Economics of Digital Transformation

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EFRI Faculty of Economics and Business

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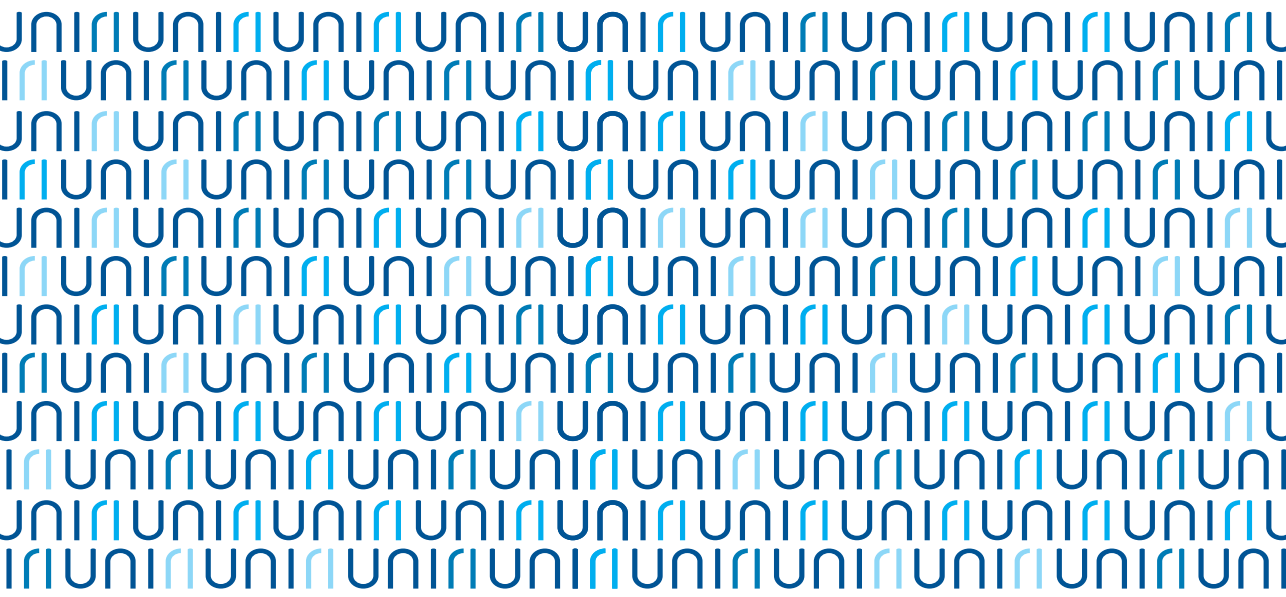

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FOREWORD

Dear authors, reviewers and readers,

It is our great pleasure to present first research monograph on the topic of Economics of digital transformation. The main goal of this research joint venture was to provide scientific proof of dramatic changes to contemporary and future economic reality caused by increasing digitalization processes. As far as we are informed, there are only few such publications which attempt to question impact of digital transformation on traditional economic systems and activities. Our contributors covered wide field of research within regulation economics, industry and European single market issues, entrepreneurship, local economic development, organization and innovation issues, digital marketing and monetary policy in the era of digital currencies.

The papers published in this monograph present best papers presented at the first conference of the Faculty of Economics and Bussiness of University of Rijeka organized on the topic of "Economics of digital transformation" from 2nd to 4th of May, 2018 in Opatija, Croatia (www.edt-conference.com). During the three days of the conference more than 50 researchers from European region contributed with their presentations. We are particularly proud on the results of our doctoral workshop where nine young researchers presented their research while five papers were published in the monograph. In this way we are building our future research capacities and expose young researchers to rigorous scientific challenge.

In addition, we also did our best to inform distinguished scientific indexing databases about our research contribution in order to enable wide dissemination of our research efforts and boost interest of both researchers and practitionares about this growing field of research. The best papers from the conference were selected for three distinguished scientific journals. These are Proceedings of Rijeka Faculty of Economics-Journal of Economics and Business, Public Sector Economics and Central European Public Administration Review. The information on papers published in these journals is given by the footnote of the topic of the paper.

Finnally, we would like to express our gratitude to our stellar keynote speakers Edward (Ned) Hill from John Glenn School of Urban Affairs, Ohio University, Iryna Lendl from Maxine Levine Goodman School of Urban Affairs, Cleveland State University and Eugenio Leanza, Head of Mandate Services of European Investmen Bank, as well as our panelists Cristian Popa, former Vice President of European Investment Bank and Boris Vujčić, Governer of the Croatian National Bank. We are immensely grateful to our contributors, reviewers, members of programme and organization board, partner universities and sponsors, as well as our students that received many complements from our guests for their knowledge, manners and hospitality.

Rijeka, December 2018

Editors

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INTRODUCTION

Digital transformation as a synonym for new technologies which enable innovation, new concepts and processes in all our traditional activities is not any more matter of our distant future or our presence. It is already part of our past. The rapid transformation processes which occurred particularly in the last decade, already transformed our life in such a radical way that we cannot imagine ourself withour use of modern technological gadgets or applications. While at the conferences and workshops we discuss about industry 4.0 and its significance for industry and quality of life, the concept of industry 5.0 is beginning with its practical implementation.

Therefore, in our research monograph, we deal with past, present and future. The most relevant contribution of our research is, by using our analytical skills, to provide some argumentation, elaborations and explanation on impact of all these processes on our well being. Thus, we try to cover wide field of economic issues and their interconnectedness, because in digital world, there are increasing and emerging relations that we have never anticipated and expected before. This makes our world more complex, and thus, makes our research endavours even more difficult.

In our monograph our researchers deal with regulation economics under new business models enabled by digitalization of industry and services, industrial developments under new circumstances, position of enterprises, changing role of local economic development under the new development paradigm of smart cities, organization issues in digital era, emergence of innovation economics, developments in digital marketing and new challenges for monetary policy under occurance of cryptocurrencies and blockchain technologies. Finnaly, we also include research papers of doctoral students which should drive our world to be even more digital in near future.

Threfore, we hope that this monograph will find not just researchers but also practitionares and provide both some questions and answers which will help them to confirm their beliefs, initiate new research and provide arguments for discussions. Of course, we will keep providing new food for thoughts. Until our new contribution next year, we wish you enjoyable reading.

PART 1

REGULATION ECONOMICS

CHAPTER 1

Disruption and the Law in the Digital World: Some Thoughts on the CJEU Uber Spain Judgment

Nada Bodiroga-Vukobrat[1], Adrijana Martinović[2]

ABSTRACT

Whether or not we can call Uber's business model as disruptive innovation (admittedly, according to the author of the disruptive innovation theory, we cannot), the fact remains that it has shaken the traditional models of passenger transport industries around the world. The law does not respond well, or, better said, it is not able to react fast enough to innovations. Technological and business inventions represent a threat to legal certainty. When an innovative business model, facilitated by the use of new technologies occurs, it is usually associated with a whole array of legal issues and conundrums. The law will try desperately to fit it into the existing moulds of legal regulation. The recent Uber Spain judgment (EU:C:987:2017) by the Court of Justice of the European Union (CJEU) provides a perfect illustration for this.

According to the CJEU, Uber is a transport company. This paper will analyse the arguments presented in the judgment to show how law is not able to deal with rapid technological and societal changes in today's digital world. The implications of this judgment are far reaching, not just for Uber's operations in the EU and world-wide, but also for other game changers in the digital economy.

Key words: EU law, transport services, information society services, single market for services, collaborative economy

JEL classification: K000, K200

1. Introduction

Ever since the adoption of the Digital Single Market strategy in 2015, the EU is devoted to maximizing the growth potential of the digital economy, while at the same time developing a 'fit for purpose' regulatory environment for online platforms and intermediaries (European Commission, 2015:11). Since then,

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a number of initiatives, studies and reports have attempted to identify key challenges for the development and operation of online platforms (European Commission 2016a; European Commission, 2016b; Gawer, 2016). They all point to the important growth potential of online platforms and other business models facilitated by new digital technologies and identify the current regulatory fragmentation as the key obstacle to their development and materialisation of their benefits. Online platforms in the digital economy are given the broadest possible meaning, from online advertising and market places to platforms for the collaborative economy (i.e. from eBay to Uber) (European Commission, 2016a:2). However, these are all soft policy instruments, and there is not a single proposal to date aiming to create common rules for the operation of such platforms, despite their obvious cross-border implications.

Meanwhile, these initiatives are at odds with the legal and judicial developments in the field, as evident from the recent judgment of the CJEU in case *Uber Spain*, and similar cases appearing before the CJEU.

2. Innovation, Uber and law in the digital world

Technological innovations and innovative business models lie at the foundations of the Digital Single Market. These innovations have certainly disrupted the traditional business patterns, even when not all of them can be labelled 'disruptive'. According to the disruption theory developed by Christensen in 1995, disruption is a process, whereby a smaller company ('entrant'), with fewer resources, successfully challenges established incumbent businesses (Christensen, 1997). Incumbents tend to overlook entrants, as they are concentrated on their trajectory towards the most profitable, high-end of the market. By focusing on segments overlooked by incumbents, entrants establish themselves and eventually move upmarket, overtaking incumbents' mainstream customers. Hence, disruption occurs precisely because entrant's innovation either went unnoticed or was considered unimportant by the incumbent business to deserve a(ny) reaction. Disruptive innovation differs from the so-called 'sustaining innovation': whereas the latter makes a good product better in the eyes of incumbent's existing customer, the first is initially considered inferior by most of incumbent's customers (Christensen et al., 2015).

Since it was created, disruption theory has gained a life of its own, mostly to the discontent of its author (Christensen et al., 2015). In the digital world, collaborative platform businesses are disrupting the disruption theory. Although Christensen claims that Uber's business model, or at least some of its versions, is not a disruptive innovation under the disruption theory (because it has not originated in the new or low-end market, but has straight away build a position in the mainstream market), others point to the need to 'update' the disruption theory (Moazed and Johnson, 2016; Cramer and Krueger, 2016; Sandstrom et al., 2014). Their main argument is that platform businesses are very different from the standard, 'linear' businesses on which the theory was built: whereas

linear businesses concentrate only on the demand-side, platforms create a network or a triangular relationship which includes both the demand and the supply-side (Moazed and Johnson, 2016; Hatzopoulos and Roma, 2017). The distinctiveness of a platform business model is an important parameter which should direct the search for disruptive competitors in the digital world (Moazed and Johnson, 2016). It would be hard to claim that Uber has sneaked into the market for passenger transport, for example, overlooked by incumbent businesses. Quite the opposite: almost everywhere it started its operations, it immediately caused fierce resistance from the traditional taxi industry.

There is no denying that Uber's business venture is innovative. The key innovation is not the application itself, but the fact that it has enabled reduction of the transaction costs (Rogers, 2015). Technological innovation facilitated organisational innovation and, coupled with aggressive expansion and corporate 'culture of misbehaviour', has changed the traditional business landscape (Jordan, 2017; Laurell and Sandström, 2016). But is it legal? Some claim that Uber's business model is predicated on lawbreaking and international illegality – and it is time to put an end to it (Edelman, 2017). Let us then, rephrase the question: is law capable of dealing with innovation, or is innovation doomed to be outlawed (at first)? There are no uniform, nor straightforward answers to these questions. If we concentrate on Uber, it all depends on the legal environment it is operating in and the type of service it offers. The underlying business model is the same, but there is no single Uber service, there are dozens, catered to specific needs of targeted groups (e.g. from standard UberPOP, UberX, Uber Black, over UberBOAT, UberLUX to Uber Freight, Uber Family or Uber English)[3] and depending on the quality of the driver, type of vehicle and geographical area. Possibilities seem endless: the new Uber Health service is even abandoning the 'old' smartphone app connection and turns to text messaging or phone calls to help patients who need rides to and from their doctors.[4] Uber Express Pool service is now competing with city buses.[5]

In the United States, Uber and similar companies have been classified and regulated as 'transportation network companies' ('TNCs'). In California, for example, which was one of the first federal states to adopt such regulations, TNC is defined as

> "[…] an organization […] that provides prearranged transportation services for compensation using an online-enabled application or platform to connect passengers with drivers using a personal vehicle." (§5431.(c) of the California Public Utilities Code (PUC))

3 For a non-exhaustive overview of Uber's services see <https://ride.guru/content/resources/rideshares-worldwide#UBER>. In some cities, Uber was testing its self-driving vehicles (cars and trucks) on public roads (e.g. San Francisco, Phoenix, Toronto, Pittsburgh). However, the testing is currently paused after a fatal accident, see <https://www.theguardian.com/technology/2018/mar/19/uber-self-driving-car-kills-woman-arizona-tempe>; <https://www.cnbc.com/2018/03/19/uber-self-driving-car-fatality-halts-testing-in-all-cities-report-says.html>.

4 <http://money.cnn.com/2018/03/01/technology/uber-health/index.html>.

5 <https://www.theverge.com/2018/2/21/17020484/uber-express-pool-launch-cities>.

A ‘participating driver’ or ‘driver’ means any person who uses a vehicle (meeting prescribed requirements) in connection with a transportation network company’s online-enabled application or platform to connect with passengers. One of the requirements for a vehicle is that it is ‘not a taxicab’ (§5431.(b)(4) PUC). So clearly, there is a distinction between taxi services and transportation services offered through Uber and similar companies.

This is an example how regulatory framework was adapted to respond to the new business model. First there was innovation, but the law followed, and (arguably) delivered. In the EU, the situation is different. Innovative model arrived quickly from the United States, but the law largely disables innovation.

3. Uber’s business model in the EU legal environment

Not surprisingly, Uber’s business operations have been subject to numerous legal challenges throughout EU Member States, from outright bans to temporary injunctions. Several cases involving Uber have reached the CJEU by means of preliminary reference procedure: *Uber Spain* (C-434/15, EU:C:2017:981), *Uber France* (C-320/16, EU:C:2017:511), *Uber Belgium* (C-526/15, EU:C:2016:830), *Uber Black (Germany)* (C-371/17, EU:C:2016:830). *Uber Spain* case so far is the only one in which a judgment was rendered. The remaining cases are still pending (*Uber France* and *Uber Black (Germany)*), while *Uber Belgium* case was dismissed as manifestly inadmissible. They all basically test the limits of national taxi licensing requirements in view of the EU internal market freedoms. For a fuller understanding of the issues presented herein, these cases also merit a comparative evaluation.

Before analysing the case law of the CJEU, it is important to note that, despite lacking common EU rules on collaborative platforms, it is not *a priori* ruled out that collaborative platforms can in certain cases be considered as providers of the underlying service and subject to sector-specific regulations, including business authorisations and licensing requirements (European Commission, 2016b:6). The level of control or influence that the collaborative platform exerts over the provider of such services, in particular concerning the setting of price, contractual terms and ownership of key assets, is extremely significant for determining whether the platform should be considered as providing the underlying service (European Commission, 2016b:6). Hatzopoulos and Roma (2017:127) rightly criticise the newly introduced distinction between platforms ‘offering only e-services’ and platforms ‘offering (also) the underlying services’. The Commission’s reasoning is, in principle, followed by the CJEU. Arguably, the CJEU’s attitude is quite less ‘pro-sharing’.

The services which are under scrutiny of the CJEU are services offered in direct competition with the traditional taxi services. Viewed from the driver – provider side, what Uber actually provides or sells is more than a service that connects them with clients in need of a ride, it is a specific package or a business model (Adamski, 2018). However, existing national licencing requirements, virtually

unaltered or at least fundamentally unchallenged for decades, are not fit to accommodate this new business model, enabled and enhanced by the use of new technologies.

The main competitors to the traditional taxi industry are UberPOP, UberX and Uber Black services. UberPOP is a budget option, connecting non-professional drivers with passengers in need of a ride, whereas UberX and Uber Black services both include licensed professional drivers, and differ concerning the class of vehicles used. UberPOP has so far been either voluntarily suspended by Uber or banned by authorities in many cities around Europe, for failing to comply with the licensing regulations.[6]

3.1. Uber Belgium: A lucky escape

The first case to appear before the CJEU involving Uber was *Uber Belgium*. Luckily for CJEU, it did not have to take a stance on it: the case was dismissed by Order of 27 October 2016 as manifestly inadmissible, because of deficiencies in a preliminary reference made by the Belgian referring court. The CJEU found that the reference contained contradictory explanations, and that the question referred was hypothetical in nature, thus making it impossible for the CJEU to consider it. As can be discerned from the Order, the referring Dutch court was deciding in a matter of prohibitory injunction lodged by the Brussels taxi radio company against Uber Belgium, aiming to determine that Uber Belgium committed unfair commercial practices by connecting, through an app, unlicensed drivers with passengers in need of a ride, and requesting immediate termination of such practices.

The CJEU found that the concept of 'taxi service' in Belgian legislation, as explained by the referring court, is not defined by the quality of the driver and does not exclude private individuals. The authorisation in accordance with the Belgian legislation is based on the assumption that the service is provided for remuneration – but the preliminary reference is not based on that assumption. Without additional elements which would enable the court to conclude that the activity in question is effectively subject to authorisation, the question posed by the national court was deemed just hypothetical. The description of the service in the main procedure is contradictory and very brief. It is described as "ridesharing" – activity usually described as using the same vehicle by many persons on the same journey, with the goal of reducing road traffic and sharing transport costs. However, from the preliminary reference read in its entirety, the disputed service is described as having the form of journeys effectuated by

6 Most recently in Oslo, <http://fortune.com/2017/10/09/uber-uberpop-norway-oslo-pause-regulation/>; Helsinki, <https://www.theregister.co.uk/2017/07/07/uberpop_is_finnished_in_helsinki_until_2018/>; Zurich, <https://www.swissinfo.ch/eng/private-transport_uberpop-service-cancelled-in-zurich/43400534>; and even before that in Italy, <https://www.theguardian.com/technology/2015/may/26/uber-pop-italy-order-discontinue-unfair-competition-taxi>; France <http://uk.businessinsider.com/uber-suspends-uber-pop-in-france-2015-7>; Netherlands, <http://www.dutchnews.nl/news/archives/2015/11/uber-drops-uberpop-taxi-service-in-the-netherlands/ >.

driver and the destination is fixed by a passenger. The CJEU considered the question as too imprecise and declared the references as inadmissible. Arguably, the 'right' case to take the stand and decide on Uber's destiny in Europe was yet to come.

3.2. Uber Spain: an intermediation service is a service in the field of transport

Uber Spain case originated from the legal proceedings brought by a professional taxi drivers' association from Barcelona (Associatión Professional Elite Taxi, hereinafter: 'Elite Taxi') against Uber Systems Spain (hereinafter 'Uber Spain'), a company governed by Spanish law. The judgment never mentions the brand name of the disputed service, but only describes it as "the provision, by means of smartphone application, of the paid service consisting of connecting drivers using their own vehicle with persons who wish to make urban journeys, without holding any administrative licence or authorisation" (para. 2 of the judgment). This is basically UberPOP service, as rightly identified in the Advocate General Szpunar's opinion (para. 14 of the opinion). Elite Taxi claims that such activities amount to unfair practices in breach of the Spanish competition legislation and that they should be banned.

The referring Spanish court considered that the question whether prior authorisation is required was crucial for determining whether a breach of competition occurred. To correctly answer that question, the Spanish court needed the CJEU's help, given that it involved a question of interpretation of EU law. Neither national court, nor CJEU doubt that the provision of service was at stake. Some authors remain sceptical. Adamski (2018:347) claims that the freedom to provide services is irrelevant from the perspective of Uber's business model, because authorisation requirements represent a market entry impediment, which means that the rules on the freedom of establishment should apply. The referring Spanish court, however, was uncertain as to what *type* of service: a transport service, or an information society service, or a combination of both? The answer to that question draws important consequences for the outcome of the case.Free provision of services is one of the cornerstones of the internal market, meaning that any restriction is in principle prohibited (Article 56 of the Treaty on the Functioning of the European Union; hereinafter: TFEU). Further acts of secondary EU legislation may regulate specific issues in connection with specific services and their provision, especially concerning possible restrictions and derogations to that freedom. Such pieces of legislation, pertinent for this case, include the Services Directive 2006/123, Information Society Services Directive 98/34 (repealed by Directive 2015/1535, but applicable *ratione temporis* to this case), and E-commerce Directive 2000/31.

The Services Directive 2006/123 establishes general provisions facilitating the exercise of the freedom of establishment for service providers and the free movement of services, while maintaining a high quality of services, but it does not apply to 'services in the field of transport, […]' (Article 2(2)(d)). As explained

in Recital 21 of Directive 2006/123, transport services include 'urban transport, taxis and ambulances as well as port services'. The Information Society Services Directive 98/34 basically lays down the rules for notifying the Commission about any draft technical regulations or standards for products or services before they are adopted in national law, as such rules are liable to create unjustified barriers to trade between Member States and should be evaluated in advance. The objective of the E-commerce Directive 2000/31 is to liberalise the provision of information society services and approximate national provisions on information society services relating to the internal market, the establishment of service providers, commercial communications, electronic contracts, the liability of intermediaries, codes of conduct, out-of-court dispute settlements, court actions and cooperation between Member States (Article 1(2) of Directive 2000/31). For the definition of 'information society service' that Directive refers to Article 1(2) of Directive 98/34, as amended by Directive 98/48.

Prior authorisations, or similar licensing requirements, are by their very nature liable to constitute restrictions to the free provision of services. Consequently, the proper categorisation of the service in question does matter, as it may or may not lead to the applicability and/or justifiability of national licensing requirements. Transport services, however, fall under the EU's competences in the field of common transport policy (Article 58(1) TFEU; Articles 90 – 100 TFEU), which is governed by the completely different regulatory objectives and pathways than the internal market rules.

Both the internal market and common transport policy fall under the shared competence of the EU and Member States and rest on the principle of non-discrimination. Transport policy completes the internal market by creating transport networks and removing technical and administrative obstacles in the transport system, as well as eliminating distortion of competition or barriers to market access which can result from different national transport regulations. Given their specificity, transport services are explicitly singled out from other services (Article 58(1) TFEU) and governed under the rules adopted in the field of transport policy. Where such common rules do not exist, as is the case for non-public urban passenger transport (i.e. taxi transport), differing Member States regulations continue to apply.

In other words, where there are no common EU rules regulating the conditions under which certain transport services are to be provided, EU Member States are free to regulate them, in accordance with the general rules of EU law.

Supported by this regulatory framework, the CJEU delivered its Grand Chamber[7] judgment on 20 December 2017. The judgement in the *Uber Spain* case is remarkably short on substantive issues: only 15 relatively brief paragraphs on 2 pages of an 11-pages judgement (paras. 34 - 48). Its impact is probably more important in what it does not say, than in what it actually does.

7 The case is assigned to the Grand Chamber (composed of 15 judges), *inter alia,* if the difficulty or importance of the case or particular circumstances so require (Article 60(1) CJEU Rules of Procedure).

According to the Court,

> "[…] an intermediation service, such as that at issue in the main proceedings, the purpose of which is to connect, by means of a smartphone application and for remuneration, non-professional drivers using their own vehicle with persons who wish to make urban journeys, must be regarded as being inherently linked to a transport service and, accordingly, must be classified as 'a service in the field of transport' within the meaning of Article 58(1) TFEU" (para. 48 and operative part of the judgment).

So, the Court is precise enough to name the disputed service 'an intermediation service', but nevertheless, a service which "has to be classified as a service in the field of transport". Can we attach any significance to this careful choice of words? As lawyers, we know that each term or word counts. And indeed, taken on its own, an intermediation service is a service, which could fall under the general scheme for the free provision of services under Article 56 TFEU and the Services Directive. However, an intermediation service which consists of connecting drivers with passengers, by means of a smartphone application meets the criteria for classification as information society service, as admitted by the CJEU in the *Uber Spain* judgment (para. 35).

An information society service, as defined in Article 1(2) of Directive 98/34 and Article 2(a) of Directive 2000/31, is deemed to be 'a service normally provided for remuneration, at a distance, by electronic means and at the individual request of a recipient of services'. 'At a distance' means that the service is provided without the parties being simultaneously present; 'by electronic means' means that the service is sent initially and received at its destination by means of electronic equipment for the processing (including digital compression) and storage of data, and entirely transmitted, conveyed and received by wire, by radio, by optical means or by other electromagnetic means; 'at the individual request of a recipient of services' means that the service is provided through the transmission of data on individual request (Article 1(2) of Directive 98/34, as amended by Directive 98/48).

Examples of 'information society services' include advertising of a dental practice via an online internet site (*Vanderborght*, C-339/15), the provision of online information services for which the service provider is remunerated, not by the recipient, but by income generated by advertisements posted on a website (such as newspaper portal) (*Papasavvas*, C-291/13), the operation of an online marketplace, such as eBay (*L'Oréal*, C-324/09), or online booking of flights and accommodation through independent service providers (*Uber Spain*, opinion of AG Szpunar, para. 34).

So why was Uber's service ultimately deemed as a service in the field of transport? In all of the above examples, the material or 'non-electronic' component of the service, e.g. delivery of purchased goods, represents merely a performance of a contractual obligation and is economically independent from the non-material or 'electronic' service (*Ker-Optika*, C-108/09; *Uber Spain*, opinion

of AG Szpunar, paras. 30-36). In contrast to that, in this case the service was provided at a distance, at individual request and by electronic means, but the Court held that it was *not a self-standing service*. It was deemed as "more than an intermediation service" by electronic means (para. 37 of the judgment). In its essence, it is an intermediation service, but it cannot be detached from the transport activity. The Court's reasoning is basically that the transport activity defines the intermediation service and represents its main component. It goes even further by stating that

> "[…] the provider of that intermediation service *simultaneously offers urban transport services,* which it *renders accessible*, in particular, through software tools such as the application at issue […]" (para. 38 of the judgment, emphasis added).

So, *offering* of a certain service is equalised to *making a certain service accessible* in any manner, and *offering* of urban transport unfolds simultaneously with the *provision* of an intermediation service. Should the activity of service *offering* be treated distinctly from the actual service *provision*? Clearly not (see *Alpine Investments*, C-384/93, para. 22), but that leaves us with conclusion that Uber is providing a transport service as if it was driving the car itself. Admittedly, this is not the case (the nature of Uber's relationship with the drivers is neither a subject-matter of this case, nor pertinent for its resolution).

There is not a word in the judgment about the nature of intermediation services, taken by themselves. What if we 'strip' the innovation part, facilitated by the technological progress, from the service? Could it then be regarded as a mere intermediation, whereby an intermediary or a broker connects the principal (the principal in that case being a driver) with the client, in exchange for a certain commission? Would it be relevant in that case, whether such service was provided electronically or through an online platform or a smartphone app or by any other means? The ensuing transaction between the principal and the client would be irrelevant for the relationship between the principal and the intermediary. But could the latter relationship escape being qualified as a transport service and potentially benefit from the general rules on the free provision of services?[8] We can only hypothesise, from the specific choice of wording in the judgment, that innovation has no bearing on the conclusion, whatsoever:

> "[…] the provider of that intermediation service simultaneously offers urban transport services, which it renders accessible, *in particular*, through software tools such as the application at issue […]" (para. 38 of the judgment, emphasis added).

Once again, in the eyes of the law, innovation is nothing but a 'glitch', a temporary anomaly in the system to be straightened out.

Surely, if a 'mere' intermediation, without the 'electronic' component was considered, the facts of the case would not have permitted any different conclusion:

8 There are no common rules on intermediation in general, but only in specific sectors, e.g. in the insurance sector (Directive (EU) 2016/97) or consumer credits (Directive 2008/48/EC).

an intermediary could never dictate the rules for the provision of service by the principal, as Uber does. But it is quite indicative that this possibility was never thoroughly investigated (and if necessary, dismissed) in the judgment or AG's opinion. While admitting that taken separately, those services can be linked to different directives or TFEU rules on freedom to provide services, the Court only provides an either-or situation: either information society services or transport services are involved. There is no denying that the service has a 'non-material' component – it brings the cross-border element to the case. In dismissing the intervening Polish Government's argument that the case is a purely internal matter over which the Court has no jurisdiction, the Court states

> "[…] the service at issue in the main proceedings is provided through a company that operates from another Member State, namely the Kingdom of the Netherlands." (para. 31 of the judgment)

So, the service is undoubtedly provided by electronic means, but nonetheless, it is 'more than an intermediation service' (para. 37 of the judgment). According to the Court, the activity of transport dictates the nature of the overall service. Indeed, it does, if viewed only from the passengers' standpoint. Passengers use the app to find reliable transport, and they care little about who is actually providing it. But what about the drivers who partner with Uber? The Court finds that there would be no drivers without Uber.

Two main arguments that support the Court's conclusion basically boil down to the following: (i) without Uber, there would be no transport service; and (ii) Uber has a decisive influence over the conditions under which the service is provided (para. 39 of the judgment). The first part of the first argument is probably the least convincing part of the judgment: the Court merely states, without any explanation, that without the application, the drivers would not offer transport services. For sure, these are non-professional drivers, as we know from the facts of the case. Did all of those non-professional drivers decided, out of the blue, to start driving when they discovered the application, or were they maybe somehow already involved in the transport business? What if there were professional drivers among them, trying out a new and more efficient method of connecting with the passengers? And how will this argument stand in the face of other services offered by Uber, which include professional drivers?[9] The second part of this argument is that persons who wish to make an urban journey would not use the services provided by those drivers. There is no further explanation here either, but it makes a bit more sense: without the application, there would simply be no connection between the passenger and that particular driver. In either case, both parts of the first argument seem too tenuous and unsubstantiated.[10]

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9 This will be further analysed in Uber Black (Germany) case here below.

10 How will this conclusion reflect on Airbnb and other similar online accommodation booking platforms, for example? It could also be claimed that many hosts would never offer their property for rent, nor would many guests book those properties, had it not been so easy to connect over the platform. Is Airbnb offering accommodation services?

The second argument, that Uber has a decisive influence over the conditions under which the service is provided, is plausible and offers a stronger footing to claim that this is 'more than an intermediation service'. A significant control is exercised in connection with setting of fares, type and appearance of vehicles used, the conduct of drivers. In addition, all payment transactions go through Uber, whereby Uber keeps a certain amount of commission, before wiring the driver his part. A mere intermediary could never determine the salient features of a service provision in such a way. More importantly, no matter how much Uber contests it, the decisive influence argument will also bear significant consequences for the nature of relationship between Uber and the drivers, i.e. whether they are truly independent contractors as Uber claims.

The conclusion is that Uber's intermediation service (which consists of connecting, by means of a smartphone application and for remuneration, non-professional drivers using their own vehicle with persons who wish to make urban journeys) is an integral part of, and must be classified as, "service in the field of transport". The consequence is that, since there are currently no common EU rules on non-public urban transport services, Member States are free to regulate conditions under which such service is provided. This implies that even a complete ban would be possible, since such a service is excluded from the scope of existing EU law.

So basically, an application service is a transport service. In other words, forget about the potential of online platforms and benefits to the digital economy and society, by facilitating "efficiency gains" and increasing "consumer choice, [and] contributing to improved competitiveness of industry and enhancing consumer welfare" (European Commission, 2016a:3). Unlike advertising or connecting sellers and providers with potential customers in an online market place, when an application is connecting drivers with passengers, it is a transport service.

Given this argument, it would be irrelevant for the outcome of the case if the connecting service was between professional drivers and passengers. It is not the quality of the driver which determines the nature of the service, but the fact that it is inherently linked to the transport service.

This judgment cannot be criticised as to its outcome: it follows the law as it currently stands. But it is a typical example how law stifles innovation. Forget the revolutionary model of connecting drivers and passengers in real time: unlike the smartphone application, the law does not respond at the click of a button or the touch of a fingertip. We have to fit such situations into the existing regulatory moulds, even when they are clearly unfit to accommodate them. Especially when an issue is hotly debated, as Uber's operations throughout Europe are: it is much easier to keep a *status quo* in EU law and throw the ball back into the Member States' yard.

To state that the smartphone application connecting drivers with passengers 'has no self-standing economic value' (*Uber Spain*, opinion of AG Szpunar, para. 32) without the transport component is perhaps legally correct, in view

of the existing law. But then, it is also a fatal blow to innovative business models, where it is, or at least should be conceivable to become the world's leading non-public urban transport company, without actually owning any car. And what about the unfair competition argument, so forcefully brought forward by taxi drivers around Europe? If you take the non-professional drivers out of the equation, i.e. someone just looking to make some extra money on the side, and partner only with licensed professional drivers, that argument is void. Actually, most national taxi companies are by now catching up with the digital world and learning what it means to be competitive in the digital market: they have also started using smartphone applications with the same or similar algorithms as Uber to connect more effectively with passengers in need of a ride. And where is the innovation in that? The market is still as closed as it was.

3.3. Uber Black (Germany) and Uber France: Testing the reach of Uber Spain judgment

Out of two remaining pending cases involving Uber, perhaps the *Uber Black (Germany)* case will carry a bit more weight.

Uber Black (Germany) case originates in a law suit filed by a Berlin taxi driver against Uber BV, a company with a registered seat in the Netherlands. The taxi driver successfully sought an injunction order against Uber to cease the provision of a service which involves placing orders for chauffeur-driven rent vehicles, through a smartphone application, which connects that passenger to the nearest available vehicle. Passenger transport by chauffeur-driven rent vehicles in Germany is different from taxi services. By definition, transport with rent vehicles (*Mietwagen*) means passenger transport whose purpose, destination and course are determined by the hirer and which is different from the taxi transport (§ 49(4) *Personenbeförderungsgesetz* (Passenger Transport Act), hereinafter: *PbefG*). An important distinction is that taxi vehicles are usually made available at pre-authorised stops and that rides can be ordered directly by passengers from the taxi drivers. In contrast to that, rent vehicles can only take orders that have first been received at the company's headquarters and transmitted to the driver. This condition is not satisfied, for example, when the driver notifies the company's headquarters about a ride request he received while performing another trip, and following that notification, obtains the company's authorisation (BGH, I ZR 201/87). Even if the entrepreneur is a single driver – his headquarter is his home address. Rent vehicles may not bear taxi signs and attributes. Driver has to return to the company's headquarters after the ride, unless before or during the ride he telephonically receives another request from the headquarters (§ 49(4) *PbefG*). In view of the technological progress, the term 'telephonically' used in this provision is to be understood as transmitted to the driver also by e-mail, text message or by other means of mobile communication (BGH, I ZR 3/16, para. 20).

In the present case, Uber Black service enabled drivers of rent vehicles to receive ride requests directly over the server in the Netherlands, without involvement of another person at the company's headquarters.

The first-instance and appellate courts ruled this to be anti-competitive behaviour in breach of the German *PbefG*.

In the revision procedure, the German Bundesgerichtshof (BGH) submitted a request for preliminary ruling on 19 June 2017 (BGH, I ZR 3/16). There is no available information about the date of the hearing before the CJEU, however, the circumstances of the case and the questions referred can be discerned from the application (OJ C 318 from 25.09.2017) and the BGH's decision to refer the matter to the CJEU. The question concerns the interpretation of Article 58(1) TFEU and Article 2(2)(d) of Directive 2006/123 (the Services Directive), which both refer to the special position of transport services. More concretely, the BGH is concerned whether a company which makes available the smartphone application, through which users can order chauffeur-driven rent vehicles from undertakings licenced for passenger transport with rent vehicles, supplies the service in the field of transport itself. This concern arises out of the fact that the services of that company are closely connected to the transport service, because the company determines the rules on price, processing of payments, conditions of carriage, as well as advertises the vehicles under its own brand name designation and applies uniform promotional offers. So basically, the factual situation is similar to the *Uber Spain* case, but the important difference is that the services used here involve licenced professional drivers and rent vehicles. Taxi transport is in competition with the chauffer-driven rent vehicles transport, but subject to different set of rules under the German *PbefG*. The problem consists in the violation of the rule from the German *PbefG*, which requires that the mandate for chauffeur-driven rent vehicle has to first arrive at the headquarter of the undertaking licensed for passenger transport with rent vehicles, before a vehicle can be dispatched. This is the so-called '*Rückkehrgebot für Mietwagen*' - the 'return mandate' for rent vehicles (§ 49(4)(2) *PbefG*). BGH considers that the provision at issue represents a rule regulating the practice of a profession, justified in view of the protection of taxi service, which is bound by fixed tariffs and obligation to contract (*Kontrahierungszwang*). This condition is not satisfied when, as in the present case, the driver who is in the closest proximity to the passenger receives the order directly from the server located in the Netherlands, even though the undertaking's headquarters simultaneously receives an e-mail confirmation of the ride by the company responsible for the smartphone application.

For BGH, the transport companies offering chauffeur-driven rent vehicles are clearly liable for the breach of the return mandate under the *PbefG*, and thus for the breach of competition. In that sense, Uber is also liable for the breach of competition rules as their partner, regardless whether Uber itself falls under the *PbefG.* However, BGH is concerned that this requirement may be at odds with the EU rules on the free provision of services, which would not be applicable if

the intermediation service by Uber, in its existing form, represents a service in the field of transport. If Uber's service is not deemed as a service in the field of transport, the BGH wonders if that requirement is justified from the perspective of safeguarding of public policy, on the basis of objective of maintaining the competitiveness and proper functioning of taxi services.

Although there are factual differences in comparison to the *Uber Spain* case, especially concerning the type of service offered, it is highly unlikely that the outcome of this case will be any different. The 'no-service-without-transport' approach will likely be followed here. The CJEU will not have to reply or even consider the second question, posed in the event that it is concluded that Uber's services may not be deemed as services in the field of transportation. Therefore, this highly controversial issue is left to the Member States.

Uber France case, in which the opinion of Advocate General Szpunar was delivered on 4 July 2017, is very similar to the *Uber Spain* case. It also involves the UberPop service, i.e. connection of non-professional drivers with passengers through online application. However, the disputed question revolves around the fact whether the French national legislation prescribing the terms for performance of non-public urban passenger transport, i.e. taxi services, should have been notified to the Commission before it was adopted, in accordance with Directive 98/34 on information society services. Of course, this question will only be relevant if the service in question can be considered as an information society service within the meaning of that Directive. In line with the *Uber Spain* judgment, it clearly would not be the case.

4. Conclusion

In the United States, Uber started operating in 2010 (along with Lyft and similar companies), and the first municipal and state regulations were being adopted since 2014 (e.g. in California, Colorado, etc.). A legal solution was to regulate them as transportation network companies – TNCs. As a consequence, these companies are not taxi companies, and the regulatory accent is placed on the questions of insurance and liability of drivers and companies. By 2017, the majority of US federal states had a state-level regulation concerning TNCs.[11]

By contrast in Europe, Uber started its operations in late 2011.[12] In 2018, the only solution we have for its innovative business model is to basically call it a transport or taxi company. In this case, regulation has hindered innovation.

Would it be possible to apply a similar regulatory pattern in the EU? This would require a clear and unequivocal political will to admit that there is a need for common rules in this area. Such determination is obviously lacking, as it would imply a significant overhaul of national regulations on non-public urban passenger transport or taxi transport, an area which has traditionally been resilient to

11 See <https://policy.tti.tamu.edu/technology/tnc-legislation/>.

12 The first European Uber office was opened in Paris in December 2011.

change and Europeanisation. But it would also require from the Member States to admit that the platform or application enabled service connecting passengers with drivers (such as Uber's service) is not, by its nature, a transport service. By its nature, it still is, even under the current set of rules, an online intermediation service – whether we consider it detachable or non-detachable from its material component, the transport, is only the next step relevant for the decision how to regulate the provision of the service in question. But to completely deny its innovativeness is simply an untenable option.

The CJEU case law in Uber cases shows us that we are a long way from regulating online intermediation platforms "in a manner that truly serves competition, innovation and user choice" (Geradin, 2016). This paper should not be understood as a plea for market liberalisation. Quite the opposite, rules on competition, consumer protection, labour standards, liability, etc. are tremendously important in the regulation of online platforms.

As much as it can hinder, regulation can also enable innovation. So, it is not about liberalisation, but about recognising and adequately defining innovative business models, and creating a specific set of rules or adapting the existing ones to regulate their operation. The degree of control exercised by the platform over the provision of the underlying service is a starting point for determination of the service in question, but it is also the most elusive one, since it can shift and vary. The sensitivity or protected status of a certain field or industry, in view of its public importance, is an additional factor to take into account, but it should not serve as an excuse to refrain from any action. Regulatory fragmentation is recognised as one of the most important obstacles for the proper functioning of the digital single market. At this pace, by the time the EU decides whether and how to build the common regulatory approach, Uber and the likes may be long gone from the market, because they *are* breaking laws in many Member States.

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CHAPTER 2

What happens to your Gmail and Facebook account after you die?

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ABSTRACT

Many people have at least one e-mail account and/or profile on some type of social media, but they seldom think about what will happen to these after they die. In some cases, what happens to an account or profile after its user dies, is determined by providers' terms of service (ToS). However, sometimes these issues are defined elsewhere – in help forums, help centers, Q&A forums; as is the case with Gmail (Gmail Help Forum or Google Accounts Help Center) and Facebook (Facebook Help Center).

This paper will explore what happens to Facebook profiles and Gmail accounts after their users die and in order to do so, it must explore the reasons behind it. Its second part will deal with the fact that such important issues are usually not found in ToSA, but elsewhere. Because of that, two conclusions arise: 1. since these policies are found in various forums, a user will have a hard time being aware of their existence, unless he/she knows where to look for them specifically and 2. as a result, a user will not be able to consent to these policies, while consenting to ToSA.

Key words: Gmail, Facebook, digital asset, inheritance, contracts of adhesion

JEL classification: K12, K15, K24

1. Introduction

What happens to personal tangible items after their owner dies is clear under inheritance law – they pass on to decedent's testate or intestate heirs. However, today, letters have been replaced by e-mails; photo albums by different sites where they can be uploaded and shared with friends or public; diaries are today replaced by blogs; bills are paid on-line; works of art are uploaded to various sites. People's lives have become digitized. The number of digital accounts of an average person is growing on a daily basis. Most of us already have numerous e-mail accounts, profiles on various social media sites, financial accounts and on-line store accounts. Yet, what happens to all of those digital accounts *post mortem* is, for most people, still an enigma.

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Even if some have thought about what will happen to their online accounts and made plans for digital inheritance, it is important to know that rules governing digital accounts are not as straightforward as the rules that apply to inheritance of tangible assets. Account holders are not as free to decide what will happen to their online accounts *post mortem* as they are in deciding about their tangible items. Major obstacle to making plans for what will happen to one's digital account is found in internet service providers' (ISP) rules either put in terms of service agreements (ToSA) or elsewhere. To elaborate, most ISPs prohibit account access to anyone other than the original account holder, including account holder's heirs. Of course, it is possible to leave heirs log-in information so they can access an account, but as soon as an ISP learns about account holder's demise, it will probably lock anyone out of the the account and might even delete it.

Therefore, making plans for digital assets stored on ISPs' servers and putting them in a will might not work. As most commentators agree, the best solution would be to negotiate directly with an ISP and resolve this issue on an individual level. Today, exactly that is possible when it comes to two of the most popular e-mail and social media providers – Google and Facebook.

The aim of this paper is to try to clarify to average Gmail and Facebook account holders what are their options concerning their accounts after they die and why. Therefore, the first part of this paper will concentrate on what some of the commentators that dealt with this topic had to say about influence of ToSA on inheritability of digital accounts and testamentary freedom of account holders. This part will also concentrate on existing law that govern ISPs and their rules about non-transferability of digital accounts. Solutions to this problem presented by Gmail and Facebook will also be analyzed, as examples of what might be done to aleviate problems account holders face today, while planning for their digital inheritance. The last part of the paper will deal with problems that stem from the fact that these solutions are not found in ToSA, but in various help forums.

2. Literature and legislation review

2.1. Terms of service agreements

As Watkins (2014) explains, whenever somebody wants to open an account with an ISP, they have to consent to a set of rules governing said account. These rules are incorporated in ISPs' ToSA and they dictate account holder's relationship with the provider. According to Ronderos (2017) ToSA are contracts of adhesion and the reason they are made in this form is, among other things, TO reduce ISPs' administrative costs.

These types of contracts are also known in Croatian legal system. Klarić/Vedriš (2014) define them as contracts concluded after one party accepts previously determined and announced conditions of another party and are usually used

by parties that conclude a lot of completely identical (standardized) contracts on a daily basis. Their conditions can usually not change – other party can only accept or decline them. Banta (2014, p. 822) calls it 'take it or leave it' principle.

Watkins (2014) and Tarney (2016) explain that ToSA usually contain a lot of clauses, some having to do with transferability of an account, possible deletion after a certain period of inactivity and fate of an account after its holder dies. However, as Cummings (2014) emphasizes, some providers do not have rules on what is to happen to deceased's account when he/she dies in their ToSA, but rather, in their Q & A or help forums. So even if a diligent account holder went through all of ToSA and read it, he/she would still not know that any special rules concerning what happens to their account or profile after they die, even exist. However, in Banta's (2014) opinion, that does not matter since if an account holder agreed to ToSA, it means he/she agreed to all ISP's policies, contained in ToSA or elsewhere.

Banta (2014) and Watkins (2014) also mention that ToSA usually contain clauses determining the law applicable to an account, which is extremely important for anybody trying to devise his/her account upon death, since the devision of digital assets might be possible under account holder's country of origin's law, but it might not be possible under the law that is applicable to an ISP that controls the account.

According to Banta (2014) and Ronderos (2017) there are two basic types of ToSA: clickwrap agreements that require future account holder to click 'I agree' as a way of indicating his/her consent. These agreements are usually deemed enforceable, because they reasonably communicate ToS to future account holders. On the other hand, browsewrap agreements, which are displayed to future account holders, but do not require them to click 'I agree', might not be enforceable if future account holder did not have actual or constructive knowledge of the terms or conditions.

Sherry (2012, p. 205) and Varnado (2014, p. 747) remark that it is interesting that maybe two people in one thousand actually read ToSA and most of those who read them, read only certain parts. Eichler (2016) and Ronderos (2017) agree and mention an important reason why future account holders probably do not read ToSA – they are usually very long and their provisions are ambiguous to an average person. However, as McCarthy (2015) emphasizes, regardless of that, ToSA are binding contracts between an account holder and the provider and they define access to files on digital accounts. The same author mentions one important issue: even if an account holder read ToSA, ISPs could change them without any notice, which would create additional problems concerning what happens to decedent's digital assets, because it is possible for an account holder to believe his/her account and its content is devisable, but ISP has changed ToSA and made it undevisable. Banta (2014) and Eichler (2016) agree that ToSA are usually not very clear and are extremely long so most account holders do not read them, but just click "I agree" on the bottom.

Banta (2014) also adds another reason for that: account holders have no real alternative to ToSA, because ToSA are offered in 'take it or leave it' fashion, so if an account holder did not like some of the rules, he/she would not be able to negotiate and change them.

As a result of account holders not reading ToSA, most of them are not aware of any rules governing their account, especially the ones determining whether transfer of digital assets upon death is allowed. And even if some account holders were aware, the market usually does not provide any choice between ISPs, since most of them have similar rules concerning devisability of digital assets. Darrow/Ferrera (2007) and Banta (2014) all agree ISPs are always the stronger party, able to solely shape ToSA and up until now nobody has tried to protect an account holder as a weaker party. Banta (2014) deliberates that this might be because digital assets are intangible and stored on ISP's servers, so people do not view them the same way as they do their tangible assets.

When it comes to one-sided changes of ToSA, it has to be pointed out that there are some ISPs that inform their account holders about changes to ToSA. Facebook, for example in their ToSA under 'Amendments' states: "We'll notify you before we make changes to these terms and give you the opportunity to review and comment on the revised terms before continuing to use our Services. ... Your continued use of the Facebook Services, following notice of the changes to our terms, policies or guidelines, constitutes your acceptance of our amended terms, policies or guidelines."[2]

Most ToSA are similar concerning transferability of an account *post mortem*. However, it has to be indicated that not all of them have exactly identical rules. Therefore, Banta (2014, p. 817) lists four possible solutions to what happens to digital assets after the death of an account holder: (1) these assets can be expressly prohibited to be transferred upon death or in general (*inter vivos* and *mortis causa*.); (2) ToSA can generally prohibit transferability, but might allow it with the permission of ISP; (3) transferability of digital assets might be explicitly allowed according to ToSA and (4) ToSA might be silent about account's transferability upon death of its holder. It would seem that the majority of these agreements either prohibit transfer or are silent about it. Some ToSA will even give ISP the power to, not only forbid transferability of an account, but terminate an account at any time for any reason. Watkins (2014) agrees and lists what different ToSA might state concerning account transferability a little differently than Banta, but the point is still the same: (1) ToSA might determine whether the account can be transferred (*inter vivos* or *mortis causa*); (2) if it is to be deleted after a certain period of inactivity or (3) if something else (if anything) is to happen to it after its holder dies.

What will happen to an account and its contents also greatly depends on what rights an account holder has over account content. As Cahn (2014) and Eichler (2016) state, ToSA may determine that an account holder owns digital content,

2 https://www.facebook.com/terms.php (last visited on March 30, 2018).

so it can be sold, donated or devised upon death; or he/she simply purchases a license, which expires upon death.

Regardless of what rights account holder has, Banta (2014) and Truong (2009) point out that, when it comes to digital assets, most of them have one thing in common – their inheritability is controlled by ToSA between an ISP and a person who uses their services or purchases digital product. Concerning this conclusion, an interesting point is made also by Banta (2014) when she explains that, there were always contracts that a person could make, which limited his/her freedom of testation. However, these contracts were always aimed at transfer of property to certain persons according to the will of their owner (in Croatia one example is the contract on lifelong maintenance, Law of Obligation, Art. 579). ToSA, however, have a completely opposite effect – they limit freedom of testation, but, at the same time, prohibit any transfer of assets stored in the digital account. So, ISPs will not let heirs access the account and its content, but they will rather destroy it or keep it on their server indefinitely. As the same author (2017) emphasizes, it is inconceivable that ISPs consider ownership interests of an account holder over the content of his/her account to cease at death, which is completely in opposition to basic principles of succession law (Banta, 2017)

Accordingly, since most ToSA prohibit descendability and devisability of digital assets, Banta (2014) states on several places in her paper that ToSA severely violate principles of succession law because these agreements preclude testate or intestate heirs from inheriting deceased's accounts. They might be valid under the principles of contract law, but it is unacceptable how they violate principles of succession law. Banta (2014) and Truong (2009) agree that ToSA should even be void because they are against public policy by reason of them letting ISPs determine what ownership interests an account holder has in his/her digital assets during life and, also, what will happen to them after he/she dies. Simply put, ToSA are ignoring account holder's ownership and testamentary intent. Banta fears that by allowing contracts drafted by just one party to determine what will happen to our digital assets, a dangerous precedent might be set – we might open the door to the same thing happening to our tangible assets or any new type of property that might be developed in the future.

As can be concluded, Banta, in most of her papers about digital inheritance (2014, 2016, and 2017), writes about this negative impact of ToSA. The same is found in the paper written by Darrow/Ferrera (2007, p. 314), who state that boilerplate provisions in contracts of adhesion (ToSA), drafted solely by ISPs, should not be allowed to rewrite probate law in a way that prevents heirs to inherit what would otherwise be inheritable. Ronderos (2017) also stresses that ISPs' ToSA prevent the inheritability of digital assets, so they have now become the main authority in governing the transfer of digital assets at death.

Most commentators agree with these statements, as was shown in this part.

2.2. Stored Communications Act (SCA)

The law most important for U.S. based ISPs' reluctance to let anyone access decedent's accounts or profiles is Electronic Communications Privacy Act (ECPA, 1986), primarily Title II, commonly known as Stored Communications Act (SCA, 1986). Borden (2014) notes that SCA was prompted by U.S.'s Congress' desire to control the federal government's interception of electronic communications while conducting criminal investigations. At the beginning, Congress adopted Omnibus Crime Control and Safe Streets Act of 1968, which was commonly known as Wiretap Act. This act made it illegal to "intentionally intercepts, endeavors to intercept, or procures any other person to intercept or endeavor to intercept, any wire, oral, or electronic communication", (§ 2511 (a)).

According to Borden (2014) primary focus was to prevent government officials from intercepting electronic communications from individuals, unless one of the exceptions listed in the Act did not exist. With the development of technology, electronic communication expanded to include various ways of communicating that did not exist earlier, so Congress had to update Wiretap Act by enacting before mentioned ECPA (1986), which in its Title II (SCA) deals with computer communications. SCA, in its chapter 2702, prohibits electronic service providers and remote computing services from disclosing account content to unauthorized individuals. Cahn (2014, p. 1708) lists the types of ISPs as: ESC providers – those that provide communications service; RCS providers – those that provides storage service and ISPs that perform both of these functions at the same time. Regardless of the type of ISP in question, if they are available to public, they fall within the scope of SCA.

Cahn (2014, p. 1700-1) also explains that SCA regulates relationship between government, ISPs and account holders in two distinct ways: it establishes limits on the government's ability to require ISPs to disclose any information concerning the accounts, without the consent of its holder, a subpoena or a warrant and it also limits ISPs in disclosing information voluntarily to either government, third party of any other entity.

When it comes to digital inheritance, the biggest problem lies in the fact that SCA is not clear in respect whether it should apply to access to decedents' accounts and profiles. Banta (2014) accentuates that SCA does not even address ownership of digital assets or its transfer, *inter vivios* or *mortis causa*, rather it only addresses access to digital accounts or digital assets. Cahn (2014) explains the reason why SCA does not explicitly mention inheritance of digital assets stored in an account: at the time of its enactment it was impossible to predict that in the very near future, digital assets will be assets capable of inheritance or will assist access to other digital assets. That is, according to Cahn, the only reason why the legislators failed to explicitly allow inheritance of digital assets stored on an account. However, according to Cahn (2014) and Banta (2014), regardless of the fact that access to heirs is not explicitly mentioned in SCA, it is certainly in accordance with its spirit, since its creators

never had heirs in mind when thinking about unlawful and unconsented access to digital accounts. Cahn (2014) also notes that SCA was enacted long before Facebook, Google or any of the most popular ISPs today, so its drafters could not envision how digital assets would look. At the time of SCA's enactment, they were concentrated only on privacy issues of account holders, not really thinking about devisability of digital accounts or assets. Because of this, Watkins (2014) mentions that many commentators agree that SCA is outdated.

According to Cahn (2014) SCA could be interpreted in a way that will allow access to heirs upon death of an account holder. However, it would be preferable to amend it in a way that will define account holders' 'consent' to include instructions put in will that allow heirs to access digital accounts and assets.

Regardless of previously mentioned points of view, ISPs interpret chapter 2702 of SCA in a way that will minimize their potential liability. Borden (2014 a/b) confirms this: in order to protect themselves, ISPs have chosen to adopt policies that do not allow anyone, other than the account holder, accessing his/her account. As a result, since social media and e-mail providers chose to adopt policies that do not allow accessing the decedent's account, except in case of one of SCA exceptions, e-mail and social media providers in almost all cases prohibit anyone to access decedent's accounts and profiles.

As Eichler (2016) also mentions, the most important exceptions to this rule are – „consent exception" (access is possible „with the lawful consent of the originator or an addressee or intended recipient of such communication, or the subscriber in the case of remote computing service") (SCA, 1986, chapter 2072, section (b)) (3) and – „the court order exception" („A governmental entity may require the disclosure by a provider…. only pursuant to a warrant…") (SCA, 1986, Chapter 2073, section (a)). [3]

Consent exception under SCA (1986) means that e-mail and social media providers can grant access to anybody who receives consent from the owner of the account. It seems that according to this exception, it would be easy to make a will and leave instructions on how to handle one's digital assets after death. However, various commentators found different issues with this claim. As Borden (2014) states, most people do not make plans for their digital assets, since social media users are usually young and as such, are less likely to think about death and leave a will with an estate plan, let alone an estate plan containing provisions on what is to happen with their digital assets after they die. Of course, the same author emphasizes that there are a lot of older people who use e-mails and social media, who tend to think about what will happen with their belongings after they die, but even if they do make wills concerning their tangible property, they do not plan for digital assets. Horton (2017), on the other side, altogether questions whether a 'lawful consent' could even translate into the inheritance context. He also makes a valid question: what will happen to digital assets of intestate decedents who have done nothing to make their wishes known?

3 See these exceptions on: https://www.law.cornell.edu/uscode/text/18/2702 (last visited on March, 30, 2018)

Cahn (2014) agrees that SCA does not explicitly address whether heirs have lawful consent to access deceased's digital account. However, as was already mentioned, she states that upon analysis of SCA it is clear that it was meant to, either, ban access to an unknown third party (i.e. a hacker) who wanted to do harm to an account holder or benefit from his/her information, or ban access to government bodies who wanted insight into someone's account, without a warrant, court order or such. Cahn calls it: 'unwarranted government snooping' (2014, p. 1713). This is essentially different from access of a person who is named in a will as deceased's heir and the one who is permitted by will to inherit said account. Therefore, according to Banta (2014), if a decedent leaves instructions in his/her will concerning digital assets, ISPs should respect those wishes without fear that they would be sued.

When it comes to court order exception under SCA, Edwards/Harbinja (2013), Darrow/Ferrera (2007), Banta (2014), Cummings (2014), Horton (2017) and most other authors that have dealt with the issue of digital inheritance, mention the highly publicized Ellsworth case.[4] This case demonstrated that social media and e-mail providers will provide (limited) access to deceased's digital content, only if those seeking access obtain a court order that commands access. They will, however, usually not grant access to the account itself (by providing log-in information).

However, Borden (2014) and Varnado (2014) mention there are several problems pertaining to obtaining court orders to access digital content of the deceased. First of all, it is neither cheap nor simple to obtain a court order. The cost of litigation is considerable, and many people will not be able to afford it. Furthermore, a huge number of e-mail and social media users whose service providers are based in the U.S. and therefore governed by U.S. laws, do not live in the U.S., so that complicates matters even more. Secondly, if family members decide to obtain the court order, they might not get it on time, since some social and e-mail sites have a deletion policy if the account is not used for a certain period of time. Thirdly, according to Borden (2014), even after a court order commanding access to deceased's account is issued, it takes a while for legal departments of social media and e-mail providers to process the request and grant access. And after access is granted, the parties that asked for it might not get what they expected, as was seen in Ellsworth case, where, Ellsworth's father, only got e-mails received by his son.

Banta (2014) also sees one big problem with the way this and many more cases were resolved – regardless of the fact that a lot of people would want

4 After a U.S. marine Justine Ellsworth died, his family members wanted access to his Yahoo! e-mail account. Since Yahoo!'s terms of service prohibit third parties from accessing someone's account, even if that someone is dead and it is his/her family members demanding access, the case ended up in court. The judge ordered Yahoo! to enable access to the deceased's account without ordering the transfer of log-in and password information. That way, Yahoo! could still abide to its privacy policy but family members could and did gain access to deceased e-mails. It was done because the judge ordered Yahoo! to provide a family with a CD containing copies of the e-mails in the account. However, they did not gain access to deceased's e-mail account or log-in information.

their heirs to have access to decedent's account, ISPs' ToSA and positions on account transfer *post mortem* stay the same. This presents a huge issue since whenever heirs request access to deceased's account, apparently, cases are resolved on an individual level which is probably the worst way to resolve these issues, since this severely contributes to legal uncertainty.

So, how do ISPs justify their contractual choices?

According to Banta (2014, p. 385), their justifications come down to administrative or cost concerns if they allow transfer of an account; concerns about protecting account holders' privacy and their apprehension that devisability of digital assets would be against the law. However, in Banta's opinion, these reasons do not justify such measures of prohibiting or limiting transfer of digital assets, and the same author gives comments to each of these concerns.

When it comes to administrative or cost concerns, while Horton (2017) agrees with this justification, Banta notes that ISPs could require heirs who want access to the deceased's account to pay a fee. Also, nobody should expect ISPs to keep a deceased's account on its servers indefinitely – they can keep it for a certain period of time which is enough for heirs to access it and delete it later. When it comes to protection of privacy, which is the main reason for ISPs' refusal to heirs accessing deceased's accounts, Banta states that ISPs are not the ones that need be concerned with the privacy of a deceased account holder, since his/her privacy died with him (see also Banta, 2016). It is not up to them to decide how to protect account users' privacy. Furthermore, according to the same author (2014), deceased's privacy is not of a concern when it comes to his/her tangible items, such as letters and photos, which are regularly inheritable after the death of their owner. There is no reason that digital assets should receive greater protection.

Third concern of ISPs is that they will be breaking the law (SCA) if they let anyone other than the account holder access an account (for example, Facebook and Yahoo! were the ones to specifically cite SCA when they refused to give access to deceased's account heirs. See case law in Banta, 2014). However, after analyzing SCA, Banta (2014) and Cahn (2014) pointed out that this law was never meant to apply to transfer of digital assets to deceased's heirs since it was never meant to prevent this type of transfer. Rather, it was meant to prevent access to third parties such as government bodies or hackers, who wanted to gain unconsented and illegal access to someone's account. Also, this seems like an empty claim, since Banta (2016, p. 964) emphasizes that no ISP has ever been prosecuted for violating SCA after releasing the contents of a decedent's account to family members. Banta (2014, p. 829) also states that the decision to prohibit inheritability of digital assets only benefits ISPs because it lets them avoid administrative hassle and promote more use and purchase of their products.

2.3. Solutions according to Google's Gmail and Facebook

As Brubaker and Callison-Burch (2016) note, if decedents leave their log-in information to their heirs, it is done outside of system design and policy of ISPs. To resolve this, Gmail and Facebook addressed the issue by allowing account holders to decide who, if anyone, will have access to information stored on their accounts and what should be done with the account itself after they die (Horton, 2017). Apparently, as Lopez (2016) indicates: it seems the pressure for access to online accounts and information after its holder dies, directly affected changes in policies of (at least some) ISPs.

Both Google and Facebook in their ToSA state that they do not own account content, it belongs to an account user: Google – "Some of our Services allow you to upload, submit, store, send or receive content. You retain ownership of any intellectual property rights that you hold in that content. In short, what belongs to you stays yours."[5] Facebook – „You own all of the content and information you post on Facebook, and you can control how it is shared through your privacy and application settings."[6]

However, Facebook ToSA under 'Registration and Account Security' part of its ToSA explicitly states: "You will not share your password (or in the case of developers, your secret key), let anyone else access your account, or do anything else that might jeopardize the security of your account. …You will not transfer your account (including any Page or application you administer) to anyone without first getting our written permission."[7] Google, on the other hand, is not as straightforward when it comes to Gmail account, but in their ToSA they clearly state: "To protect your Google Account, keep your password confidential. You are responsible for the activity that happens on or through your Google Account.[8]

2.3.1. Facebook – deletion, memorialization or Legacy Contact

As Carroll (2018) explains, Facebook, unlike many other ISPs, has three features that deal with the death of an account holder – memorialization of an account, Legacy Contact and deletion after Facebook is notified of account holder's death. However, as Brubaker/Hayes/Dourish (2013) mention, deletion is probably the least preferable option because most account holders often underestimate what these accounts mean to their family and friends. Arnold (2016) and Fearon (2011) mention that social media is often used as a coping mechanism for deceased's family and friends. Nowadays it is common, after a person dies, for his/her family and friends to post their sentiments on Facebook. Deceased's friends and family sometimes even set up new online venues that serve as an emotional outlets.

5 https://www.google.com/intl/en/policies/terms/ (last visited on March 30, 2018).
6 https://www.facebook.com/terms.php (last visited on March 30, 2018).
7 https://www.facebook.com/legal/terms (last visited on March 30, 2018).
8 https://www.google.com/policies/terms/ (last visited on March 30, 2018).

Borden (2014, p. 413) explains that first time Facebook actually became a coping mechanism was in 2007 after Virginia Tech Massacre. Prior to it, Facebook deleted accounts after it learned about user's death. However, friends and family of victims urged it to adapt its policy concerning deletion of an account. As Brubaker and Callison/Burch (2016) mention, 2007 was actually the year that brought Facebook's oldest feature concerning account user's death – account memorialization (for more about memorial groups and memorialization, see Fearon, 2011; Moncur/Waller, 2014). As is stated in Facebook: What will happen to my account if I pass away?[9] after Facebook account holder dies and Facebook is notified of it, they will memorialize an account, meaning that the profile will remain viewable under the same privacy setting as earlier, but no one will be able to access it or change it in any way; a word 'Remembering' will be added to decedent's name; memorialized profiles will not display any advertising and can be excluded from features such as 'People You May Know' or birthday reminders.

Brubaker and Callison-Burch (2016) point out that, although there have been many straightforward requests for memorialization, there were some that were exceptionally complex (father wanting to connect to his deceased son's profile, but was not 'friends' with him on Facebook; mother wanting to change her deceased daughter's profile photo to something more appropriate...). Facebook had no way of knowing what the deceased would have wished (Would the son want his father for a Facebook friend? What would the daughter find appropriate for a profile photo?). Therefore, Facebook started thinking about introducing a new feature that will take into consideration the deceased's wishes.

According to same authors (2016, p. 2-3), there are three different ways to deal with decedent's account, other than deleting it or letting it stay indefinitely on servers, without anybody being able to access them: 1. Configuration-based approach – ISP could leave it to an account holder to decide what will happen with his/her account post mortem (for example, there is 'IfIDie' application for Facebook users that lets them decide what the system should do after they die)[10]; 2. Inheritance-based approach – account holders could leave log-in information to their heirs and hope ISPs will not notice or 3. Stewardship-based approach – ISPs could let an account user choose a person to care for both needs of the deceased and the community.

Brubaker/Callison-Burch (2016) state that Facebook opted for the latter – in 2015 they introduced a new feature called Legacy Contact. Facebook did this, because memorialization option was underutilized; the reasons being the lack of public awareness, little incentive to memorialize an account (since after memorialization, an account is excluded from many other Facebook features) and because most of decedent's Facebook friends were unsure whether it was appropriate for them to submit a request for memorialization, if close family members neglected to do so themselves.

9 https://www.facebook.com/help/103897939701143/?__tn__=%2As-R (last visited on March 30, 2018).

10 http://ifidie.net/ (last visited on March 30, 2018).

Linishi (2015) adds mentions that Legacy Contact was made according to wishes of different decedent's family members that turned to Facebook with requests to gain access to deceased's profile and download data or post funeral information etc.

Legacy contact settings can be accesses through Security section in account settings. According to Brubaker and Callison-Burch (2016), it has three features that all legacy contacts have and one optional eature that will only come into force if an account holder opts for it. Chosen legacy contact will never be able to log in as the person who died or see their private messages.

These authors explain:

Primary features are: 1. Legacy contact can post on decedent's Wall whatever information they want (or were instructed to, by decedent). For example: information concerning user's death, memorial service information, final words etc. These posts will always be at the top of the profile, so Facebook friends will not have to search for them somewhere on the Wall, like they have to on memorialized profiles. 2. He/she will be able to change profile or cover photo and 3. Accept or deny friend requests made *post mortem*. Fourth feature is optional – account holders can grant legacy contacts the permission to archive data on his/her account (photos, posts, videos…).

2.3.2. Google – request for a deceased person's account or Inactive Account Manager

As Cummings (2014) stated not very long after Google launched its 'Inactive Account Manager' (IAM), it is the only policy that is consistent with SCA because an account holder who finds and participates in Gmail process, has clearly indicated circumstances under which he/she consents to access of third party to his/her account *post mortem*. Regardless of the fact that a lot of Gmail account holders are still probably unaware of IAM feature, it is the only effective way to determine the intent of the deceased concerning his/her Gmail account.

IAM has existed since 2013 and it lets Gmail account holders choose a person who will be granted access to their data, after they die and their account becomes inactive. According to Google rules, an account user needs to log in to his/her Gmail account and set an alert notification method (a phone number) and a time out period, which can be 3, 6, 12 or 18 months of inactivity. Google will alert an account holder multiple times by SMS, or e-mail, one, two or three months before that period expires, depending on the length of inactivity an account holder chose. After an account user chooses a time out period, he/she will have to add „trusted contacts" who will be notified that his/her account has been inactive for a chose period of time. Account user can even share his/her data with „trusted contacts". For example, he/she can choose to send Gmail messages to one person and Google Drive documents to someone else.

Account user can, additionally, set his/her account to be deleted after the chosen period on inactivity has passed.[11]

Steps to set up IAM are, as follows:

> **Step 1: Decide when Google should consider your Google account inactive** - an account holder can choose between four options – 3, 6, 12 or 18 months of inactivity. This period starts with the last sign-in. IAM alerts an account holder on multiple instances via SMS or email.
>
> **Step 2: Choose who to notify & what to share** – an account holder chooses trusted contacts and decides whether he/she wants to share data with them.
>
> **Step 3: Optionally delete account** – alternatively, an account holder can instruct Google to delete his/her account.[12]

Lamm (2013) adds that the difference between IAM and Facebook Legacy Contact is that Gmail account users can choose up to ten „trusted contacts". The reason Google opted for this alternative is because the person designated to receive account holder's data may not be able to receive it because they changed e–mail accounts, phone numbers, because they are incapacitated or also deceased.

If an account holder failed to utilize IAM, Google offers his/her family members another possibility:

> **„Make a request for a deceased person's account**
>
> We recognize that many people pass away without leaving clear instructions about how to manage their online accounts. We can work with immediate family members and representatives to close the account of a deceased person where appropriate. In certain circumstances we may provide content from a deceased user's account. In all of these cases, our primary responsibility is to keep people's information secure, safe, and private. We cannot provide passwords or other login details. Any decision to satisfy a request about a deceased user will be made only after a careful review.
>
> What would you like to do?
>
> Close the account of a deceased user
>
> Submit a request for funds from a deceased user's account
>
> Obtain data from a deceased user's account"[13]

11 https://support.google.com/accounts/answer/3036546?hl=en (last visited on March 30, 2018).
12 https://myaccount.google.com/inactive (last visited on March 30, 2018).
13 https://support.google.com/accounts/troubleshooter/6357590?visit_id=1-636571564316645775-2493820124&rd=2 (last visited on March 30, 2018).

3. Methodology

Although the title and the main topic of this paper are Google and Facebook accounts and what happens to them after their holder dies, it was first important to research background behind these and other ISPs rules about non-transferability of an account. It has to be stressed that neither Google nor Facebook, prior to the solutions mentioned in this paper, had any different rules on account transferability, than most other ISPs. Therefore, the first part of the research was focused on why some of the most popular ISPs that are based in the U.S., but are largely used all over the world (including Croatia), have such similar rules concerning non-transferability of an account *inter vivos* or *mortis causa*. The second part of research was directed at analyzing possible solutions to this problem, both in literature and in specific ISPs options offered to their clients (Google and Facebook).

The research was first directed at finding where ISPs' rules on non-transferability are found. Since they are mainly placed in ISP'S ToSA, to find out what these agreements state about what will happen to an account after its holder dies, specific ToSA and available commentators' views on these agreements were researched. Those commentators speculations and solutions on how to resolve the issue of (too) great of an impact ToSA have on basic principles of ownership and succession law, were analyzed. While researching ToSA, the author investigated what different commentators had to say about different types of ToSA, their enforceability, validity and provisions that directly affect succession law (Banta, 2014,2016, 2017; Cahn, 2014; Cummings, 2014; Darrow/Ferrera, 2007; Eichler, 2016; Klarić/Vedriš, 2014; McCarthy, 2015; Ronderos, 2014; Sherry, 2012; Tarney. 2016; Truong, 2009; Varnado, 2014; Watkins, 2014;https://www.facebook.com/terms.php; https://www.google.com/intl/en/policies/terms/)

Since all U.S. based ToSA analyzed in this paper have similar provisions about non-transferability of accounts, directly or indirectly incorporated in ToSA, the research proceeded to find the reason behind this. Therefore, the legislation that governs ISPs account transfer was researched and its impact on these agreements. Also, since ISPs claim that said legislation prohibits account transfer, unless specific exceptions exist, the research then dealt with the most important exceptions that might allow account transfer (Banta, 2014; Borden, 2014; Cahn, 2014; Eichler, 2016; Horton, 2017; Varnado, 2014; Watkins, 2014; Electronic Communications Privacy Act; Stored Communications Act; Omnibus Crime Control and Safe Streets Act).

Because most commentators and public (as was discovered in literature and in case law) criticized existing solutions and requested change, the final part of the research proceeded to analyze Google's and Facebook's solutions to this problem, that are more in accordance with basic principles of succession law. These solutions were analyzed themselves and also various commentators speculations on them (Arnold, 2016; Borden, 2014; Brubaker/Hayes/Dourish, 2013;

Brubeker/Callison-Burch, 2016; Caroll, 2018; Cummings, 2014; Fearon, 2011; Horton, 2017; Lamm, 2013; Linishi, 2015; Lopez, 2016; Moncur/Waller, 2014[14]).

4. Empirical data and analysis

ToSA are contracts of adhesion that govern the relationship between an ISP and an account holder (Darrow/Ferrera, 2007; Ronderos, 2014). There are a few commentators who question their enforceability because of their form, length, vagueness and the fact that they are solely defined by an ISP (Banta, 2014; McCarthy, 2015; Ronderos, 2014; Sherry, 2012; Varnado, 2014). Others claim that clickwrap agreements are enforceable, while browsewrap might not be, which they corroborate with case law (Banta, 2014; Ronderos, 2014)). However, ToSA are binding contracts between an account holder and an ISP, regardless of the fact that most account holders do not even read them (McCarthy, 2015).

Furthermore, commentators agree that ToSA severely limit, not only interests of ownership, but also freedom of testation (Banta, 2014, 2016, 2017; Borden, 2014; Darrow/Ferrera, 2007; Troung, 2009; Ronderos, 2017). They are sometimes silent about, but mostly are against, account holders exercising certain ownership interests and transferring their account after they die. (Banta, 2014, 2017)

They all agree that one of the reasons for the impact ToSA have on ownership of an account, its content and its (un)inheritability today, stems from ISP's interpretation of a thirty year old law – SCA which, many commentators emphasize, was never meant to prevent succession of said accounts (Banta, 2014; Borden, 2014; Cahn, 2014; Horton, 2017; Varnado, 2014; Watkins, 2014). One of the most important provisions of SCA for this paper is found in its chapter 2702, which prohibits electronic service providers and remote computing services from disclosing account content to unauthorized individuals.[15] It was concluded that SCA is not clear in respect whether it should apply to estates accessing deceased users' accounts, but that private social media and e-mail providers have chosen to interpret it in such a way that will minimize their potential liability. Most commentators agree that, in order to protect themselves, ISPs have chosen to adopt policies that do not allow anyone, other than the user, accessing the deceased user's account, regardless of the fact that most agree SCA was never meant to prohibit access to decedent's heirs (Banta, 2014; Borden, 2014; Cahn, 2014; Watkins, 2014). There are some exceptions to this rule – consent exception and a court order exception, being the most important for this paper and these might explain why some ISPs have allowed heirs to access a decedent's account.

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14 Also: https://www.facebook.com/help/103897939701143/?__tn__=%2As-R (last visited on March 30, 2018).
https://support.google.com/accounts/answer/3036546?hl=en (last visited on March 30, 2018).
15 https://www.law.cornell.edu/uscode/text/18/2702 (last visited on March 30, 2018).

Some commentators agree that inheritance of digital assets stored on ISPs accounts could be allowed if ISPs allowed account users to choose what they wanted done with their account *post mortem*, which would be in accordance with SCA 'consent exception' (Banta, 2014, 2016; Hopkins; Sherry, 2012; Tarney, 2012). Google's Inactive Account Manager and Facebook's Legacy Contact are presented as good examples of how ISPs themselves might resolve this issue, without exposing themselves to liability for breaking the SCA.

5. Results and discussion

ToSA might differ from an ISP to an ISP, but as was shown earlier, most of them regulate important issues like transferability of an account *inter vivos* or *mortis causa* similarly – they do not allow it, at worst, or are silent about it, at best. Since most of them deal with this matter in the same way, this means they do not offer any real alternative to account holders (Banta, 2014). Regardless of the fact that ToSA are seldom read and those who do read them, usually do not read all of them, they are binding contracts that regulate relationship between an account holder and an ISP, (McCarthy, 2015).

From analysis of different commentators points of view and solutions offered by various ISPs, it can be concluded that, until legislation changes and expressly allows transferability of digital accounts and its content to decedent's heirs, which will in turn make changes to ToSA concerning the same issue possible, the best solution is for account holders to address this issue with an ISP they have an account opened with (Banta, 2014, 2016; Hopkins; Sherry, 2012; Tarney, 2012; Truong, 2009). This is only possible if that ISP offers this possibility to its clients. Most do not, but Google and Facebook, arguably some of the most popular e-mail and social media providers, do.

However, what was discovered while researching Google's and Facebook's solutions is that features which let account holders decide what will happen to their accounts *post mortem* are not mentioned anywhere in Gmail or Facebook ToSA. They are located in their respective help forums. Because of that, future account holders could read ToSA word for word, but they would still not be aware of these features, unless they specifically knew where to look for them (Cummings, 2014). This might be a problem since both Google and Facebook ToSA, either directly or indirectly, state that passwords must not be revealed to anybody and that accounts are not transferrable. So, an account holder that has consented to Google and Facebook ToSA might believe that there is nothing he/she can do if he/she wants an account or its content transferred *post mortem*.

This is the main problem encountered concerning these solutions. Most commentators (i.e. Banta 2014, Ronderos, 2017) agree that browsewrap agreements, which display the rules to future account holders, but do not require them to click that they agree, should not be enforceable if future account holder did not have actual or constructive knowledge of the terms or conditions.

One can ask, how is putting certain features in such unenforceable agreements, different from putting them in various help forums? In both cases account users will have a hard time finding them and no way of consenting to them.

Therefore, since not knowing about these features, account holders will not activate them and all their digital conten stored on their accounts might be lost to their heirs forever, because without these features, their accounts will be considered non-transferrable and heirs will probably not be able to gain access to any of their content.

It has to be noted that, while researching for this paper, the author knew a lot about these possibilities and where to look for them, but still had a hard time in finding them because they are dispersed all over Google and Facebook sites. For an average user, that has no idea these features even exist, it might be close to impossible to become aware of them, let alone find them.

6. Conclusion

It might seem morbid und mundane to think about what will happen to one's digital account *post mortem,* when there are much more pressing problems the world is facing today. But, death has always been a significant legal fact and has always had a big impact on civil law, especially on inheritance. Also, digital accounts are now becoming places that hold a tremendous amount of data about ourselves and the world around us. Most of the items that were once tangible now exist only in a digital form and many of them are stored on on-line accounts. One can say that our lives have become tremendously digitized and our digital assets have great emotional and monetary value. However, all of that wealth is, according to the rules of those who hold it, not ours to dispose as we would want.

Since ISPs' ToSA prohibit account inheritability and, under existing legislation, it seems this will not change soon, other solutions had to be found. Account users could try to put preassure on ISPs to do something about it, but it is not certain whether they will succeede. However, public preassure seemd to have given some results: two of the most popular e-mail and social media providers have adopted solutions to help their clients choose what, if anything, will happen to their accounts after they die. After a thorough analysis, it seems this is the only soluiton that will appease both account users and ISPs and one can only hope that the rest of the providers will decide to follow this example.

The only problem with existing solutions is that because they are not visible, account users are, at present, unlikely to found them.

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CHAPTER 3

Electronic signature in legal theory and practice - new regulation

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ABSTRACT

In the Republic of Croatia, electronic signature is subject to the regulation of a statute which regulate the implementation of European legislation on electronic identification and trust services for electronic transactions. The goal of the paper is to identify and estimate the new EU legislative framework for electronic identification and a new system of regulation and supervision for electronic service providers in the EU, which should stimulate electronic commerce and cross-border digital public services. This regulation places particular emphasis on the recognition of electronic identification means between Member States for cross-border authentication, personal data security and the supervision of qualified providers of trust services. Using the normative and institutional analysis of national legal source, as research method in the paper, has helped to identify the typical problems that arise in regulating electronic signature. We find that the results imply that, despite the optimism that using electronic signatures can have a significant impact on e-finance, cybercrime is a growing threat. Commercial operators only become aware that the electronic signature methods they use must be adequate and that certain criminals can even „break" the two-degree authentication process. Professional users and consumers needs continuous education to keep pace with the fraudsters.

Keywords: electronic signature, manifestation of will, authentication, public key

JEL classification: K12, K15

1. Introduction

Legal transaction is a manifestation of will directed towards the achievement of permitted legal effects, among which the most important is the occurrence, change or termination of a civil law relationship (Klarić and Vedriš, 2006: 107)[3]. In the Republic of Croatia, the Obligatory Relationship Act, in article 249, paragraph 1, regulates the ways in which will for conclusion a contract may be declared, stating that the willingness to conclude a contract may be expressed by words, usual signs or other behavior from which it can be concluded with

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3 This definition of legal transaction is emanation of the principle of consensuality of contracts in contemporary civil law regulations. (Crnić, 2006: 246).

certainty about its existence, content and identity of the statement provider (*Obligatory Relationship Act*, *2005*). Thus, from the form of manifestation of will it must be manifestly: the existence and content of the statement, and the identity of the person which declare will (Klarić and Vedriš, 2006: 127). Paragraph 2, article 249 of Obligatory Relationship Act provides the possibility of giving a statement of will through various means of communication, which is in fact related to statements of will given electronically (*Obligatory Relationship Act*, *2005*). In the explanation of the Final Proposal of the Obligatory Relationship Act it is stated that in this way, in line with the trend that is present in the foreign legislations, is eliminated the doubts thats occur in practice regarding the use of modern telecommunication means for concluding the contract (Crnić, 2006: 248). The tendency is that the electronic manifestation of will is equal to the written form. Thus also article 292 paragraph 4 of Obligatory Relationship Act stipulates that the requirement of a written form of contract is fulfilled even where the contracting parties enter into agreements by means which enable it to establish with certainty the content and identity of the statement provider (*Obligatory Relationship Act*, *2005*). The written manifestation of will is valid only when it is signed. The signature in itself contains the presumption that in the text is expressed true will of the signatory. Valid signature is that which does not put in doubt the identity of the signatory (Klarić and Vedriš, 2006: 128). Although, basically, between the conclusion of the contract electronically and the contracts concluded in another way there is no substantive difference, since the contract is in any case an agreement (Crnić, 2006: 287), article 293 paragraph 3 of Obligatory Relationship Act suggests that electronic signature is subject of a special regulation[4].

2. Concept and use of electronic signature

Understanding the terms “signature” and “confirmation” is different in the legal theory and practice of common law and the continental European legal system. The countries of the continental European legal system apply the principle of non-formalities, which means that the contract does not have to be concluded and signed in writing form to be valid. The common law system, over the past 150 years, has passed the evolution of the concept of “signatures” from the emphasis on form to focus on the function. It can be said that the courts in the common law system are focus on the parties’ intent, rather than on the form of their signing act (*UN Commission on International Trade Law, 2009*: 3). Obligatory law in the Republic of Croatia accepted the principle of non-formalities of the contract. In that sense, the obligation arises because of content that is desirable, not because of the form in which the content is expressed (Klarić and Vedriš, 2006: 131).

4 Aforecited article of Obligatory Relationship Act stipulates that the use of an electronic signature in stipulating of the contract is regulated by a special regulation. (*Obligatory Relationship Act,* 2005).

As stated, electronic signing in the Republic of Croatia are regulated by a special regulation. The Implementing Act of Regulation (EU) No. 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC[5], in article 2 paragraph 1, with regard to the terms used in The Implementing Act of Regulation (EU) No. 910/2014, refers to the meaning of the terms in Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC[6], which regulates electronic identification and electronic transactions, and whose implementation is regulated by *The Implementing Act of Regulation (EU) No. 910/2014.* In that sense, the meaning of the term electronic signature, *The Regulation (EU) No 910/2014* is provided in article 3 item10, by specifying it as electronic data that is associated or logically linked to other electronic data and which the signatory uses to sign (Council Regulation (EU), 910/2014)[7, 8, 9].

However, the same value as handwritten signature has a qualified electronic signature (Council Regulation (EU), 910/2014, (25)). Qualified electronic signature means an advanced electronic signature that is generated by qualified[10] means for generating of electronic signatures and is based on a qualified electronic signature certificate (Council Regulation (EU), 910/2014, (3)). An advanced electronic signature is an electronic signature that meets certain requirements. These requirements are prescribed by *The Regulation (EU) No 910/2014,* article 26, which defines as an advanced electronic signature the one which is unambiguously linked with the signatory, enables identification

5 Hereinafter *The Implementing Act of Regulation (EU) No. 910/2014.*

6 Hereinafter *The Regulation (EU) No 910/2014.*

7 One data in electronic form contains a message (manifestation of will) and in a second data is signature in electronic form that serves for the authentication of the first. (Nikšić, 2000: 255).

8 In the legislation of United States of America, the Electronic Signature in the Global and National Commerce Act defines the electronic signature as “any electronic sound, symbol, or process associated with an agreement and executed with the intention of signing an agreement”. Apart from being in digital form, the electronic signature is legally identical to a, handwritten signature and carries the same authority and credibility as John Hancock’s name on the Declaration of Independence. *Electronic signatures in the United States, Legal considerations and best practices*. (Adobe Systems Incorporated, 2017).

9 The oldest act that contains definition of an electronic signature is the Digital Signature Act of the U.S. Utah state from year 1995, which states that the electronic signature should be implemented in order to link legal effects to its use. (Katulić, 2011).

10 Qualified means for generating electronic signature shall, by appropriate technical and procedural means, ensure that the confidentiality of the electronic signature creation data, used to create an electronic signature, is reasonably ensured, that the electronic signature data used for electronic signature can practically be appear only once, that the electronic signature data used to generate an electronic signature can not, with a reasonable degree of confidence, be derived from it, and that the electronic signature is reliably protected against counterfeiting using the currently available technology, that the lawful signer can reliably protect electronic signature data used to generate electronic signature from use by other persons. Qualified means for generatig electronic signatures may not change data that is signed or prevented from displaying such data to the signatory before signing it. (Council Regulation (EU), 910/2014, (Annex II))

of the signatories, was made by using data for generatig electronic signature which the signer may use with a high level of trust under his exclusive control and is associated with the signed data so that any subsequent data changes can be detected.

The legal and business practice in the contracts concluded in electronic communication recognize the character of the written form, and thus the electronic signature undoubtedly gains the meaning of the traditional signature (Matić, 2000: 267).. In this respect, legal transaction in the electronic form is considered as a special form, an external manifestation of the content of a particular legal transaction (Klarić and Vedriš, 2006), which, by its legal effects, is aligned with the written form of legal transaction[11]. So in electronic business, with use the advanced electronic signature, memorandums and stamps are unnecessary and inadequate (Matić, 2002: 274).

3. Promoting security in electronic business

More and more use of information technology has enabled remarkable growth of the branches of the economy wich used electronic commerce, and the development of commerce through the Internet accelerates the development of other technologies such as electronic money transfer, internet marketing, automated storage and data analysis (Katulić, 2011: 1340). More than 315 million Europeans use the Internet on a daily basis, and the common European market is open to more than 500 million consumers. However, less than 4% of online services are offered across national borders, meaning that business, with its goods and services, only reaches a limited number of populations. A small percentage of consumers buys online from one EU country to another, and even fewer entrepreneurs risk trading on the Internet to a cross-border customers. This situation suggests that at EU level there is a need for a policy that, with the aim of launching the economic recovery of the European Union, will quickly remove obstacles to electronic business (Woolfson and Terruso, 2015: 1).

In this respect, the European Commission began work on the new european regulation for trust and security of electronic transactions in 2011. The work was culminated in the new The Regulation (EU) No 910/2014. (Woolfson and Terruso, 2015: 1).

4. New European regulation

The Regulation (EU) No 910/2014 sets a new legislative framework for electronic identification and a new regulatory and control system for electronic services providers in the EU. This regulation should encourage electronic commerce and cross-border digital public services. I

11 This distinction is solely theoretical, because in practice this distinction is of no significance. It is important that legal transaction produces the same effect as the traditional written form. (Matić, 2002: 275).

n summary, The Regulation (EU) No 910/2014 provides:

- The legal effects of advanced electronic signatures, seals, electronic seal certificates, time stamps, and tools for generating electronic seal.
- The legal framework for authenticating[12] web pages
- Fundamentals for identification scheme of electronic identification means between Member States for the purpose of cross-border authentication.
- Personal data security and application requirements for all trust providers[13]
- Supervision of qualified service providers (Woolfson and Terruso, 2015).

The Regulation (EU) No 910/2014 is applicable from 1 July 2016 (Council Regulation (EU), 910/2014, (52)). As a regulation, it applies directly in the Member States without the need for national legislative measures.

4.1. Electronic signature protection and user identity verification

In order to be able to identified signatory with electronic signature (ensuring the authenticity of the information) and confirm the authenticity of the signed electronic record (ensuring the integrity of the information), in a way that such signature has the same legal force and the possibility of replacing the handwritten signature and imprint of the stamp in the Republic of Croatia, based on European regulation of electronic transactions, is used advanced electronic signature. An advanced electronic signature must ensure connectivity solely with the signatory, must undoubtedly identified signatory, must be generated by the use of means solely under the supervision of the signatory and must include direct linkage with the data it relates to in a manner that undoubtedly enables access to any modification of source dana (Council Regulation (EU), 910/2014, (26)). In doing so, a qualified certificate is used to produce an electronic signature, which represents an electronic confirmation by which a provider of services issuing qualified certificate certifies an advanced electronic signature. Realization of electronic and advanced electronic signature is possible by using Public Key Infrastructure[14] which is based on the application of an asymmetric cryptographic system whereby PKI enables reliable authentication in the process of applying to electronic services as well as protection of authenticity, integrity and confidentiality of information. The PKI manages the generation and distribution of the public and private key, the life cycle of the certificate, and publishes the

12 Authentication means an electronic procedure that allows the electronic identification of a natural person or legal person or the authenticity or integrity of the data in electronic form to be confirmed. (Council Regulation (EU), 910/2014, (3)).

13 The Regulation (EU) No 910/2014 in article 3 item 14 specifies a trust service as an electronic service that is normally provided for compensation and consists of:

(a) Creating, verifying and validating electronic signatures, electronic stamps or electronic time stamps, electronic recommended delivery services, and certificates relating to those services; or
(b) Creating, verifying, and validating certificates for authenticating web pages; or
(c) Preservation of electronic signatures, seals or certificates relating to those services.

14 Hereinafte PKI.

certificates in the directories. The PKI requires a tripartite trust in which two sides trust each other, even though they have not previously established a business or personal relationship, since each of them has established a relationship with a third party that is a guarantor for establishing trust between the first two sides (National PKI, 2004: 1).

Therefore, for security reasons, strict measures for the protection of advanced electronic signature as well as the measure of user identity verification are determined. The European Commission by implementing acts prescribes the conditions for the means used for the generation of an advanced electronic signature, which must ensure that the data for generation of an advanced electronic signature can only appear once and that their security has been achieved, that the advanced electronic signature is protected against counterfeiting with using the existing available technology and that the data of an advanced electronic signature signer can reliably protect against the use of others. Also, The Regulation (EU) No 910/2014 stipulates that means for the generation of an advanced electronic signatures must not, during making change the data that is signed or disable access to that data before the process of creating an advanced electronic signature (Council Regulation (EU), 910/2014, (Annex II)). Certification service providers must provide the recipient of the electronic messages which is signed by electronic signature or another authorized person, inter alia, to enable data verification of electronic signature and enable to reliable determine content of the signed data. As it is clear from the above, there are three sides in the process of using the electronic signature: the certification service provider, signatory and recipient of an electronic messages signed by electronic signature and a computer-communication system that allows data exchange between the three sides, it is necessary in all four of these segments, to ensure the security of the electronic signatures. In addition to the legislative framework, the area of electronic signature security is also defined by the security procedures of the certification service providers.

4.2. Responsibility for damage

Although the technical norms and standards, as well as the prescribed technical and technological procedures for electronic signature design and implementation, ensure an adequate level of confidentiality, completeness and availability of dana, from a legal determination that the qualified certificates service provider is required to insure the risk of liability for damages caused by performing certification services through mandatory insurance, it is clear that there is a risk in using the electronic signature. This is also confired by the possibility that the issuer of means of electronic identification respond to the damage which he caused to natural and legal persons, by a transfrontier transactions, by disregarding the obligation that personal identification data undoubtedly represent the person concerned, and that the party carrying out the authentication process is responsible for the damage caused to the natural or legal persons, in a transfrontier transaction, in breach of the obligation to perform authenti-

cation in such a way that any trustworthy party[15], established in the territory of another Member State, can confirm personal identification data received in electronic form (Council Regulation (EU), 910/2014, (11)). Also, trust service providers are responsible for damage caused intentionally or by negligence to any natural or legal person by disregarding obligations under The Regulation (EU) No 910/2014 (Council Regulation (EU), 910/2014, (13)) [16] [17]. The liability of certification services provider may, under The Regulation (EU) No 910/2014, be restricted so that trust service providers determined the limits to the use of the services they provide, and they are not liable for damages related to the use of services that exceed such limitations. The financial risk that providers of trust services can bear on the basis of liability for damages is covered by the insurance policies. In this regard, the certification service provider, in the qualifying certificate, may indicate the limit of the value of the transaction for which the certificate may be used and which option in the Republic of Croatia has been used by two of the three trust services providers (Ministry of Economy, 2013)[18]. Users of the trust services should be adequately informed of the limitations of liability for damage, eg. by including informations on the limitation of liability in to terms of transactions[19]. Also, *The Implementing Act of Regulation (EU) No. 910/2014* also prescribes misdemeanor provisions for natural persons who unauthorized access and use data and means for generating of electronic

15 A trusted party means a natural or legal person which relies on a electronic identification or a trust service. (Council Regulation (EU), 910/2014, (3))

16 Cited articles that defining liability for damage determine that liability relations are governed by national liability rules. In this respect, we can conclude that the application of the rules on liability based on fault (fault liability) comes into play. In that case, in relation to an unqualified provider of trust services, it is rules on liability based on fault in which fault must be proven (the criterion of proven guilt). The burden of proof is on a natural or legal person claiming damages. In relation to a qualified provider of trust services, it is rules on liability based on fault in which the fault is presumptive. Since the provisions of The Regulation (EU) No 910/2014, in relation to the assumptions of liability for damage, refers to national legislation, the rule in the Republic of Croatia is that the lowest degree of fault is presumptive, and it is the ordinary negligence. (Klarić and Vedriš, 2006: 610).

17 That in national legislation is applying the rules on liability based on fault, it is clear from the diction of article 9 of *The Implementing Act of Regulation (EU) No. 910/2014*., which, in relation to the responsibilities of the signatory, ie. the natural person which generate the electronic signature, in the use and storage of means and data for the generation of an electronic signature, requires reasonable host diligence. (*Implementing Act of Regulation (EU) No. 910/2014,* 2017).

18 Thus, the Record of the Certification Service Provider in the Republic of Croatia, which is kept in electronic form by the Ministry of Economy, Entrepreneurship and Crafts, determines the limitations for transactions for which certifying service providers meet: up to 8000 kuna for standard security certificates and up to 400,000 kuna for certificates high levels of security. One of certification service provider has not limited the amount of transaction value it suits. (Ministry of Economy, 2013).

19 Therefore, the Agency for Commercial Activities Ltd., as one of the certification service providers, has published the Internal Rulebook on Certification Procedures of the Certification Body for issuing certificates to persons for the purpose of electronic identity cards of the Republic of Croatia (HRIDCA), Edition 2.0 from 7 July 2017, which states that the Agency for Commercial Activities Ltd. has a insured risk of liability for damages arising from the provision of certification services in the form of insurance policies, totaling of 2,000,000.00 kuna. The users of the service are informed in advance from the web-portal about the terms of the certification services. (Agency for Commercial Activities, 2017), hereinafter Internal Rulebook.

signatures, as well as misdemeanor provisions for qualified trust services providers aimed at the unauthorized use of an electronic signature *(Implementing Act of Regulation (EU) No. 910/2014 (18)),* 2017).

4.3. The problem of unauthorized use of electronic signature

It is precisely the area of unauthorized use of advanced electronic signature that is the biggest security problem that occurs in its application. Vulnerabilities of users computer systems which using advanced electronic signature allow unauthorized users access to a computer system and electronic signature creation tools that can lead to unauthorized creation of an electronic signature on a user's computer system or theft of a qualified certificate and related data, including a decryption key (authorization code), and in some cases, unauthorized use on other computer systems. Therefore, it is of utmost importance that the users of the electronic signature their computing systems are kept safe, including regular upgrades of the operating system, up-to-date antivirus and antimalware protection, and to implement security measures that include physical and logical protection against access to the computer system and tools for creating advanced electronic signature as well careful access to electronic content from unsafe sources, which may contain malicious software code that can lead to compromise of the electronic signature creation system. By choosing an advanced electronic signature issuer, users can also choose the technology framework used for electronic signatures because within the records of the certification service providers in the Republic of Croatia[20], [21] there is a publicly available list of norms which the service provider applies in his business.

In order to keep up with the technological development and maintain a sufficient level of technological protection in the generation of advanced electronic signatures, when is using the asymmetric cryptography system, PKI, the length of the signatory key for the electronic signature creation must be at least 2048 bits. The use of cryptographic algorithms from the class RSA / DSA is also required. National CA for the Republic of Croatia (NCARH) General Safety

20 For the compilation of the technical specifications necessary for the production of the products and their placing on the market, in accordance with the current state of technology, are in charge of standardization organizations. The ISO/IEC (International Organization for Standardization/International Electrotechnical Commission) defines the general terms and principles of security of information technology and defines a general model of assessment to be used as the the basis for evaluating the security features of information technology products. The European Committee for Standardization (CEN) has developed, as part of the European Commission's standardization requirements, the standards for qualified means for producing electronic signatures and making electronic stamps. These standards are considered to comply with the requirements of Annex II of The Regulation (EU) No 910/2014. (Commission Implementing Decision (EU) 2016/650 Introductory Statement (2-4), hereinafter Implementing Decision.

21 Article 1 paragraph 1 of Implementing Decisions stipulates that the standards for assessing the safety of information technology products that are apply to the certification of qualifying means for the generation of electronic signatures or qualifying means for the generation of electronic stamps are set out in the Annex to the Implementing Decision. (Commission Implementing Decision (EU) 2016/650)

Regulations Version 1, dated 05/11/2013 (Ministry of Economy, 2013). describes the way in which the general rules of security are prepared, guided and published. The general security rules relate to physical security, system access control, operational security, backup and data archiving, operational personnel, information confidentiality, and detailed documents relating to general security policies, including: an information system security plan, physical security plan, an incident recovery plan, software backup and data backup plan, and NCARH operating manual, and they are related to policy of information confidentiality and security policies[22]. The introduction of three-factor authentication, along with the existing two-factor authentication to whom it belongs and the use of advanced electronic signature, is one of the solutions to further increase security in security issues created by unauthorized access to the computer system of the user[23].

4.4. Trust in the online environment

As stated in the introductory statement of The Regulation (EU) No 910/2014, building trust in an online environment is key to economic and social development. Due to the lack of confidence, especially because of the feeling of legal insecurity, consumers, companies and public authorities hesitate to conduct electronic transactions and use or introduce new services. Along with other EU regulation[24] The Regulation (EU) No 910/2014 represents the pertinence of the payment industry in the EU. The European Commission held a series of meetings of independent experts with representatives of financial services providers and insurers' representatives on issues of electronic payment in cross-border finances and educating the public on the benefits of using electronic signatures. It was expressed strong support for using smartphones and other mobile devices to provide reliable use of electronic signatures (Woolfson and Terruso, 2015). In this respect, due to the speed of technological changes, The Regulation (EU) No 910/2014 needs to adopt an open approach to innovations (Council Regulation (EU), 910/2014, Introductory Statement (26)).

Despite the optimism that using of electronic signatures can have a significant impact on e-finance, Cybercrime is a growing threat. It is emphasized that mobile devices, in this sense, are particularly vulnerable. As more and more

22 National PKI Policy, Version 1.2 of 5 November 2013. determines that Security Policy is a strategic document and reflects the business needs of PKI protection. (Ministry of Economy, 2013).

23 In this regard, the Implementing Decision states that the preconditions for the security of certified products is the corresponding cryptographic algorithms, key lengths and summary functions, to ensure that electronic signatures or stamps, which are generated by qualified means for making of signatures or stamps are reliably protected from counterfeiting. Since this issue is not harmonized at European level, Member States should cooperate on an agreement on cryptographic algorithms, key lengths and summary functions in the field of electronic signatures and seals. (Commission Implementing Decision (EU) 2016/650 Introductory Statement (8)).

24 Such as eg. Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015, on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC. (Council Directive (EU), 2015/2366).

people use their smart phones for finance, the number of incidents increases considerably[25]. Commercial operators only become aware that the electronic signature methods they use must be adequate, and that certain criminals can even „break“ the two-degree authentication process. Professional users and consumers needs continuous education to keep pace with the perpetrators (Woolfson and Terruso, 2015). In this respect, in order to contribute to their general cross-border use, it should be possible to use trust services as evidence in court proceedings in all EU Member States (Council Regulation (EU), 910/2014, Introductory Statement (22)).

5. Conclusions

In the Republic of Croatia, electronic signature is subject to the regulation of a special statute which regulate the implementation of European legislation on electronic identification and trust services for electronic transactions. The use of an electronic signature fulfills all segments of information technology in a contemporary legal transactions through the authorization of electronic mail, electronic documents and electronic contracts (Katulić, 2011: 1341). Although more than 315 million Europeans use the Internet on a daily basis, less than 4% of online services are offered across national borders. For this reason, The Regulation (EU) No 910/2014 has set a new legislative framework for electronic identification and a new system of regulation and supervision for electronic service providers in the EU, which should stimulate electronic commerce and cross-border digital public services. This regulation places particular emphasis on the recognition of means of electronic identification between Member States for cross-border authentication, personal data security and application requirements for all providers of trust services and supervision of qualified service providers. Building trust in an online environment is key to economic and social development. Due to the lack of confidence, especially because of the feeling of legal insecurity, consumers, companies and public authorities hesitate to conduct electronic transactions and use or introduce new services. It is of the utmost importance that the users of the electronic signature their computing systems are kept safe, including regular upgrades of the operating system, up-to-date antivirus and antimalware protection, and to implement security measures that include physical and logical protection against access to the computer system and tools for creating advanced electronic signatures as well as careful access to electronic content from insecure sources, which may contain malicious software code that can compromise the electronic signature creation system. In order to keep up with the technological development and maintain a sufficient level of technological protection in the development of advanced electronic signatures, in use of the asymmetric cryptography system, the length

25 Some types of services, such as Internet banking, use special devices, tokens, which ensure the authentication of their users and their interactions with the banking system. The use of such authentication devices, such as tokens, or biometric technology, is common in typical and specific transactions of Internet banking. (Katulić, 2011: 1357).

of the signatory key to generate the electronic signature must be at least 2048 bits. The use of cryptographic algorithms from the class RSA/DSA is also required. The introduction of a three-factor authentication, along with the existing two-factor authentication to which it belongs and use of advanced electronic signature, is one of the solutions to further increase security in security issues created by unauthorized access to the computer system of the user. The Regulation (EU) No 910/2014 predicts the responsibility of all providers of trust services. It specifically establishes a system of responsibilities according to which all providers of trust services should be liable for any damage to any natural or legal person due to non-fulfillment of obligations under The Regulation (EU) No 910/2014 which should be applied in accordance with national liability rules. In this regard, we can conclude that electronic signature is the foundation of electronic communications and commerce and it is legally identical to a handwritten signature which must ensure the security of business communication but remain easy to use to users.

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CHAPTER 4

Sharing Economy and Workers' Protection

Ana Pošćić,[1] *Sandra Laleta*[2]

ABSTRACT

The creation of the single market in the European Union is a continuing commitment. The European Commission published a series of documents in order to facilitate its accomplishment. In the Single Market Strategy and the Digital Single Market Strategy actions are focused on different levels. One of the targeted measures concerns creating additional opportunities for consumers, professionals and businesses. The concept of a balanced development of collaborative economy is particularly stressed. This concept is also known as sharing economy, access economy or peer-to-peer economy. Sharing economy business models present new opportunities to consumers, professionals and workers in the areas that have been governed by traditional rules. The new model challenges the well-established procedures. Indeed, there are many open questions. This article puts emphasis on the impact of sharing economy on the workers' legal status and workers' protection, particularly on the category of crowdworkers.

Key words: Single Market, collaborative economy, sharing economy, crowdsourcing, workers' legal status

JEL classification: K31

1. Introduction

The creation of the single market in the European Union is a continuing commitment. In order to facilitate its accomplishment, the European Commission published a series of documents. It adopted the Single Market Act in 2011 with a series of measures to improve the European economy and create jobs, while in 2012 it issued a communication, the so-called Single Market Act II with a second set of priority actions. The main areas on which the Commission focuses are: "developing fully integrated networks in the Single Market, fostering mobility of citizens and business across borders, supporting digital

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economy across Europe, strengthening social entrepreneurship, cohesion and consumer confidence“ (Single Market Act II). The European Commission presented a new Single Market Strategy in 2015 in order to complete these goals. The main actions are dedicated to creating additional opportunities for consumers, professionals and businesses, encouraging the modernization and innovation that Europe needs and ensuring practical benefits for people in their daily lives. According to our opinion, the first action deserves particular attention, and in this context especially the rapidly developing concept of sharing economy. The model challenges the well-established procedures in different sectors. This article puts emphasis on the impact of sharing economy on workers' protection, i.e. the employment status of crowdworkers and the scope of application of employment legislation. At the outset it is necessary to define the main concept.

2. Defining the concept of sharing economy

Sharing economy is far from unusual. People have benefited from sharing since the onset of civilization. Albeit sharing has existed for centuries, the emergence of digital technologies enabled more ways of collaboration. It is a new trend enabled by technology. Sharing economy may produce economic, environmental, cultural and social advantages. The model is particularly widespread in certain sectors such as transport, accommodation and professional services, however, it is growing across the whole economy. It is also known as collaborative consumption, sharing economy, peer-to-peer economy, access economy, demand economy (Hatzopoulos and Roma, 2017: 84), gig or crowd economy. These notions are used interchangeably. There is no uniform terminology or definition. In a broader sense, sharing economy is considered to be a “part of a “collaborative consumption” … trend, where sharing is viewed as a profitable alternative to owning.” (Sprague, 2015: 3).

In his work “The zero marginal cost society” (2014) Jeremy Rifkin speaks of sharing economy as the third industrial revolution.

There are few social, cultural and economic factors that have enabled the concept of sharing economy to boost. One is certainly the technological evolution that has made transactions easier and safer. The second refers to urbanization, growth of population and the awareness of environmental issues, sustainability and the need to focus on recycling. The last one refers to financial crisis and the rise of unemployment (Hatzopoulos and Roma, 2017: 83). Changes in the consumer behavior, social networks and electronic devices have pushed the development of sharing economy.

According to a recent study, the five main collaborative economy sectors (peer-to-peer finance, online staffing, peer-to-peer accommodation, car sharing and music video streaming) have a potential to increase global revenues from around EUR 15 billion now to EUR 335 billion by 2025 (What Do You Know about the Peer-to-peer or Sharing Economy?, 2016).

It all started in the US in 1999 with the originally non-profit organization aiming to match people who had an empty couch with people who wanted to travel cheap (Couchsurfing). It inspired the creation of AirBnB and turned it into a big business (Hatzopoulos and Roma, 2017: 84). The term was first used by Lessig who defined it as the "collaborative consumption made by the activities of sharing, exchanging, and rental of resources without owning the goods" (Puschmann and Alt, 2016: 95).

Collaborative economy according to the Commission "refers to business model where activities are facilitated by collaborative platforms that create an open marketplace for the temporary usage of goods or services often provided by private individuals" (A European Agenda for the Collaborative Economy, 2016: 3). Three groups of individuals are involved: service providers, users of those services and intermediaries that connect them ("the collaborative platforms").

Sharing has, of course, been around forever – and many industries offer alternatives to ownership. As a model, according to the research of PricewaterhouseCoopers LLP (2015), sharing economy is distinguished from other industries by these cornerstones: The first one concerns digital platforms as sharing economy business models are hosted through digital platforms. The definition of a platform depends on whether a platform only provides an information society service or is offering other additional services. The second one concerns the transaction costs connected with ownership. Everything is based on easier and open access. Transactions using sharing business models implicate deeper social interactions. The last one is the so-called "a platform of experience". The value of the brand increases depending on social connections, convenience and confidence. The focus is more on trust then imbursement.

We can see that there are certain key elements: digital platforms, emphasis on accessibility, peer-to-peer transactions, capitalizing of the unused capacity, self-regulation (Hatzopoulos and Roma, 2017: 85), improvement of trust and transparency and the creation of greater value. The collaborative economy has many advantages. It can allow a more efficient use of resources and skills.

Some surveys indicate that participation levels in the collaborative economy are already high in some sectors of the economy and have the potential to spread even further. Current estimates indicate that 68% of adults globally are willing to share or rent goods for money. (Global Consumers Embrace the Share Economy, 2014). The sharing economy has, according to one estimate, the potential to add EUR 160-572 billion to the EU economy (A European Agenda for the Collaborative Economy, 2016: 2).

The importance of the collaborative economy has also been recognized in the Digital Single Market Strategy for Europe (2015) in the context of the action on platforms. It is necessary to assess the role of platforms in terms of transparency, data protection, relationship between platforms and suppliers, possible obstacles on the movement from one platform to another and problems with the unlawful content on the Internet.

Although sharing economy models offer many new ways of transactions comparing to traditional models, the well-established rules may not be suitable for those models. The known legal frameworks often do not fit the new relationships and models. Likewise, there could be problems with the applicable rules.

The Commission speaks of "complex ecosystems of on-demand services and temporary use of assets based on exchanges via online platforms" (Upgrading the Single Market, 2015). According to the Commission there are a lot of open questions. One of them concerns possible regulatory burden in form of necessary business authorizations and registration obligations. The collaborative platforms and service providers must have an open market access. Any requirement for business authorization has to be justified, proportionate and non-discriminatory. The next question is connected with uncertainty the consumers are facing. Problems in relation to information asymmetry or a weaker bargaining position may emerge in these transactions. Also, the distinction between business and consumers may sometimes be blurred, so we can ask who in fact is the weaker party in need of protection. The next question reflects the problems of liability as platforms take no responsibility other than to facilitate a transaction between a provider and user. Sharing economy poses a number of additional wider questions.

The collaborative platforms promote new employment opportunities. These implicate the development of an on-demand economy and the impact this has on workers. (Communication, 2015). It is a move towards flexible employment relationships in comparison to regular traditional, standard employment relationships, based on a contract of employment for indefinite time, with full time and usually from employer's premises. The impact of digitalisation on work organization, content of jobs, job opportunities and labour market in general is a growing phenomenon, hence we speak of a "'platformisation' of labour" (Houwerzijl, 2015: 1), or even "Uberification" (Wertz, 2015). 'Platformisation' of labour' by virtual network organisations and 'ICT-based mobile work' that takes place outside the employer's premises are two manifestations of digitalisation of work. They "cannot be fully separated from one another, but instead represents a continuum, ranging from partially to fully digitalised work places and employment relationships." (Houwerzijl, 2015: 1). In following sections the authors outline and analyse the most important issues concerning one of the atypical forms of employment, namely crowd employment. A more in-depth discussion would go beyond the scope of this paper.

3. Crowdwork – notion and specificities

Crowdwork (crowdsourcing or crowd employment) is "an employment form that uses an online platform to enable organisations or individuals to access an indefinite and unknown group of other organisations or individuals to solve specific problems or to provide specific services or products in exchange for payment ... It is a new form of organizing the outsourcing of tasks, which would

normally be delegated to a single employee, to a large pool of 'virtual workers'." (Eurofound, 2015: 207). The key element of this new form of employment is a technology - online platform (an internet based 'crowdsourcing platform') that enables a (generally) large group of prospective workers (the 'crowd') to perform certain work, a task (subtask) or a service. The platform provides the crowdworkers and supplies the infrastructure for tasks that have to be completed (Risak, 2016: 95). Therefore, it is defined as 'a *socio-technical work system* constituted through a set of relationships that connect organisations, individuals, technologies and work activities'. (Kittur, 2013: 109).

Crowdwork is interesting for companies as a way to engage a workforce potential not available with other forms of work; to increase efficiency and save costs; as an alternative to outsourcing and temporary agency work that are also based on conventional employment relationships; as (frequent) involvement of crowdworkers as freelancers that provide services independently and with sole responsibility for the work result etc. (Risak, 2016: 95; Felstiner, 2011: 151ff). On the other hand, crowdwork is attractive for workers as a way to reconcile work and family responsibilities, to provide extra money besides other regular work, because of the freedom to choose the place, time and the content of work, for learning opportunities, social exchange, the opportunity for self-marketing etc. (Risak/Warter, 2015: 4; Klebe/Neugebauer, 2014; Eurofound, 2015: 114).

Two types of crowdsourcing can be differentiated: internal and external. In case of internal crowdsourcing "the crowd comprises a company's internal workforce", and therefore usually poses fewer fundamental problems. In case of external crowdsourcing, what is the topic of this paper, the employer (crowdsourcer) uses the crowdsourcing platforms that already have an active crowd. The tasks that can be completed through the external crowdsourcing range from very simple, repetitive activities (e.g. labelling and creating descriptions for images, categorizing data and products, translating or proofreading short texts, performing internet research etc.) that include low pay, highly standardised and automated processes, to more complex, time-consuming tasks (testing software products, designing products, writing programme code etc.) (Risak 2016: 94; Felstiner 2011: 148ff).

Further, two forms of work can be differentiated (European Parliament 2016: 1). If the workers use a platform as a digital resource to perform the same work or a service, it is a "virtual service", that is transmitted via internet and can be performed anywhere in the world (e.g. translation tasks or accounting). If a platform mediates "physical services" (not digitalized work) that should be always performed locally, e.g. plumbing, driving passengers or childcare, those services are "work on-demand via apps/internet" (Aloisi, 2016: 653ff). According to De Stefano, despite the differences, both forms share some similarities: both are enabled by IT and make use of the internet to match demand and supply of work/services at an extremely high speed, the risk of dehumanization of labour, possibility to shift risks and responsibilities to individual workers, the in-

security of income, the problem of lack of social security coverage (De Stefano, 2016: 473ff).

In comparison with standard employment, the crowd employment encompasses complex, multilateral contractual relationships. Due to its heterogeneity, it is difficult to describe a unique or simple scenario and its actors. The manner in which tasks are offered on the platforms (e.g. in a form of a competition between the crowdworkers), as well as the interests of the crowdworkers (that could be divided on: those who have other sources of income; those for whom the crowdwork is the only or the main source of income; those excluded from the labour market due to disabilities and social exclusion) vary (Risak, 2016: 94-95).

In a very simplified scenario the 'employer' (user, client, buyer, crowdsourcer) is a party for whom the crowdworker (seller, provider) performs work (task), or provides services. These two parties usually do not enter into a direct contact, but make contact through the platform. (Risak, 2016: 94). In general, the platform acts as an intermediary or agent, without becoming directly involved in the business between the employer (client) and a crowdworker. Their relationship is, on the other side, often based on a bilateral agreement, rather than a formal contract (Eurofound, 2015: 109). As the complexity of the crowdwork depends on a platform set-up, further elaboration is needed (see *infra* 4).

Therefore, legal problems arising from crowdwork are the main topic of debate of legal scholars. From the employment law point of view, most important are the questions of the qualification of crowdworker (De Stefano, 2016: 471ff; Bjelinski Radić, 2017: 888) - which is most discussed - as well as the identification of the responsible employer who would enable the allocation of rights and responsibilities (Prassl/Risak, 2016: 619ff).

It must be emphasised that from the very beginning one of the most burning issues among many controversies about 'sharing economy' concerns the dispute over eroding labour security and inequalities (Codagnone/Martens, 2016: 17). The research carried out by Eurofound has found that, on one side, even though the crowd employment platforms were regulated by the general legal framework (commercial and civil codes, consumer protection acts and data protection legislation), there was no evidence that "any legal or collectively agreed framework specifically addressing crowd employment in Europe" exists. On the other side, the research has shown that crowdworkers perform work as self-employed, whereas economic independence is assumed. Consequently, labour law regulation does not apply, and crowd workers are not entitled to a minimum wage, paid annual leave or a compensation of wage in case of sickness (Eurofound, 2015: p 109). In general, the pay, working conditions and other issues (e.g. intellectual property rights) are determined either by the individual agreement of the client and worker, as the contracting parties, or the terms and conditions of the platform (Klebe/Neugebauer, 2014: p 5ff). The ILO concluded that "the platforms are not regulated by governments but … rather, the platforms regulate the market" (Berg 2016: 18).

4. The legal status of crowdworkers – Self-employed or workers?

One can agree with the widespread opinion that crowdsourcing is "the biggest paradigm shift in innovation since the Industrial Revolution" (Kaufman, 2008). In comparison with the standard employment relationship, crowdworkers perform work in a cyberspace workplace, often anonymously, with no physical job site. "Crowd work is characterized by many-to-many connections, with some connections lasting as little as a minute or two." (Felstiner, 2011: 145-146) The platforms see themselves as digital agents, that connect customers and independent contractors, and their terms and conditions vary from country to country, always pursuing identical aims – the denial of worker status. On the other hand, the platforms exercise significant control, from setting wages to specifying and supervising how the work should be done (Prassl/Risak, 2016: 619).

Crowdwork seems to challenge the boundaries of labour and social protection and of employment relationship (De Stefano, 2016(a): 463). It has brought about the problem of determining the scope of labour law legislation (employee-protective) norms: are crowdworkers workers deserving of labour law protection, or self-employed, independent contractors, or a genuinely novel form of work that deserves its own legal status and regulatory apparatus? (Prassl/Risak, 2016: 619ff).

"All systems of labour law draw a fundamental distinction between employment which is categorised as 'dependent' or 'subordinate' and that which is 'independent' or 'autonomous'. (Deakin/Morriss, 2012: 145). In most legal systems protective labour law provisions apply to workers (employees), persons that perform work personally, for a remuneration, in a relationship of personal subordination to the employer. The persons who work as independent contractors are usually not covered by those protective provisions. The distinction between self-employed and subordinate workers, a cornerstone of labour law, has raised difficult questions and has remained largely undefined. Various tests have been developed in civil and common law jurisdictions in order to make distinction between the self-employed worker and the employee. (Engels, 2014: 361-373). Those tests "refer to a host of factual circumstances on the basis of which decisions are being taken to label a given work contract either as an employment contract or as a contract for the independent delivery of services. None of the characteristics or facts seem to be determinative themselves." (Engels, 2014: 371).

Under the 'actual control test', one of the early tests, it is required that the employer, the entity, legal or natural person, actually controls (either personally or through the intervention of supervisors) the work performed by the worker. As this test became inadequate to protect workers who have skills that make them independent of the business enterprise, the courts developed the test of the employer's ability to exercise control. Afterwards, the economic dependency test was developed, in which the judges look at the existence of the economic dependence, i.e. the fact that the worker is dependent on his/her income from

work to survive. The most used is a hybrid (mixed technique test) test, in which judges apply all the previously mentioned tests (Engels, 2014: 371-373).

The important instrument in this field is the ILO Employment Relationship Recommendation No. 198 (2006) which invites the ILO Member States to formulate and apply a national policy for reviewing and, if necessary, clarifying and adapting the scope of labour laws and regulations in order to guarantee effective protection for workers in an employment relationship. Members may consider clearly defining the conditions applied for determining the existence of an employment relationship. In this document subordination or dependence is given as an example. It should be emphasised that this criterion is one of the crucial ones used in practice in determining the existence of employment relationship. The Recommendation also enumerates a number of specific indicators for determining the existence of the employment relationship, e.g. "a) the fact that the work is: carried out according to the instructions and under the control of another party; involves the integration of the worker in the organization of the enterprise; is performed solely or mainly for the benefit of another person; must be carried out personally by the worker; is carried out within specific working hours or at a workplace specified or agreed by the party requesting the work; is of a particular duration and has a certain continuity; requires the worker's availability; or involves the provision of tools, materials and machinery by the party requesting the work; (b) periodic payment of remuneration to the worker; the fact that such remuneration constitutes the worker's sole or principal source of income; provision of payment in kind, such as food, lodging or transport; recognition of entitlements such as weekly rest and annual holidays; payment by the party requesting the work for travel undertaken by the worker in order to carry out the work; or absence of financial risk for the worker." (section II.13). According to the principle of 'primacy of facts', recalled in the Recommendation, "the determination of the existence of an employment relationship should be guided primarily by the facts relating to the performance of work and the remuneration of the worker, notwithstanding how the relationship is characterized in any contrary arrangement, contractual or otherwise, that may have been agreed between the parties". Consequently, the judge has to take into consideration all the relevant facts and the circumstances of the case, giving primacy to the reality of the facts over the legal qualification of the contractual parties (Grgurev, 2017; Senčur Peček/Laleta, 2018).

Searching for the answer about the legal status of crowdworkers, one of the approaches is the analysis of different types of contractual relationships associated with the typical crowdsourcing set-ups (Risak, 2016: 96ff; Felstiner, 2011: 168ff). If the crowdsourcing platform acts solely as a broker (agent), a direct contractual relationship exists between the crowdworker and the crowdsourcer (client). It is generally a contract for services. Its content is largely determined by the standard contractual forms and terms and conditions provided by the crowdsourcing platform. As the platform has strong influence on these relationships, it can be argued that in reality it is "a covert contractual relationship between the crowdworker and the platform." (Risak, 2016: 97).

If the crowdworkers are registered with the platform and the task is taken on, the general terms and conditions of the platform apply. Placement of the task on the platform represents an offer to the crowd or may be considered only an offer to the crowd to make an offer. The contract is concluded when the task completed by the worker is accepted by the platform. Both contract partners shall have the right to reject services. This contract can be classified as a contract of employment or a contract for services, depending on the intensity of the influence the contractual partner has on the work performed (Risak, 2016: 97-98).

If the platform serves as intermediary (providing infrastructure) between the crowdworker and the crowdsourcer, this represents "a placement service", for which only the crowdsourcer pays. It does not represent temporary agency work due to the lack of integration of the worker in the crowdsourcer's business, and of managerial prerogative and control by the crowdsourcer. (Risak, 2016: 98).

When the crowdworker performs work for the platform, it is deemed to constitute an employment relationship if the work is done in a relationship of personal dependency. The worker should be "integrated into an external operational body and be subject to the right to instructions on the part of the recipient of the service" (Risak, 2016: 98). Even though the contractual relationship is often of a very short duration and the performance takes place at a separate location over the internet, according to Risak, it "is important whether this takes place in a kind of 'virtual workshop', i.e., using an interface provided by the crowdsourcing platform, and whether it involves monitoring mechanisms" (Risak, 2016: 98, 99). Also important are opportunities for disciplining the crowdworker through ratings on platforms (Risak, 2016: 99; Bjelinski Radić, 2017: 895ff), and determination of work-related behaviour (e.g. through the specification of allotted time), that "equals 'classical' personal dependency necessary for an employment relationship" (Risak, 2016: 99). A specificity of crowdwork is the often extremely short duration of the contractual relationship (the task often takes some minutes), but this can be compensated by a high level of external control (e.g. regular screenshots or automated analysis of the workflow) (Risak, 2016: 99). We can conclude that a spectrum of different indicators should be used in order to determine the existence of the employment relationship.

In literature a different approach to legal problems arising from crowdwork can be found that adopts a functional concept of employer that analyses which party, if any, in the multilateral contractual relationships that characterize this type of work can be identified as responsible employer. The main functions and their functional underpinnings of the employer are: inception and termination of the employment relationship; receiving labour and its fruits; providing work and pay; managing the enterprise – internal market, managing the enterprise – external market. "It is the ensemble of the five functions that matters: each of them covers one of the facets necessary to create, maintain, and commercially exploit employment relationships, thus coming together to make up the received legal

concept of employing workers or acting as an employer – and being subjected to the appropriate range of employee-protective norms." (Prassl/Risak, 2016: 620, 636). On the other side, Sprague argues in favour of "the classification test that focuses not on the dependence of the workers on the employer, but the dependence of the employer on the workers. If the enterprise arranging all of these individualized tasks and services is dependent on the service providers for its existence, then those service providers should be considered employees of the enterprise." (Sprague, 2015: 23).

5. Working conditions

In general, the working conditions of the crowdworkers seems to be poor, including low and insecure remuneration, legal insecurities, job insecurity, potentially unfair terms and conditions of work etc. (Risak/Warter, 2015: 3).

Eurofound's survey research has found that the pay of crowdworkers is extremely low. For example, 25 % of the tasks offered at Amazon Mechanical Turk are valued at $0.01, 70% offer $0.05 or less, and 90% pay less than $0.10, what is equal to an hourly rate of around $2. Czech Topdesigner.cz offers tasks that are small in scale, with an average pay of $200, while the worker who performs work for German Clickworker can earn $200 – 400 per month, for about 30 hours of work. (Eurofound, 2015: 115). For comparison, it seems that the workers that provide physical/local services ('work on-demand') earn more per hour than the workers – suppliers of virtual services, and high-skilled workers more than low-to-medium skilled workers (European Parliament, 2016: 9). Furthermore, there is insecurity whether work, that is not continuous or regular, will always be paid (Eurofound, 2015: 115; Felstiner, 2011: 167). Consequently, crowdwork is often precarious work (Bodiroga-Vukobrat et al., 2016).

As self-employed, crowdworkers lack representation. Other negative aspects include the possibility of privacy violation and the lack of support from colleagues and managers (Eurofound, 2015: 115). According to OSHA, platform work has an impact on health and safety of workers, because they are exposed to psychosocial risks that are still unknown and in need of further investigation (OSHA, 2015: 2).

In 2016 the platforms in Europe had around 100,000 active workers (representing 0.05 % of total employees in the EU). (De Groen/Maselli, 2016: I). Development of crowdwork in Croatia is marginal. The most known platform is Uber. An individual can perform work as the driver-partner, a self-employed person (craftsman or a simple private limited liability company), but also as the employee of rent-a-car businesses that perform work for Uber. Uber Croatia d.o.o. (LLC), registered in Zagreb, in 2016 had an income of 4.2 million kunas (around 564.000 €) and a profit of 232.700 kunas (around 31.234 €) (Jutarnji list, 2018). Several platforms offer job performance. In addition, there are several applications for students' employment (e.g. 'yourJob', Danasradim.hr), the platform for youth employment Get Ready 4 Work etc.

It must be emphasised that platform work does not attract persons who are unemployed or inactive, but the under-employed or the self-employed, wishing to work more, and unable to find full-time employment. Two studies suggest that the individuals from the socially most excluded groups are neither aware of the digital labour possibilities, nor have the necessary skills to participate in them (European Parliament, 2016: 8).

6. Conclusion

The emergence of crowdwork in Europe is a relatively recent phenomenon with permanent growth, not only because of the economic and financial crisis, but also due to the modern technologies that offer opportunities especially in light of the need to reconcile private and work life and for those looking for alternative forms of employment (Eurofound, 2015: 111).

The legal employment status of crowdworkers is the central issue of the scholarly debates and research studies which advocate different approaches. According to the authors of this article, the crucial issue is to determine whether the crowdworker performs this type of work as self-employed or as a worker in a relationship of personal subordination or dependence. The well-known spectrum of indicators or tests should be used in order to determine the existence of the employment relationship. The most recent decision of the Court of Justice of the EU in the case *Uber* (Case C-434/15 *Asociación Profesional Elite Taxi v Uber Systems Spain SL*) will have the implications on the legal status of workers. For the sake of the protection of the army of people engaging in crowdwork every day, the question is "how do we ensure that workers have access to decent labour and social protection whilst engaging in platform work." (De Stefano, 2016(a): 462). These forms of employment are a necessary element of modern labour markets, but as they pose an inherent danger to the working conditions and the labour market they should be addressed through legislation and regulation (Eurofound, 2015: 144).

In the wider context of sharing economy in general, the dilemma is of regulation versus innovation. While some minimum rules are needed, too much regulation could stifle innovation (Hatzopoulos/Roma, 2017: 126). We are more in favour of innovation. Sharing is not a novel concept, but with digital tools it has been given completely new potentials. This model has disrupted all sectors and has changed the way we work. It is necessary to understand the new definitions in order to be able to detect possible problems and offer clarification and possible solution. The concept of sharing economy allows occasions for increased efficiency, growth and jobs, however, it also increases regulatory problems (A Digital Market Strategy for Europe, 2015: 7), calling for the adoption of a balanced solution.

To date, there has been no regulation of this model in the EU. The EU opted for a fragmentary approach. Most of the older legal concepts are not well adapted

to sharing economy. We should not overregulate it, but, on the other hand, certain minimum rules are necessary. The question is should we regulate it at all or maintain the current state and see what happens. This can be seen in the transportation sector. There are legal battles concerning safety conditions, unfair competition and particular labour law issues.

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Appendix

Skills	Definition in Digital Competence Framework
Information skills	Identify, locate, retrieve, store, organise and analyse digital information, judging its relevance and purpose.
Communication skills	Communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.
Problem solving skills	Identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update one's own and others' competences.
Software skills	Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences

Table A1. Skills in Digital Competence Framework

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.822
Bartlett's Test of Sphericity	Approx. Chi-Square	357.373
	df	36
	Sig.	.000

Table A2. KMO and Bartlett's test

PART 2

INDUSTRY 4.0 AND BEYOND

DIGITAL SINGLE MARKET IN EUROPE / SOCIAL AND LABOUR MARKET ISSUES IN DIGITAL WORLD

CHAPTER 5

Selecting location for a new business unit in ICT industry

Sanja Marinkovic[1], Ilija Nikolic[2], Jovana Rakicevic[3]

ABSTRACT

Location theory is studying how location is impacting any economic activity, trying to answer where operations should settle and what is the reasoning behind such decisions. The aim of this paper is to discuss and prioritize the key location determinants for successful selection of an optimal location in ICT industry and to emphasize the importance of this concept in ICT sector, given the trends and changes global economy is facing, specially today with digitalization and big internet revolution. The initial determinants were formed based on the literature review and evaluated through two round Delphi study among experts from ICT companies in Serbia. The second goal of the study was to reach consensus about relative importance between agreed determinants. According to the obtained results using AHP decision making model, the first priority in location selection in ICT industry is human resource availability, second priority should be placed on the political and economic environment and the third priority should be placed on the competition. It can be concluded that political and economic strategies are starting to play a bigger role in ICT market, as governments are getting more interested in this industry. The study confirmed that due to a shortage of supply and fierce competition in the ICT sector, the concept of location selection is an important success factor for sustainable growth and development of ICT organizations.

Key words: Location determinants, Delphi study, AHP decision-making, ICT industry

JEL classification: D70, L21, M15, M21, R39

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1. Introduction

In predicting a long-term survival and growth, location has always played a vital role. Due to shortage of supply and fierce competition in the ICT sector, over recent years the concept of location selection has been recognized as a key success factor for sustainable growth and development of ICT organizations. ICT sector serves as an intermediary between customers, and MNCs enabling a company to establish an online presence and global reach. Staying competitive in today's terms means that services should be available to customers in a few clicks, being capable to process huge amount of data in real time for accurate decision making. Also, it implies having backend systems that can manage effectively the production, inventory or other areas of business.

Location theories are studying how geographic location is impacting any economic activity. The main question that this theory tries to answer is where should economic activity settle and what is the reasoning behind such decision. Given the internet and true integration and collaboration on global level it is interesting to discuss if location in this sense has still equal importance in the ICT industry as before the big "WWW" revolution. The aim of this paper is to discuss and prioritize the key determinants for successful selection of an optimal location in the ICT industry and to emphasize the importance of this concept in the ICT sector given the trends and changes global economy is facing, particularly ICT sector.

2. Literature review

The sector of Information and Communication Technologies (ICT) is one of the key instruments for the development of an economy (Muñiz & Cuervo, 2014). As a consequence of such growth, the competition on this market became fierce. The rapid growth in total employment of specialists in this area confirms the increasing importance of ICT in the global economy (European Commission, 2017). Providing the services of best quality while keeping the costs in control is the formula for success. As an appealing solution for the management of ICT companies the outsourcing strategy is often chosen. In this setup companies retain only their most experienced engineers and managers, while all the other responsibilities are given away to the supplier, usually coming from a less developed country where costs are typically lower than in the home country of the company.

However, with this trend, another challenge emerged where the demand for highly capable software engineers is now larger than the general supply on the markets. Hence, for outsourcing companies to grow, they have to choose an optimal location, where the long-term success and stability is possible. Company location can be defined as a geographical and central place for the company to realizeit's all basic occupations and to carry on relations with its close and far environs (Burdurlu & Ejder, 2003). Location choice is a strategic decision

which has an influence on revenue and costs also, and the main question for starting a business is where to locate a facility, particularly in this age of global markets and global production (Gusavac, Stojanovic, & Kuzmanovic, 2013). 'The location theory of business locations applies explicitly to the choice of the location to establish a business' (Noort & Reijmer, 1999). The developmentof teheories in this field recognized the following: 1. (Neo) Classical location theories: Land use, Industrial Location (Weber and Isard), Central Places (Christaller andLösch), Spatial Competition (Hotelling); 2. Behavioral location theory; 3. Institutional Approach, 4. Agglomeration Theory (alaMichael Porter Cluster Theory). In general, within economic geography, neo-classical, behavioral, and institutional location theories are used to explain firm migration (Pen, 1999).

ICT sector serves as an intermediary between customers and MNCs enabling a company to establish an online presence and global reach. Staying competitive in today's terms means that their services should be available to customers in few clicks, being capable to process a huge amount of data in real time for accurate decision making, and having backend systems that can manage effectively the production, inventory or other areas of a business. The service sector is now a major component of the global economy, particularly in the majority of developed countries. Because of its advantageous capabilities to dramatically accelerate communication speed and increase information channels, ICT saves costs while increasing the output and quality of most service productions. Since the ICT is becoming ever-so-important in the service industry, it is common that every such company has an ICT department of their own. To further cut the costs, companies are also turning to outsourcing as a business strategy.

IT outsourcing, defined as the process of commissioning part or all of an organization's IT assets, people, and/or activities to one or more external service providers, has emerged as a viable option in information systems management (Lee, 2006) There is still an ongoing debate in business management world whether outsourcing is a successful strategy, and if it is applicable for any business case. Primary motivators for such strategies are also changing. Furthermore, as the motivations of outsourcing are increasingly evolving from cost reduction to business performance improvement, it is crucial for organizations to align their outsourcing strategy with their business strategy (Lee, 2006). However, according to another paper, "many business organizations often treat outsourcing as de facto solution, based on assumption, that savings will be achieved without in-depth analysis of the real strategic and economic factors and values" (Boguslauskas & Kvedaravičienė, 2015).

Even today outsourcing as a strategy is a debatable topic among business professionals. It is also mentioned in the journal article as "very topical issue" (Andone & Pavaloaia, 2010, p. 164). While it can be very successful, outsourcing can prove to a be very difficult challenge to achieve. Majority of reasons may be connected with the way a company decided to opt for a strategy of outsourcing.

“A survey conducted by KPMG International shows that 42% of outsourcing agreements are based on a formal framework designated for benefits assessment at the strategic level of the enterprise.

2.1. Location selection factors in ICT context

To identify factors or criteria for location choice it should start from product or service characteristics and business sector (Stojanovic, 2005). In the case of this paper, the main interest is put on ICT industry. This industry, depending on a segment, can be categorized as the production as well as a service industry. Further, within the production segment, ICT companies may be involved in production of for end-users (e.g., personal computers) or their core business may involve production of certain high technology parts (e.g. computer processors). On the service end of the spectrum, ICT companies may further differentiate based on for whom they provide the services, end customers or to intermediates. In case of outsourcing companies, as analyzed in the previous section, services are not being offered directly to the customers. Rather, the company which is outsourcer is providing the value for end-customers. Based on this differentiation factors for location selection in the ICT context may differ. In the table below general factors for business location selection are presented.

Major factors	Sub-factors
Costs	Fixed costs; transportation costs; wage rates and trends in wages; energy costs; other manufacturing costs; land cost; construction/leasing costs and other factors (e.g. R&D costs, transaction and management costs etc.)
Labor characteristics	Quality of labor force; availability of labor force; unemployment rate; labor unions; attitudes towards work and labor turnover; motivation of workers and workforce management
Infrastructure	Existence of modes of transportation (airports, railroads, roads and sea ports); quality and reliability of modes of transportation; quality and reliability of utilities (e.g., water supply, waste treatment, power supply, etc.) and telecommunication systems
Proximity to suppliers	Quality of suppliers; alternative suppliers; competition for suppliers; nature of supply process (reliability of the system) and speed and responsiveness of suppliers
Proximity to markets/ customers	Proximity to demand; size of market that can be served/potential customer expenditure; responsiveness and delivery time to markets; population trends and nature and variance of demand
Proximity to parent company’s facilities	Close to parent company

Major factors	Sub-factors
Proximity to competition	Location of competitors
Quality of life	Quality of environment; community attitudes towards business and industry; climate, schools, churches, hospitals, recreational opportunities (for staff and children); education system; crime rate and standard of living
Legal and regulatory framework	Compensation laws; insurance laws; environmental regulations; industrial relations laws; legal system; bureaucratic red tape; requirements for setting up local corporations; regulations concerning joint ventures and mergers and regulations on transfer of earnings out of country rate
Economic factors	Tax structure and tax incentives; financial incentives; customs duties; tariffs; inflation; strength of currency against US dollar; business climate; country's debt; interest rates/exchange controls and GDP/GNP growth, income per capita
Government and political factors	Record of government stability; government structure; consistency of government policy; and attitude of government to inward investment
Social and cultural factors	Different norms and customs; culture; language and customer characteristics
Characteristics of a specific location	Availability of space for future expansion; attitude of local community to a location; physical conditions (e.g., weather, close to other businesses, parking, appearance, accessibility by customers, etc.); proximity to raw materials/resources; quality of raw materials/resources and location of suppliers

Table 1. Summary of major factors and sub-factors affecting international location decision (adapted from Gusavac, Stojanovic, & Kuzmanovic, 2013)

Given that one of the main reasons for opting for outsourcing strategy is cost reduction, costs as a location factor may have a critical role. ICT is a knowledge intensive industry, where the success of company usually relies on how capable the workforce is. Therefore, labor characteristics should play a significant part in the decision. Infrastructure factors may also play important part since ICT companies (especially the outsourcing ones) depend on reliable infrastructure when it comes to transportation and telecommunication systems. Similarly, it can be seen that for outsourcing company most of the factors and sub-factors are relevant.

3. Research methodology

Introducing the problem of location selection in the ICT industry implies the understanding of contributing determinants to such decision. The initial determinants were formed based on the literature review and conducted Delphi study among experts from ICT companies in Serbia. The study was designed to offer initial determinants for the defined problem leaving the option to the experts to extend the initial list or agree to the same. The conclusion was that consensus was reached around same determinants as originally proposed. The second goal of the study was to reach consensus about relative importance between agreed determinants. The initial determinants were defined based on literature review and analysis. Figure presents the starting point, from which it was deduced which determinants should be included in the model. In the study, they were grouped in three principal areas: quantitative, qualitative and other. Twelve determinants for choosing an optimal location for opening a new business unit in ICT industry are capital investment costs, transportation costs and operation costs from quantitative perspective, political and economic environment, legal framework, competition, and suppliers from qualitative perspective, and human resources availability, infrastructure availability, and cultural compatibility in the last group.

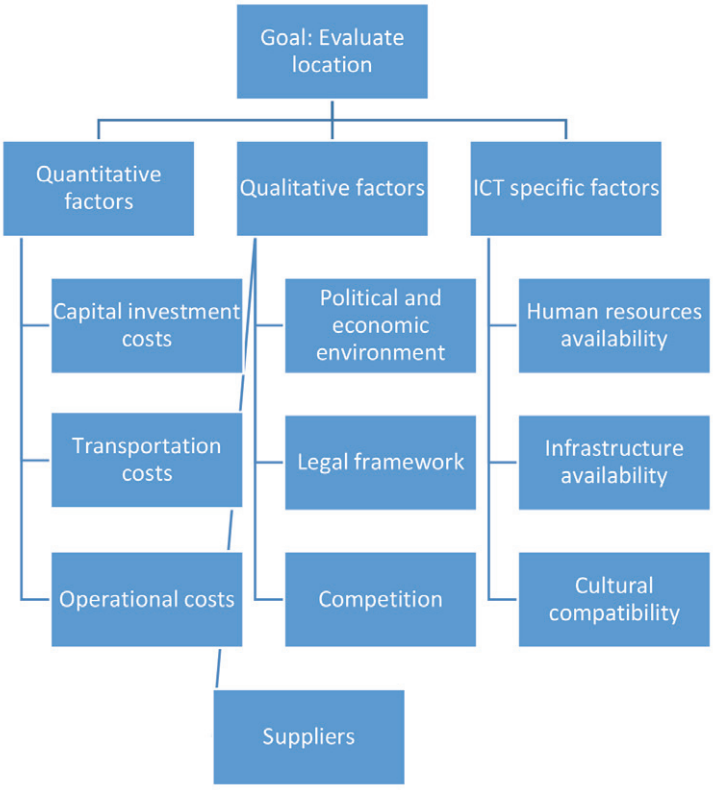

Figure 1. Research framework for location evaluation in ICT industry

MNC's commonly capitalize on foreign business opportunities by engaging in foreign direct investment (FDI), which is investment in real assets (such as land, buildings, or even existing plants) in foreign countries (Madura & Fox, 2011) The costs generated as a direct result of FDIs are capital investment costs. Since in the ICT industry the trend of outsourcing is evident, and was ellaborated more in the previous chapter, this determinant should be analyzed with foreign perspective emphasized. Though, the same costs apply when the company is investing localy.

It is also important to understand that capital investment costs can be influenced by other factors like economic and political circumstances of the particular market. For example, costs may be lower due to subventions programe the goverment defined to encourage foreign investments into local ICT sector. Another example would be the progressive tax policy where the initial investment may look appealing to the investor, but after more thorough evaluation it could turn out that projected benefits are not compesating the real costs. Most consumption requires either the conveyance of finished goods or the transfer of people to the points at which goods and services are supplied (Stephen J. Redding, 2014).

The conveyance of goods in ICT sector has a different meaning, though, since the final product of the ICT industry is located in virtual space and can be transfered via internet. Similar analogy could be made for raw materials and fuel, since the only inputs ICT really needs is electricity and internet connection. These costs are influental, but should be analyzed as part of operational costs. However, since ICT is primarily a service industry, distance between delivery centers and customers may impact the costs. Further, the location of the company relative to the labor may also result in higher transportation costs on regular basis in order to enable employees to deliver final products or services.

According to the Corporate survey from 2009 it was concluded that the labor costs is the single most important factor in site selection decision. Increasing consumer demand for lower-priced products is driving companies to find ways to lower manufacturing costs. Companies have been forced to look at ways to control and reduce operating costs such as labor costs, inbound/outbound shipping costs, utility costs, corporate tax rates, occupancy costs, and other factors - most of which were also listed as top-10 factors in the Area Development Corporate survey (Michelle Comerford, 2017).

Similar trend is found in the ICT industry, where labor costs are the most significant part of operational costs. In order to reduce their costs ICT companies from US or Western Europe are rellocating their development centers towards countries with cheaper labor force. The demand is significantly higher than the supply on the ICT labor market. Therefore,the employees from ICT companies are used to extra benefits not usually found among companies from other sectors such as flexible working hours, working from home policies, benefits packages etc. Since there is not enough ICT professionals available on the

labor market, companies are investing extrain effort in order to attain and retain talents. This is also a determinant in operational costs which could impact the decision for choosing an optimal location. Other significant operation costs for an ICT company is related to the infrastructure and software required for development. However, compared to the labor costs, those are less significant.

When considering the political factors, a company needs to evaluate the amount of influence a government has on the economy. Those factors may include tax policy, trade restrictions, and tarrifs, etc. On the other hand, country stability and risks related to country risks (such as hostile takeovers, wars, sanctions, etc.) need also be taken into account. Every country also has a strategy of growth. This strategy may involve the production of some products or services to be demerited, while others to be supported by subventions, government loans or other means. In general, measures of fiscal policies may also be considered as part of political environment.

On the other hand, the economic factors are more quantitive indicators of the market and can be viewed as a quantitie prospect of a country. These may include growth of GDP, and the three main economic indicators, the interest rates, exchange rates, and the inflation rate. These factors can influence greatly how the busness operate in specific markets.

In the case of ICT industry we can see that the importance is recognized by all conuntries of the world in various extent. This is expecially the case for the developing countries as supported by the analysis of the European Parlament:

While the legal framework is also impacted by the government and is consisted of several different elements, the political and economic factors are oriented on the government from the perspective of foreign trade policies and fiscal policies. Legal elements may include employement regulations, competitive regulations, health and safety regulations, product regulations, antitrust laws, patent infringements etc. Respecting those regulations is even more complex in case of multinational corporations which are doing businesses in different conutries, even different continents.

Company that has a similar target group in the same industry with similar products can be considered as a competitor. Factors which are influencing the level of competitveness can be extracted. Those may include, but not limited to, cost of production, price of final products, marketing activities, customer loyalty, and access to technology.

In Porter's Five Forces model special attention is given to the suppliers. They are companies that supply raw materials, equipment, machinery, associated services and labor (Indiatsy, et al, 2014). In the Porter's model the barganing power of suppliers is seen as a force that may impact the competiteveness of a company. Suppliers can influence company's price, quality, and overall delivery.

An ICT industry is an industry which is very dependent on highly educated human resources. In process of creating software, rather than using raw materials and production facilities, everything is happening in the mind of software

engineers which is then transfered to an executable code. There is a trend in the world of shortage for softare engineers. Therefore human resources are becoming a bottleneck in meeting the market demand for software products. In the published paper key human resource challenges in one of the greatest centers of software industry, India, are ellaborated and studied. Those include managing human resources in a globally distributed team, shortage of software professionals having sufficient knowledge and competencies, low-skilled nature of the work, lack of well-developed HR systems and processes, high employee turnover, lack of work-life balance, and the problems associated with the use of contract employees (Agrawala, Khatrib, & Srinivasanc, 2012).

Infrastructure availability as a factor contributing to location related decisions was analyzed by Kazuo Kadokawa in his paper from 2011. In his paper he is mentioning „infrastructure-related reasons". He names the reasons„as commuting convenience, industrial zoning, unrestricted environment, access to highway and business and logistic services." (Kadokawa, 2011) Though Kadokawa was exploring the infrastructure factors for the placement of a plant for producing goods, these factors may apply to the ICT industry. For the ICT sector, specificaly access to stable and high speed internet, provided by the internet service providers may play a critical role.

The importance of world business has created a demand for managers sophisticated in global management and skilled at working with people from conutries other than their own (Adler & Gundersen, 2008). As mentioned, the ICT industry is mostly relying on virtual communication, teams, products, and services. Therefore, multicultural global teams are fairly common in the industry. However, in order to achieve strategic goals, a company has to do a cultural alignment among its business units. Culture consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiement in artifacts; the essential core of culture consists of traditional ideas and especially their attached values; culture systems may, on the one hand, be considered as products of action, on the other, as conditioning elements of future action (Adler & Gundersen, 2008). Therefore, when choosing the location for a new business unit, local management and working culture needs to be taken into an account.

3.1. Methods used in data collecting

Two methods were used in this study in order to collect quantitative data: Delphi and Analitical Hierarchy Process – AHP. Delphi method represents'a systematic procedure that collates the opinions of a diverse group of experts located in different geographical areas whose opinions are important for decision analyses. Through the Delphi technique, different responses and views are obtained aon the underlying problem resulting in generating new ideas and unique suggestions, and eventually provides consensus on the findings among a panel of experts' (Eskandari, et al., 2007). Another application is ranking-type of problems. „Researchers have applied the Delphi method to a wide variety

of situations as a tool for expert problem solving. They have also developed variations of the method tailored to specific problem types and outcome goals. One variant that has received widespread use is the 'ranking-type' Delphi, used to develop group consensus about the relative importance of the issues" (Okoli & Pawlowski, 2004)

The AHP is well known and most widely applied in solving decision-making problems (Mousavi, et al, 2013). Decomposition into a hierarchy is based on previous studies and empirical experiences. In order to decompose a problem into a hierarchy, a researcher needs to consult previous experiences and attempts for a particular topic of interest. The criteria and subcriteria are not each equally important to the decision at each level of the hierarchy, and each alternative rates differently on each criteria. AHP can provide an analytical process that is able to combine and consolidate the evaluations of the alternatives and criteria by either an individual or group involved in the decision-making task. The further strength of the model lies in its ability to recognize incosistent judgements (Chen, 2006). Combined with Delphi method it provides a framework for solving different types of multi-criterion decision problems based on the relative priorities assigned to each criterion's role in achieving the stated objective (Tornjanski, Marinkovic, Jaksic, & Arsic, 2015).

4. Empirical results and discussion

Next paragraphs present the data obtained from the Delphi and AHP studies, followed by analysis and discussion on the research results. In addition, the results of the Delphi method are tested using a statistical analysis to confirm the reliability of the given results of the Delphi method.

4.1. The application of the Delphi method in the study

The first and second round of surveys in this study was conducted using the Delphi method. The goal was to reach consensus among experts about the determinants for optimal location selection in the ICT industry which were grouped into three contexts that are synthesized based on thorough literature review.

This study was implemented using web-based questionnaires and the consensus was considered adequate if 70% of experts agreed on each determinant. The same experts were involved in round 1 and round 2 of the Delphi. Experts were individuals on management positions in the ICT companies. They were asked to rank the importance of determinants for an optimal location selection in the ICT industry in which their response reflects subjective attitude based on their knowledge and experience. A five-point Likert scale was used to evaluate the importance where: 1 = unimportant; 2 = slightly important; 3 = important; 4 = very important; 5 = critical. Further, an open question was also given to the participants for comments or suggestions at the end of the questionnaire.

Fifteen (15) ICT management experts from 6 IT companies were asked to participate in this study, and ten (10) took part in it, resulting in the participation rate of 66% in both rounds of the Delphi. The average importance rating, standard deviation and percentage level of importance for each evaluated determinant after round 1 and round 2, were obtained using statistical calculation. The most significant detemrinants as recognized by the experts in the Delphi survey are further evaluated through an AHP model. The most significant detemrinants as per Delphi results are presented in Table 2.

	The significance of determinants after II round of Delphi	**Average value (t_n)**
Quantitative context	Capital investment costs	3.4
	Operational costs	4.3
	Transportation costs	1.9
Qualitative context	Political and economic environment	4.2
	Legal framework	3.9
	Competition	4.1
	Suppliers	2.9
ICT-specific context	Human resource availability	4.7
	Infrastructure availability	3.2
	Cultural compatibility	3.1

Table 2. Determinants and their significant after the second round of Delphi

In addition to the Delphi method, Cronbach's alpha test is used to estimate the reliability of results obtained from the Delphi study. The reliability test was performed on the mentioned determinants after the second round, consisting of 10 elements. The result of Cronbach's alpha test is presented in Table 3:

Cronbach's Alpha	Number of elements
0.665	10

Table 3. Reliability test result based on Cronbach's alpha test

The reliability result obtained using Cronbach's Alpha test shows the value of **0.665**, indicating the scale of reliable judgments. Therefore, experts' judgment on the importance of determinants for optimal location selection is considered reliable and may be further evaluated with the AHP.

4.2. The application of the AHP method in the study

The AHP is used to prioritize the determinants of optimal location selection in the ICT industry, previously collected through the Delphi method. The research problem is decomposed into a hierarchy structure that includes the overall goal, 3 criteria and 10 sub-criteria, as shown in Figure 2.

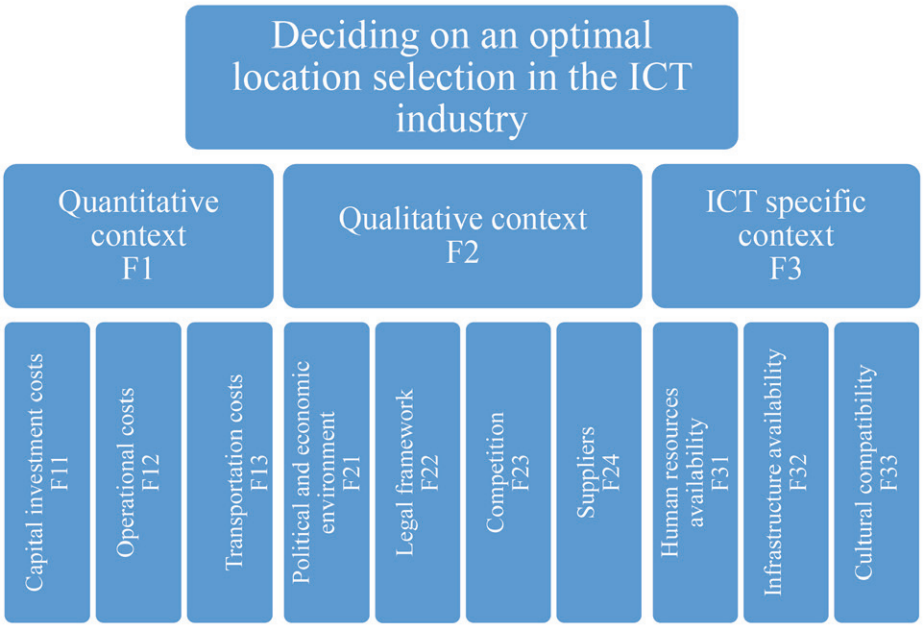

Figure 2. Structured AHP hierarchy for development of optimal location selection model in ICT industry

The highest level of the hierarchy is the overall goal, in this case, optimal location selection in the ICT industry. Below the overall goal, the next level represents the most significant criteria which influence this decision, including: quantitative context (F1), qualitative context (F2), ICT-specific context (F3).

As seen in the Figure 2, there is total of 10 sub-criteria placed at the bottom level of the hierarchy. The factors related to quantitative context consists of three sub-criteria: capital investment costs (F11), transportation costs (F12), and operational costs (F13). Factors related to qualitative context are the following four sub-criteria: political and economic environment (F21), legal framework (F22), competition (F23), suppliers (F24). For the ICT-specific context the following three sub-criteria are considered: human resource availability (F31), infrastructure availability (F32), cultural compatibility (F33).

Once the structure of the problem has been designed, the prioritization of each element started in order to determine the relative importance of each. Prioritization procedure implies the pairwise comparison of elements at the same level

and in regard to elements of the upper level of the hierarchy. Once all elements at both levels (Level 1 represents criteria, and Level 2 represents sub-criteria) were compared by the experts, according to the AHP procedure, the matrices are constructed.

4.2.1. Results of Level 1 evaluated criteria

Based on the results obtained from the Delphi study, ICT-specific context (F3) is important in comparison with quantitative context (F1) and moderately important in comparison with qualitative context (F2). Quantitative context (F1) is important compared to qualitative context (F2).

Deciding on an optimal location selection in the ICT industry		F1	F2	F3
		Quantitative context	Qualitative context	ICT-specific context
F1	Quantitative context	1.00	0.33	0.5
F2	Qualitative context	3.00	1.00	1.00
F3	ICT-specific context	2.00	1.00	1.00
∑		6.00	2.33	2.50

Table 4. Judgment comparison matrix of criteria relative to the main goal

Table 5 illustrates the calculation of results that includes assigning the local weights according to the distributive way of calculation, resulting in the prioritization of criteria at Level 1 for successful decision on optimal location selection in the ICT industry.

Deciding on an optimal location selection in the ICT industry	F1	F2	F3	∑a*ij	Weights	Priority vector
F1	0.17	0.14	0.20	0.51	0.16943252	17%
F2	0.50	0.43	0.40	1.33	0.44306152	44%
F3	0.33	0.43	0.40	1.16	0.38750596	39%

Table 5. Vector of eigenvalues of comparison matrix and weight calculation based on Saaty's eigenvector procedure for criteria at Level 1 relative to the overall goal

Priority of criteria at Level 1 relative to the main goal is as follows: F2 – F3 – F1.

Based on the Delphi results, the highest priority in the selection of optimal business location in the ICT industry refers to the qualitative context (w=0.44), followed by the ICT-specific context (w=0.39). Quantitative context (w=0.17) has the least priority according to the results.

$$\lambda_{max} = (0.17)(6.00) + (0.44)(2.33) + (0.39)(2.50) = 1.02 + 1.025 + 0.975 = 3.02$$

$$CI = \frac{\lambda_{max} - n}{n-1} = \frac{3.02-3}{3-1} = 0.01; RI = 0.58$$

$$CR = \frac{CI}{RI} = \frac{0.01}{0.58} = 0.017$$

Consistency ration was calculated to ensure the coherence of the judgments respectively.

Consistency ratio of the pairwise comparison matrix is calculated as 0.017, which is less than 0.10. Therefore, the weights are shown to be consistent and the comparison is acceptable.

4.2.2. Results of Level 2 evaluated alternatives

Next steps show the analysis of evaluated alternatives at Level 2 towards the corresponding criteria placed at Level 1 in the AHP model. Table 6 shows the results of evaluated alternatives relative to the quantitative context (F1).

F1 Quantitative context		F11	F12	F13
		Capital investment costs	Operational costs	Transportation costs
F11	Capital investment costs	1.00	0.33	5.00
F12	Operational costs	3.00	1.00	8.00
F13	Transportation costs	0.20	0.13	1.00
∑		4.20	1.46	14.00

Table 6. Judgment comparison matrix of sub-criteria relative to the criteria related to the quantitative context

Based on the Delphi results, the highest priority related to the quantitative context in the selection of optimal business location in the ICT industry refers to the operational costs (w=0.66), followed by the capital investment costs (w=0.27). Sub-criteria related to transportation costs (w=0.07) has the least priority according to the results.Consistency ratio of the pairwise comparison matrix is calculated as 0.067, which is less than 0.10. Therefore, the weights are shown to be consistent and the comparison is acceptable. Table 7 shows the results of evaluated alternatives relative to the qualitative context (F2).

F2 Qualitative context		F21	F22	F23	F24
		Political and economic environment	Legal framework	Competition	Suppliers
F21	Political and economic environment	1.00	2.00	1.00	5.00
F22	Legal framework	0.50	1.00	1.00	4.00
F23	Competition	1.00	1.00	1.00	5.00
F24	Suppliers	0.20	0.25	0.20	1.00
∑		2.70	4.25	3.20	15.00

Table 7. Comparison matrix of sub-criteria relative to the criteria of qualitative context

The results of pairwise comparison of sub-criteria at Level 2 in relation to the qualitative context (F2) shows that political and economic environment (F21) is moderately important in comparison to the determinant that refers to legal framework (F22), equaly important to sub-criteria related to competition (F23), and strongly important compared to determinant related to suppliers (F24). Further, the sub-criteria related to legal framework (F22) has equallyimportance compared to sub-criteria related to competition (F23), and moderately important compared to suppliers (F24). Further, competition sub-criteria (F23) is stronlgy important compared to sub-criteria related to suppliers (F24). Table contains the calculation of local weights results, which implies the prioritization of the alternatives at Level 2 against the qualitative context at Level 1.

Factors related to qualitative context	F21	F22	F23	F24	∑a*ij	Weights	Priority vector
F21	0.37	0.47	0.31	0.33	1.15	0.3844862	38%
F22	0.19	0.24	0.31	0.27	0.73	0.24432643	24%
F23	0.37	0.24	0.31	0.33	0.92	0.30605483	31%
F24	0.07	0.06	0.06	0.07	0.20	0.06513253	7%

Table 8. Vector of eigenvalues of comparison matrix and weight calculation based on Saaty's eigenvector procedure for sub-criteria at level 2 relative to the criteria F2

Priority of criteria at Level 2 according to the quantiative context is as follows: F21 – F23 – F22 – F24 Based on the Delphi results, the highest priority related to the qualitative context in the selection of optimal business location in the ICT industry refers to the political and economic environment (w=0.38), followed by the competition (w=0.31), followed by legal framework (w=0.24). Sub-criteria related to suppliers (w=0.07) has the least priority according to the results.

Consistency ratio of the pairwise comparison matrix is calculated as 0.029, which is less than 0.10. Therefore, the weights are shown to be consistent and the comparison is acceptable.

Next steps show the analysis of evaluated alternatives at Level 2 towards the corresponding criteria placed at Level 1 in the AHP model. Table 9 shows the results of evaluated alternatives relative to the ICT-specific context (F3).

F3 ICT-specific context		F31	F32	F33
		Human resources availability	Infrastructure availability	Cultural compatibility
F31	Human resources availability	1.00	5.00	6.00
F32	Infrastructure availability	0.20	1.00	1.00
F33	Cultural compatibility	0.17	1.00	1.00
∑		1.37	7.00	8.00

Table 9. Judgment comparison matrix of sub-criteria relative to the criteria related to the ICT-specific context

The results of pairwise comparison of sub-criteria at Level 2 in relation to the ICT-specific context (F3) shows that human resources availability determinant (F31) is strongly important in comparison to the determinant that refers to infrastructure availability (F32) and strongly important related to sub-criteria related to cultural compatibility (F33). Further, the sub-criteria related to infrastructure availability (F32) has very equal importance compared to sub-criteria related to cultural compatibility (F33). Table 10 contains the calculation of local weights results, which implies the prioritization of the alternatives at Level 2 against the ICT-specific context at Level 1.

Factors related to ICT-specific context	F31	F32	F33	∑a*ij	Weights	Priority vector
F31	0.73	0.71	0.75	2.20	0.731997677	73%
F32	0.15	0.14	0.13	0.41	0.138066202	14%
F33	0.12	0.14	0.13	0.39	0.129936121	13%

Table 10. Vector of eigenvalues of comparison matrix and weight calculation based on Saaty's eigenvector procedure for sub-criteria at level 2 relative to the criteria F3

Priority of criteria at Level 2 according to the quantiative context is as follows: F31 – F32 – F33. Based on the Delphi results, the highest priority related to

the ICT-specific context in the selection of optimal business location in the ICT industry refers to the human resources availability (w=0.73), followed by the infrastructure availability (w=0.14). Sub-criteria related to cultural compatibility (w=0.13) has the least priority according to the results. Consistency ratio of the pairwise comparison matrix is calculated as 0.017, which is less than 0.10. Therefore, the weights are shown to be consistent and the comparison is acceptable.

4.2.3. Results of final prioritization

Next steps show the analysis of evaluated sub-criteria at Level 2 towards the overall objective in AHP model. Table 11 depicts the final ranking expressed in percentage of priority sub-criteria at Level 2 relative to the overall goal, i.e., optimal location selection in the ICT industry.

SUB CRITERIA		OVERALL PRIORITY OF SUB-CRITERIA IN RELATION TO THE MAIN GOAL		PRIORITY
W F31	Human resources availability	0.2837	28.37%	1
W F21	Political and economic environment	0.1704	17.04%	2
W F23	Competition	0.1356	13.56%	3
W F12	Operational costs	0.1115	11.15%	4
W F22	Legal framework	0.1083	10.83%	5
W F32	Infrastructure availability	0.0535	5.35%	6
W F33	Cultural compatibility	0.0504	5.04%	7
W F11	Capital investment costs	0.0463	4.63%	8
W F24	Suppliers	0.0289	2.89%	9
W F13	Transportation costs	0.0116	1.16%	10

Table 11. Final prioritization of sub-criteria in relation to the overall goal

According to the obtained results presented in Table 11, the first priority in an effective decision related to optimal location selection in ICT industry is human resource availability with priority vector of 28.37%. Experts in Serbia are of the opinion that second priority should be placed on the political and economic environment with a ranking of 17.04% towards the overall goal. The third priority should be placed on a competition with priority vector of 13.56%.

These three together account for 58.97%, making them more important than all other sub-criteria combined. Still, sub-criteria related to operational costs and legal framework account for 11.15% and 10.83% respectively, which makes them a significant determinant in relation to the overall goal. On the other hand, other sub-criteria such as operational costs, legal framework, infrastructure availability, cultural compatibility, capital investment costs, suppliers, transportation costs have a lower degree of the accomplishment of the main goal in the AHP. However, these should still be taken into account when considering a decision of optimal location selection in the ICT industry.

5. Conclusions

The goal of the study is to prioritize determinants for the decision regarding optimal location selection in the ICT industry. The purpose of this paper is to demonstrate and emphasize the importance of location selection in the ICT industry as a key success factor for sustainable growth and development of the ICT industry in the 21st century. In predicting a long-term survival and growth, a location has always played a vital role. Due to a shortage of supply and fierce competition in the ICT sector, over recent years the concept of location selection has been recognized as a key success factor for sustainable growth and development of ICT organizations.

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Still, sub-criteria related to operational costs and legal framework account for 11.15% and 10.83% respectively, which makes them a significant determinant in relation to the overall goal. On the other hand, other sub-criteria such as operational costs, legal framework, infrastructure availability, cultural compatibility, capital investment costs, suppliers, transportation costs have a lower degree of the accomplishment of the main goal in the AHP. However, these should still be taken into account when considering a decision of optimal location selection in the ICT industry.

It comes as no surprise that human resource availability has the highest priority. According to the report from European Commision: "*employment of ICT specialists in the EU-28 has resisted the effects of the downturn of uncertainty on global labor markets, and remained on an upwards path. Growth in the employment of ICT specialists averaged 3 % over the ten-year period 2006-2015, more eight times higher than the average growth rate for total employment over the same period.*" (European Commission, 2017)

Second importance in priority has the political and economic factors. This is a very interesting outcome of the study. According to the same report: "*In recent years, EU policies have given greater attention to ICT skills, and in particular to the employment of ICT specialists. The recently updated Digital Single Market strategy emphasizes the need for policies designed to boost stability in European labor markets and improve the EU's competitive position.*" (European Commission, 2017). This suggests that indeed, political and economic strategies are starting to play a bigger role in ICT market, as governments are getting more interested in this industry. In Serbia, the government even named ICT as one of the key priorities of development.

Finally, this study acknowledges potential limitations despite the relevance of the obtained results in terms of the optimal location selection choice in the ICT industry. One limitation of the research study is the participation of one group of stakeholders, i.e., management professional in ICT companies in Serbia. Other stakeholders might have different views, requirements related to the optimal location decision, i.e., shareholders, customers etc. Another limitation of the research paper is the focus on the participants from only one country. Consequently, the study results may not be directly applicable to each other country. Finally, the research was focused on mainly outsourcing software companies, while there can be another type of ICT companies with different business models for which this model for optimal location selection would not be applicable.

Future research on the optimal location selection in the ICT industry should incorporate perspectives from more various stakeholder group. Moreover, the results should encompass a larger number of experts from more diversified ICT companies based on their business model. These insights may reveal additional useful information regarding the optimal location selection in the ICT industry.

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CHAPTER 6

Reindustrialization as a basis of new development paradigm in transition countries

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ABSTRACT

Transition "vortex" and radical changes that, in the global context, occurred in the real economy at the end of the 20th and the beginning of the 21st century, inevitably imposed the need for a more serious re-examination of the existing conceptual bases, equally economic sciences and its dominant practice. When it comes to transition countries, especially if we focus more closely on the Western Balkans, there is almost an undivided opinion that the impact of the deindustrialization process for them was as radical as the "arrival" of socialism, so many indicators testify to the so-called "Reformation". As a logical consequence of the globalization of the imposed natural flow of things, a significant number of those who believe that the starvation of the industry is in most of the countries in transition is over. In the sense of the previously cited, the key question arises: can countries in transition ever reach the standard of living of most developed market economies?

We intend to point out in this paper the necessity of stopping the reindustrialization process and raising the level of national competitiveness of the countries in transition and living standards of citizens. In countries in transition, though with delay, it implies the problem of finding a new development paradigm, that is, designing new industrial policies and their revival in the form of a re-industrialization process.

Key words: transition countres, development, globalization, reindustrialization, competitivenes

JEL classification: L6

1. Introduction

When it comes to globalization, in addition to being one of the key phenomena of our time, it is undoubtedly a complex economic, political, historical and social issue whose essence is worth studying further. This process is particularly important in terms of the evolving developments and the future of the less

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developed countries, with no concern for the large regional community. Warnings of this kind are not from yesterday, let's say a jade of them: "Experience tells me that I believe that it is more likely that Europe will become a historic park for the well-being of Americans and Asians, but the most dynamic world, as it has proclaimed"; John Naisbitt. At the same time, it turned out that in a global context, ever-more intense competition threatens survival, just as enterprises that are not able to transform, be innovative, productive and able to respond to pressures from the environment as well as to entire national economies.

Equally, advocates and antiglobalists agree that the globalization of the economy and society as a whole has become the dominant characteristic of modern capitalism and the verified determinant of success at the global level. We worry that when it comes to most transition countries, we do not have a clearly defined development concept, especially when it comes to different starting points, the functions from which it is observed, and the consequences. Namely, as K.Ohmae points out, "the global economy has its own dynamics and its logic, because it is no longer a theory, but a reality. The greater the possibility that it will continue to emerge, but weaken, "(K.Ohmae, 2007). We think that countries in transition can not stay on the side of the mentioned processes, they are evident laws that imply that they themselves will come up with their own development strategy. Other experiences can be useful to them, but conceptual development frameworks must respect the existence of a "new economy" and focus on their own comparative advantages. The pragmatic attitude forces us to raise a crucial question in the introductory part of this paper - what is our (countries in transition) today's true reality, and what is the outlook? Is it possible to reduce the development gap between this group and a group of developed market economy countries by re-opening and intensifying the industrialization process (reindustrialization)? Can these countries, at least, avoid "bad" and maintain "good" consequences of a total phenomenon such as globalization?

2. Globalization process - imperative or challenge for earth in transition

Equally, practice and theoretical research show that globalization offers more opportunities for large companies and national economies that succeed in competing with the competition in the global market. So often, entire national economies or some of their parts are embedded in global currents, which further weakens them, while at the same time strengthens the power of the "global economy" and empowers "debt slavery," and so on. Prof. LJ. Jurčić points out that global processes are a chance and a limitation to the development of national economies, but "in the nature of things, big economies are benefiting, while globalization spills spread across a large number of small countries (LJ. Jurčić, 2014). Unfortunately, there is still not a small number of supporters, who, like in the time of the "Great Depression" some 80 years ago claim that "there is no need to worry, the markets are only regulative and, if they do, the economy will be restored."

Consistent with the disassociation of the myths of globalization, J. Stiglitz points out that what economic policymakers and developing countries should consider as an unquestionable legitimacy is that if globalization failed to reduce poverty, it did not succeed in securing stability (Stiglitz, 2016). And not only that, inequality has become the Achilles heel of modern economies, so that despite the impression that today's networked economy offers the same chances to everyone, it is evident that further deepening of the gap in terms of development and inequality in wealth between developed and less developed countries. T. Piketty, as one of the possibilities, is dominated by the above-mentioned discrepancy in the inequality that continues to deepen, is seen as follows: "Poor developed economies compensate for productivity lag and increase national income by adopting a method of production and skills that can be compared with those in developed countries."(see: T.Piketty; 2014). Otherwise, the past transitional, multi-century experiences show that neoliberal market fundamentalism is based on a firm belief in "free markets", imposed over the past thirty years as an ideological political doctrine in the service of economic interests. However, it turned out that as the prevailing ideology and branch of economic theory that had already burst into the forefront from the end of the seventies, it has never been fully confirmed in economic theory, and today it is clear that it has not been confirmed by historical practice (see: J. Dušanić, 2015).

Taking into account the current phase of globalization, the problem of lagging behind in the development of the countries in transition, as an outstanding expert of this issue, Branko Milanović raises another issue closely related to the subject of this paper, which is: "Can societies coexist with people with different levels of income and consumer spending habits to stay democratic and stable?"In the end, in view of the many dilemmas that the globalization process carries with itself, it seems logical to see whether the less developed countries, in the conditions of ever more intense globalization, are trying to make a radical break with the past in the form of a new development paradigm?

It is evident that transition countries in newly emerging transition and transition economies have failed to effect production factors, ie comparative advantages they have (land, labor, capital), resulting in lower achievements of "potential income". In support of the thesis that it is a "failing reform" in a significant number of countries, we emphasize the statement of prof. D. Judic, who is a good connoisseur of transition, where, on the example of Serbia, states that her main problem is the so-called " output gep; ie the level of economic activity that is below the objectively possible level. "Serbia's economy is impotent and scandalized"; "Also, the environment (regulation + institutions + prevailing strategy of economic entities) in which economic policy is implemented is not adequate. This particularly applies to institutions such as the Securities Commission, the financial market and the central bank, as well as the mentality of business entities in the so-called. "Burazerska privatizacija", concludes prof. Đuričin (see: D.Đuričin). We also add the opinion of prof. LJ. Jurčić states that "many countries are in crisis, not as victims of the global economic crisis, but as

a consequence of the lack of active industrial policy", with deindustrialization, the author continues, "the consequence of leaving the national economy" to the invisible hand "situation when smart countries have clear industrial policies and goals "(LJ. Jurčić, 2014).

3. The development perspectives of the earth in transition in globalization conditions

With the onset of the transition process in the late 1980s and early 1990s, the former socialist, mostly less developed countries, simultaneously found themselves under the severe and uncertain blows of the globalization process that imposed itself as the dominant determinant of success at the global level. At least this is a bit clearer because of the expected prosperity and a structural adjustment program that should have been reflected in a better standard of living for citizens in most transition countries, especially those who without accepting the "ten commands" from the "new economic bible", established on the dominant policy of liberal economic ideology advocated by the IMF, the World Bank, and the like.

In the sense of the previous indictment, if today's nearly three-quarters long transitional achievements are estimated and the same comparison is in line with expectations, it is noticeable that most transition countries have similar problems that have all the characteristics of crisis strikes that have little or no flow of time. Some of them are: a) a drastic fall in industrial production; b) a high deficit of the balance of payments, c) a reduction in domestic investment in production capacities; d) high external indebtedness; e) unbalanced budget, f) high unemployment and impoverishment of the majority of the population; g) low salaries of employees and other income of citizens; h) clientelism as an engine of corruption; i) late, slow progress and insufficient progress in institutional reforms, j) unfavorable demographic trends; k) overcoming affirmation of polycentric spatial development; l) slowly solving accumulated ecological problems, etc. Better to say, the globalization of this type and the "introduction" of the market economy in the majority of economies that were in transition from communism to the market did not bring the promised results to the political elites. Whether the previously mentioned is that many other inherited characteristics have been favorable to the rise of corruption to the all-encompassing state, then the absence of the rule of law (so-called rule of law), disregard for property rights, and so on, are still clearer reasons why the so- In spite of the modest effects, the market reform still and in almost all transition countries is considered to be flawed and completely uncertain.

There is no doubt that the globalization of the economy and society as a whole has become the dominant characteristic of modern capitalism, and thus the verifiable determinant / success at the global level. With this, any reliance on the emerging order is meaningless, so that the losing countries are the only ones left to accept the reality and start the process of their own restructuring

in accordance with the valid rules at the global level. Guided by this understanding, in this paper we will focus more on its economic aspect, dealing with more positive and negative impacts on „small" economies, or even closer to the domestic reality of the countries in transition. Furthermore, this means that we will look into the answer to the question, can, and how, small underdeveloped economies survive in the conditions of the growing globalization intensity that is manifested in the dramatic increase in inequality between developed and underdeveloped countries, between the rich and the poor in each country separately, then There are also overcrowding, ecological disasters, mass migrations, ethnic conflicts and more. Additionally to the previous question, (T.Pikettty,2014), who is genuinely concerned with the issue of inequality in the distribution of wealth by the essence of globalization, explores the following: „Are we quite sure that an economy that is based on" free market „and private ownership always and everywhere leads the optimal distribution? „An expert, Nobel laureate J.Stiglitz sees globalization as a trap in terms of the overall development of society, emphasizing that since today's globalization, many poor people in the world have no benefit, and neither does it benefit either nature or stability of the world economy (J.Stiglitz, 2004). By doing so in the context of the largely negative aspects of globalization, he asks, „How did it happen that the process that was supposed to bring benefit to everyone - and developed and developing countries - now everyone is attacking?"

These flows and processes are controversial and contradictory. In our opinion, there is a huge and unimaginable change, and with the flow of time an increasing part of us is convinced that the change is up. In this sense, the intensity of connections, that is, the level of globalization and its consequences on the global level is the subject of numerous analyzes and controversies, and the simplest can be presented in the form of the so-called „ Global Index of Globalization (KOF), which includes three sub-indices: economic, social and political, Table 1.

Country/ Index of Globalisation	Netherlands	Hungary	Slovakia	Cezch	Slovenia	Croatia	Romania	Serbia	Bosnia and Herzegovina	Montenegro	Albania	Macedonia
Global	1	9	16	17	32	35	36	46	55	59	88	93
Economical	4	7	12	15	40	44	55	53	79	32	102	64
Social	5	23	20	21	42	43	47	61	66	71	105	101
Political	9	49	44	42	50	46	28	75	64	120	90	144

Table 1. Ranking of countries by index and globalization sub-indices

According to the Globalization Index (KOF) for 2016 - Table 1; The following countries are the most globalized: the first is the Netherlands, followed by Ireland, Belgium, Austria, Switzerland, Singapore, Denmark, Sweden, Hungary, Canada, Finland, Portugal, etc. Regarding the countries in transition, some of which have already become members of the EU, the order is as follows: Hungary is the first in the global list to rank ninth, followed by Slovakia (16); Czech Republic (17); Poland (22); Lithuania (29); Bulgaria (30); Slovenia (32); Croatia (35); Romania (36); Serbia (46), Bosnia and Herzegovina is in 56th place; Montenegro at 59; Macedonia at 93 place, etc. If this indicator is brought into line with indicators such as the level of global competitiveness, GDP per capita, etc., it is concluded that better results have been achieved by those countries that have significantly engaged and accepted the principles of globalization so that, generally speaking, could say that globalization is not, in principle, an obstacle to development. Examples of such countries can serve as models of development followed by the so-called. "Asian tigers" (South Korea, Hong Kong, Taiwan), as well as other emerging industrialized countries that are swimming in the waves of globalization, have managed to get closer and reach the level of development of the leading highly developed countries. Based on an insight into the global ranking, it has been confirmed that the state does not have to be large, nor rich in natural resources to be successful. Also, there are examples of some of the most populous countries in the world such as China and India, which in the conditions of globalization implemented deep and comprehensive reforms of the economic system. This suggests that the dynamics of the development of individual national economies will depend more and more on their own ability and perseverance to raise their competitiveness on the basis of a fuller effect of knowledge and that this is possible if that group of countries succeeds in more fully effecting its existing and " new comparative advantages. In the long run, the main force that truly leads to greater equality is the spread of knowledge and skills (T.Piketty, 2014).

Furthermore, given the objective of the work, special attention is paid to the key issue raised in one of the recent reports of the European Bank for Reconstruction and Development, which reads: "Can countries in transition ever meet the standard of living of most of the developed market economies?" In this document it is clearly stated that the economic growth of this group of countries is still below the pre-crisis level, that many of them "turned their backs" to reforms that could raise the economy of the countries of the former Eastern Bloc. The aforementioned "shock", as the report further states, raises doubts about the ability of these countries to return to the right track of reforms, jeopardizing their ability to catch up with developed countries when it comes to living standards.

In order to search for the answer to the question of whether there was a real progress in transition, one good estimate of what really happened to the "fall of socialism in the early 1990s" is given by prof. LJ. Jurčić says when he says "history is definitely bent on liberal capitalism, marking it as the undisputed winner and the universal model of the future arrangement of the world. It was some kind of a conservative revolution that was portrayed as a historical

necessity and which, by the power of the "invisible hands" of the free market, would provide the people of the world with stability, peace and prosperity. The development of a society (the state) is understood as a general privatization, liberalization and deregulation, with economic growth occurring as a natural result of market automatism "(LJ.Jurčić, 2014). Similar to the previous observation, and B. Milanović, in his famous analysis of the twenty-five year period after the fall of the Berlin Wall, points out that only one in ten people living in transition countries experienced a successful transition to capitalism and more democracy. In the next part of the paper, we give an overview of a number of key indicators, based on which a fuller insight into the transition paths across individual countries is possible:

a) an overview of the size of the market and the economic strength of a number of countries and the EU; Table 2;

b) a review of GDP per capita in relation to the EU average in 2016; Table 3;

c) ranking of countries in transition according to priorities in the "Strategy 2020"; Table 4;

d) review of the ranking of countries according to the Human Development Index - HDI; Table 5;

e) comparing the level of competitiveness for the report 2015/16, table 6.

COUNTRIES and population 2017	GDP, current prices, mird. USD	Structure of GDP in world GDP		GDP/pc, current prices, intl. USD	
	2017	2010	2017	2010	2017
Brasil (209 mil.st.-2,7%)	2.140,94	3,30%	2,75%	10.816	10.308
China (1.409 mil st.18,7%)	11.795,29	9,30%	15,14%	4.382	8.480
India (1.339 mil st.-17,7%)	2.454,46	2,40%	3,15%	1.475	1.850
Russia (144 mil st.-1,9%)	1.560,70	2,30%	2,00%	11.445	10.885
Turkey (80.7 mil st.-1,07%)	793,69	1,20%	1,02%	10.475	9.826
Montenegro (0,62 mil st)	4,19	0,01%	0,01%	6.684	6.718
Japan (127 mil st.-1,7%)	4.841,22	8,7%	6,21%	44.673	38.281
USA (325 mil st.-4,3%)	19.417,14	23,30%	24,92%	48.310	59.609
EU (510 mil st.-7%)	16.139	25,90%	20,71%	30.388	40.874
TOTAL (7,5mird inhabitants)	77.928,03	100%	100%		

Table 2. Overview of market size and economic strength of a number of countries and the EU

Country	BDP per capita	Real personal consumption according to purchasing power standard[3]
EU 28	100	100
Slovenia	83	75
Croatia	59	59
Montenegro	42	54
Macedonia	38	41
Serbia	36	45
Albania	30	39
Bosnia and Herzegovina	31	41

Table 3. GDP per capita and actual personal consumption in relation to the average of the European Union

HDI Rank	State	HDI value	Expected duration of life	Expected duration of schooling in year	Average number of years. education	GNI/pc (const PPP 2005)	GNI /PC – HDI rank	HDI 2014. year
Very high HDI - 51 states; 0,949 – 0,800								
1	Norway	0,949	81,7	17,7	12,7	67,614	5	1
2	Australia	0,939	82,5	20,4	13,2	42,82	19	3
3	Switzerland	0,939	83,1	16,0	13,4	56,364	7	2
25	Slovenia	0,890	80,6	17,3	12,1	28,664	13	25
28	Czech Republic	0,878	78,8	16,8	12,3	28,14	11	28
48	Croatia	0,827	77,5	15,3	11,2	20,291	14	46
48	Montenegro	0,807	76,4	15,1	11,3	15,410	24	49
49	Russia	0,804	70,3	15,0	7,3	76,075	-48	50
High HDI - 54 states; 0,796 – 0,701								
56	Bulgaria	0,794	74,3	15,0	10,8	16,261	13	57
66	Serbia	0,776	75,0	14,4	10,8	12,202	22	66
71	Turkey	0,767	75,5	14,6	7,9	18,705	-7	72
75	Albania	0,764	78,0	14,2	9,6	10,252	24	75
81	Should	0,750	76,8	14,2	9,0	10,091	22	82
90	China	0,738	78,0	13,5	7,8	13,345	-7	91
Middle HDI - 40 states; 0,699 – 0,550								
111	Egypt	0,691	71,3	13,1	7,1	10,064	-7	111
119	J. Africa	0,666	57,7	13,0	10,3	12,087	-30	119
131	India	0,624	68,3	11,7	6,3	5,663	-4	131
Low HDI – 40 states; 0,541 – 0 352								
149	Syria	0,536	69,7	9,0	5,1	2,441	13	145
152	Nigeria	0,527	53,1	10,0	6,0	5,443	-23	151
	World	0,717	71,6	12,3	8,3	14,447	-	-

Table 4. Overview of countries ranking according to the Human Development Index – HDI

3 In addition to goods and services purchased directly by households, this indicator also includes services provided to non-profit institutions and governments for personal consumption (eg health and education services).

State	Intelligent growth				Integrative growth		Sustainable growth
	The environment companies	Digital agenda	Innovative Europe	Education and training	Market. work and employment	Social inclusion	Environmental protection
Finland[4]	4,83	6,15	6,08	6,09	4,73	6,30	5,75
Croatia	3,34	3,99	3,15	4,39	3,37	4,18	4,67
Estonia	4,21	5,30	4,28	5,12	4,88	4,73	4,67
Macedonia	3,95	3,63	2,78	4,01	3,80	3,95	3,19
Hungary	3,49	4,03	3,37	4,47	3,76	4,09	3,59
Lithuania	3,81	4,63	3,65	4,90	4,43	4,27	5,48
Montenegro	3,88	3,91	3,34	4,28	3,69	4,62	4,76
Poland	3,72	3,98	3,43	4,85	3,87	3,89	4,07
Romania	3,61	3,61	2,98	3,95	3,68	3,79	3,94
Serbia	3,16	3,66	2,70	3,80	3,33	3,69	3,84
Slovenia	3,53	4,30	4,25	4,88	3,90	4,98	5,17
Turkey	4,20	3,45	3,53	4,28	3,59	4,38	3,36

Table 5. Rank of the countries in transition according to the priorities set in the “Strategy 2020”

4 Finland was taken as the first-ranked country.

State	Switzerland	Bosnia and Hercegovina	Montenegro	Serbia	Croatia	Slovenia
Global Competitiveness Index GCI – Rank	**1**	**107**	**82**	**90**	**74**	**56**
Basic requirements	**2**	**94**	**86**	**87**	**68**	**38**
1st pillar: Institutions	6	126	80	115	89	58
2nd pillar: Infrastructure	6	105	76	74	46	39
3rd pillar: Macroeconomic stability	4	76	119	103	84	58
4th pillar: Health and basic faces.	8	50	60	53	66	16
Efficiency enhancers	**3**	**106**	**79**	**90**	**67**	**54**
5th pillar: Visions. And training	4	92	64	69	49	22
6th pillar: Efficiency of the commodity market	6	129	74	121	95	42
7th pillar: Labor Market Efficiency	1	125	83	106	100	85
8th pillar: Sophistication of the financial market	8	101	54	110	95	118
9th pillar: Technological Readiness	1	76	52	70	47	35
10th pillar: Market size	39	98	130	74	78	84
Factors of innovation and sophistication	**1**	**122**	**98**	**120**	**92**	**37**
11th pillar: Sophistication of business	1	115	103	125	80	48
12th pillar: Innovation	1	125	94	108	103	33

Table 6. Comparison of competitiveness levels for Switzerland, BiH, Montenegro; Serbia, Croatia and Slovenia according to the report 2016/1.

Regarding the data from the previous tables and the comparison of the effects of the countries in transition in relation to the developed market economy countries, their significant lagging behind most of the analyzed indicators is noticeable, some of which are: a) the development gap between the developed and the most developed countries of the world and the peripheral the region is deepening in relation to less developed countries (Table 2); B) EU participation in GDP globally decreased 25.90% in 2010 to 20.71% in 2017 (Table 2); c) GDP / pc in a number of countries (Russia, Turkey, Montenegro) has a tendency to decline or stagnate; d) countries in transition, EU Member States and those at the stage of accession significantly lagging behind in development for the EU average (Table 3); e) The best placed country from this group of countries according to the HDI coefficient is Slovenia in 25th place, Croatia at 48 and so on. (Table 4); the lagging behind countries in transition is particularly evident in the indicators set out in the "Strategy 2020", whereby we refer to the assessments related to the "digital agenda", "innovative Europe", "education and training", which indicates that this group of countries does not have a clear development perspective Table 5); Significant lagging of this group of countries is also evident in the achieved level of competitiveness compared to the leading Switzerland, BiH is 102th, Montenegro is 82, Croatia - 74, Serbia - 90 and so on. (Table 6). Hence, as a logical one, the conclusion is that the reform process has begun in the countries of socialism, especially in view of the Western Balkans, stopped in mid-2000 and can generally be regarded as unfinished. Thus, for example, according to currently projected growth rates, the economies of the Western Balkans will reduce by only 2030 only a small fraction of the current difference in relation to income levels per capita in advanced economies. It is noted that much more inconsistency than the nature of the reform processes carried out resulted in these countries becoming victims of their own "reform fatigue". Worse still, the success in developing countries so far, if it was, was mainly based on a combination of vast natural and other domestic resources, government aid, cheap labor or some other inherited advantages, which we usually refer to as comparative. However, business in today's conditions shows that, over time, the comparative advantages that individual countries have are no longer sufficient to achieve and preserve a high standard of citizens. As a logic, the consequence is the globalization of the imposed natural flow of things, in the function of which numerous indicators are presented that testify to the so-called. "Reformation", there were not many who think that the starvation of the industry in the majority of countries in transition is over. Hence, instead of advocated convergence, the continuation of the deepening of the gap between developed and less developed countries, which we pointed out as a problem, shows that the dynamics of the development of some national economies will increasingly depend on their own ability to raise their competitiveness to a higher level.

4. A new development paradigm as a basis of the reindustrialization process

With the advent of the global economic crisis, it has been shown that, in addition to those transition economies, the problem of economic growth and the creation of additional value, increased incidence, and so on, have developed countries. According to strategically designed and key documents formalized by the vision of a European social market economy for the 21st century, the EU economy should be: intelligent, sustainable and integrative. Presenting the annual report on the competitiveness of EU members, it was pointed out that "Europe is emerging from the crisis and signs of slow recovery are visible. Nevertheless, although we have made progress, we have not yet reached the level we anticipated and which we need to create employment." that report noted that the share of production in gross value added creation in the EU fell from 15.8 percent in 2008 to 15.1 percent in 2013. In the same period, about 3.5 million employees lost production jobs, while only Germany had achieved employment growth in all areas. Consequently, in the context of return to industrial policies, the notion of "new industrialization" or a shorter "reindustrialization" was again "revived", with the overall objective of revitalizing the EU economy as a whole, determined by the contribution of the GDP industry in 2020 to a level of 20 percent.

Furthermore, in the aforementioned report, it was pointed out that improved production improves the competitiveness of European industry, better to say, it is marked as a key driver of job creation and economic growth. This implies all solutions leading to increased productivity (production speed, operational precision and raw material and energy consumption), and / or reducing waste and pollution of the manufacturing industry, both in traditional and in new sectors of industry. Examples include: sustainable production technologies, intelligent production with the help of information and communication technologies and high performance production. In the same report they are in the function of the necessary increase of competitiveness in the EU member states, as the following recommendations are key:

1. First, more investment is needed in all sectors of the economy;
2. Second, growth requires investment, and investments need capital;
3. The third message is that we (EU) should emphasize the importance of innovation for growth;
4. The fourth message is that Europe is lagging behind in competitiveness due to high energy prices;
5. The fifth message is an imperative for European firms to have better access to markets and fully integrated into the global value chain; and
6. The sixth message is imperative that EU member states improve the quality of public administration, the inefficiency of public administration and the legal system is recognized as a key obstacle to improving EU competitiveness.

The current situation, characterized by stagnation in growth, low competitiveness, high unemployment, a decline in the share of manufacturing and industry in general in GDP, undoubtedly support the emphasis on economic growth as a key priority. Thus, e.g. the participation of industry in GDP in the period 2001-2009. years in Slovenia decreased from 30.1% to 25.5%; in Romania from 28.2% to 25.3%; in Croatia from 20.4% to 18.3%, Serbia from 21.6% to 18.0% and the like. Prof. Ž.Primorac points out that at the end of last year, and especially at the beginning of this century, there were major changes in the industrial development plan in its conceptual view in the way that "traditional industries are suppressed and replaced by new technologies, based on new materials, smart software, high-performance production robotics, three-dimensional 3D printers and other technological achievements "(Ž.Primorac, 2013).

Reindustrialization, in the way announced in this paper, does not in any way means the "defense" of socialism, and even less the appeal of the "centrally planned economy", nor even the undemocratic ideology and decline in the trap of new ideological discussions. On the contrary, it turned out that in today's multipolar world there are no embedded development paradigms; the way out of the crisis of the countries in transition is possible only in the form of a new order, which, as things stand now, will not have much socialism in itself. In this sense, we think that as the conceptual directions of the action of governments in transition countries, united in the form of a development paradigm, they can signify the following: a) the new role of the state; b) "creative destruction" as the completion of the "de-industrialization" process; c) new industrial policy; d) regional clusters; e) abandoning bribes on foreign investments; f) translating absolute and comparative into competitive advantage; g) reducing inequality; h) the process of technological convergence; i) the rise of "human capital"; j) new economic paradigm and reactivation of the entrepreneurial economy. In the next part of the paper, we will briefly explain each of the following conceptual directions:

a) New role of the state. Let's go to the fact that more and more advocates are aware that if "development is under the domination of the state, then development without the state is completed equally." The new role of the state could be described in the shortest way as its abandonment of the role as the leading entrepreneur and the transition to the function of correcting market anomalies and failure. In this sense, our starting point is that "the state is wrong", but that the market is more sinful than the state. Nevertheless, both the attitude and the "anti-market" and "anti-state" have something in common, which is to restrain and take control of the "crazed" financial capitalism and fundamentally modernize the tax and transfer system in the center of the fashionable "welfare state". Furthermore, each country, which is particularly important for less developed countries, has special mecanisms to mitigate the negative consequences of globalization. Thus, for example, no matter how contradictory it may seem, "globalization has allowed the creation of a spectrum of regulatory strategies and, in a certain sense, greater activity of

the state than it led to the end of the state. Accordingly, the power of the national governments is not necessarily reduced by globalization, but contrary to it - it has been reconstructed and erstructed in response to the growing complexity of the governance process (V.Vuletić, 2003).

b) "Creative Destruction" (Schumpeter, 1942), as the completion of the process of "de-industrialization." The countries in transition to which we have focused our research are all important features of a small economy, so that they must be open to the global environment at the same time, to influence international capital flows and overall trends in the global market, which would mean a total break with an unproductive "smoke industry", the shutdown of large business systems, former socialist giants, which in a number of transition countries continue to survive mainly due to dominantly non-economic reasons, are "political" and the like.

c) New industrial policies. The affirmation of entrepreneurship in the form of new industrial policies, not inherited, but those that prove to be meaningful, as a dark social activity should be placed in the focus of the changed awareness of the future progress and dynamism of the countries in transition. Argumenet for such an effort finds that developed industrial countries intervene whenever it is in the interest of protecting domestic industry, and have opened their markets during decades of development only to the extent that they have increased the level of their own competitive ability.

d) Regional clusters. Reindustrialization that would indicate the dynamics of economic growth will not be possible in the extent that continuity in development policy continues, especially on the obsolete institutional and organizational base. In addition, a number of countries can not be timely transformed into an entrepreneurial economy due to the lack of "economies of scale", an unbalanced.

g) Reduction of inequality. The convergence of inequality is possible only by the gradual establishment of a new development paradigm in which the foundations and the "knowledge economy" will be found. Let's start with it that it is quite clear that knowledge and innovations have played a key role in the process of civilization development. "The main power is the convergence of the process of disseminating knowledge and investing in vocational education. The process of disseminating knowledge and skills is a central mechanism that at the same time allows for general productivity growth and reduction of inequality, "T.Piketty, 2014 points out.

h) The process of technological convergence. The concept that we prefer here implies acceptance of the principles of the knowledge economy, that is, knowledge and innovation based development policy. The basis of this strategy consists of four basic pillars (World Bank, 2007): a) workforce, b) modern and adequate information infrastructure, c) efficient innovation system, and d) developed national institutional framework.

i) Fourth Industrial Revolution; Industry 4.0. Under the bumps of globalization, and, to a large extent, as a result of its inability, individual governments became "agents" of large economic monopolies, and shifted the completely disrupted domestic economic structure to the service sector as the only remaining, thus creating numerous developmental problems. We therefore consider that countries in transition must not "close their eyes" before the "fourth industrial revolution" that had already happened in the early twenty-first century. Otherwise, they will in the short term feel all the disastrous consequences of the so-called. "Technological Darwinism" in which some of them have been deeply trapped by the devastating and uncontrolled "deindustrialization".

j) New role of social capital. "If technology is the driving force of a global economy, to what I firmly believe, then knowledge is its noble metal"; says K.Ohmae,2007. In fact, here it is practically about the rise of "human capital", whereby the starting hypothesis can be stated that a developed strategic approach to the development of human potentials of a small and undeveloped country can achieve not only national recognition in regional frameworks, but also greatly accelerate its economic development.

k) New economic paradigm and reactivation of the entrepreneurial economy. The idea of reactivating this premise in the process of reindustrialization is not new, but in reality we have the situation that "entrepreneurship is in language, and classics in thoughts". In addition, in most of the transition countries, the tradition of collective entrepreneurship has caused problems in the inauguration of in-company entrepreneurship, the start-up of family businesses, and the like. Evidently low level of entrepreneurship in transition countries is almost a logical consequence of the realization that the so-called " entrepreneurial necessity entrepreneurship, and not if that is the case in developed countries of a market economy where I predominantly are so-called. entrepreneurship driven by opportunity (Deakins D. 2012).

5. Conclusion

In the function of searching for answers to the question of whether it is possible and how to reverse the future concept of development in countries in transition in the direction of greater world equality in wealth, the issue is again open and as an "exit of emergence" the possibility of "new industrialization", that is, reindustrialization. In that sense, the new model of economic growth should be basically based on the use of knowledge where it will no longer be so important maximum rate of growth of social production, forced loyalty, subordination and hegemony, raw functional authority. It is better to say that the exit from the crisis of the countries in transition under conditions of globalization is possible only in the form of a "new" order, accepting the "new" economic development paradigm in which the so-called "new economy."

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CHAPTER 7

The effects of the digital revolution on costs and prices

Gábor Rekettye[1], and Gábor Rekettye Jr.[2]

ABSTRACT

The rapid digital development of the fourth industrial revolution will result in drastic changes both in manufacturing and in business models. The conceptual study intends to define the expected changes and investigate the intensity of changes of the different industries, some of them already in the middle of the digital vortex. The main part of the paper wants to describe the expected future effects of these changes on the costs of production, within the industries touched directly by the disruptive innovations arising from the digital revolution. The study also intends to investigate the cost effects on those fields of the social sphere which are not directly touched by the digitalization. The study comes to the conclusion that the two limits of price setting i.e. the costs as the bottom and the customer value as ceiling limit will move in opposite directions in technologically intensive industries providing with a growing elbowroom for pricing. This development will have a determining effect on the whole social life.

Key words: Digitalization, disruptive innovations, digital vortex, costs and prices

JEL classification: M11, M21, M20, O14

1. Introduction

The first two decades of the 21st century have been characterized by turbulent changes in the world economy and we have reason to believe that this is going to continue in the future as well. A large number of researchers and scientific research institutes are making efforts to identify the most important global trends (we might as well call them megatrends) that will determine the future of the world economy and, closely related to it, the future of mankind (*Larsen, 2006; National Intelligence Council, 2012; Gregosz, 2012; Vielmetter and Sell, 2014; Hajkowicz, 2015; Bradley et al., 2018, Dobbs et al., 2015, etc.*).

Interest in the investigation of global issues is less widespread in Hungary, the few studies that have been published focus mainly on assumptions about the future of single industries while global issues are at best discussed at the level

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of journalism. There is general agreement on the part of experts and thinkers dealing with the economy and more specifically business life that those who restrict the validity of their theories to individual countries – however small or large they might be – are making a big mistake.

Towards the end of the previous millennium it was already possible to observe in our world turning more and more into a global village the emergence of the kind of changes that – gathering strength in the first two decades of the first millennium - regarded all types of separation, or restriction to be short-sighted and utterly provincial. Those who fail to recognize the increasing interdependence of markets and national economies, ignore the impact of international processes, are in a cul de sac beyond doubt.

The author of the present study - in co-operation with some volunteering researchers – has studied these global issues for several years. An extensive review of international literature has lead them to identify six global megatrends, that will have a decisive influence on the future changes in the business environment. They are the following (*Rekettye, Rekettye Jr., 2013*): *shift in world power which has already started, demographic changes, proliferation of products and communication tools, changes in consumer behaviour following economic depression and the radical acceleration of technological development.*

The consequences of power shift have already been analysed in detail as commissioned by the Marketing Subcommittee of the Hungarian Academy of Sciences (Rekettye, 2016) and now attention is focused on digitization, the driving force of the radical acceleration in technological development as well as its effect on business life. This is considered to be of importance because both the review of literature and consultations with experts in several countries (*Rekettye Jr., 2017*) have proved that *technological development* is of utmost importance even though the trends outlined here are closely interrelated.

This trend is so strong that references to a fourth industrial revolution have already appeared. This study focuses on the essence of this industrial revolution (Industry 4.0) describing the characteristics of the so-called disruptive innovations that - as a result of digitization - appear like a vortex and get multiplied. Their effect on costs and prices will also be examined.

2. Industrial revolution 4.0

The compound ‘fourth industrial revolution’ is actually the title of a book written in 2016 by Klaus Schwab, founder and current leader of the World Economy Forum. (*Schwab, 2016*). In his view the world has now entered a stage of technological development, which can very well be called a revolution and this is a change (development) which might overwrite former trends, determine our whole life, and as such, it can have a fundamental influence on the production of customer value, the factors motivating it, the methods of its implementation , its results and consequences. Figure 1. shows the changes in production over the last two-three centuries.

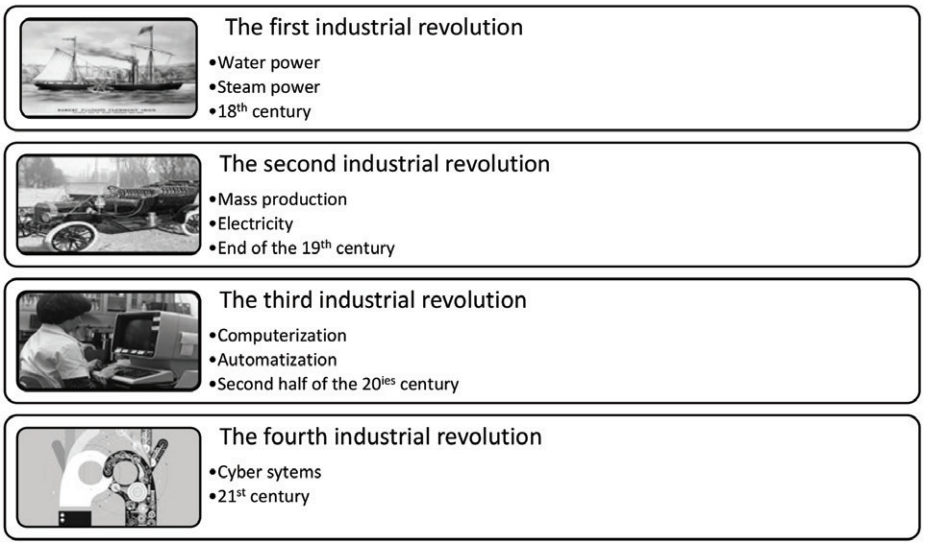

Figure 1. The industrial revolutions
Source: Own construction

At present it is impossible to foresee the consequences of the fourth industrial revolution. Let us examine what kind of changes we have to do with. The VINTlabs research team at the Sogeti Research Institute (Vision, - Inspiration – Navigation – Trends) described as early as in 2013 that the bricks used for building the 'smarter world' - community media, smart phones, analysing skills, cloud applications complemented with the internet of things now constitute a coherent and co-operating system, that makes it possible for us to make our things smarter or create smarter things (SMACT Figure 2).

The fourth industrial revolution was also the leading topic at the World Economic Forum in Davos, 2016 with the title: Mastering the Fourth Industrial Revolution. The forum discussed both the positive and the negative aspects of the fourth industrial revolution. As Schwab put it: „There has never been a time of greater promise, or peril". The opportunities arise from what the SMACT theory defines by saying that the building bricks of a more optimal life constitute single system by now.

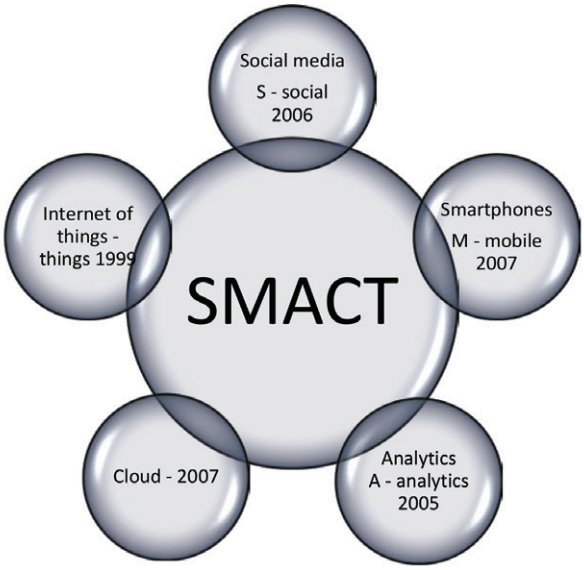

Figure 2. Components of SMACT (with the date of their introduction)
Source: https://www.sogeti.com/why-us/leading-innovation/

Note: SMAC is the acronym used by the Gartner Research Institute in the research project entitled: Nexus of Forces, and VINTlabs added T for the Internet of things.

John Moavenzadeh analysed another aspect of this development in his paper presented at the 2015 summit meeting in Amsterdam. He stated that the fourth industrial revolution fundamentally transforms the *global system of production.* The emerging cyber-physical system combines communication, information technology, data, physical elements and a host of basic technologies, receptors, the infrastructure of communication via the internet, intelligent, simultaneous processing, the participants of mechanical activities, the 'big data' and the way it can be obtained, the automated operation and management systems, advanced robotics, 3D and 4D printing.

It is on this basis that the business models of industry will change fundamentally. A survey conducted in 2015 involving strategic leaders of companies found the following:

- 88% of experts working in the car industry believe that by 2030 at least one car manufacturer will realize higher income from the sale of data and services than from the sale of cars and spare parts.;
- 92% of banking experts agree that the so-called *'distributed ledger'* technology will have eroded the whole financial system;
- the majority of institutional investors and financial leaders agree that by 2025 most of the transactions, and even company documents will be processed in the *blockchain system* (Peplow, 2016)

In conclusion it is reasonable to forecast that IT (Information Technology) will get integrated with OT (Operation's Technology) (Figure 3) which, in turn, will lead to a paradigm change in operation as a consequence of M2M (machine-to-machine) communication. The resulting Internet-based cyber-physical systems will induce favourable changes in the creation of customer value or – as Francois Barbier one of FLEXS's managers put it: The fourth industrial revolution will change the way we produce and consume.

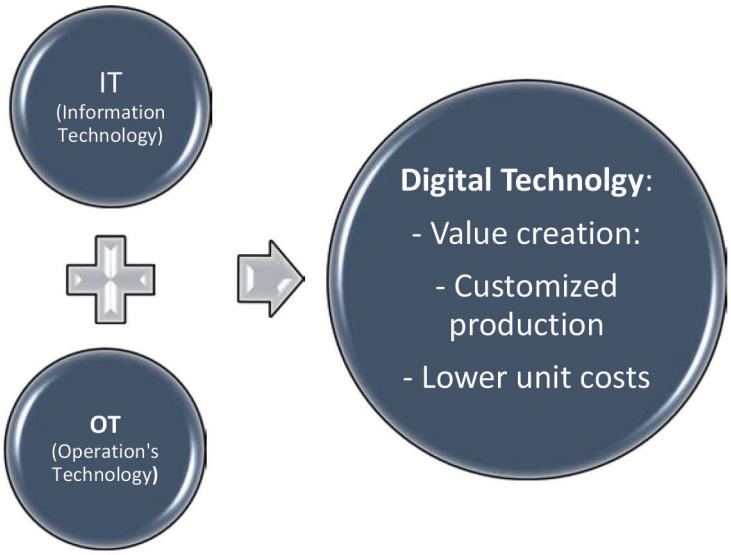

Figure 3. The linking of IT and OT
Source: based on (Bloem et al., 2014)

3. Proliferation of disruptive innovations — the digital vortex

The rapid development of digital technology will bring about a paradigm change in production and will affect not only the individual companies, but the competitiveness of the countries as well (*Baur et al., 2015; Rüßman et al., 2015; Geissbauer et al., 2016, Berger, 2016*). What can be observed already is the fact that the digital technology favours the so-called disruptive innovations.

A large number of examples could be mentioned to illustrate this point. One of them, perhaps the most spectacular, is the industry built on photography. Taking photos on celluloid film flourished for more than a hundred years when, in the 21st century, is was replaced at a rapid pace by the digital camera. It is ironic that the Kodak company – inventor of the digital camera - insisted on going on with the production of the old product too long and went bankrupt as a result. But manufacturers of digital cameras could not quietly rest on their laurels either, because smart phones appeared in 2007 and they took hardly one decade to fully replace the digital camera (Figure 4).

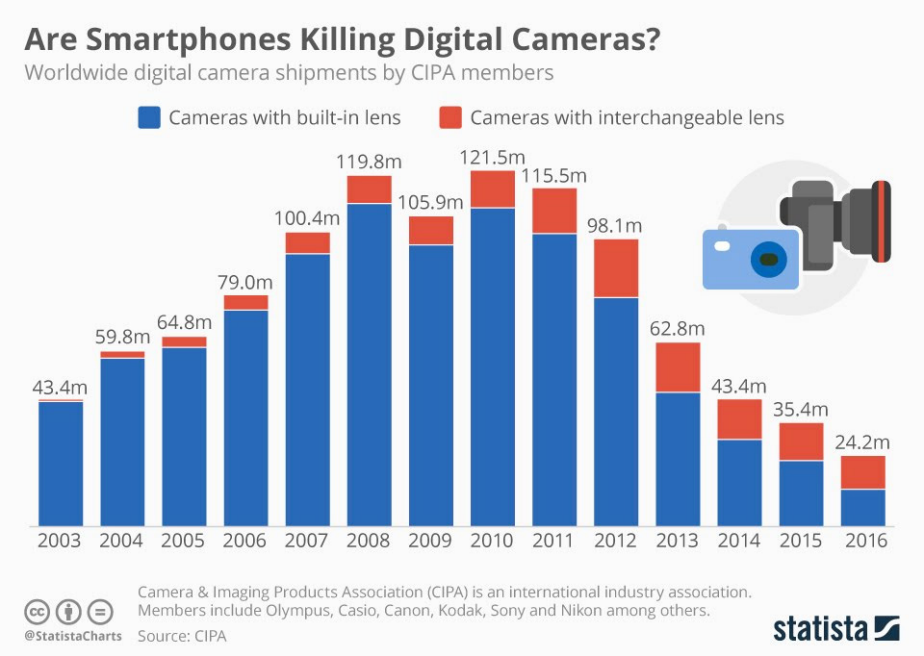

Figure 4. Smart phones oust digital cameras (global sale of digital cameras in m pieces
Source: statista.com

For some industries digital disruptive changes mean the introduction of new developments, new ways of meeting consumer needs either by companies within the industry or external ones (e.g. start-ups) which jeopardize the present position of the industry as a whole.

Once this process begins, it takes up more and more speed, and like a vortex, sweeps along the companies. Certain studies refer to this period starting around 2012-15 as the era of digital vortex. In this context we should mention the book entitled 'The Digital Vortex' by Loucks et al, which obtained the Axiom Business Award Prize in 2017.

The digital vortex represents great danger for some but excellent opportunity for others. As Bradly and al wrote: 'Economists may very well argue about the advantages of digital technology for productivity, this debate is, however, overshadowed by the fact that buyers (both individual consumers and organizations) unquestionably enjoy great advantages in value - lower costs, better performance, new relationships' (*Bradly et al., 2015a: 10*).

Not every industry is exposed to the effects of the digital vortex to the same degree. The Global Business Centre for Digital Business Transformation, a research centre operated by IMD and Cisco found the following order among the industries in 2015 (Figure 5).

12. Pharmaceuticals
11. Oil & Gas
10. Utilities
9. Healthcare
8. CPG manufacturing
7. Hospitality & Travel
6. Education
5. Telecommunication
4. Financial Services
3. Retail
2. Media & Entertainment
1. Technology

Figure 5. Order in which industries are exposed to the digital vortex (1 = most exposure, 12 = least exposure).

This order can, of course, change in no time; a company may be on the edge of the vortex today, but fall suddenly in its centre or vice versa.

4. The effect of industrial revolution 4.0 on prices

Manufacturers have to bear in mind two limits when setting the price of a product or service: the lower limit is defined by the costs (in the short run variable unit costs and in the longer run the total unit costs), while the upper one depends on the consumers' willingness to buy and their price acceptance. It goes without saying that the latter is deeply influenced by the size of the perceived value that the product or service represents for customers at the target market. If the price does not fall between the two limits the product cannot be sold or if it can, it will make a loss. As demonstrated in our earlier papers (*Rekettye, 1997, 1999*), these limits gradually move away from each other in the case of technological goods, (Figure 6) thereby giving more elbow room to price policy.

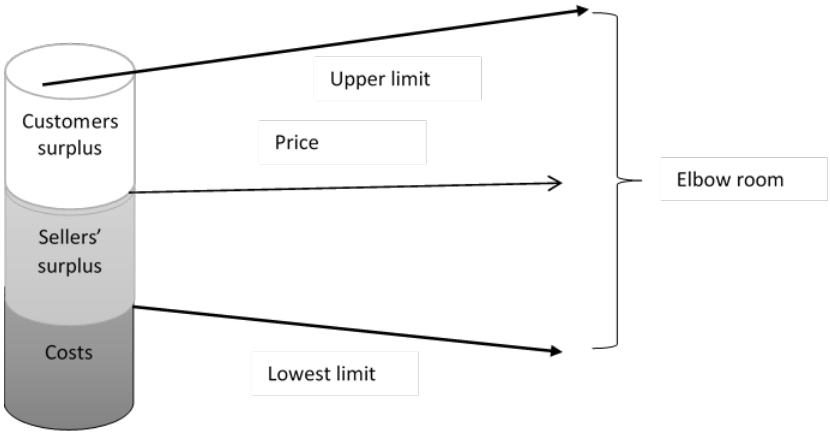

Figure 6. The elbow room available for prices
Source: own construction

4.1 The effect of the fourth industrial revolution on the lower limit of pricing

The term lower limit of pricing actually means the costs. In the long run the profitability of a company depends on whether the price allows the return of all the costs per unit, while in the case of price actions in short term business policy a return of variable costs per unit can be sufficient. If a product can be manufactured at lower costs than before, we speak of *improved productivity*. Looking back on the history of industrial revolutions we can see that each resulted in a huge improvement in productivity. Just think of emergence of mass production or the consequences of automation.

Now, at the beginning of the fourth industrial revolution all forecasts point in the same direction: in the next 10-20 years an unprecedented, radical improvement of productivity can be expected, which means that the unit costs will decrease significantly, of course to various degrees in the different industries. Let us examine now to what extent the various cost elements will be affected in these processes. Röβmann et al. made calculations concerning the production of spare parts in Germany and concluded that

- on the average *direct labour costs* will decrease by 30%, over the present values within the next 5-10 years;
- a decrease of similar magnitude can be expected in the *costs of operation;*
- *Costs of materials* will remain unchanged, but forecasts speak of a 50% decrease in moving goods and materials, and logistics;
- *overhead costs* are supposed to decrease by 30%

- It takes, however, significant investment to create the “clever factory” and this will increase the rate of *depreciation – by about 40%* forecasts say. This is the only cost component which is supposed to increase.
- In conclusion they forecast a 5-7% decrease in total costs, and a 27-30% decrease in conversion costs (with materials excluded).

At this point we have to make two digressions:

- The *first is about the impact of productivity improvement and the cost decrease on the labour market*. Speaking about labour costs we can forecast that the sum of money paid as wages will go down because very few employees will be needed in the ‘smart factory’.

Machines will do the work like in Okuma, the Japanese machine factory that is capable of working round the clock, seven days a week, without any human intervention. All the operators do is supervise the system and the work they do requires very highly qualified people. (Dujin, Geiisler, 2016: 7). They also succeeded in automizing the *kaizen method* which is very popular with the Japanese, and as a result, the productivity of the factory got multiplied. It is this side of the fourth industrial revolution that Schwab referred to as great potential danger. Some researchers think that in the USA, for example, about half of the people employed in the industry have to face the danger of losing their jobs to the machines. This ratio is even higher in the developing countries, which specialize in contractual manufacturing with little value added.

More optimistic forecasts expect new jobs to be created in general, or in complementary services. This, however, would require significant changes in the qualification and attitude of the labour available. In this context Erik Brynjolfsson, professor of MIT (Massachusetts Institute of Technology) made the following statement in an interview on the BBC: ‘The concern is that we are not updating our education, training and political institutions to keep up.” And this may lead to a situation where we lose a lot of people. (Gray, 2017).

- The second digression deals with *the cost changes in areas not affected directly by the fourth industrial revolution.* The fourth industrial revolution will make a distinguishable impact in all areas of the society. There are, however certain corners where this impact will not be very strong. Aspects of culture should be mentioned here, some parts of education, and health services, etc. These are the fields where human participation will remain decisive in the future as well.

The question is, whether the decrease in costs will be experienced in these activities as well. Well, the answer is found in the theory named ‘cost disease’ advocated by the late William Baumol. This theory holds that the increase in productivity of manufacturing has made possible – and quite understandably goes hand in hand with – a rise in the wages of employees. Using Baumol’s example, it is clear that a string quartet cannot be expected to increase productivity, but if their salaries had not been raised, they would certainly have abandoned their career and taken a job in industry. (Lee, 2017)

Productivity increase in the manufacturing industry makes it possible to lower prices in this sector, but – at the same time- wages are also raised. This, in turn, makes pay rise in the labour-intensive services indispensable and – to finance it – the simultaneous increase in prices as well.

4.2. The impact of the fourth industrial revolution on the upper limit of pricing

The upper limit of pricing policy is the buyers' willingness to accept the price. The marketing literature describes in detail that consumers' buying decisions are mainly affected by perceived customer value, making it the primary determinant of their willingness to purchase. The perceived customer value is the result of the customers' careful comparison of the perceived benefits of the product or serves and the perceived expenditures they have to make to acquire the product or service in question.

The analysis of the economic history seems to prove that the industrial revolutions, the development of the industry and the growing number of innovations have all contributed gradually to increasing the benefits of the offered products.

This process has become more radical in the fourth industrial revolution. The joint application of the tools (SMACT) listed in the first half of the paper makes it possible to

- involve customers already in the early stage of product development, and make more customer-friendly products in this way;
- The time needed for product development is reduced considerably by the simulation tests and 3D printing, therefore the product gets ready to be launched in a significantly shorter time;
- The use of robots and the elimination of human work wherever possible makes the quality of the product much better;
- Digitalization and the use of IoT in particular, can add new functions to the product which facilitate its use, and make its use not only safer but more enjoyable as well;
- The new technology will be able to customize products more cheaply.

In summary we can conclude that in areas affected by the technology, a rapid growth can be expected in customer value which is a decisive component in the upper limit of pricing. It is also clear that while the lower limit moves downwards, the upper limit moves upwards and these changes lead to a rapid extension of the elbow room available for the pricing policy.

4.3. Expectations concerning price changes

The main question is how prices will change in the industries affected by technology. Will they follow the decrease in costs and go down, or will they rise because customer value increases? Let us examine what happened in the past. Figure 7 shows price movements in some product groups over a period of 36 years in the US.

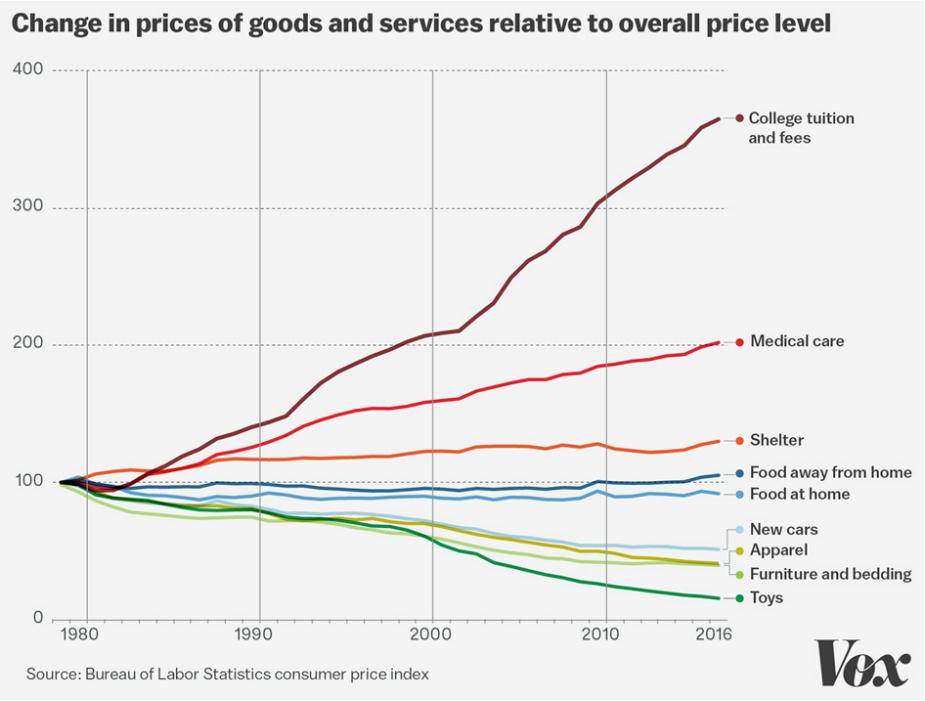

Figure 7. Changes in the price of some products in the usa between 1980-2016
Source: Vox, Bureau of Labor Statistics

For the most part the American example proves Baumol's 'cost disease' theory. We can get very similar results if, for example we examine price changes in Hungary. In a book published a few years ago the authors analysed (Rekettye, 2011) this point and concluded that while the real value of prices of technical goods fell considerably after the transition, the prices charged for labour intensive services kept rising. Hungarian higher education and the health services could not be investigated for obvious reasons, this is why driving licences were found to have the highest price rise.

As far as our present discussion is concerned, the main point/question is what is happening in the conditions created by the disruptive innovations of the fourth industrial revolution. The study concludes that the same trends will continue, but at a quicker pace. To what degree prices will follow the decrease in costs, depends on several factors:

1. What kind of power relations will prevail at the market of the industry in question, and who will dominate the market;
2. What will be the outcome of the hide-and-seek game of prices between the suppliers and customers (Rekettye, Liu, 2018);
3. What kind of business policy will be dominant in the industry under examination.

5. Summary: possible business policies in the era of the digital vortex

Companies already in the digital vortex can be divided into two large groups. Disruptors and disrupted. Disruptors and those on the defensive while waiting to be disrupted can chose between two business policies to follow. Both business policies derive organically from the chain of thoughts written about the lower and upper limits of price policy:

- *Price-centred business model*: followers of this business policy intend to create value for the customers by putting price-cuts in focus because they believe that lower the prices the more they can help them reach a competitive edge.
- *Value-centred business model:* The other alternative is to make efforts to gain a favourable position in the competition by offering products with *higher customer value than the competitors*.

The price-centred business model is the one that disruptors prefer to use mainly at the beginning their activity. Sometimes they apply novel, unconventional management methods – for example in the supply chain, human resource management, and most of all in manufacturing and pricing – because these methods promise them a cost advantage. Several of these methods can be observed in our days already.:

- G*et something free***:** This method is mainly used in telecommunication. Customers are not charged anything for products that earlier cost money. This practice can be adopted in cases when variable costs are relatively low and marginal variable cost is close to zero. Good examples are Skype (audio and video calls), Spotify (music) or Dropbox (online storing). Customers are, however, expected to pay for higher level, premium services.

- *Cost sharing: U*sers divide the costs among themselves (for example Groupon).
- *Fostering hard bargains:* Trivago could be the best example for that (travels, accommodation).
- *Inverse auction:* In this case the price is set by the buyer.
- *Pay as you go*: Instead of the former fixed price, buyers are only charged for the part of the product or service that they have used.

Value-centred business models intend to provide customers with higher customer value (more modern products, more comfort, etc.) in addition to lower prices. Businesses operating in the vortex follow the basic principle that they should digitalize everything that can be digitalized. This is the reason why we often experience that something which used to have a physical character, can now be linked with the product as a service. Here are some of the methods applied:

- possibility to test the product free of charge,
- eliminating intermediaries, involvement of buyers in the sale (do it yourself)
- complete customization
- introducing new digital functions on the products
- making products available very quickly and comfortably,
- making purchases very easy, etc.

The two models are not separated so clearly from each other in real life. Most of the companies prefer to use the principles of both models simultaneously.: they increase customer value of their products while keeping low their unit cost. However, this management method is not always simple to realize.

If companies are to be successful in the conditions of the fourth industrial revolution and the digital vortex, they will have to get to know, accept and implement a number of new things. One thing is certain: sticking to the old, familiar methods – that were built on the slow and gradual transformation of the environment is as good as a death penalty (Hansgaard and Mikkensen, 2013). Because it is a new reality. All this has an effect on the transformation of company organization structures, managerial practices, and company culture.

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CHAPTER 8

More than technological evolution: organizational and business impact of Industry 4.0

Nedeljko Štefanić[1], Heri Bezić[2], Petar Gregurić[3]

ABSTRACT

Industry 4.0 is a new paradigm enabled by the implementation of digital technologies in business processes, and it is regarded as the transformation from individual and centralized processes to flexible, self-regulated and connected process through the use of cyber-physical systems. Most of the recent literature deals with technology features of Industry 4.0 while the business and organizational aspects are substantially less covered. This fact motivates the need to systematize current knowledge on the subject and to outline potential research directions. Our goal was to address this challenge by reviewing available papers on topics of organizational and business models in the context of Industry 4.0 in order to assess the impact of digitalization on current models. Specifically, we have investigated which current organizational models are more suitable for digital transformation and what are the expected challenges regarding business models. In addition, we were also interested in what way are organizational and business issues addressed in proposed frameworks for digital transformation. Research findings imply that Industry 4.0 will have a major impact on existing organizational and business models, with the concrete organizational changes depending on factors such as industry type, geographical location or current organizational models. These findings lead to the conclusion that there won't be a one-fits-all solution that will facilitate the digital transformation. The used transformation framework will have to take into account specific organizational circumstances.

Key words: Industry 4.0, Organizational model, Business model, Transformation framework

JEL classification: JEL_L6, JEL_O3

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1. Introduction

The process of globalization, liberalization of international trade and the global economic crisis in 2007 showed that the classical vision of the enterprise and its business activities can't survive in today's turbulent economy. It is the reality, not only for production-oriented enterprises, but for service-oriented enterprises too. Because, today's enterprise needs to have a high degree of specialization in its field, and, at the same time, a flexible and fast response (new product or service) to the needs of customers (a very specific ones and a wide range ones). That creates a new vision of a modern enterprise which needs to unite contradictory requirements: specialization and flexibility.

Since the introduction of phrase "Industry 4.0" by the Germans during Hannover Fair in 2011 (Quin, Ying, Grosvenor, 2016), the literature regarding that topic has risen sharply, but while most of the recent literature deals with technology features of Industry 4.0 the business and organizational aspects are substantially less covered. This paper is going to be offering a viewpoint on most suitable management practices which promote innovation, startup culture and learning as well as the best organizational and business frameworks suitable for Industry 4.0.

Industry 4.0 is going to be characterized by smart manufacturing and implementation of Cyber-Physical Systems (CPS) (Shamim, 2016). There is the number of factors connected to the Industry 4.0 including lack of workforce, society getting older, mass customization, shorter product life cycle, volatile markets and pressure to reduce costs (Shamim, 2016). Some of them can be solved by implementing technological features of Industry 4.0, while others, like lack of workforce and older society by changing organizational and business features. Level of innovation has been recognized as number one factor for adapting to the new demands of the markets. R&D and innovation are key policy components of the Europe 2020 strategy (Eurostat R&D intensity). All this require new innovative leadership style, closest to it is transformational leadership (Investopedia - Leadership) (Transformational leadership) (Ma Prieto, Pilar Perez-Santana, 2014).

The second big challenge, which will, in addition to technological approach require organizational approach too is mass customization. Although it utilizes modularization to simultaneously increase product variety and maintain mass production (MP) efficiency, there are some limitations to mass customization (Yi Wang, 2017).

The third big challenge is business paradigm change. From 1960 until 2015 world population has grown from 3 billion to more than 7 billion people. Furthermore, the buying power of each individual tripled in that period. The result is misbalance between supply and demand side. Neoclassical business models are getting outdated and unsustainable. New business models need to be constructed, which will include social and environmental factors (De Man,

Strandhagen, 2017: 721-726). Social and political parameters will play a crucial role in the process of digital transformation. Some say that universal basic income will become necessity (Michael Rander) (Universal basic income).

Making progress in this direction and solving this dilemma would make integration of businesses with the 4th Industrial revolution, i.e. industry 4.0 much easier for stakeholders. Horizontal integration of the products, customers, workers or suppliers, and the manufacturing equipment requires not only technological approach but organizational and different management approach.

That is why in this paper, we will address the influence of Industry 4.0 and digital transformation on business models and organizational frameworks and investigate which one is the most suitable for digitalization process. In addition to that, we will categorize the best changes and ways for current models to adapt to the necessary changes and categorize them by industry type and geographical location. There is no unique solution for all type of organization; they need to be customized.

2. Methodology

Since Industry 4.0 is pretty new, most of the research on it have been based on theoretial, not experimental methods. This one is no different. It is challenging to try to practice new business or organizational concepts because that would require remodeling businesses and being exposed to risks which most of the companies are not ready for.

The framework methodology used to develop our model is the step-by-step process which included systematic literature research and review, summarizing, synthesizing new concepts from old, categorizing them and describing in which direction should research continue.

We have started the process of searching for the appropriate literature by using scientific sources such as Thomson Reuters to find the articles with the keywords: Industry 4.0, digitalization, digital transformation, organizational and business models, transformation framework. After exploring numerous essays dealing with this topics, we have decided on the ones best suitable for our research directions. Those are the ones referenced in the introduction part. We chose the sources based on the ones which explore the combination of technological innovation needed to pass digital transformation with the organization and management influence taken into consideration. Furthermore, articles investigating socioeconomics impact on the Industry 4.0 were especially noted.

After deciding on the literature, next step has been summarizing the most suitable concepts for our topic. In summarizing phase, we identified essential elements and condensed vital information into their own words to solidify meaning.

For summarizing we have used a simple method adapted from “Summarizing a Research Article 1997-2006, University of Washington”[4]. First, we determined what our focus is and how this article relates to our paper. We asked ourselves:

- How reliable are the results?
- Are any of the results unusual?
- What does this study contribute toward answering the original question?
- What aspects of the original question remain uncertain?

After reading for depth, highlighting main points and answering the questions, we have summarized the essential points and results while keeping an eye on eliminating wordiness, using specific, concrete and scientific language.

In synthesizing, we have taken key points from the previous phase and grouped ideas to new concepts and thoughts. Synthesizing takes the process of summarizing one step further. Instead of just restating the crucial points from the text, synthesizing involves combining ideas and allowing an evolving understanding of a text.

The last step was recommending in which direction should the research continue to understand organizational and business impact of Industry 4.0 better.

3. Results and discussion

3.1 Innovative management

Success in Industry 4.0 is measured in the capability of adapting to changes and in innovation level. Organizations require smart management and smart workers. Management style has not changed much since the late 80ties, so new management paradigms are becoming hot research topic. There is a need to develop capabilities to manage business models successfully, to access potential market and reach customers, to improve value chain processes and systems, risk management and legal matters, and strategic management because of globalization. First and essential parameter companies need to reevaluate is their capability to innovate. Level of innovation is becoming number one factor needed to be successful in the following years.

In present times, needs of customers are changing daily, and companies must be able to innovate and follow those needs fast as possible. Competitors are becoming more agile, dynamic and proactive. Responding times to competitors moves will need to become shorter and more responsive. The primary innovation indicator also cited as R&D intensity, shows the proportion of gross domestic product (GDP) dedicated to research and development (Eurostat R&D intensity). As seen from the graph, expenditure on R&D slowly progressed from

4 How to summarize a research article, http://web2.uconn.edu/ahking/How_to_Summarize_a_Research_Article.pdf

1.77% in 2007 to 2,04% in 2014, but recent figures point to stagnation. Still far away from 3% target (Eurostat R&D intensity)..

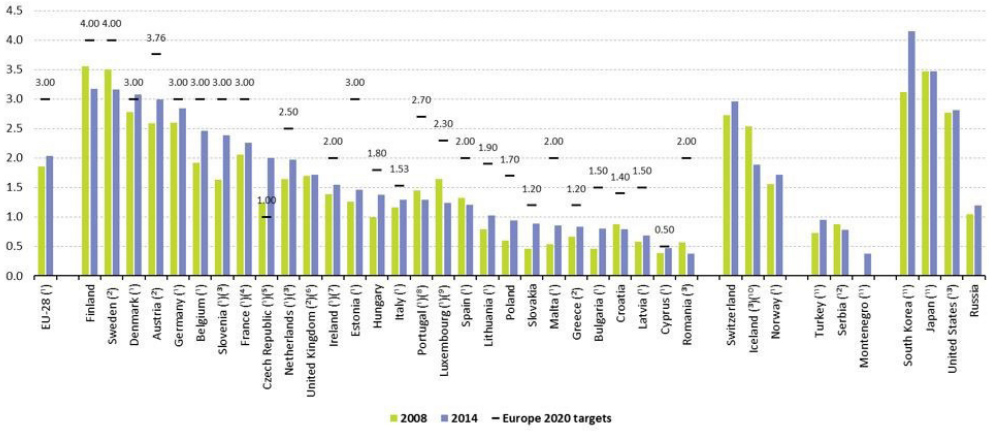

Figure 1. R&D INTENSITY (Eurostat R&D intensity).

If we compare expenditure in innovation globally, EU is still lagging behind more advanced economies, such as

Japan, South Korea, China and the United States. R&D intensity can be considered a solid indicator of the potential GDP growth (Eurostat R&D intensity).

Fostering entrepreneurship and creativity is number one challenge to make use of R&D. However, innovation is not limited to it. Companies can be stimulated to innovate internally, but it requires a different approach to the employees. A progressive business environment is vital for the promotion and diffusion of innovation. It is in direct correlation to the leadership style. Investopedia defines leadership as the ability of a company's management to set and achieve challenging goals, take swift and decisive action, outperform the competition, and inspire others to perform well[5].

The last part, "inspire others to perform well" is essential for innovative management.

For example, Apple Inc. is on the list of most innovative companies in the world. According to most of the case studies, it is not due to the technical skills of past Apple's CEO Steve Jobs; it is due to the leadership style of managers. They know how to extract best outputs from their employees (Shamim, 2016).

If companies aim to stay concurrent in the age of Industry 4.0, they will need to adopt special, innovative management style.

The most commonly mentioned management style for Industry 4.0 is transformational. Transformational leadership is leadership approach that causes a change in individuals and social systems. James MacGregor Burns (1978) first

5 Investopedia - Leadership, https://www.investopedia.com/terms/l/leadership.asp#ixzz5Db3rb

introduced that concept. While transactional leadership style is based on “give and take” relationship, transformational is based on leaders personality and drive toward change. Transformational managers strive to change organizational culture.[6] Since digital transformation requires new, remodeled business and organization frameworks, transformational management is more suitable for doing that.

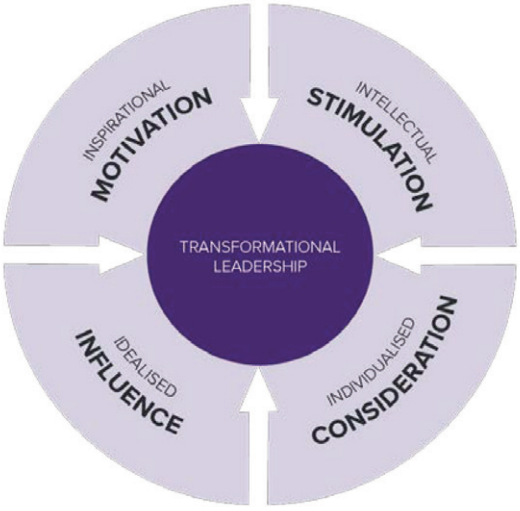

Figure 2. Transformational leadership

In addition to management being transformational in Industry 4.0., it has to implement some more parameters to be successful. Those are a specific approach to hiring, training, grouping, compensation and job design.

Hiring has to be slow and methodologic, testing the candidates’ ability to comprehend open concepts and testing their capabilities of thinking outside the box, personality traits needed for the innovative mindset. Firing has to be swift when it is evident that individual cannot fit into the organizational structure. Training programs need to be designed to enhance the innovative capability (Shamim, 2016: 5309-5316) .

Groups formation should follow Belbin system of 9 roles in it. Innovative managers need to motivate employees by designing objective performance compensation system which is reflecting employees contribution to the company (Ma Prieto, Pilar Perez-Santana, 2014: 184-208).

Job rotation, flexible working time, the lengthy list of tasks and responsibilities to the employees promote the climate of innovation. Furthermore, job design ought to promote teamwork and collaboration (Ma Prieto, Pilar Perez-Santana, 2014: 184-208).

6 Transformational leadership, https://www.langston.edu/sites/default/files/basic-content-files/TransformationalLeadership.pdf

3.2 New organizational models

Manufacturing is a crucial part of today's society. Production paradigm is now coming through forth powerful change. In the first industry revolution products were manufactured based on the demands of the user at the limited number and high cost. In the second industrial revolution, that changed and low-cost products were made using large-scale production. The variety of the products was very limited. The leading pioneer of production in Industry 2.0 was Frederick Winslow Taylor. Third industrial revolution introduced mass customization production. It required new flexible production paradigm. Lean production was born from it, including concepts like just in time, pull system and Toyota production system.

Industry 4.0 brought different demands, shifting focus from company's value to customers demands. Customers want personalized products while at the same time there is a visible deficit of personalized production. In order to solve it, new smart, modern manufacturing model needs to be invented. China already adopted the strategy of smart manufacturing and it is called "China manufacturing 2025". Many similar projects are in the world, including "Intelligent manufacturing system" by European Union.

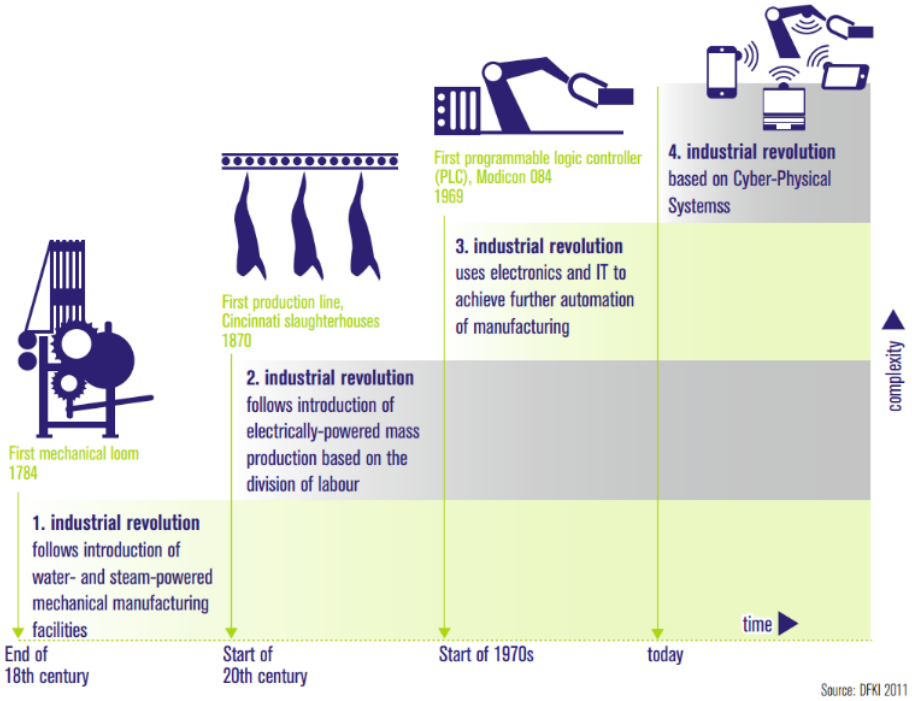

Figure 3. The four stages of the industrial revolution (Veza, Mladineo, Petko)

Customers are demanding products as fast as possible. The delivery time is going to get shorter and shorter, reducing from a week to days and later to hours time.

For mass customization model to be satisfied it needs to configure various products variants through modularity with commonality embedded in the product platforms to reuse proven design among product families. Furthermore, products have to be created so the parts of it can easily be modified.

Also for mass customization production to be successful, current organizational models need to be reassessed.

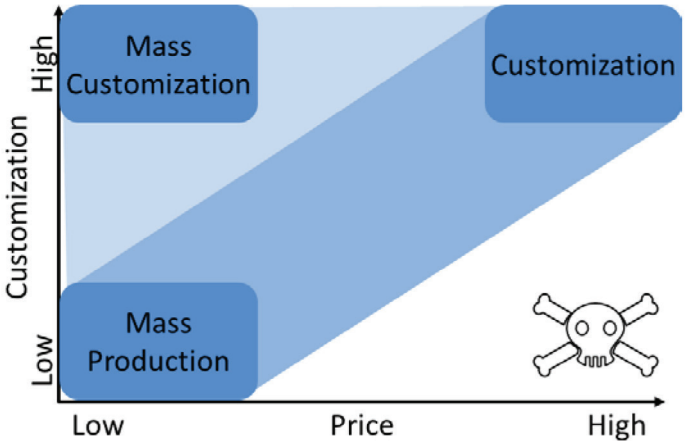

Figure 4. Mass customization

An organization can range from mechanistic which are characterized by a centralized structure, bureaucracy, many rules, and vertical hierarchy to organic which are decentralized, characterized by startup culture, horizontal communication, and fewer formalities (Shamim et al., 2016: 5309-5316). Industry 4.0 is characterized by volatility and uncertainty, so organic design is much more suitable for it.

Future-oriented companies nowadays are organized in either matrix structure, decentralized, project-oriented or flat hierarchy.

A matrix type of organizational structure combines the traditional departments seen in functional structures with project teams. In a matrix structure, individuals work across teams and projects as well as within their own department or function. For example, a project or task team established to develop a new application might include engineers and web designers as well as those with marketing, financial, personnel and production skills[7].

Advantages are that it helps break down the traditional departments, improve communication vertically and horizontally, reduces costs, improve coordination, induces motivation and encourages synergy of ideas which directly influences innovation level in the company. At the same time, it brings some disadvantages such as a double line of responsibility, unclear line of authority and members could neglect their functional responsibilities.

7 Matrix structures, https://www.tutor2u.net/business/reference/matrix-structures

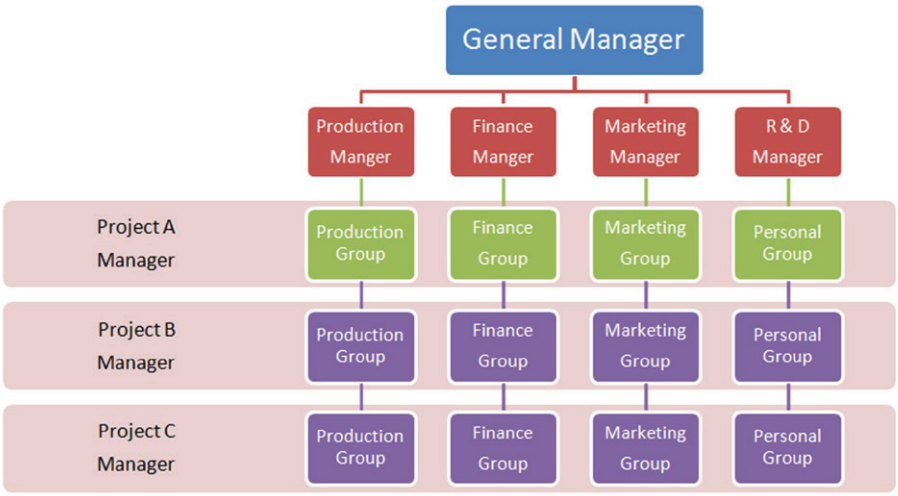

Figure 5. Matrix structure

The second common organization structure is a flat hierarchy. It is most often seen in startups. It has no levels of middle management between staff and executives. Managers have more employees and responsibilities under them. Furthermore, chain of command is short, and there is usually no more than three levels. Open office design is typically seen in flat organizations. The flat structure increases employee-managers communication, which increases learning and feedback process. It is reasonable to argue that a flatter organizational structure can be a good fit with industry 4.0, as it promotes innovations (Shamim et al., 2016: 5309-5316).

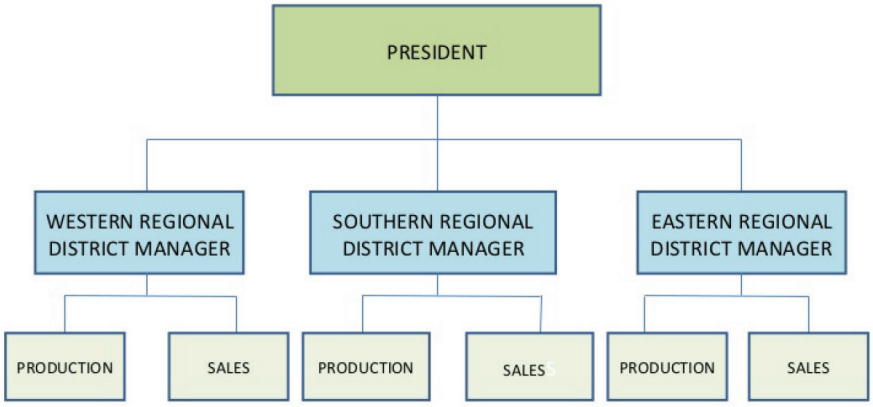

Figure 6. Decentralized structure

In decentralized organizational structures, decisions are often transferred to the lower levels. The main idea is that employees have better knowledge of activities than top management.

It allows them to make decisions faster. In changing times, it has proven to be more flexible and agile than standard organizational structures (Shamim et al., 2016: 5309-5316).

Industry 4.0, as we mentioned before, requires the new type of innovative management ready for dynamic and volatile times. This type of management cannot function in a standard functional organization. It needs new organizational type which is going to combine matrix and flat structure while being decentralized. It would allow innovative management to use a full resource of the employees. By decentralization, employees would become more implemented in decision making which would make an organization more agile and responsive to the demands of customers and competition.

3.3 New business paradigm and social-economics results of Industry 4.0

Digitalization and Industry 4.0 are bringing automation with it. 47% of the U.S. workforce is at risk of being replaced by automation over the next 20 years[8]. At the same time, new jobs will be created – requiring some people to transform their careers to fit the needs of the new market. However, some people will remain unemployed. In 2014, there were approximately 233,700 taxi drivers in the United States with a 2015 median annual pay of $23,150. No formal education is needed to become a taxi driver. In the event of a future large-scale automation, this middle-aged group will not only have no or little formal education, but also no training that directly positions them for the new jobs in the digital economy. While some will bounce back, get creative, and start over in new areas, it is a difficult challenge. Many will not overcome transition (Shamim et al., 2016: 5309-5316).

It will bring a profound social effect which Industry 4.0 leaders will have to keep in mind.

As we mentioned in this working paper, digital transformation is the most powerful revolution happening in the world so far. New management style and organizational structures will be used to stay competent. However, in addition to technological, management and organizational approach, social-economical should also be taken into account.

8 Michael Rander “Is A Universal Basic Income A Must-Have In The Digital Economy?” http://www.digitalistmag.com/future-of-work/2016/07/05/universal-basic-income-must-have-in-digital-economy-04303867

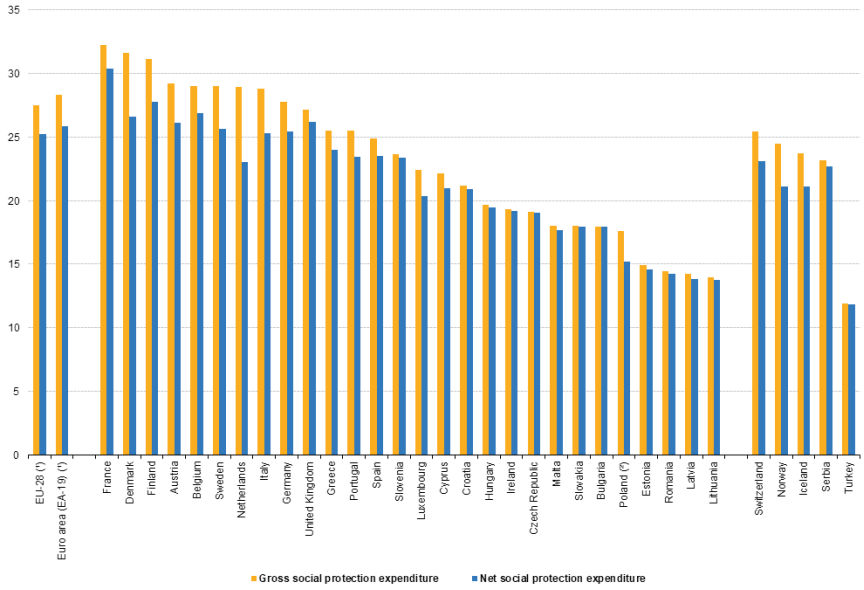

Figure 7. Expenditure on social security

Countries spend massive amounts of money on social security, unemployment programs, food stamps, housing initiatives, and other social benefits as well as the resources and administration needed to support these programs (Shamim et al., 2016: 5309-5316). More than 25% of the GDP in European Union (Eurostat, 2017).

An alternative solution is the universal basic income (UBI). It is a fixed amount given by the state to an all individual at a level sufficient for survival, designed to prevent society from dividing into two distinct groups: those who can survive and thrive in the digital economy and those whose jobs are endangered by digitization[9]. While that may sound like a massive expense for any country, you have to consider that UBI would alleviate at least part of the current impact on social and economic expenses related to unemployment.

Instead of managing and paying out different social security initiatives, the UBI would offer a less bureaucratic, more transparent, simple and efficient approach to supporting those in need.

9 Universal basic income, http://basicincome.org/basic-income/

4. Conclusion

In this paper, we tried to synthesize the “ingredients” of the future-oriented companies which will dominate the market in the following years. Those companies will have to contain the mixture of innovative management and new organizational structure to stay adaptable to change and customer demands.

Furthermore, they will need to move the focus from following the competition to the satisfying the customers in a way that products or services will become more personalized and customized. Not all the companies will survive the fourth industrial revolution, the biggest so far. Many of them will not be able to adapt and as a result, will fail, but the successful ones will become industry leaders.

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CHAPTER 9

Adaptability of the workforce in Europe – changing skills in the digital era

Maja Jandrić[1], Saša Ranđelović[2]

ABSTRACT

Technological changes have had a large impact on labour markets. New technologies can either complement or substitute workers. In both cases, one of the most important consequences is change of set of skills that are needed in the labour market. Problem solving skills, creativity and socioemotional skills gain much more importance than before, as well as functional literacy and technical skills related to the use of ICT. Impact of adoption of new technologies in specific country's labour market depends on industrial and occupational structure, the skill mix of the workforce, organization of work and the extent to which new technology is already present in the local economy. The aim of this paper is to analyse levels of the workforce skills adaptability in different European countries, using OECD data on achievement in reading, maths and science, as well as data on digital competencies, inclusion in lifelong learning and subjective perception on ability to find a new job. The analysis based od principal component and cluster analysis showed that there are large differences between the countries, while for some countries low levels of adaptability of the workforce can pose an important obstacle for future growth and development.

Key words: labour market, digitalization, lifelong learning, digital competencies

JEL classification: J21, J24, J62

1. Introduction

Contemporary labor market is fundamentally shaped by demographic trends, accelerating globalization and deepening technological progress. Developed countries of OECD are facing aging populating, the demographic forecasts suggesting considerable further decline of the working-age population in these countries. Globalization promotes integration of goods and services markets and paves the way for smoother technological dissemination.

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These developments have several opposing effects on the labor market. In one hand, lower transaction costs tend to promote development of high value-added services sector, which is sustained by the demand from foreign markets. In the other hand, globalization creates incentives for offshoring, services outsourcing and increasing exposure to competition of manufacturing labor force in developed countries, to their lower-cost counterparts in developing countries. Technological progress leads to automatization of tasks, traditionally performed by humans. In the last couple of decades this was mostly the case with the routine tasks, while nowadays, with emerging of Artificial Intelligence, Big Data, Internet and development of computing power, there is a trend of automation of more sophisticated tasks and activities as well. Technological advancement is expected to affect labor market both in developed and in developing economies. As the developed countries have higher labor costs, they are perceived as more incentivized to aim at replacing humans with machines in business operations. However, that risk is also present in developing economies, as full automation of business operations creates incentives for companies to reallocate manufacturing back closer to their main markets (developed countries). This hypothesis is supported by the data on the manufacturing employment data in developing economies, which are facing decline in share of manufacturing employment in the early stage of industrialization, thus creating "middle income trap" risk (Rodrik, 2016).

Automatization, driven by development of technologies, may have a severe impact on the labor market size, structure and features in the future. It is expected that in the future, role of workers would be transformed from managing to monitoring of the machines. At the same time, the key parameters of competitiveness of workers at the labor market will be related to interdisciplinary skills and creativity, instead of specialization. In terms of the form, life-time jobs with employment contract and strictly defined working hours are expected to be increasingly replaced by flexible working arrangements. Technological innovations are expected to influence the size of labor market as well. Empirical studies suggest that 5% of jobs will be questioned due to full automatization, while for almost two thirds of all jobs, there is a risk of at least partial automatization (Manyika et al. 2016). Risk of automatization will be particularly high in transportation, logistics, administration, manufacturing and trade sectors (Frey and Osborne, 2017). World Bank (2016) study shows that the share of jobs potentially jeopardized by new technologies in the Western Balkans, range from 62% in Bulgaria, to over 68% in Macedonia and Romania[3].

Digitalization is also expected to put stronger emphasis on the new skills, such as problem- solving, creativity and communications. According to Cunningham and Villasenor (2014) the three most wanted skills by employers would be socioemotional (50%), cognitive (29%) and technical (15.9%).

3 These values correspond to estimates that are not adjusted to the speed of adoption of new technology.

Considering the impact technological advancement and digitalization are expected to make on labor market, the position of an individual at that market in the future will be substantially shaped by degree of adaptability, i.e. individual's employability is expected to be strongly linked to her/his adaptability. Concept of labor market adaptability refers to the ability of the labor market to provide protection against uninsurable labor market risk, to provide training in order to ensure that labor skills continuously match demand as economic development and technological advance take place and as the international division of labor evolves, to preserve an efficient degree of geographical mobility and to mobilize labor supply and to ensure a sizeable labor force (Boeri et al, 2002).

This paper is aimed at filling the gap in the empirical literature on the impact of digitalization on labor market in Europe, by providing the empirical analysis of the level of workforce adaptability and the quality of skills-mix. In that respect, we use the Eurostat data on digital competences, inclusion in lifelong learning, and subjective perception of competitiveness at the labor market, which altogether describe workforce adaptability, as well the data on PISA results in science, mathematics and reading. These data suggest positive relationship between the adaptability and PISA results in Europe. By means of the principal component analysis and cluster analysis, we find that European countries can be grouped into three clusters – North and Western Europe, which are high performing, Central Europe and Baltics which are medium performing and South and Southeastern Europe which are low performing. The results could be used as an information base for reshuffling of the policies, particularly in terms of modernization of education, promotion of entrepreneurship, redesign of active labor market policies and investments in innovations in these countries.

The rest of the paper is structured as follows. In Section 2, data and methodology are described. Section 3 provides results of the principal component analysis and cluster analysis, as well the discussion of the results, while Section 4 concludes.

2. Methodology and data

The Principal Component Analysis (PCA) is used for assessment of the relative position of 30 European countries according to the levels of the workforce skills adaptability to the rapid technological changes. The aim of the PCA is to sum information from larger group of variables into limited group of factors that cannot be measured directly (Aaker et al., 2008). While transforming original variables into new uncorrelated variables named *factors*, it is crucial to keep as much of the original variability as possible. Since the factors cannot be measured directly, they are revealed on the basis of the initial variables (Aaker et al., 2008) and their interpretation is based on their correlations with original variables. One of the main strengths of this method is that it can summarise a set of individual indicators while preserving the maximum possible proportion of the total variation in the original data set. According to OECD, this method

is convenient for cross country comparisons, since the largest factor loadings are assigned to the individual indicators that have the largest variation across countries, which is a desirable property for cross-country comparisons, as individual indicators that are similar across countries are of little interest and cannot explain differences in performance (OECD, 2008).

To conduct the PCA and cluster analysis, the following data on participation in lifelong learning, subjective perception of employability, the Eurostat data on digital competences (2015) and achievement in reading, mathematics and science from PISA testing (2012) in 30 European countries have been used:[4]

I. *Lifelong learning* – participation rate in education and training (last 4 weeks), age 25 – 64;

II. *Information skills* – Percentage of all individuals who have above basic information skills in the digital competencies framework;

III. *Communication skills* – Percentage of all individuals who have above basic communication skills in the digital competencies framework;

IV. *Problem-solving skills* – Percentage of all individuals who have above basic problem-solving skills in the digital competencies framework;

V. *Software skills* – Percentage of all individuals who have above basic software skills in the digital competencies framework;

VI. *Competitiveness perception* – Percentage of the employed persons who find it easy to find a job of similar salary (European Working Conditions Survey);

VII. *Underachieving in reading* – Percentage of underachieving 15-year-old students in reading (PISA);

VIII. *Underachieving in mathematics* – Percentage of underachieving 15-year-old students in mathematics (PISA);

IX. *Underachieving in science* – Percentage of underachieving 15-year-old students in science (PISA)[5].

Absence of continual improvement of skills and knowledge through lifelong learning (variable *i*) can result in uncompetitive level of skills needed to face challenges initiated by technological improvement and digitalization. Digital skills indicators (*ii-v*) are indicators that, in line with Eurostat methodology, can be considered as proxy of the digital competences and skills of individuals.

4 Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia (FYROM), Malta, the Netherlands, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden and the UK.

5 Data from 2012 was used due to absence of 2015 data for Serbia. Only for Macedonia and Malta data from 2015 have been used, since there is no available data for 2012.

These indicators are based on selected activities related to internet or software use performed by individuals aged 16-74 in four specific areas (information, communication, problem solving, software skills). It is assumed that individuals having performed certain activities have the corresponding skills. Digital competence skills framework is disclosed in Appendix (Table A1). Variable *vi* describes perception of the employed persons of her/his competitiveness at the labour market, which may be interpreted as a proxy for subjective perception of labor market (in)security and employability. Variables *vii-ix* represent general functional knowledge and relates to PISA results in reading, mathematics and science.

On the basis of these original variables, key skill groups (factors) have been determined, based on which the cross-country comparison in terms of each obtained factor is conducted. In the next step, in order to detect similar country groups, the cluster analysis is performed. To check the robustness of the cluster groups, several clustering methods, as well as latent class analysis were performed (Latent Class Cluster Models).

3. Results and discussion

Prior to analysis, it has been evaluated whether the PCA method is suitable for identification of factors. In that respect, the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy have been used. Both the Bartlett's test and the Kaiser-Meyer-Olkin test have indicated that the PCA method is appropriate (see the test statistics in Appendix Table A2).

3.1 Principal component analysis

As the PCA method is assessed as appropriate, the next step is to determine the number of components. This is commonly done by inspection of the correlation matrix eigenvalues: the Cattell scree test and the Kaiser rule. According to the scree test only those components above the point of inflection on a plot of eigenvalues ordered by diminishing size should be retained. Kaiser rule recommends that only eigenvalues at least equal to one are retained. Both the scree plot test and Kaiser rule point to conclusion that two factors should be retained in the analysis (Table 1). The initial eigenvalues statistics also suggests that two detected factors explain 85.43% of total variability, which is satisfactory.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.886	65.402	65.402	5.886	65.402	65.402	4.455	49.496	49.496
2	1.802	20.027	85.429	1.802	20.027	85.429	3.234	35.933	85.429
3	.553	6.146	91.575						
4	.399	4.431	96.006						
5	.202	2.248	98.253						
6	.075	.835	99.088						
7	.034	.377	99.465						
8	.028	.310	99.776						
9	.020	.224	100.000						
Extraction Method: Principal Component Analysis.									

Table 1. Total variance explained

In order to enhance the interpretability of the results and to obtain a clear pattern of loadings, it is standard practice to perform rotation. As it is plausible to assume that there is some correlation between the two factors, the oblique rotation method (Direct Oblimin) is selected as more adequate. However, both Varimax and Direct Oblimin rotation give similar results and interpretation of the factors doesn`t change (Table 2).

The correlation coefficients between factors and original variables are called factor loadings. Table 2. presents the factor loadings for the observed indicators. Factor loadings show how each of original variables correlates with every factor, while higher values mean a closer relationship. This information is then creatively used to identify and name the unobservable factors (Aaker et al., 2008).

The results indicate identification of two factors and suggest a few conclusions. The first factor can be interpreted as *adaptability/employability*, since it relates to high level of all aspects of digital skills, high participation in lifelong learning programs and perception that the probability for finding a new job in the next 6 months is high. This is indicated by the values of factor loadings of 0.760 and more in the Table 2, which show that these variables load highly on Factor 1. This factor explains 65.4% of the total variability (Table 1). The second factor may stand for *PISA success*, since all three relevant variables (PISA results in reading, mathematics and science)[6] load highly on factor 2 (Table 2). This factor explains additional 20.03 % of the variability.

6 Shares of underachieving 15-year-old students in PISA testing were given with the minus sign in order to facilitate interpretation of the factor (so that the higher values mean the better results).

Rotated Component Matrix[a]			Pattern Matrix[a]	
	Component		Component	
	1	2	1	2
Lifelong learning	*.818*		*.835*	
Information skills	*.872*	.383	*.857*	
Communication skills	*.900*		*.971*	
Problem-solving skills	*.892*	.415	*.871*	
Software skills	*.814*	.325	*.807*	
Competitiveness perception	*.760*		*.796*	
Underachieving in reading		*.967*		*.995*
Underachieving in mathematics	.324	*.929*		*.918*
Underachieving in science		*.972*		.998
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]				
a. Rotation converged in 3 iterations.			a. Rotation converged in 4 iterations.	

Table 2. PCA results

3.2 Cluster analysis

In the next step countries are grouped in accordance to cluster analysis results. Generally, cluster analysis encompasses a number of different algorithms and methods for grouping similar observations into respective categories based on a set of variables that describe the key features of the observations. Optimal number of clusters (3) was determined by hierarchical cluster analysis, using squared Euclidean distance as a measure of distance and various cluster methods (Ward`s method, Between groups method and Centroid method), which all led to the same conclusion about the number of clusters. Based on the previously defined number of clusters, a non-hierarchical K-means clustering was performed. This method, opposite to hierarchical methods, allows subjects to move from one cluster to another, and it is generally more reliable in comparison to hierarchical methods (Aaker et al., 2008.). However, K-means clustering can be very sensitive to the choice of the initial cluster centers. In this case, the same results have been obtained without any prior specification of cluster centers and with predefined cluster centers obtained from the initial hierarchical cluster analysis.

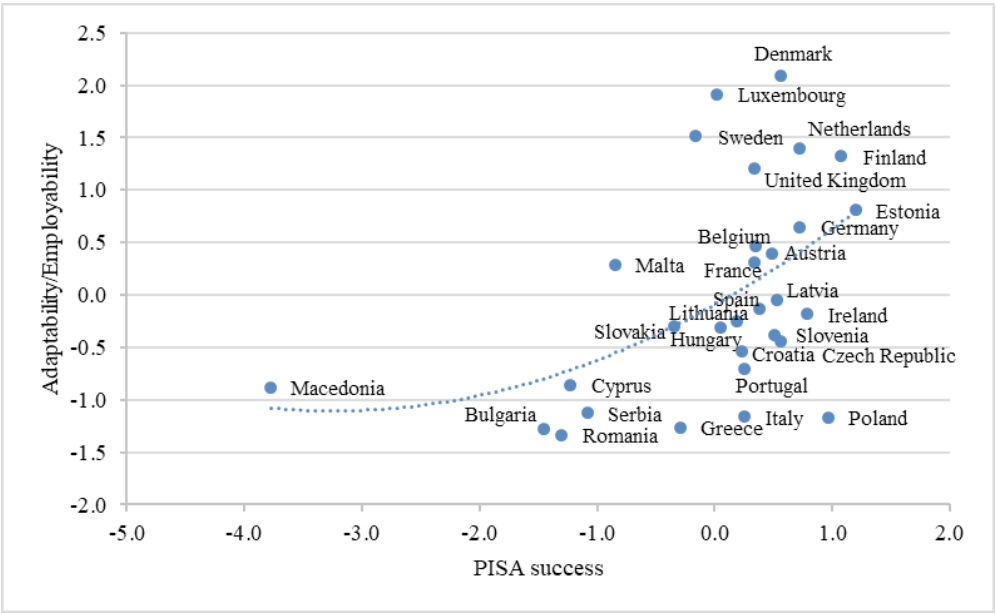

Figure 1. Distribution of countries by adaptability/employability and PISA success
Source: Authors' calculations

Distribution of countries indicates that in terms of adaptability/employability, the lowest ranking countries are Romania, Bulgaria and Greece, while the best performing are Denmark, Luxembourg and Sweden. With regards to the mentioned elements of PISA score, the top ranking are Finland, Estonia and Poland, while the lowest ranked being Macedonia, Bulgaria and Romania. The scatterplot (Figure 1) also indicates positive relationship between adaptability/employability and PISA results. For the PISA test results, Macedonia is identified as an outlier, which may be at least partly explained by the fact that PISA 2015 was the first PISA wave in that country. Therefore, after dropping the outlier, the cluster analysis is conducted (Table 3)

	Performance	Countries
Cluster 1	Low	Bulgaria, Cyprus, Greece, Romania and Serbia[7]
Cluster 2	Medium	Austria, Belgium, Croatia, Czech Republic, France, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Slovakia, Slovenia and Spain
Cluster 3	High	Denmark, Estonia, Finland, Germany, Luxembourg, Netherlands, Sweden and United Kingdom

Table 3. Cluster analysis results

7 If Macedonia were included into analysis, it would belong to Cluster 1, and the position of Greece would change to Cluster 2.

Cluster 3 has the best performances in terms of all selected variables, while the Cluster 2 outperforms Cluster 1 in all observed variables, at the same time performing worse than the Cluster 3. Results are also relatively stable when the K-means clustering is performed on the results of PCA instead on the original variables – in this case only Belgium moves the best-performing cluster group, and Malta changes cluster membership to the worse performing group. The results suggest that the lowest-performing cluster consists of the South and Southeastern European countries, while the Central Europe, Baltics and some Western Europe countries belong to the medium-performing cluster. The best performing cluster consists mostly of the North and Western European countries.

To overcome the shortcomings of the K-means clustering method (i.e. problems with sensitivity to outliers, concerns about stability of clusters and sensitivity to the order in which data is assembled), we also use latent class cluster analysis (LCCA). The main difference between LCCA and traditional cluster analysis is linked to the fact that LCCA is model-based and cluster analysis is not (Schreiber, 2017). In LCCA, it is assumed that there is a nominal latent variable with *n* categories which are called clusters or classes. LCCA classifies cases into unobserved subpopulations represented by a categorical latent variable which is not observed and must be inferred form the data (i.e. from the indicator variables[8]) (Pei et al, 2017). This is done on the basis of membership probabilities estimated directly from the model. The most popular model-based approach is known as mixture-model clustering, where each latent class represents a hidden cluster (Magidson, 2005). The optimal subgroup structure that explains the most variance is determined, while requiring the simplest specification of the model (Kent et al, 2014).

The models with different numbers of classes are compared using information criteria (IC)-based fit statistics such as Consistent Akaike Information Criteria (CAIC), Bayesian Information Criteria (BIC) and AIC3 (Akaike information criterion with 3 as penalizing factor), where lower values of these criteria indicate a better model fit. While the K-means method itself provides no information about the optimal number of clusters and therefore involves arbitrary selection, LCCA gives various diagnostics, which can be useful in determining the number of clusters. In that way, the decision to adopt a particular model is less subjective. Another important advantage of LCCA lies in the fact that the items do not need to have the same scale or equal variances (Schreiber, 2017). Beside larger classification accuracy, there are also other advantages of LCCA over traditional clustering methods, like better handling missing data problem and provision of classification probabilities for each case. To determine the most optimal number of classes, we used IC indices. An initial run of 1-6 clusters was analyzed, and, in accordance with BIC (Bayes Information Criterion), AIC3 and CAIC, the

8 Indicator variables used to determine latent classes can be continuous, binary, ordered/unordered categorical counts, or combinations of these variable types (Pei et al., 2017).

model with 3 clusters was chosen[9]. All three indices consistently showed that the three-class model provides significantly better fit, with the lowest values of BIC, AIC3 and CAIC. The results of the LCCA are presented in Figure 2 and Table 4.

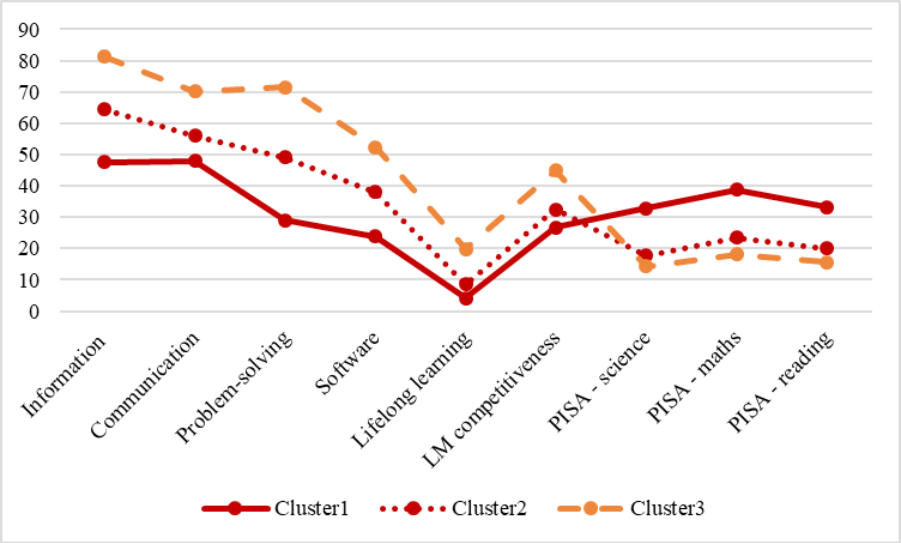

Figure 2. Cluster means
Source: Authors' calculations

The Figure 2 shows the means of all indicators across three latent clusters. It is important to notice that PISA results are given as percentages of under-achievers, so that the larger values point to the worse results. Cluster 1 has the lowest mean values for all adaptability/employability indicators (as defined in PCA): participation in lifelong learning, perception of high employability and above basic digital competences (information, communication, software and problem-solving skills), while the percentages of the underachieving students in reading, mathematics and science in PISA testing are the highest in this cluster. Cluster 2 has better results in comparison to Cluster 1 in all domains, while Cluster 3 outperforms both Cluster 2 and Cluster 1.

	Performance	Countries
Cluster 1	Low	Bulgaria, Greece, Romania, Serbia, Macedonia, Italy, Portugal and Poland
Cluster 2	Medium	Austria, Belgium, Croatia, Czech Republic, France, Hungary, Ireland, Latvia, Lithuania, Malta, Slovakia, Slovenia, Spain and Cyprus
Cluster 3	High	Denmark, Estonia, Finland, Germany, Luxembourg, Netherlands, Sweden and United Kingdom

Table 4. Latent class cluster analysis results

9 It is assumed that for LCA models BIC is a good indicator for which model to choose (Schreiber, 2017; Nylund et al, 2007).

Countries' positions according to cluster groups are shown in Table 4. The best performing cluster is stable – it is the same as when K-means method was used. In comparison to the results based on K-means method, only Italy, Poland, Portugal and Cyprus have changed the cluster groups. Cyprus has moved from Cluster 1 to Cluster 2, while Italy, Poland and Portugal have moved from the Cluster 2 to Cluster 1, although some of these countries perform well in terms of PISA results (e.g. Poland). Other countries have remained in the same cluster, which indicates the robustness of clustering under different methods (see Figure 3).

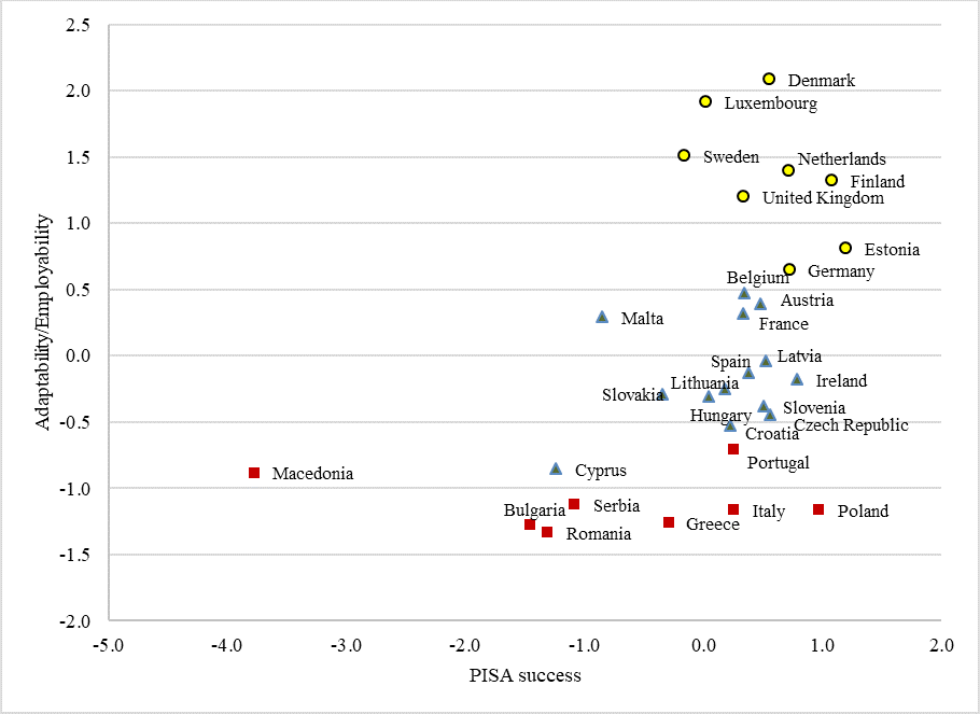

Figure 3. Distribution of countries and clustering
Source: Authors' calculations

4. Conclusion

Contemporary labor markets are exposed to rapid demographical and technological changes. The ability of the workforce to make the necessary adjustments to the set of needed knowledge and skills is one of the important factors that determine in what way will particular country's labor market react to technological changes. Effects of these changes can be divided into two broad groups: (1) creation of the new jobs and destruction of the existing ones under the influence of automation and robotization and (2) application of new technologies in the cases when jobs are not susceptible to technology substitution, that lead to changes in organization and the nature of work. Both aspects lead to

significant changes related to the knowledge and skills needed in the labor market, which points out the importance of constant improvement of the workforce`s competences. According to analysis based on large set of indicators, 30 European countries are classified according to adaptability and employability of their workforce, as well as their functional knowledge in reading, mathematics and science, which are considered as essential for full participation in the knowledge society. Northern European and a number of Western European countries were identified ad the best performing countries in terms of adaptability, employability and the functional knowledge. On the other side of the spectrum are countries that generally have very low levels of adaptability of the workforce. Some of the countries from this cluster have at the same time high percentages of the underachieving students according to PISA survey results (Macedonia, Bulgaria, Serbia and Romania). These countries already have employment and activity rates well below the EU-28, and the low levels of adaptability of the workforce can impose even larger problems in the labor markets in the near future. This is particularly important considering the need to base the future growth on sophisticated, high value-added industries. In that sense, crucial role belongs to education systems, putting more emphasis on creativity, critical and systematic thinking, but also to active labor market policies and other measures aimed at fostering implementing the lifelong learning approach.

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PART 3

ENTERPRISES IN DIGITAL ERA – CURRENT STATE AND CHALLENGES

CHAPTER 10

The Use of Information and Communication Technologies in Enterprises in the Region: Level Achieved and Further Development

Aleksandra Zečević[1], *Jelena Radović - Stojanović*[2]

ABSTRACT

In the paper we analyse the usage of information and communication technologies (ICT) in the enterprises in the countries of the region, namely in: Slovenia, Croatia, Serbia, Montenegro, Bosnia and Herzegovina, and the Republic of Macedonia. The aim of the analysis was to examine the level achieved in the ICT usage in enterprises and to explore the directions for further development. The analysis is based on the data from statistical offices of the respective countries and on the EUROSTAT data on the ICT usage in enterprises in the EU Member States for 2017. We analysed the following indicators of the ICT usage: broadband internet access, employment of ICT specialists, internet presence (enterprises having a web site), use of social media, use of cloud computing services, e-commerce indicators (enterprises having received orders via Internet and share of e-commerce in total turnover). Based on these indicators, comparisons between countries and with the average for the European Union (EU – 28) have been made. Comparative analysis showed that there are significant differences between countries in the value of indicators, whereby the EU countries - Slovenia and Croatia - are the leaders in the ICT use, especially when it comes to e-commerce and cloud computing services. The development of infrastructure in the countries of the region and the investments these countries make in ICT, however, give hope that these differences will be overcome in the near future.

Key words: information and communication technologies, e - commerce, cloud computing, enterprises

JEL classification: L81, L86

1. Introduction

Countries in the region – Slovenia, Croatia, Serbia, Bosnia and Herzegovina, Montenegro and The Republic of Macedonia share many common perspectives of social, economic and technological development. One of them is their mutual future within the European Digital Single Market. Nowadays, these countries

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are its regional segment connecting European Union and Western Balkans. Tomorrow, they will be an integral part of that market. This is a perspective that is not only imposed on them, but also desired one: imposed, because European environment has already embraced Digital Agenda for Europe; a desired one, because the countries themselves are essentially interested in the process of information society development and inclusion in European digital environment.

The governments of the countries in the region pay great attention to this issue. The governments have adopted information society strategies which set goals, principles and priorities in the development of the information society and pointed out the activities to be undertaken on this path. Current *Information Society Development Strategy in the Republic of Serbia until year 2020* has been adopted by the Government of the Republic of Serbia in 2010. *Montenegro Information Society Development Strategy until 2020* was adopted in 2016, in 2017, Bosnia and Herzegovina adopted Information Society Development Policy for the period of 2017 – 2021 and they plan to adopt Information Society Development Strategy that would be a key strategic document. In the Republic of Macedonia, S*hort-term National IKT Strategy* was in power in 2016 and 2017. In Croatia, the current *e-Croatia Strategy 2020* was adopted in 2017, and in Slovenia, *Digital Slovenia 2020 – Information Society Development Strategy until 2020.* The goals defined by these strategies are similar: raising the level of information society development, achieving EU standards set in The European Commission's Digital Agenda, integration into European single digital area. The current strategies are not the first ones that have been adopted. *Information and Communication Strategy – Croatia in the 21st century* has been adopted in 2002 and *National Strategy for Information Society in Serbia* in 2005. Development of information society is a spontaneous process that evolves through the exchange of people, knowledge and information and communication technology (ICT) in countries; however, the development is monitored and controlled by state authorities.

The aim of the Paper was to explore the level of progress in this process, how successful the previous and current strategies and the efforts made by countries were and what was the achieved level in ICT usage in the countries. Therefore, the Paper has considered ICT usage in enterprises which is one of the two indicators of that process (the other is the usage of ICT by individuals and households, also monitored by state authorities and international organizations). There are two important aspects of the analysis in the Paper: the assessment of the achieved level of ICT usage in enterprises in the countries and comparative analysis – comparisons between countries in the region and with the European Union (EU – 28). The following indicators of the ICT usage were analysed: broadband internet access, employment of ICT specialists, internet presence (enterprises having a web site), use of social media, use of cloud computing services, e-commerce indicators (enterprises having received orders via Internet and share of e-commerce in total turnover). Based on the selected indicators of ICT usage in enterprises, defined and monitored by Eurostat and national statistical offices, the achieved level of ICT implementation

by countries was analysed and comparisons among countries and to the average for European Union (EU – 28) were made.

The initial assumption in the research was that the existing differences in the achieved level of economic development between the countries, which were known from the recent economic history, had reflected on the achieved level of development and implementation of ICT in the countries, and therefore on the value of the indicators. The question was whether it was really the case and if so what were the differences. Finally, the results of the analysis were expected to show the directions of future development in areas of implementation and development of ICT in the countries.

After the Introduction, in the second part of the Paper there is a short literature review dealing with the achieved level of ICT implementation in enterprises in the countries within the region. As it will be seen, there is not much literature, especially scientific papers. Therefore the aim of the Paper was to fill the gap to some extent and encourage future researches on the topic. In the third part of the Paper, data sources and methodology used in statistical surveys of ICT usage in enterprises are presented. It is the methodology of Eurostat in *Digital economy and society* area. The indicators defined by the methodology were the basis for analysing the usage of ICT in enterprises in the Paper. The values of the selected indicators by countries were presented in the fourth part of the Paper and comparative analysis between countries and with the EU - 28 average was made. The fifth part of the Paper gives an analysis of research results and indicates future development in ICT usage in enterprises. As it will be seen, for some countries future development means improvement in performances in ICT usage, while for the others, it is still about building an ICT infrastructure. The sixth part of the Paper – Conclusions – summarizes the results of the analysis and indicates the future directions of research.

2. Literature Review

Every year, the European Commission compiles European Digital Progress Report (EDPR) and Country Profile for each member country thus monitoring the progress of digitisation for each country individually. This report combines quantitative evidence from the Digital Economy and Society Index (DESI)[3] with qualitative information on country-specific policies. A part of the report, named Business Digitisation and e-Commerce is dedicated to ICT usage in enterprises.

The European Commission compiles EDPR Country Profile for Slovenia and Croatia to assess the achieved level in digitisation. In EDPR Country Profile Croatia for 2017, one of the important conclusions of the European Commission

3 The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. See at : https://ec.europa.eu/digital-single-market/en/desi .

is that Croatia lacks appropriate strategies within some areas of digital skills and practice. In addition, "The country's greatest challenge in digital is its low performance in connectivity. Rural broadband connectivity and fast broadband coverage are limited. Furthermore prices for fixed broadband remain extremely high." Among other things, it is estimated that companies lack financial support in ICT implementation in enterprises. "Croatia does not have a comprehensive strategy in place. Some funding is available under SME support programmes. ... In spite of the relative absence of national digitisation policies, Croatian companies are medium performers. It would therefore be even more beneficial for the Croatian economy if Croatia's businesses could benefit from a targeted digitisation strategy." (European Commission, 2017(a), p.8)

EDPR Country Profile Slovenia for 2017 says that "Slovenian enterprises have considerably stepped up their digitisation efforts. SMEs (small and medium size enterprises, author's note) seem to be on right track towards integrating digital solutions rapidly into their production processes, business models and distribution channels as selling online enables them to reach out to cross-border markets. Slovenia has no specific policies aimed at stimulating the digitisation of business in general or e – Commerce in particular and has not introduced any specific and targeted fiscal breaks for investment in digital. However awareness of the need to integrate digital technologies into business processes is rising." (European Commission, 2017(b), p.8).

Each country in the region individually analyses the achieved level of ICT implementation in its information society strategy. As a rule, all countries are critical towards the achieved level of development in ICT implementation and believe that they should move faster. Also, they explore the opportunities for faster progress. Thus, for example, *Montenegro Strategy of Information Society Development until 2020* distinguishes as an issue the fact that a small number of companies do not want to use online business concepts. There are reasons given for this: many companies behave inert, they are satisfied with usual channels of selling products and services, they do not want to change selling platform, they miss an ear for new technologies. The *Strategy* defines strategic development directions for Montenegro as well as the ways for overcoming this and similar issues: creating the conditions for electronic business concept, encouraging transformation of business into digital, introduction of stimulative business environment. *Information Society Development Strategy in the Republic of Serbia* focused on the analysis of the value of information society development indicators: the aim of the Republic of Serbia is to reach the EU average till 2020.

National Short-term Strategy of the Republic of Macedonia mainly deals with ICT business sector and proposes the concrete measures for its improvement: providing the support to ICT companies, promoting public and private dialogue, encouraging education in the area. *Information Society Development Policy of Bosnia and Herzegovina* emphasizes e-business and the creation of the necessary prerequisites in the form of ICT infrastructure and ICT implementation improvement in enterprises.

There are not many scientific papers, literature on ICT implementation in enterprises in the countries of the region. Authors deals with ICT implementation in enterprises mainly in terms of contribution ICT to company performances, for example in (Mihalčić, et al., 2015) where the ICT influence on Slovenia hotel sector competitiveness is analysed. Another example of an analysis of ICT contribution to economy improvement, this time for Croatia, i.e. a part of it, Eastern Croatia is given in ((Požega and Pudić, 2014). For Serbia, in a similar way, (Bradić-Martinović and Zdravković, 2012) the analysis of ICT influence on business performance in telecommunications, education, manufacture, financial and insurance activities and retail trade is given while in (Milićević et al., 2013) the importance of ICT for improvement of companies and tourist agencies operations is indicated.

For Serbia and Montenegro only there are analyses regarding ICT usage in enterprises. For Serbia, there is an assessment of the achieved development level of ICT usage in enterprises in (Zečević and Radović-Stojanović, 2017), where the achieved level of ICT usage in Serbia was assessed as: “Above the European average, but not at the level of the developed European economies” (p. 401), however, there are no comparisons to the countries of the region. For Montenegro, a large research named *A Research on the Use of Information and Communication Technologies in Montenegro* has been made in 2011. The research was conducted by the Agency for Electronic Communication and Postal Activities of Montenegro. The research actually presents a detailed analysis of already published Eurostat indicators in Statistics on the Information Society. The majority of the research is devoted to the indicators of ICT usage in enterprises and their comparison to selected countries. The research included the comparative analysis by selected indicators with EU, Norway, Turkey and Croatia (Agency for Electronic Communication and Postal Activities, 2011). There were no other similar researches for the countries in the region.

3. Methodology and Data Sources

The research on ICT usage in enterprises in the region was based on the data of country statistical offices: Statistical Office of the Republic of Slovenia (SORS), The Croatian Bureau of Statistics (CBS), Statistical Office of the Republic of Serbia (SORS), Statistical Office of Montenegro (MONSTAT), Agency for statistics of Bosnia and Herzegovina (BHAS) and State Statistical Office of the Republic of Macedonia (MAKSTAT). Data on the usage of information - communication technologies in enterprises are collected with the annual surveys conducted by the country statistical offices. Data on ICT usage are available on Internet sites, in data bases and in publications of statistical offices (press releases, bulletins, statistical year-books). The analysis is based on 2017 data and where data were not available, the latest available data were used. Eurostat data on ICT usage in enterprises in the European Union member countries were also used in the research (section Digital economy and society).

These data are available in publications and Eurostat Internet site, as well as Eurostat Data Base.[4]

The analysis of the achieved level of ICT usage and comparative analysis among countries have been enabled by the fact that all surveys on ICT implementation in enterprises in the countries of the region are conducted based on standardized methodology. All statistical offices of the countries in the region have adopted Eurostat concepts and definitions in this area so the applied methodology in all countries is completely in line with the EU methodology. This is visible not only in the results, form and the way of data presentation but also is explicitly specified in publications and methodological instructions, even in the countries that are not EU members, in: Statistical Office of the Republic of Serbia (2016), Agency for Statistics of Bosnia and Herzegovina (2017), State Statistical Office of the Republic of Macedonia (2017), Statistical Office of Montenegro (2017). Compliance with the EU methodology in the area is a part of the process of adopting European standards and Eurostat methodology in all areas of official statistics.

Therefore, data used in the Paper are obtained by the survey on ICT usage in enterprises that is conducted by the statistical offices according to Eurostat methodology. The title of the survey is "Usage of Information - Communication Technologies (ICT) in Enterprises". This survey collects data on ICT usage in enterprises, computer use, internet use, e - business and other aspects of ICT implementation in enterprises. The survey methodology is based on Eurostat methodological instructions in Statistics on the Information Society area. Methodological instructions include: statistical unit definition, target population, periodicity, then, definition of observation variables, summary measures, aggregates and indicators, as well as the concepts and nomenclatures as the additional elements ensuring that statistics are harmonised and comparable (Eurostat, 2016). The survey was established in 2002 by the European Commission and had been conducted in Slovenia since 2005, Serbia and the Republic of Macedonia since 2006, Croatia since 2007, Montenegro since 2011 and Bosnia and Herzegovina since 2015.

In accordance with Eurostat methodology, the observation units in survey are enterprises with 10 or more employees, dealing with the following activities according to the NACE Rev.2 classification: Manufacturing, Electricity, Gas, Steam and Air conditioning, Construction, Wholesale and Retail Trade, Repair of Motor Vehicles,

Transport and Storage, Accommodation and Food Service Activities, Information and Communications, Real Estate Activities, Professional, Scientific and Technical Activities, Administrative and Support Service Activities, Repair of Computers and Communication Equipment. Enterprises are classified according to the number of persons employed to small (10-49 employees), medium (50-249) and large enterprises (more than 250 employees).

4 Eurostat Data Base, Digital economy and society: http://ec.europa.eu/eurostat/web/digital-economy-and-society/data/database

Data in researches are collected based on survey's questionnaires. Survey's questionnaires completed by enterprises contain a large number of questions that are grouped together by the following modules (Eurostat 2016):

- Use of computers;
- ICT specialists and skills;
- Access and use of the internet;
- Use of cloud computing services;
- Sharing of information electronically within the enterprise;
- Sharing Supply Chain Management information electronically;
- Use of Radio Frequency Identification (RFID) technologies;
- e- Commerce.

A large number of questions for enterprises is defined within these modules. For example, the module referring to the Access and use of internet, some of the questions are: Does your enterprise have access to the internet? How many employed persons use computers with access to the internet for business purposes? Does your enterprise have a Website? Does your enterprise use any of the social media, etc. The e-Commerce module includes questions referring to: receipt of orders for goods or services that were placed via computer network or website, value of the turnover and percentage of turnover from e - sales, information about the difficulties when selling via internet, etc. Survey's questionnaire model can be found in (Eurostat 2016).

Enterprises complete the questionnaires by telephone or e-mail. In Slovenia, for example, the majority of questionnaires is filled out in electronic form and sent via web. In the Republic of Macedonia, data are gathered via on-line questionnaire, but also with paper one, sending via mail or e-mail. In Croatia, first, all participants were contacted by mail with guidelines for completion of web survey, and so one. The research is conducted on a sample which is as a rule stratified by size and activity of an enterprise and the scope of sample is relatively large, in 2017 there were 1,673 enterprises in Serbia, 2,483 enterprises in Bosnia and Herzegovina, 600 enterprises in Montenegro, and so on. In Croatia, 2,889 enterprises took part in the survey (this is the number of enterprises that responded the survey), while in Slovenia, the sample includes approximately 1,800 enterprises every year.

Data obtained by surveys are published by statistical offices in press releases, statistical year-books or office data bases. Online access to data base is provided by statistical offices of all observed countries except Bosnia and Herzegovina. MONSTAT data base still does not provide data overview in ICT area, while in MAKSTAT base only a small number of indicators is available. A slightly larger number of indicators can be found in Serbia Statistical Office Database, details on Database can be seen in: (Radović-Stojanović et al., 2015).

Some countries publish specific publications dedicated to this area, for example, since 2015, Statistical Office of the Republic of Serbia has been publishing a specific publication named Usage of Information and Communication Technologies in the Republic of Serbia (Statistical office of the Republic of Serbia, 2017), in which data on ICT usage in enterprises have been presented in details. Slovenia dealt with ICT implementation in enterprises in the publication E - Skills and Digital Economy (Statistical office of the Republic Slovenia, 2016), in which the development of information society in Slovenia is presented. The publication provides data on E-business and E-commerce in enterprises in Slovenia.

4. Empirical Data and Analysis

In the Paper, the following indicators were observed as the indicators of the achieved level of ICT usage in enterprises: broadband internet access, employment of ICT specialists, internet presence (enterprises having a web site), use of social media, use of cloud computing services, e-commerce indicators (enterprises having received orders via Internet and share of e-commerce in total turnover). These indicators were selected as the representative ones for each module in the survey. These indicators are some of the most important ones, “Key statistics” as it is said in (Statistical Office of the Republic of Slovenia, 2017). There was a problem with indicator names which in office publications sometimes were not consistent for all countries although they were the same indicator calculated on the basis of the same methodology, Eurostat methodology.

The first observed indicator was broadband internet connection, an indicator within module *Access and use of the internet*. It is ICT infrastructure development indicator.

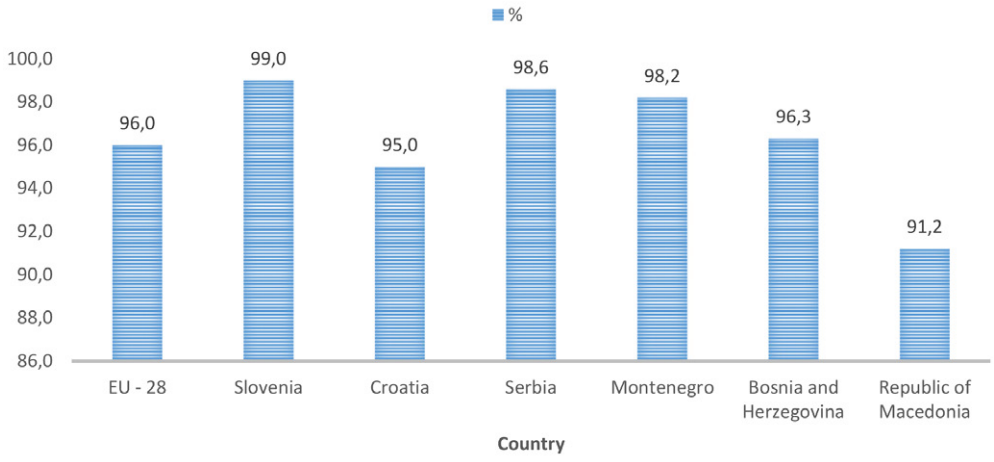


Figure 1. Enterprises with broadband access (fixed or mobile), 2017 (% of enterprises)
Sources: Eurostat, national statistical offices

Although the percentage differences between countries in the region are not large they still reflect uneven infrastructure development. A slightly lower value of the indicator even for the EU – 28 is the consequence of the indicator low value in some countries – Greece, Romania, Bulgaria (Source: Eurostat Database, section Digital economy and society). When looking at data for EU by countries, it can be noticed that island countries, United Kingdom, Ireland, Cyprus as well as countries with indented coastlines such as, Greece and Croatia have slightly lower values of internet connectivity and speed indicator compared to other countries and the average for EU. Great attention is paid to these indicators when analysing infrastructure development in countries so EDPR Country Profile for Croatia has indicated that availability of fixed broadband connections is below the EU average although it is only one percent - in the contemporary information world, each percent is relevant.

Regarding the employment of ICT specialists (indicator for *ICT specialists and skills module*), the value of this indicator in the region is dominated by Montenegro, while Bosnia and Herzegovina and Macedonia have lower percentage of ICT specialist employment compared to other countries in the region. There is still a growing demand for specialists in this area, for example, even 43% of enterprises in Serbia and 66.8% of enterprises in the Republic of Macedonia declared that they had difficulties employing ICT specialists. Enterprises in EU, however have no such problems, only 5% of companies there reported difficulties in finding ICT specialists.

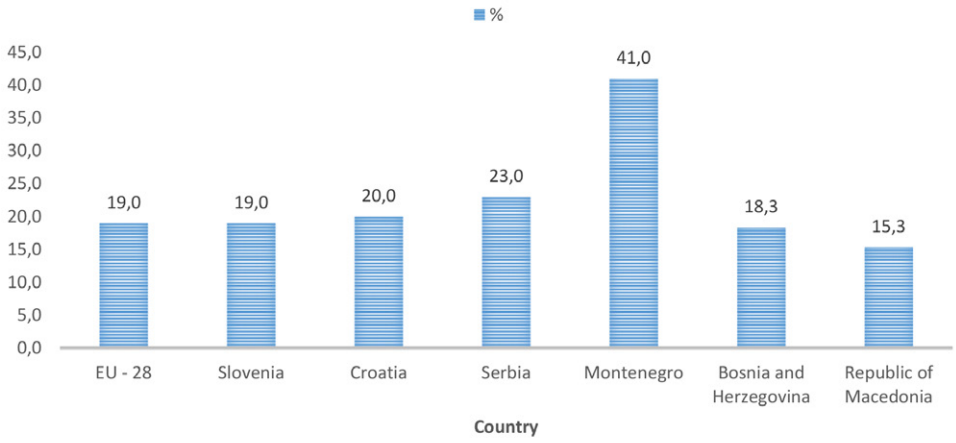


Figure 2. Enterprises employed ICT specialists, 2017 (% of enterprises)
Sources: Eurostat, national statistical offices

The largest percentage of website are owned by companies in Slovenia and Serbia (this is the indicator of *Use of computer* module), while there is a smaller number of companies with websites in the countries where the previous two observed indicators are slightly lower – Bosnia and Herzegovina and the Republic of Macedonia.

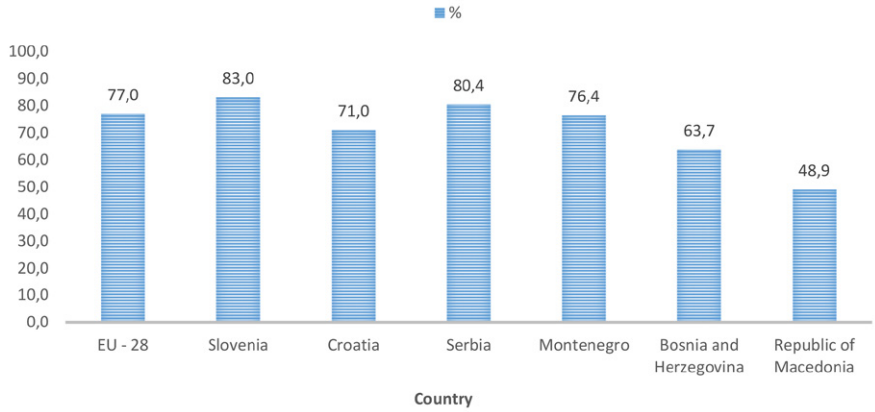


Figure 3. Enterprises having a web site 2017 (% of enterprises)

Sources: Eurostat, national statistical offices

Looking at the way enterprises use their web site, enterprises in the region mostly use their websites to display the description of goods or services and the price lists and for personalised content in the web site for regular visitors, while online ordering or reservation via web site is still low. The situation is similar in other European countries where companies strive to improve their presence on internet and integrate social media in their operations through their web site.

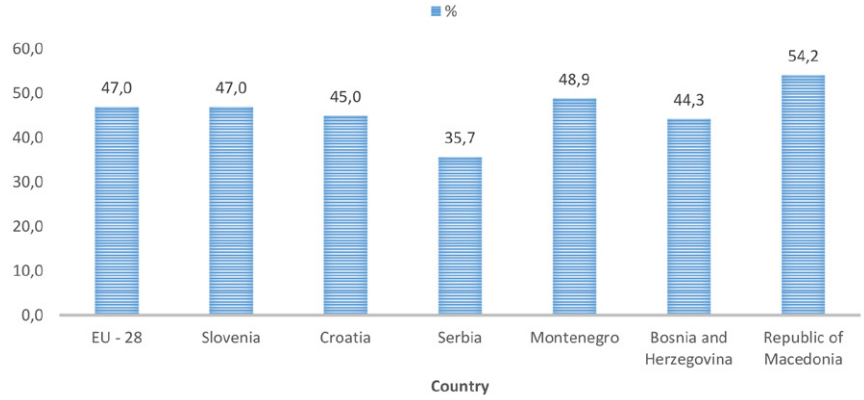


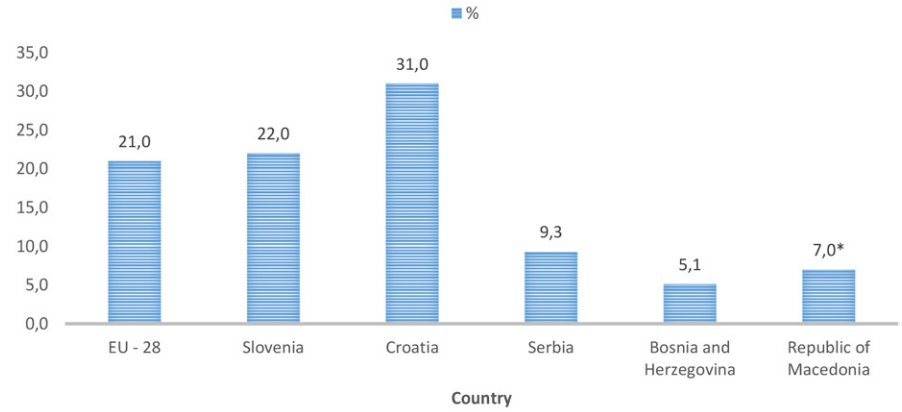
Figure 4. Use of social media, 2017 (% of enterprises

Source: Eurostat, national statistical offices

Regarding the use of social media, 47% of EU companies used some of the social media in 2017, while in Serbia this percentage is much below the average – 35.7%. Other countries in the region are around the European average. There are significant differences regarding the use of social media in European countries - differences range from countries where more than 50% of companies use social media (the Netherlands, Belgium, Scandinavian countries), to those where this participation is below 30% (the Czech Republic, Slovakia,

Romania, Poland, Lithuania). It is interesting that regarding the use of social media, the Republic of Macedonia stands out in the region what might not be expected considering the unfavourable infrastructure and lower percentage of enterprises with website and employment of ICT specialist. It could be said that enterprises in the Republic of Macedonia wisely use social media: the largest number of enterprises (38%) use social media to develop the enterprise image or market products (source: Eurostat).

Use of cloud computing service is also a module in the surevey questionnaire. In general, the use of cloud computing is considered an advanced level of ICT use. As time progresses and more companies adopt cloud technlology, the expectations move from hype and confusion in the early years and migrate toward broad acceptance as standards, best practices, and success stories emerge (Kavis, 2014.). Therefore, the use of cloud computing is an important indicator of e-business integration, i. e. enterprises willingness to adopt e-business (on e-business concept for further details see Eurostat, Digital Economy and Society Statistics).[5]



**Data refer to 2016 (the latest available data)*

Figure 5. Use of cloud computing services, 2017 (% of enterprises)

Source: Eurostat, national statistical offices

Croatia is far ahead of other countries in the region regarding the use of cloud computing services. The high value of this indicator for Croatia goes hand in hand with other indicators of e-business integration which are also high for Croatia, such as Use of Enterprise Resource Planning (ERP) and Use of Customer Relationship Menagement – CRM. According to these indicators Croatia is slightly behind Slovenia and far ahead of Serbia and Macedonia as well as of a large number of other European countries. For Bosnia and Herzegovina and Montenegro, data on e-business integration are not available.[6]

5 http://ec.europa.eu/eurostat/statistics-explained/index.php/E-business_integration

6 About E- business integration see on: http://ec.europa.eu/eurostat/statistics-explained/index.php/E-business_integration

Regarding *E - commerce*, there is a larger number of indicators collected in the survey for this module, however not all of them are available in publications and statistical office databases or are not available for all countries in Eurostat database. That is why here in the research the indicator *Enterprises having received orders via computer mediated networks* was selected as e-commerce indicator. This is an indicator which value can be found for all the countries in the region and it is comparable regardless of already mentioned differences of the indicator name. ("Orders received via internet" in Montenegro or just "Received orders via computer networks" in the Republic of Macedonia). Some other indicators that are collected by survey are Enterprises selling online (at least 1% of turnover), Enterprises having orders via website or apps, and they are also illustrative for e-commerce analysis, however, not all the countries in the region publish them and comparisons cannot be made. Figure 6 shows data for 2016 as this is the last year the indicator is available for all countries.

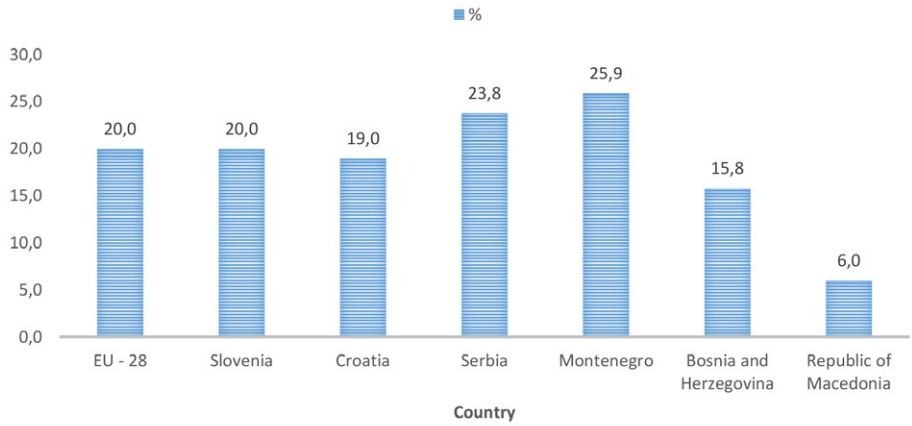


Figure 6. Enterprises having received orders via computer mediated networks, 2016 (% of enterprises)

Source: Eurostat, national statistical offices

However, it is not only the percentage of enterprises selling via internet that matters, even more important is a turnover share obtained by e-commerce in the total business turnover. Slovenia and Croatia are significantly ahead of the countries in the region by the value of such achieved turnover. While the share of such achieved turnover in the total turnover for EU – 28 was 18% in 2016, for Slovenia it was 15% and Croatia 14%. As a comparison, for Serbia, this percentage is rather low and in 2014 it amounted to only 6% of total turnover (source: Eurostat database, also the latest data available), while the average at the EU-28 in 2014 was 15% of the total turnover. It is important to note that 18% of small and medium size enterprises in Croatia and 15% in Slovenia sell online while EU average is 17%. For Montenegro, Bosnia and Herzegovina and the Republic of Macedonia there are still no data available on electronic commerce share in total commerce and there are no data available on online selling in the total small and medium size enterprises turnover.

5. Results and Discussion

The assessment of the achieved level of ICT usage in enterprises cannot be made only on the basis of the indicators observed here, however they are, to a certain extent, indicative. There are differences in the achieved level of ICT usage in the countries in the region. However, they are not too large. It could be said that information infrastructure development in enterprises in the region is at a satisfactory level with connectivity approximately or above the average for EU, except for the Republic of Macedonia that generally has lower indicators related to IT infrastructure than other countries in the region.

European Union member countries – Slovenia and Croatia are leading in the implementation of modern advanced cloud computing technologies and achieved e-commerce turnover. In addition, a large share of enterprises selling their products via internet in Serbia and Montenegro indicates that enterprises in these countries make significant efforts to develop e-commerce, probably thus trying to overcome some other limitations and increase their market share. It is noticeable that enterprises in the region make efforts to take an advantage provided by information and communication technologies and improve their business based on the existing infrastructure and within the existing opportunities, for example, more intensive use of social media (Macedonia) and employment of ICT specialists (Montenegro).

In comparison, one should be cautious because the values of the indicators vary from country to country depending on the differences on a national level in the size and structure of enterprises, industrial specializations, level of development of ICT infrastructure, and even the level of development and the style of consumer culture to which businesses are adapting. Initial conditions of ICT development have not been the same for all the countries in the region and there are still many difficulties in economic conditions in countries that make the progress of ICT usage difficult. In order to grasp a more complete picture of ICT development in enterprises it is necessary to have a comprehensive analysis of a larger number of indicators and analysis during time. Not all the indicators are available for all the countries, some of them are still not collected and some are being collected but not published yet.

However, all the countries in the region are dedicated to one goal and that is information and communication technology development and improvement. In recent years, since ICT statistics have been available and the awareness of the need to raise ICT emerged, and Digital Agenda for Europe entered each country, countries in the region started to build their ICT development strategies. European Union monitoring is also important, it points to shortcomings on this path. One of the significant remarks to countries within European Union monitoring is the lack of financial stimulus. The countries themselves are aware of it and lately they try to improve the development through investment.

So in July 2016, the Croatian government adopted “Strategy for Broadband Development in the Republic of Croatia” for 2016 – 2020 in order to improve IT infrastructure performances (European Commission, 2017(a), p. 4) which plan necessary investment into electronic communications infrastructure and associated facilities in mobile and fixed communication networks, in particular investment in broadband access infrastructure. National short-term ICT strategy of the Republic of Macedonia also perceives the importance of investment in ICT infrastructure development, particularly for improving internet connection and access to speed internet. Additional support will be provided by the Fund for Innovation and Technology Development which was established in 2013. Investment and Development Fund of Montenegro provides loan support for ICT infrastructure improvement, development of new products and services in the area and business development based on information technology; these are exactly the aims defined by the Montenegro Information Society Development Strategy. In addition to public investment, all countries expect significant private investment, primarily foreign ones. Despite the already achieved high level of all ICT indicators, Slovenia National Broadband Plan estimates that Euro 355 million should be invested to define broadband targets. The plan foresees public funding, mostly European, amounting to € 72.5 million, and private funding of € 292, 5 million (European Commission, 2017(b), p. 4).

6. Conclusions

After having analysed the indicators of ICT usage in enterprises, it has been concluded that countries in the region are by the largest number of observed indicators at or above the European average. Although there are differences in ICT usage in enterprises in countries in the region, there is also an improvement and achievements in the area. The efforts countries in the region make in ICT development and investment will contribute to further ICT development in countries. The advantages of this process will be numerous and will enable inclusion of the countries into European Digital single market. The analysis has showed that enterprises try to improve their business within the existing opportunities and based on the existing infrastructure. Countries that are not leaders in ICT infrastructure development try to compensate it through intense use of the existing capacities and achieve business advantages through the use of social media and employment of ICT specialists. The analysis pointed out to the directions of further ICT development in the countries. For some countries this will mean infrastructure improvement while for the others future lies in adopting advanced technologies and e-commerce development but it is always about the improvement of general performances in ICT use. Scientific theory will support this development through the improvement of the existing knowledge and adopting new one. The fact that there not many scientific papers on ICT usage in enterprises opens up many opportunities for authors. The area is a fertile soil for analysis and comparisons, research of future development directions in ICT usage in enterprises, the ways of overcoming the obstacles and achieving

the desired level of development in the area. A topic that might most likely be of interest to authors is the contribution of ICT to business operations success – contribution to productivity increase, competitiveness and improvement of general performance on micro level and the entire economy on macro level too. However, this is a new area and the next big step in an analysis which is yet to come.

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CHAPTER 11

In Search for Company Sustainable Value

Dejan Miljenović[1]

ABSTRACT

Inadequate company management can often be perceived as the main cause of severe social, environmental and contemporary market issues. General perception is that companies try to generate maximum profit at the expense of the society and the environment. However, contributions of business sector to sustainable development issues became relevant success factor during the last two decades. This is one of the important reasons why sustainability and Corporate Social Responsibility (CSR) have become important concepts in business management. Managers became aware that environmental and social problems are not exclusively PR issues and that they represent opportunities that may lead to future business and social growth. Sustainability and CSR strategies significantly propel development and innovations of the companies, along with the positive effects for society in general. In other words, it is a way to create economic value with a sustainable adjective for the company and its stakeholders. In the past, concepts like sustainability and CSR were often associated with environmental problems and efforts to limit the negative impact on the environment. However, new market trends indicate that there are much more than pure ecological concerns. Stakeholder groups are now searching for information's regarding sustainable value that company derives from its CSR strategies. Sustainable value of a company is inevitably being shared in cooperation with the stakeholders. The more companies spread their sustainable activities to specific environmental or social impacts, than more added values should be created for the society in general. The aim of this paper is to examine the process of distributing sustainable value between the company and its stakeholders and presenting management and development opportunities for analyzing this type of value in the future.

Key words: Sustainable value, Corporate Social Responsibility, Stakeholders, Triple Bottom Line, Sustainability, Company

JEL classification: A13, M14, Q01

1. Introduction

There is a significant shift in a way that modern companies deliver their value to the society. Although financial interests dominate, relevant global non-economic changes affect the business process of value creation. First of all, there

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is more to a contemporary market than a traditional demand – supply relation. There are significant modifications of relations between company and customers' that have been expanded to different groups of interest. For example, besides physical customers, who buy company products and services, there are parties of interest who demand non-physical aspects of business to also be ensured by the company. These are parties like governmental and non-governmental institutions, activists or civil society groups, media, local communities, public in general. They may insist on full transparency of the business process, including all of its inputs and outputs, not only financial ones, but also non-financial ones like environmental or social. Although these are non-financial aspects of doing business and they also have to be included in company evaluation. This is primarily due to concerns that relate to managing ecological or social issues, which may arise as important business risks. Groups indicating such risks are not only regular company shareholders but also groups related to company by non-financial interests.

There are many groups being entitled to much more than pure shareholder value of the company. These groups are known as stakeholders, and they value business contributions differently than the common shareholders. Because of stakeholder's diversity, they are oriented to different aspects of the company business result, such as environmental or social ones. The social aspects of doing business represent a level company includes in development of modern civil society. Crucial social aspects of doing business are represented by the issues of human rights, child labor, decent work, employees' (safety, education and benefits), gender diversity and equal opportunity, customer health and safety. Shareholders are also stakeholders, primarily interested in financial aspects of doing business. In the last two decades' shareholders became more aware of influences that non-financial business aspects have on their shareholder value. Environmental aspects are a long term present issue of modern business and society and manifest in a way company manages issues of sustainable material, energy and water usage, the way its dealing with biodiversity issues, eliminating greenhouse gas emissions, effluences and waste treatment. Therefore, stakeholders are extremely focused on the company Triple Bottom Line (TBL) as an integrated expression of financial, environmental and social business results. TBL represents business sustainability evaluation frame customized for the analysis of Corporate Social Responsibility (CSR). Development of CSR business policies introduced a new paradigm of sustainable management in general. Friedman's ″exclusive profit″ orientation broke under a strong influence that non-financial risks have on company financial value. Mistaken environmental and social risks appeared as an irreversible damage in global business practices where a serious lack of responsible approach to such risks took place. Exxon, British Petroleum and Volkswagen were not the only companies that have lost multibillion profits and sustainable reputation due to neglecting environmental issues. This was also the case with Nike, Sony and some others in terms of inappropriate management of social risks. Because of this, managers urgently wanted to evaluate business sustainability contributions

properly, not only for the company, but also for all the relevant stakeholders and society in general. Moreover, the business leaders realized the importance of cooperation with the stakeholders when managing aspects of TBL in order to prevent mentioned risks. To ˝listen˝ the stakeholders became a relevant step forward in company path to sustainable relationships with its environment. This relationship, according to Porter and Kramer (2011) is a process of value sharing. However, this paper research question goes a step forward by researching the process of sharing sustainable value. When a company delivers its value to its stakeholders based on sustainability performance, then this value has sustainable characteristics. Aim of this paper is to present characteristics and forms of sustainable value being brought to the stakeholders by the company.

2. Literature review

Importance of value sharing beyond company shareholders was recognized by leading business experts and subjected to different types of analysis. Porter and Kramer (2011) discussed shared value after 2007 (i.e. post-crisis) business evaluation frame stating that *˝business has been criticized as a major cause of social, environmental, and economic problems.˝* However, CSR strategies dealing with this issues are developed almost 30 years to this point providing organizational and management solutions to deal with business effects on environment and society. One of the most important step forward was development of the Triple Bottom Line approach (TBL), which in its core, respects financial, environmental and social sustainability at the same level (Elkington, 1997). TBL highlights benefits of integrating economic capital, human-social capital and natural capital. These types of capital go beyond shareholder value and into the area of non-financial business contributions. These contributions relate to sustainable form of different environment and society issues. Mentioned issues engage evaluation of company contributions to business related groups other than shareholders. Therefore, the term *stakeholders* came to a focus of modern managers as a set of interest and influential groups that are related to one company operations on non-financial basis. According to Freeman (1984) stakeholders demand adequate management reaction and improved organizational response to environmental and social demands, especially in terms of sustainability. Mitroff (1983) engages stakeholder theory defining that these groups react to values organizations provide for them. However, research recognizes different types of sustainable value and shareholder value. Figge and Hahn (2004) call it the Sustainable Value Added (SVA) by setting this formation to different forms of company value added. Hart and Milstein (2003) provide a framework where Sustainable Value is set between internal and external stakeholders and present/future drivers for the value. This framework is later used by Senge et al. (2010) to explain on individual and organizational contributions to sustainability. *˝The interest in sustainability and sustainable development around the world today reflects an awakening that is occurring in many forms… Continued growth of our take-make-waste patterns of consumption*

and production will soon make this imbalance more acute.˝ (Senge 2009: 24). Today, most of the leading business strategies rest on successful management of sustainability issues. Sustainability performance can be defined as the ability of an organization or firm to remain productive over time and hold on to its potential for maintaining long-term profitability. Not only economic results should be considered but also non-financial factors. Sustainability assessment is thus a mainstream business activity that shows the link between the organization's strategy and commitment to a sustainable global economy (Kassem et al., 2016). Therefore, Corporate Social Responsibility (CSR) is the other concept that must be defined before the core subject of this paper, sustainable value, can be addresses. In terms of stakeholder sustainability contemporary management puts up different questions, stating: *What type of value do stakeholders want? What information's do they need? Should a company cooperate with the stakeholders proactively?* Answering these questions is not easy due to the fact that every company has specific stakeholders and their influence depends on different situations. One is certain, quoting the Jamstetji Tata: *In a free enterprise, the community is not just another stakeholder in* business*, but is in fact the very purpose of its existence.* Business and stakeholders of the community reciprocally share their values. This was recognized in CSR approach very early (Backman, 1975; McGuire, 1963), however, tools for sustainable value analysis weren't developed at the time. In the same time models of financial analysis did not evaluate sustainable risks in relation to environmental or social issues. According to Graham and Bertels (2008) the sustainable value generated by CSR strategies has to be set in a suitable strategic framework. This initiates development of stakeholder management. Sustainable value is also called stakeholder value, because value distribution process in global economics is under influence of new technologies. Stakeholders have to be included in this process and be able to evaluate elements of organizational sustainability they relate to. Increasing relevance of stakeholder inclusion in business activities created companies improve their CSR strategies (Hediger, 2010). Although sustainability approach based on stakeholders had its critics it gains an important economic perspective, especially during recent crisis. The recent economic crisis revealed growing sustainability tensions related to economic growth on one side and environmental and social sustainability on the other. Goal is to reconcile global pursue of economic and sustainability.

3. Conception of analysis

There are different strands of thoughts regarding measuring the sustainability performance of the modern companies. On the one hand, there are some authors who claim that companies are only sustainable when the value created surpasses the external damage they cause. On the other hand, there are supporters of what is called 'eco-efficiency'. They postulate that companies should create as much value as possible per environmental impact. Unfortunately, many of these approaches are either difficult to apply or, if they can be applied, are of limited significance (Figge, Hahn, 2004). The framework of

eco-efficiency, for example, has some advantages but also limitations. The biggest strength of the eco-efficiency framework is its simplicity. It contains a manageable number of indicators which require data that is easily gathered. This framework has nevertheless some important limitations, including: social issues are not addressed; only a few measures for employees are included, product sustainability is completely missing and a graphical representation of the results is not recommended by this framework. All of these issues were improved in research by Miljenović (2016) where sustainable value is empirically tested and proved as an integrated measure of company sustainability. To perceive sustainable value, it is important to take into account non-financial factors and asses them with financial results. When companies operate they use three basic types of resources: natural, human, social and financial resources. These groups of resources are limited in supply. The way these resources are used determines the welfare and the sustainability of one organization and society. It is important that companies use these resources wisely since they play a key role in guaranteeing the welfare and sustainability of our society. Performance measurement should, therefore, not only cover the use of economic resources but also the use of environmental and social resources (Figge et al. 2006). Sustainability assessment can be carried out differently, depending on research objectives. In this paper aim is to detect the elements of sustainable value in relation to internal and external stakeholders and within the possible aspects/ content of sustainable value. This two approaches are explained below.

3.1. Sustainable value framework

Whenever the sources of sustainable value for each organization have to be determined a sustainable value framework has to be set previously. Stakeholder diversity conditions different approaches in sustainable value identification. Therefore, the methodology consists of different approaches. Hart and Milstein (2003) developed a sustainable value framework that directly links the societal challenges of global sustainability to the creation of shareholder value by the firm.

Sustainable Value framework represents strategic elements for managing business sustainability including key business objectives, strategies and sustainability practices. To set this framework company has to include stakeholders in the process of identifying joint sustainable value. Most challenging part is to predict future sustainability sources in different areas. Good prediction is what usually marks successful leader and its company. Crucial examples are inventions related to ecological efficiency, energy, internet and IT development, with highest rates of growth in a globalized world. Today successful brands base on new clean technologies that prevent pollution and on business processes that include. Base of sustainability should be created in cooperation with stakeholders because they are first source of impact from organizational surroundings. Based on this framework value is shared between company and its stakeholders becoming an external expression, i.e. the holistic impact of one business. Companies more and more sell solutions to global social and environmental issues.

Figure 1. The sustainable value framework

Source: Adapted from Hart, S. L., Milstein, M. B. (2003) ″Creating sustainable value″, Academy of Management Executive, Vol. 17, No. 2, pp. 56-69.

The given framework turns into a specific sustainability portfolio for managing sustainability value thru time. This portfolio includes (Hart 1997):

1. Clean Technology – improves ecological efficiency of production process and contributes to general sustainable development objectives
2. Corporate vision based on sustainability issues – setting economic objectives in a manner they support solving the unmet needs of stakeholders or society in general
3. Pollution prevention – engaging policies of environmental protection on all organizational levels and implementing environmental standards,
4. Product quality – enabling longer life cycles with less waste and maintenance.

By using this framework, a portfolio of sustainable value can be created for each organization. Basic process is on identifying key stakeholders and to manage relations between them and organizations successfully. In these conditions sources of sustainable value can be determined.

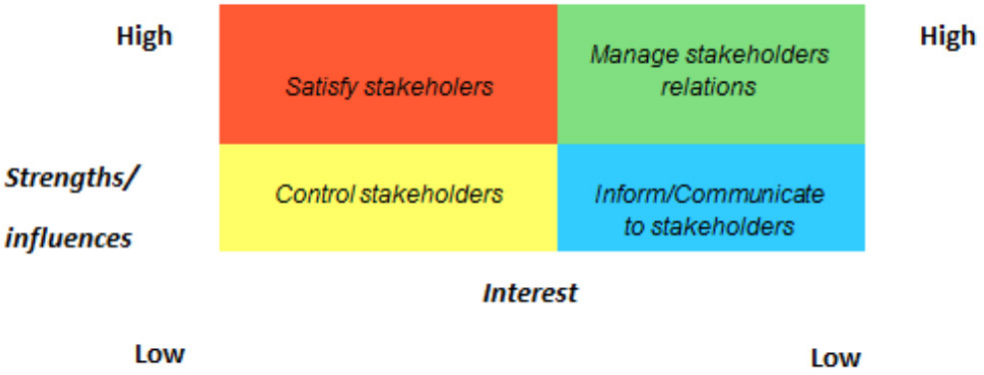

Figure 2. Mapping the stakeholders based on their strengths and interest related to sustainable value

Source: Adapted from Morris, J., Baddache, F. (2012) Back to Basics: How to Make Stakeholder Engagement Meaningful for Your Company, Copenhagen: BSR – Business for Social Responsibility.

Objective of such methodology is to detect relations between stakeholders and organizations that can generate joint sustainable value. This map, along with before presented framework enables to manage sources of sustainable value thru space and time.

3.2. Sustainability assessment

The underlying logic of sustainable value is actually the same as the logic that investors use to evaluate an investment. When investors evaluate an investment, they compare the return on capital with the cost of capital. Since capital does not really have a price, the investors must use an alternative approach (Reeder, Colantonio, 2013). Therefore, investors compare the return on their investment with the return on alternative investments. In this manner, they actually take the opportunity cost into account. Only an investment of which the return exceeds this benchmark creates value. But companies do not only use economic capital because they also engage significant social and environmental resources that should be taken into account. In order to assess corporate sustainable performance, one should check if the use of a particular set of resources creates value. This is not the case in common financial business performance measurement. The use of all kinds of resources is expressed in monetary terms, including the use of social and environmental resources. Figge et. al. (2006) research sustainable value in monetary terms as a value created or destroyed by a company through the use of a specific set of resources. By using the same logic as financial markets, corporate sustainable performance is actually translated into a language that is very understandable for managers and investors. This is a sustainable value added approach that judges simultaneously the efficiency and the effectiveness of all three dimensions of sustainability (economic, environmental and social). The measure indicates if the firm reaches a certain threshold to contribute to sustainability. Furthermore, it also

indicates where and when the resources have to be allocated to realize their highest sustainability contribution.

In this case methodology is set by two elements called the 'if-question' and the 'where-question'. This is actually the same logic as the logic used by investors, as described above. First, investors have to determine whether the return on their investment exceeds the costs (if-question) and then, if the investment is more attractive than other possible investments (where-question). The absolute sustainable value added is the original value added of a company adjusted for the external environmental and social costs and opportunity costs (figure 3, upper left field) (Figge, Hahn, 2004).

		Benefit > Cost? (If-question)	
		considered	non considered
Maximum benefit? (Where-question)	considered	Absolute Sustainable Value Added	Relative Sustainable Value Added
	not considered	Net or Green Value Added	Value Added

Figure 3. If – and where – matrix

This approach judges simultaneously the efficiency and the effectiveness of a certain set of resources. Efficiency refers to the 'if-question', namely: does this particular set of resources contribute to sustainability and create value? Effectiveness on the other hand, refers to the 'where-question', namely: is this set of resources indeed more attractive than other possible sets? Sustainable value added is, thus, a monetary approach to evaluate the sustainability performance of companies in a way that is easily understandable for managers and investors.

According to Figge et al. (2006), the procedure to assess corporate sustainability performance using the sustainable value approach can be summarized into five large domains that each consists of a few different steps.

The five general domains are the following (presented by Figure 4):

1. Preparing for the assessment;
2. Data mining;
3. Calculating sustainable value;
4. Taking company size into account;
5. Interpreting and communicating results.

	Amount used by the company		Efficiency [€ per unit of resource]	Return created with the resources	Value contribution
CO2-emissions	1,370,613 t	Company	1,478 →	2,026,000,000 €	-1,676,623,890 €
		Benchmark	2,701 →	3,702,623,890 €	

Figure 4. Determining sustainable value for one company within the benchmark

In the given example company with a use of 1,370,613 tons of CO2 emissions destroys its possible sustainable value due to poor efficiency per unit of used resources of 1,478. The rest of the benchmark has higher efficiency setting higher returns with less resource and providing a sustainable impact. Data mining is probably the most demanding part of given methodology because companies are still not transparent in publishing of non-financial information. To assess the use of economic resources an opportunity cost approach is used. This means that value is created when a resource is used more efficiently than through an alternative use of the same resource. Conducting sustainability assessment based on environmental and social resources is more complicated approach. In this case, environmental and social resources are approached in the same manner as the economic resources. A company creates value when it uses the economic, environmental and social resources more efficiently than the benchmark. This is elementary crucial for dimensioning the context for sustainable value research and identification, which is proposed by this paper search objectives.

4. Documentation background and analysis

Research background rests on ADVANCE projections of sustainable value for European companies. ADVANCE stands for Application and Dissemination of Value-Based Eco-Ratings in Financial Markets and is an international project supported by the LIFE Environment program. In this project the environmental performance of 65 European companies of the manufacturing sector is assessed using the sustainable value approach (Figge et. al 2006.). ADVANCE assesses the Sustainable Value for two scenarios. The past performance scenario calculates the Sustainable Value for the years 2001, 2002 and 2003.

In this scenario companies must use environmental resources more efficiently then the EU countries in the same year. The future performance scenario uses the expected 2010 benchmark efficiencies as benchmark. To create Sustainable Value in this scenario companies must use resources as efficiently as the EU countries expect to use resources in 2010.

To illustrate the results of this analysis, the focus will be on the benchmark results within different countries. ADVANCE calculates the Return to Cost Ratio (RCR) to assess the environmental performance of companies. This ratio indicates how much more (or less) efficiently each company uses its environmental resources. If the RCR is 2 then the company uses its environmental resources twice as efficiently as the benchmark. For the years 2001, 2002 and 2003 the performance of the company is benchmarked against the efficiency of the EU countries of the same year and for the last column the company's efficiency is benchmarked against the expected EU efficiency in 2010. The results for selected companies of automotive industries are shown in Table 1.

Company: BMW	**2001**	**2002**	**2003**	**2003 > 2010**
Sustainable value (€)	8,936,911,302	9,229,109,374	9,510,633,231	8,514,813,453
RCR	4.3: 1	4.1: 1	3.9: 1	3: 1
Company: DaimlerChrysler	**2001**	**2002**	**2003**	**2003 > 2010**
Sustainable value (€)	30,077,701,600	31,896,158,886	29,876,257,351	26,133,559,478
RCR	3.6: 1	3.7: 1	3.6: 1	2.7: 1
Company: Volvo	**2001**	**2002**	**2003**	**2003 > 2010**
Sustainable value (€)	3,163,639,310	3,341,355,994	3,396,583,146	2,882,359,807
RCR	2.5: 1	2.5: 1	2.5: 1	2: 1
Company: Volkswagen	**2001**	**2002**	**2003**	**2003 > 2010**
Sustainable value (€)	9,476,251,319	9,524,622,621	8,059,197,491	3,835,194,441
RCR	1.6: 1	1.6: 1	1.5: 1	1.2: 1

Table 1. Advance results on sustainable value for automotive industry (benchmark)

Although ADVANCE Project relates to the period of 2001 – 2010 it is the only holistic methodology of Sustainable Value calculation and therefore subjected to analysis in this paper. According to the data DaimlerChrysler has the generated Sustainable Value among selected automotive companies. The BMW has

the highest RCR of 3: 1, meaning that it uses its environmental resources three times more efficiently than rest of the benchmark. At the same time Volkswagen has the lowest RCR within the benchmark, stating 1.2: 1. The projection of Sustainable Value for all companies in the period of 2003 – 2010 ends with lower values due to expectations that less resources will be used in the forthcoming period due to technology advancement. It would be interesting to perceive Volkswagen Sustainable Value affected by its Dieselgate affair in 2015. It would certainly turn this value into negative; however, projections were not given for the rest of the automotive industry in the period of 2009 - 2015.

The table below shows the ranking of all 65 companies taken into ADVANCE Project. Companies are listed in alphabetical order. There are eight rankings per company. There is a difference between a ranking based on absolute Sustainable Value and relative Return to Cost Ratio (RCR). Both rankings are conducted for the years 2001-2003 and for a future performance scenario i.e. the year 2010. This is only existing calculation of Sustainable Value for EU countries until today.

		RANKING SUSTAINABLE VALUE				RANKING RCR			
No.	**Company**	**2001**	**2002**	**2003**	**2003> 2010**	**2001**	**2002**	**2003**	**2003 > 2010**
1	**ABB**	7	9	8	6	12	13	12	9
2	**Acea**	30	31	30	30	30	33	30	30
3	**AEM**	49	45	46	40	60	58	57	57
4	**AEM Torino**	31	33	32	32	44	41	41	42
5	**Agfa-Gevaert**	19	19	18	17	14	12	9	13
6	**Airbus**	9	8	7	7	1	1	1	3
7	**ASM**	35	36	35	34	47	49	50	49
8	**AstraZeneca**	8	7	9	5	17	18	18	14
9	**Atlas Copco**	21	22	23	22	21	24	23	20
10	**BASF**	52	54	52	54	35	35	35	35
11	**BG Group**	42	46	40	42	41	43	39	40
12	**BMW**	3	4	3	3	3	5	4	5
13	**BP**	63	64	64	64	46	48	47	48
14	**Celanese**	50	49	48	47	52	51	52	52
15	**Centrica**	45	53	45	44	38	45	37	36
16	**Crown van Gelder**	29	30	31	29	45	46	46	45
17	**DaimlerChrysler**	1	1	1	1	7	6	7	8
18	**Degussa**	47	48	49	50	36	38	38	39
19	**Edison**	54	55	55	55	57	59	59	59
20	**Energias de Portugal**	56	57	57	58	61	60	60	60

		RANKING SUSTAINABLE VALUE				RANKING RCR			
No.	Company	2001	2002	2003	2003 > 2010	2001	2002	2003	2003 > 2010
21	Electrolux	18	18	19	19	23	22	22	21
22	ENEL	61	62	59	59	54	54	45	47
23	ENI	60	61	62	62	50	52	51	51
24	ERG	44	43	53	52	58	63	62	61
25	FIAT Group	41	47	41	48	32	39	33	34
26	Fortum	55	56	56	56	56	57	58	58
27	Gorenje	27	28	28	24	6	4	3	2
28	Heidelberger Druckmaschinen	16	20	20	20	5	7	8	10
29	Heineken Group	20	21	21	27	24	25	27	27
30	Henkel	14	16	17	16	13	14	16	17
31	Holmen	32	34	33	33	33	32	34	33
32	Imperial Chemical Industries	33	32	34	35	29	30	31	32
33	Kemira	46	44	44	43	55	56	56	54
34	MAN	N/A	13	13	11	N/A	15	14	12
35	M-Real Corporation	37	38	38	38	37	37	42	41
36	MVM	57	58	58	57	64	65	65	65
37	NedCar	25	26	26	23	9	10	11	7
38	Novonordisk	17	17	16	14	4	2	2	1
39	Novozymes	26	27	27	25	22	21	21	22
40	OMV	36	39	47	46	40	40	48	46
41	Philips	5	5	5	4	8	8	6	6
42	Pilkington	40	40	39	39	43	44	43	43
43	Pirelli	23	24	24	31	26	28	28	29
44	PSA	6	6	6	9	10	9	10	19
45	Renault	11	11	10	18	18	20	20	25
46	Repsol YPF	58	59	60	61	49	55	53	56
47	Richter	28	29	29	28	25	26	24	28
48	Robert Bosch	4	2	2	2	11	11	13	11
49	Royal DSM	38	37	37	37	39	34	36	37
50	SCA	34	35	36	36	31	31	32	31
51	Scania	22	23	22	21	19	19	19	18
52	Schering	15	15	15	13	2	3	5	4
53	Scottish & Southern Energy	51	51	51	51	51	53	55	55
54	Shell	64	65	65	65	48	47	49	50
55	SKF	24	25	25	26	28	29	29	26

		RANKING SUSTAINABLE VALUE				RANKING RCR			
No.	Company	2001	2002	2003	2003 > 2010	2001	2002	2003	2003 > 2010
56	**Slovnaft**	43	41	42	41	59	61	61	62
57	**STMicroelectronics**	13	14	14	15	16	17	17	16
58	**Stora Enso**	53	52	54	53	42	42	44	44
59	**Suez**	62	63	63	63	53	50	54	53
60	**Unilever**	10	10	11	12	27	27	26	23
61	**Union Fenosa**	59	60	61	60	62	62	63	63
62	**Unipetrol**	48	50	50	49	63	64	64	64
63	**UPM-Kymmene**	39	42	43	45	34	36	40	38
64	**Volkswagen**	2	3	4	8	20	23	25	24
65	**Volvo**	12	12	12	10	15	16	15	15

Table 2. Advance results on sustainable value for 65 EU companies

Sustainable Value reflects how much Sustainable Value is generated by the company in absolute terms. It depends on company size and efficiency. Larger companies tend to produce more Sustainable Value than smaller firms. This can be due to volume economics where fewer resources provide more products. Some of the ranked companies are large technological companies and known leaders of R&D sectors. To take this size effect into account companies are also ranked according to their resource efficiency. This efficiency is termed Return to Cost Ratio (RCR). Efficiency for a specific company can only be assessed within belonging industry or a benchmark. Higher RCR indicates higher Sustainable Value because resources are used in a better manner than the rest of the benchmark.

5. Results and discussion

ADVANCE assesses the environmental performance of European companies from six different manufacturing sectors, including: Automobile, Chemicals Forestry & Paper, Oil & Gas, Pharmaceuticals and Utilities (ADVANCE Project results 2006a). Sustainability performances of these sectors vary, depending on used technologies, resources and innovations across time. Figure below represents a very wide variability of performances within each sector.

ADVANCE data analysis indicates some very clear sector clusters in terms of environmental impact and RCR indicators. Performances distinguish within each sector confirming different Sustainable Value approach across one benchmark. The aim of the research was to reveal processes and forms in which company delivers sustainable value to its stakeholders. It was established that by representing the framework of sustainability value generated within can be managed between organization and its environment. Sustainability assessments are unfortunately very rare because financial analysis dominates.

ADVANCE methodology based on sustainable value framework and sustainable value assessment gives a unique example of sustainability assessment. Results provided by a monetary value of company sustainable value and backed up with an RCR rankings distinguish sustainable forms characterized by varying levels of substitutability (different ratios of financial, environmental and social capital). According to ADVANCE Project result RCR values are extremely low in Oil&Gas sector along with utilities that can include greenhouse gas emissions, water and land pollutants. Industry of forestry, paper and chemicals also breaches in a few of RCR level due to the fact that they have a direct environmental effect in terms of forest, landfill, water and air pollution. In terms of research results these are crucial impacts representing contributions to Sustainable Value. Existence of Sustainable Value is not questionable; however, the way it is processed can be a matter of significance discussion. Results of the ADVANCE Project are based on Figge and Hahn estimators of Sustainable Value and cover crucial manufacturing sectors in the EU. Relative size, RCR and benchmark specifications indicate that it is possible to detect non-financial value that goes beyond shareholder value.

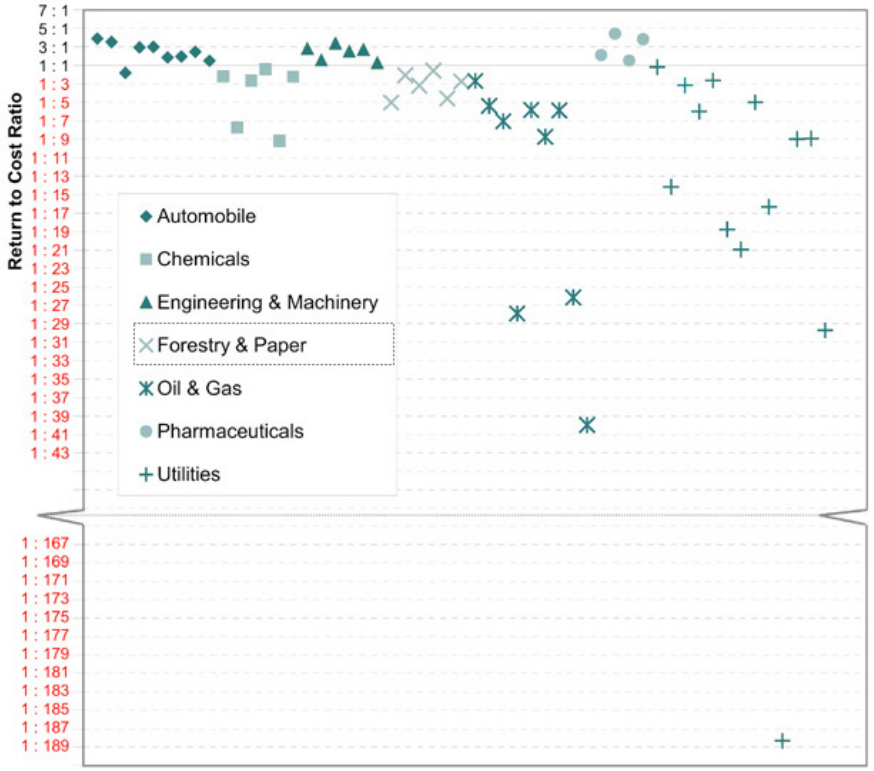

Figure 5. Environmental performance of European companies in key manufacturing sectors

Source: ADVANCE Project results (2006b) available at http://www.advance-project.org/results/sectorresults/index.html> [Accessed: January 5, 2018]

Research results can be observed through Sustainable Value portfolio. This portfolio, similarly as the Sustainable Value framework consists of four basic elements:

1. control of environmental and social risks (pollution and cost prevention);
2. implementation of innovations and clean/green-technologies;
3. coordination and data exchange with the stakeholders;
4. joint projects with local community.

To create stakeholder value, companies have to engage management for each component and include it in its strategy. European companies are especially involved, primarily by inclusive Corporate Social Responsibility strategies. Each organization or a company has a wide range of sustainable business opportunities. Sustainability issues can be reduced to the Triple Bottom Line where company manages its financial, environmental and social impacts. Sustainable Value reflects Triple Bottom Line in a monetary value. Most companies focus their time and attention on the short-term solutions tied to existing products and stakeholder groups. However, sustainable value is a long-term indicator. Therefore, a data projection of 2003 – 2010 is used. According to founders of Sustainable Value framework (Hart and Milstein) incremental improvements have to be associated with clean technology, and the largely underserved markets at the base of the economic pyramid. Future growth has to be profitable not only for a company, but also for its stakeholders, which are environmentally or socially interested. This long-term growth can be only determined as Sustainable Value.

6. Conclusion

The values that companies distribute in modern global economics significantly distinguish from those being generated during the 20th century. Technological changes initiated by environmental concerns involved new types of stakeholders into value creation processes. In this point value shared between companies and their stakeholders stops to be exclusively financial and enters environmental and social aspects that are of non-financial character. Above all environmental and social issues related to business are directed to sustainability issues. Global problems of environmental devastation, social inequalities and health impoverishment relate to worldwide business operations. However, business sector has always been the generator of shared value. To recognize its sustainable aspects each company should create own sustainable value framework. This framework always consists of internal and external elements related to specific company that may be the stimulators of sustainable value.

The focus of this paper was the assessment of sustainable value by different approaches. Financial logic was used to assess the sustainability performance of companies with regard to the use of economic, environmental and social resources.

This approach is often more accessible for managers and investors. First step is always on defining the concepts of sustainability and Corporate Social Responsibility among different stakeholders. Sustainable assessment was discussed with a focus on the Sustainable Value approach. To assess the sustainability performance of companies, it is important not only to consider the economic results but also to assess the non-financial factors; like the use of environmental and social resources. Several approaches in the past failed because they engaged complicated evaluation of used environmental and social resources. Sustainable Value framework and assessment evaluates environmental and social resources in the same manner as the economic resources, namely through an opportunity cost approach. Since it uses a financial logic and is, therefore, easy to use for managers and investors, it could also contribute to the further implementation of CSR practices in modern companies. Important issue is shall all environmental and social effects of a company's activities be expressed in monetary terms. This research has unquestionably proved that sustainable value exists in different forms, moreover, in terms of future research it has also imposed the important question of applicable forms and management strategies of sustainable value in the future.

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CHAPTER 12

The link between entrepreneurial learning and the use of E-Visitors in the function of sustainable tourism development (example of the study of the peninsula of Čiovo)

Mirela Müller[1], Brigitte Landmayer[2]

ABSTRACT

Learning about Entrepreneurship and Entrepreneurship represents an increasingly important aspect of the curriculum in the EU member states, especially as it is the main factor in mastering the skills and use of E-Visitors for private landlords providing catering services for overnight stays. Entrepreneurial learning can have different goals and results - from creating a new venture to the development of entrepreneurial traits, skills and behaviors, which is extremely important both to capturing the skills of the E-visitor's IT system and for the sustainable development of Dalmatia's tourism, especially in the Čiovo peninsula; all in order to assist in the suppression of the gray economy of the Republic of Croatia. Therefore, the aim of this paper is to conduct research to determine the attitudes and opinions of private renters about the importance of participating in training programs organized by the County Council of Okrug and incorporating the same respondents to acquire entrepreneurial skills and acquire knowledge about the use of E-Visitors. The subject of the research was private renters who participated in training programs where they acquired entrepreneurial learning awareness, adopted certain levels of digital competence and developed awareness of the role and significance of the proper use of the E-Visitor system. The questionnaire was attended by 327 respondents at the age of 21 to 57, where their views and opinions of local private renters were examined during the period from October 15 to December 1, 2017. The findings gained insight into the importance of entrepreneurial learning in the framework of the Training Program, which is important for adopting the general level of digital competence, as it facilitates the use of E-Visitors and thereby suppresses the side economy in the region of Dalmatia. Research can be an example of how third-year respondents can also be catered for by providing catering services for overnight stays to further develop sustainable tourism development for the next generation.

Key words: entrepreneurial learning, digital competence, E-visitor information system, sustainable development

JEL classification: L8

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1. Introduction

Studies on the future of work show that future employment biographies Increased switching between non-self-employed and self-employment and periods of training and unemployment can have. Workers should be in modern working forms with flat operating hierarchies as entrepreneurs in the company - so-called intrapreneurs (Esser, 2003). It follows: Entrepreneurial thinking and action wins still important - throughout Europe. An entrepreneur is therefore a person who is responsible for himself (Entrepreneur) or other (intrapreneur) potentials active in the market seeks, recognizes and innovates on the basis of new Combinations of production factors used economically (See Eickhoff, 2006, p. 51). If both entrepreneurs as well Intrapreneurs are understood as entrepreneurs, is in this Contribution to Entrepreneurship may mean something to others Entrepreneurship, entrepreneurship or self-employment Culture is called. Entrepreneurship Education is particularly special for Germany

great importance because here entrepreneurship and start-up activities only lower than average (cf. Sternberg; Brixy; Schlapfner, 2006, p. 12; Wolfe, 2004) and negative effects for Competitiveness, economic growth and employment are afraid. On the one hand, they have as part of the Global Entrepreneurship Monitor (GEM) respondents self-doubt whether they are over the skills needed for entrepreneurship and Have experience[3]. With the proposed education phases comprehensive Entrepreneurship Education concept is supposed to be a way of achieving this Goal are shown. The concept is called curriculum - in the sense from the result of a didactic reflection - understood. (see Jongebloed; Twardy 1983, p. 176). Such a reflection applies to all didactic questions - target group, intentions (goals), Contents, methods and teaching / learning success control (see Böhm, 2000, P. 118) - a. This is intended to broaden the existing entrepreneurship Education approaches towards a coherent, educational phases overall concept. The goals of the individual stages of education build on each other, so with each education phase a targeted increase in competence in the sense continuous professionalization (Aaker, 2010; Belch, 2015). In one such spiral curriculum are subsequently in the individual Phases proven topics, methods and teaching / learning success controls to match the target group and the intentions. Hereby should create a coherent overall concept. Entrepreneurial learning can have different goals and results - from the creation of a new venture to the development of entrepreneurial traits, skills and behaviors, which is extremely important both to capturing the skills of the E-visitor's IT system and the sustainable development of tourism in Dalmatia. eVisitor - IT system for registration and deregistration of tourists. The IT system for registration and deregistration of tourists is an IT system that connects all tourism associations of the Republic of Croatia. It will be accessible over the Internet without having to download it to the computer. This system links and exchanges the most important tourism information provided by tourism associations and over 60,000

3 Vgl. Sternberg; Brixy; Schlapfner, 2006, S. 20. Die Kontrollbefragung von Experten zeigt übrigens, dass diese Selbstzweifel nicht unbedingt berechtigt sind (vgl. ebenda, S. 21).

providers of accommodation services[4]. The individual tourist boards will have an insight into all the information about the providers of accommodation services and their properties as well as information about the number of tourists in their area. An internet connection and a web browser suffice for the use of the said IT system. For security reasons users will receive a login password (Vidgen, R. Francis, D, Powell, P. & Woerndl, M., 2004) The system in which information is collected and processed complies with all data protection regulations. The Croatian Tourist Board, together with the tourism associations and other stakeholders, has developed the IT system eVisitor. With this system one wants to simplify the processes of the registration and deregistration of tourists as well as the supervision of the payment of the tourist tax. In the Croatian Official Gazette "Narodne novine" No. 126/15, the guideline on the collection of guest data, on the form and content of the guest registration form has been published. Thus, the said system is now the central point for the registration and deregistration of guests, the payment of the tourist tax and the statistical management of information on taxpayers and tourists. Taxpayers and tourist boards are required to use the system from 1 January 2016 for the registration and deregistration of guests. After that, alternative login and logout methods will no longer be possible. What is the purpose of the IT system for the registration and deregistration of tourists? Collecting and processing information on providers of accommodation and accommodation in the Republic of Croatia; Registration and deregistration of guests by providers of accommodation services via the Internet; Billing and control of the payment of the tourist tax; Data processing and data analysis for statistical purposes and Cooperation between public authorities.

4 https://www.evisitor.hr/eVisitorWiki/(X(1)S(f403b0qzidl35k1sxpkt44fd))/Javno.Web-API.ashx;

2. Literature review

Tabular presentation of literature analysis used for writing and text methodology and discussion of work issues.

analytical skills[5]	adaptability[6]	reasoning ability[7]
Persistence	assertiveness	resilience
Observing the existence in the industry knowledge	Technology-market competition	Chance Recognition
Disciplinarity	Assertiveness-dynamics dynamics and agility	Learning-Techniques Autonomy Procedures of
Dominance pursuit	Readiness to take decisions with the joy of decision	freight creation
Efficient work and personal initiative and introduction of new ones and distribution of new goods from growth thresholds	uncertainty	Determination Development, Production Recognition and Managing
Procurement-markets Assessment capacity	Development-Development of new ethical and normative	New sales markets
Experimentation	Extroversion Sensitivity and empathy pursuit	Finance-Flexibility Frustration tolerance
previous experience	Leadership Holistic Vision High level of intelligence Internal knowledge in (brand) communication skills	Design Capability
Inventiveness Identification	Control conviction protection right	Creative will Profitable use Conscientiousness
Innovation-Enthusiasm Integrity		Information-Management Communication skills
Contact ability and interest		Conflict management

Table 1. Tabular presentation of literature

5 Förderkreis Gründungs-Forschung. *Good Practice in der Entrepreneurship- Ausbildung – Versuch eines internationalen Vergleichs*. Studie für den FGF erstellt von Dr. Petra Moog. Bonn, 2005.
Frese, E. *Unternehmensführung.* Landsberg am Lech, 1987.
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3. Methodology and empirical data and analysis

Units included in the studio are self-employed renters-private at the age of 21-57 years. Of these, only 26% of the total number of respondents participated in the e-visitor management training program. A quantization methodology was used in SPSS data processing. The questionnaire was attended *by 327 respondents at the age of 21 to 57*, where their views and opinions of local private renters were examined during the period from October 15 to December 1, 2017. Descriptive statistics were used to calculate the frequency, percentage, Hi quadrat ($\chi 2$) and correlation coefficients (Cramer's V (ρc) coefficient). Investigate and identify the perceptions of private innovators on the importance of communication-marketing strategy for tourism development as well as investing in adult education for the development of digital literacy on the use of E-Visitors system. The findings gained insight into the importance of entrepreneurial learning in the framework of the Education Program (Theme title in Education Program: 1. New media as a customer service; 2. Increasing trust through customer talk; 3. Possibility of service for users in new media in the tourist sector; 4. Methods and techniques of hospitality on new media; 5. Managing reputation in new media: fishing for comments; 6. A Strategic Approach to Creating a Native Campaign; 7. Advertising Planning; 8. Designing and realizing a native campaign and 9. The Steps to Implementing an E-Visiter System), which is important for adopting the general level of digital competence, as it facilitates the use of E-Visitors and thereby suppresses the side economy in the region of Dalmatia. The findings gained insight into the importance of entrepreneurial learning in the framework of the Education Program, which is important for adopting the general level of digital competence, as it facilitates the use of E-Visitors and thereby suppresses the side economy in the region of Dalmatia. Research can be an example of how third-year respondents can also be catered for by providing catering services for overnight stays to further develop sustainable tourism development for the next generation. Education lasted one day in two sections. The first section was about getting familiar with new technologies and the other on implementing ICT on practical examples of using the E-Visitor System.

4. Results and discussion

Graph 1 shows statistical data on the importance of entrepreneurial learning in the framework of the Education Program, which is important for the adoption of the general level of digital competence, since it facilitates the use of E-Visitors and thus eliminates the side economy in Dalmatia. Therefore, 78.64% (M=0.78. SD=0.52) of respondents believe that an important entrepreneurial learning at the expense of the Education Program that participants, or private renters, took part because they adopted the general levels of digital competence that facilitate the use of E-Visitors System.

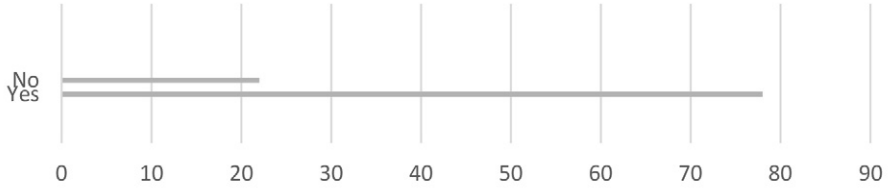

Chart 1. Statistical data on the importance of entrepreneurial learning in the framework of the Training Program, which is important for the adoption of the general level of digital competences because it facilitates the use of E-Visitors and thus eliminates the side economy in Dalmatia.

Source: Authors

Graph 2 shows statistical data of respondents as being satisfied with the Okrug Gornji Municipal Education Program which organized and will continue next year. They, 84.25%, were satisfied that they would continue with the Program and the following year. While 15.75% of them considered that they were not satisfied and would not continue with the Education Program next year.

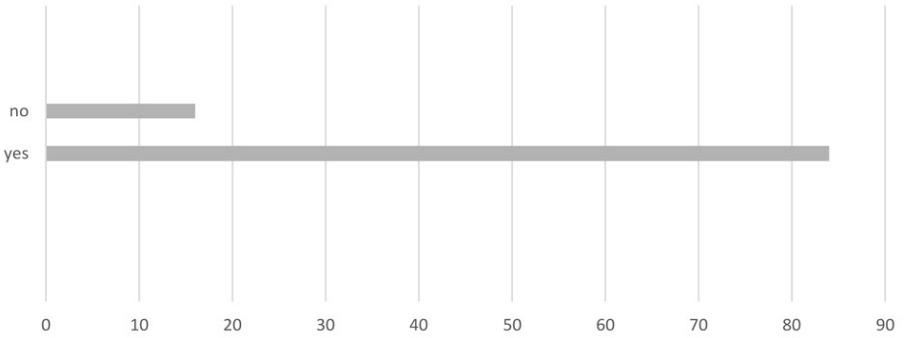

Chart 2. The statistical data of the respondents were satisfied with the Okrug Gornji Municipal Education Program which organized and would continue next year.

Source: Authors

Chart 3. Shows this statistical results: 1. New media as a customer service (9% M=0.45, SD=1.52); 2. Increasing trust through customer talk (7%, M=0.75, SD=0.58); 3. Possibility of service for users in new media in the tourist sector (6%,M=0.69, SD=0.87)); 4. Methods and techniques of hospitality on new media (12%, M=0.45, Sd=0.74); 5. Managing reputation in new media: fishing for comments (6%,M=0.64, SD=0.48)); 6. A Strategic Approach to Creating a Native Campaigne (11%, M=0.41, SD=0.85); 7. Advertising Planning (6%, M=0.74, SD=0.57); 8. Designing and realizing a native campaign (9%, M=0.74, SD=0.64)); 9. The Steps to Implementing an E-Visiter System (25%, M=0.41, SD=0.41)

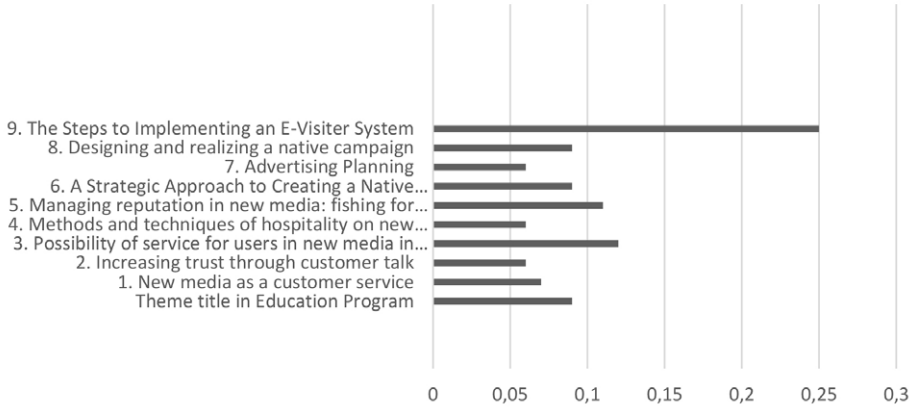

Chart 3. Static representation of the variables data that most of the participants in the Education Program were able to acquire digital skills in digital competence to work on the E-vist system.

Source: Authors

Legend: 1. New media as a customer service; 2. Increasing trust through customer talk; 3. Possibility of service for users in new media in the tourist sector; 4. Methods and techniques of hospitality on new media; 5. Managing reputation in new media: fishing for comments; 6. A Strategic Approach to Creating a Native Campaign; 7. Advertising Planning; 8. Designing and realizing a native campaign; 9. The Steps to Implementing an E-Visiter System.

In this part of the survey questionnaire, renters have their own perceptions of investing in adult education through the E-Visitor Training System for the development of skills through the aspect of significance of the development of semi-tourism, increasing their own capital and for inclusion in the world of tourism. Eight assertions were offered in total (Table 1-%)

Variable	*1 %*	*2 %*	*3 %*	*4 %*	*5 %*	*N*	*x²*	**df*	**p*
For ease of communication between tourists and obligations towards the Municipality	***9***	***10***	***11***	***20***	***50***	***100%***	***12.51***	***4***	***0.001***
Opening and / or joining entrepreneurial travel agencies	***10***	***12***	***18***	***18***	***42***	***100%***	***10.25***	***3***	***0.003***
For the development of digital literacy with the goal of pragmatic use of E-Visitors	***14***	***14***	***13***	***25***	***34***	***100%***	***11.42***	***2***	***. 0.005***
To combat the payment of unrequited guests and to suppress the gray economy	***24***	***12***	***13***	***11***	***40***	***100%***	***13.63***	***3***	***0.051***
To monitor the EU trend	***22***	***17***	***28***	***19***	***14***	***100%***	***13.61***	***3***	***0.021***
To facilitate the collection of information related to tourism demand	***19***	***24***	***25***	***16***	***16***	***100%***	***15.21***	***5***	***0.055***

Table 2.

(Key: With each statement was used original-point Likert scale with anchors: 1 = strongly disagree, 2 = mostly disagree, 3 neither agree nor disagree, 4 = mostly disagree and 5 = completely I agree)

Table 2 shows that 50% of private renters (M = 0.37, SD = 0.37) most often as the purpose of investing in adult education through the education program for learning the use of the E-Visitors system are seen through a variable for easier communication between tourists and municipalities, and 42% (M = 0.38, SD = 0.41) believe that the purpose of learning e-Visitors was to increase capital and attendance at EU 295 (M = 0.26, SD = 0.45) and third place is a variable to suppress the gray economy and prevent the payment of punishments 40% (M = 0.58, SD = 0.69), which means that private commentators think that it is very important to know the use of E-Visitors system not only for reporting tourists and increasing private capital, but above all saw the way to the inclusion of adults and thirds in the world of tourism and the development of

the digital economy. A statistically significant correlation ($\chi 2 = 144{,}12$, df = 3, $p < .05$, Cramers V = .21) was obtained, where participants who participated in training programs for the use of the E-Visitor system were more often aware of the role and the significance of the communication-marketing skills strategies for the development of semi-tourism in Okrug Gornji. Furthermore, testing of statistical significance showed that most respondents considered a very important investment in the E-Visitor Learning Training Program to reduce the rate of gray economy at a statistically significant level of less than 1% ($p \leq 0.01$). Table 2 points out the necessity of development of communication-marketing strategy and sets out the most important strategies that the respondents should acquire in order to incorporate the trend into the trend of the world's tourism world as quickly as possible and thus by promoting the development of capital of the same municipality (Kesić, 2003).

Variable	**1%**	**2%**	**3%**	**4%**	**5%**	**Total**	**x^2**	***df**	***p**
segemntation	11	14	16	20	39	100%	11.412	3	0.005
positioning of tourist product	11	22	27	28	12	100%	16.45	2	0.004
the differentiation	9	11	21	21	38	100%	16.521	1	0.003
Low cost and low prices	13	3	14	21	49	100%	09.21	4	0.005
measuring and predicting tourist market proposals	8	9	11	24	48	100%	14.13	5	0.005
functional strategies and programs	3	21	16	21	39	100%	13.51	2	0.002

Table 3. Respondents' opinion on the type of communication-marketing strategy that private renters should acquire

*(**Legend**: The original scale of the Likert type with the anchors was used with each claim: 1 = completely disagree, 2 = mostly disagree, 3 = disagree or disagree, 4 = mostly agree and 5 = fully agree I agree)*

Table 3 indicates the most important types of communication-marketing strategies that renters should possess and develop. In the first place, it is very important to realize the significance of "measuring and predicting tourist market proposals" (48%, M = 0.45, SD = 0.45), then "Low cost and low prices" (49%, M = 0.71, SD = 0.68). A statistically significant correlation was obtained ($\chi 2 = 139.21$, df = 3, $p < .05$, Cramers V = .18) among those who sensitized HEAD -TO HEAD POSITIONING significance: (Directly competing with competitors with respect to the particular product properties on the same target part) and DIFFERENTIAL POSITIONING (a quest for smaller market niches where there is no strong competition for positioning your own product).

4. Conclusions

The acquired knowledge gives insight into the type of communication marketing strategy that is important for private renters and facilitates the development of semi-tourism in Dalmatia. Knowledge is produced, transmitted, accessed and shared at the minimum cost. E-Visitor is a unique online information system that provides insight into tourist traffic and accommodation capacities (commercial and non-commercial) in Croatia. It generates statistical reports and marketing indicators in real time (i.e length of stay, location, gender, age, country of residence, type of facility, destination, etc), which enables more efficient monitoring of tourist traffic and revenues, allowing better control over the collection of accommodation fees creating a synergistic effect of all Croatian tourism stakeholders and contributes to ensuring their competitiveness. The communication-marketing strategies have a major role in the development of tourism, eycepally in the adults Education Program to the use E-Visitors System. To use the E-Visitor system, it is necessary to develop digital literacy, and as a prerequisite of all this is a well-developed communication and marketing skill that develops strategies for successful tourism development and more successful renting of private catering services, mostly overnight stays. The information and communication-marketings strategies have plays a significant role in implementation in the tourismus industry in Dalmatia, Okrug Gornji and it can be dimensioned starting from a study regarding the existing relationship between this and the performance of Education Programm for the adults units in the current economic contextand the E-visitors The study was conducted among the most important renters and providing hotel service overnight stays units in the peninsula Okrug Gornji and consisted of a questionnaire regarding the use of the information and communication – marketing strategies technology for the managerial and operational activity and its impact on obtained performance and through ICT to establish tourist demand (Kotler, 2006). The current state is such that technology it becomes smarter and smarter, and sales solutions are required at every corner, and for a while they can testify to everything that has a smart prefix. According to Kotler, marketing is required to bring the company to a position in which will “survive” and even grow in a distinctive and diverse environment interest groups and markets. Innovative circumstances that create opportunities in the market are very important widely interpreted, as they do not only extend to innovation in services and procedures, but also innovation in management, distribution and communication, are of particular importance to communication and marketing strategies for business and tourism as well as for the development of digital competences regarding the use of E-Visitors system. For this reason, Educational Programs for E-System Visitors and E-Marketing are very important for adults who have very little or no digital literacy. All this leads to the suppression of the gray economy, the EU_ trends of tourist demand, the development of human capital, and the development of further skills in the development of semi-tourism in Okrug Gornji. Of the communication-marketing strategies, strategy has been extremely important*: Low cost and low prices and measuring and predicting tourist proposals.* The acquired knowledge gives

insight into the type of communication marketing strategy that is important for private renters and facilitates the development of semi-tourism in Dalmatia. Of course we can talk about the placement priority inside marketing, but long-term market potentials also means integration the market of procurement in a closed market, the concept of the economy, without being talked about the importance of purchasing marketing in the seller's market conditions. The questionnaire was attended by 327 respondents at the age of 21 to 57, where their views and opinions of local private renters were examined during the period from October 15 to December 1, 2017. The findings gained insight into the importance of entrepreneurial learning in the framework of the Training Program, which is important for adopting the general level of digital competence, as it facilitates the use of E-Visitors and thereby suppresses the side economy in the region of Dalmatia. Research shows that the results, 78.64% of respondents believe that an important entrepreneurial learning at the expense of the Education Program that participants, or private renters, took part because they adopted the general levels of digital competence that facilitate the use of E-Visitors System. They, 84.25%, were satisfied that they would continue with the Program and the following year. While 15.75% of them considered that they were not satisfied and would not continue with the Education Program next year. Research can be an example of how third-year respondents can also be catered for by providing catering services for overnight stays to further develop sustainable tourism development for the next generation.

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CHAPTER 13

Entrepreneurs' Readiness in Small and Medium-Sized Companies to Face Challenges in Digital Business

Marino Golob[1]*, Snježana Babić*[2]

ABSTRACT

Under the influence of contemporary trends and economic and political integration in entrepreneurial globalization, it is necessary to develop digital business in small and medium-sized companies as an important prerequisite for survival in the global market. Research conducted so far, as well as practical experience, indicate that entrepreneurs, as the main driving force behind the abovementioned changes, have the need to acquire additional knowledge, skills and abilities for conducting business of a certain quality in the digital environment. This paper puts a special emphasis on Croatian small and medium-sized entrepreneurs. Thus, a research was carried out to identify their readiness to implement digital innovations in business. In relation to that, ways and frequency of their education for digital business, along with their familiarity with certain knowledge and skills to achieve success in the digital business were determined, as well as the impact of competencies on their attitudes toward the use of ICT for business and the intention to use new models of digital entrepreneurship. The results of the research may contribute to practitioners, scientists and to all those who aim to increase the level of digital transformation of the entire society and to create bigger profits.

Key words: entrepreneurs, digital business, competencies, small and medium-sized companies, digital transformation

JEL classification: A20, O15, 033, O34, 035, 044, Q55

1. Introduction

The process of "digitalization" of small and medium-sized companies (SMEs) and the development of the entrepreneurial capacity of European citizens and organisations are key policy objectives of the European Union (e.g. the Horizon 2020 Framework Program; Neirotti et al. (2017); The Entrepreneurship 2020 Action Plan). Foroudi et al. (2017) have emphasised that the SMEs

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implementation of digital technology in their business enables them to respond positively to customer needs, improve customer-side operations, increase their efficiencies by reducing costs and achieve growth and innovation. Furthermore, the European Commission in its document "The EntreComp Framework" (Bacigalupo et al., 2016) has emphasised entrepreneurship as a competence and defined "digital entrepreneurship" as "entrepreneurship that involves the use of new digital technologies (particularly social media, big data, mobile and cloud solutions)". According to Bacigalupo et al. (2016) the purpose of implementation of new digital technologies in small and medium enterprises may be multiple e.g. to improve business operations and business intelligence, to invent new business models, to engage with customers and stakeholders etc. Garcia-Morales et al. (2017) have found that social media technologies (e.g. wikis, blogs, microblogs, social networking sites, virtual worlds, and video sharing sites, etc.) drive technological knowledge competencies and influence organizational performance and development of innovations. Also, the European Commission in its document "e-Leadership Digital Skills for SMEs" has defined "Digital Savvy" as one of the major components of "SMEs competence", and the research results of the e-leadership education show that "most SMEs need leaders with very strong digital skills". Implementation of Information and Communication Technology (ICT) can be considered as an innovation in small and medium enterprises (SMEs). Neirotti et al. (2017) have emphasised that changes in the ICT paradigm raise the level of business complexity and bring changes in competition levels, and have concluded that the adoption of ICT in small and medium enterprises (SMEs) depends on the combined effect of size and competitive environment.

The adoption of digital technologies by entrepreneurs of SMEs is a key factor for the successful development of digital entrepreneurship and economic growth. Therefore, numerous authors have explored a wide number of factors that affect the acceptance of digital technology by entrepreneurs. As an example, Moghavvemi et al. (2015) have concluded that understanding the individual, technological, and environmental factors can help in providing guidance on the adoption and use of IT innovations by entrepreneurs of SMEs. Also, authors emphasise that entrepreneurs who have the necessary resources and knowledge for IS innovations will actively use an IS innovation. Ngoasong (2017) has concluded that the influence of context (technological, institutional and local) on digital entrepreneurship is mediated by entrepreneurial digital competencies. Gangi (2018) has emphasized that entrepreneurship education requires a comprehensive strategy which includes, for example, national innovation system, investment in information and communication technology etc. Brusić et al. (2017) have concluded that the development of innovative ICT knowledge and skills (e.g. work with cloud computing) must begin in the early stages of primary and secondary education.

The aim of this research was to identify readiness of Croatian small and medium-sized entrepreneurs to implement digital innovations in business, especially those from the Istria County and the Primorje-Gorski Kotar County.

In relation to that, ways and frequency of their education for digital business, their familiarity with certain knowledge and skills to achieve success in the digital business was determined, as well as the impact of competencies on their attitudes toward the use of ICT for business and the intention to use new models of digital entrepreneurship.

The rest of this paper is organized as follows. The following section contains a discussion on the existing literature. Employed research methodology is described in the third section. Fourth section presents the empirical results. Research findings are presented and discussed in the fifth section. Concluding remarks are offered in the last section.

2. Literature review

Digital entrepreneurship requires a new type of e-leader: "innovative disrupter", i.e. a person who, for example, "unravels the complexity of IT, increases accessibility to technology and is open to new ideas, with the ability to work with peers" (Li et al., 2016). The entrepreneurs have three roles as follows (Dillen et al., 2018): "technical-functional", "managerial" and "entrepreneurial"/"strategic". Arendt (2008) emphasises that between SMEs and large corporations exists the digital divide which broadens as digital technologies become more complex; also, SMEs believe that THE costs of ICT are greater than the benefits of their implementation into business processes. Based on the research results of SMEs from Spain, Portugal, Poland and the USA, Arendt (2008) found that the "lack of proper knowledge, education and skilled owner-managers and employees within the enterprise" is the main barrier for the use of information and communication technology (ICT) and e-Business solutions in their business processes.

According to Ngoasong (2017), "entrepreneurial digital competencies" (EDCs) refers to a combination of entrepreneurial and ICT or digital competencies. In this context, according to the same author, entrepreneurial competencies include entrepreneurial skills, knowledge and attitudes "required to search and acquire new information, to identify and pursue entrepreneurial opportunities and to innovate", and ICT capabilities include technological capabilities (e.g. building technology infrastructure, business process integration and brand building).

Furthermore, the European Commission in its document "DigiComp" (Ferrari, 2013) has emphasised that ICT competencies include "secure, critical and accountable use and engagement of digital technologies for learning, at work and participation in society" (e.g. information and literacy, communication and collaboration, creation of digital content, security, problem solving, etc.). For example, Neirotti et al. (2017) have defined three types of ICT-based capabilities of SMEs: production management and administrative capabilities, production innovation and market management, based on the use of ICT system (e.g. Enterprise Resource Planning – ERP, CRM system, SCM system, collaborative production planning, inventory management with external partners, product data management, etc.).

According to the theory developed by Ajzen (1991), users' attitudes to the behaviour have a direct impact on their behavioural intention to use new technologies and innovations. Furthermore, the model of technology acceptance (Davis, 1989) is one of the most widely used models for adopting information systems (IT) by users. Based on this model, users' attitudes toward use of the information system can be explained by the motivation of a user who is influenced by the real features of the system in the organization. According to TAM (Davis, 1989), perceived ease of use strongly and directly influences the attitudes toward the use of innovative information and communication technologies by users. Both, Davis (1989) in TAM model and Venkatesh et al. (2003) in their model Unified Theory of Acceptance and Use of Technology have confirmed that users' intention of using IT directly affects the real use of IT.

Based on the theory of planned behaviour (TPB), Yaghoubi Farani et al. (2015) have developed their model and found that a relationship between entrepreneurial knowledge and digital entrepreneurial intentions is mediated by the attitudes toward digital entrepreneurship and perceived behavioural control. Therefore, their research results confirm that attitudes toward digital entrepreneurship is positively related to digital entrepreneurial intentions and that entrepreneurial knowledge is positively related to attitudes toward digital entrepreneurship. Furthermore, results of the research based on UTAUT model, Moghavvemi et al. (2016) indicates that perceived desirability and perceived feasibility have significant effects on entrepreneurs' intention to adopt and use IS innovations. They have found strong effect of intention and facilitating condition on entrepreneurs' behaviour (1,200 entrepreneurs in Malaysia).

Based on the existing literature, SMEs entrepreneurs have a lot of challenges to face in the digital business, especially in the development of digital entrepreneurial competencies which are required for the use of new digital business models in the new era of global economy.

3. Methods

3.1. Participants

One hundred and eighteen small and medium-sized entrepreneurs from the Istria County (59.3%) and the Primorje-Gorski Kotar County (40.7%) participated in this research. Among the participants, 43.2% of them were female and 56.8% were male.

The most frequent participants were between 35 and 54 years of age (64.4%). The majority of small and medium-sized entrepreneurs (57%) had between 10 and 25 years of work experience in entrepreneurship. Furthermore, 44% of participants had university qualifications, 36.4% had secondary school qualifications and 17% had a two-year post-secondary school qualifications. According to the data presented in Figure 1, in most cases (90.1%), small and medium-sized entrepreneurs are employing their smartphones for making and

receiving calls for the purpose of business, 87.9% for sending and receiving emails, 78% for Web browsing, 74.5% for instant messaging (e.g. Viber, Whats App), 69.5% for sending SMS messages, 56% for online account payment, 52.5% for accessing social networking sites, 42.6% for online education and 40.4% for online shopping.

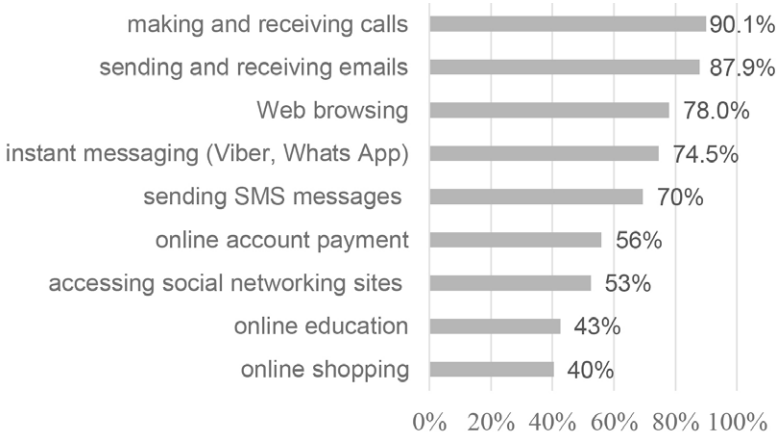

Figure 1. Percentage of entrepreneurs of SMES using their smart phones to access different applications for the purpose of business

Source: Authors' calculation

With regard to the question: "*How often do you attend workshops, courses, seminars etc. for the purpose of developing your competencies in the business environment?",* most small and medium enterprises answered "only once a year" (52.4%) and "several times a year" (44%). These results are shown in

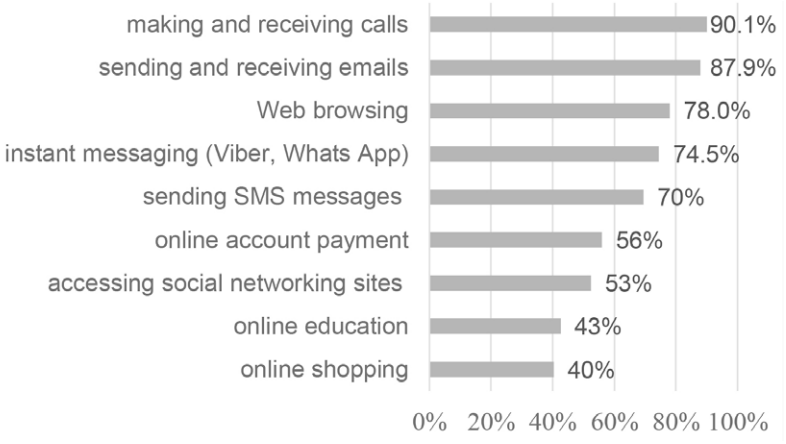

Figure 2. Percentage of SME entrepreneurs in relation to frequency of education for the purpose of developing their competencies in business environment

Source: Authors' calculation

Results of data analysis displayed in Figure 3 indicate that most of small and medium-sized entrepreneurs acquire new entrepreneurial knowledge, skills and abilities independently through print or digital resources (24.6%), courses and/or workshops (22%), faculty (17%), secondary school (6.4%), while 15.3% of respondents are not acquiring new entrepreneurial knowledge, skills and abilities.

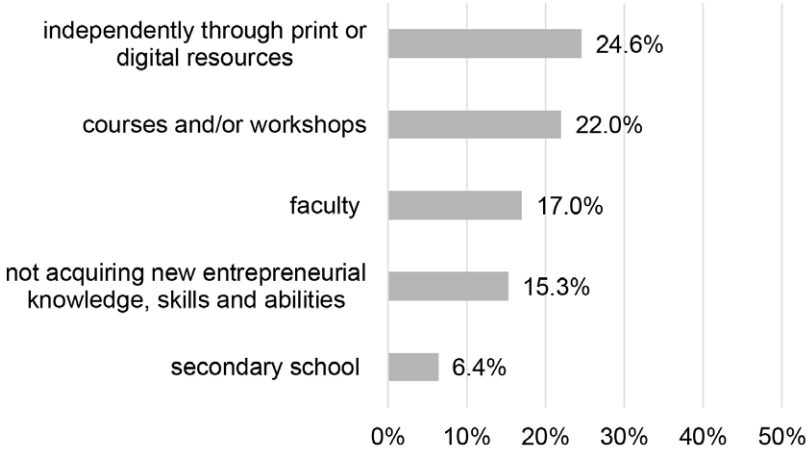

Figure 3. Percentage of entrepreneurs of SMES in relation to ways of acquiring new entrepreneurial knowledge, skills and abilities

Source: Authors' calculation

3.2. Instruments and Procedure

Based on document "The EntreComp Framework" (Bacigalupo et al., 2016), document "e-Leadership Digital Skills for SMEs" (European Commission), document "DigiCom" (Ferrari, 2013), Ngoasong (2017), Babić (2016) and Babić and Bubaš (2015) a new questionnaire was developed, as were the following five scales:

- *entrepreneurial knowledge and skills* refers to the ability to use knowledge and skills (e.g. marketing, economics, management, internal and external communication, project management) to implement entrepreneurial ideas.
- *entrepreneurial digital competencies (EDCs)* refers to the ability to use ICT or digital skills in the entrepreneurial context.
- *ICT knowledge and skills* refers to the ability to use basic and advance types of information and communication technology necessary for business system.

- *Attitude(s) toward the use of ICT for business* refers to the "positive or negative perception" of entrepreneurs about the use of ICT or digital technologies in the digital business environment (adapted Babić and Bubaš, 2015).
- *Intention to use new model(s) of digital entrepreneurship* refers to the prediction of the real use of digital technologies in business process (adapted Venkatesh et al., 2003) .

The questionnaire was composed of 24 items related to participants' demographics and 55 items assessing the knowledge and skills of small and medium-sized entrepreneurs. Responses to the questionnaire items were modulated on a five-point Likert scale (1-strongly disagree, 5–strongly agree). The research was conducted by means of an online questionnaire (http://google.com) in March and April 2018. Participation was voluntary and anonymous. The processing of collected data was done by descriptive statistics, Pearson correlation and multiple regressions analysis (stepwise). Internal consistency of the scales was measured with Cronbach's alpha coefficient. Results in Table 1 show that all of the scales had a satisfactory internal consistency (above 0.90).

Scale	Number of items	Cronbach alpha	Mean	SD
Entrepreneurial knowledge and skills	11	.94	38.14	10.07
Entrepreneurial digital knowledge and skills	11	.96	33.26	10.98
ICT knowledge and skills	24	.96	79.75	23.16
Attitude(s) toward the use of ICT for business	5	.93	20.26	4.55
Intention to use new model(s) of digital entrepreneurship	3	.88	10.90	3.11

Table 1. Number of items, Cronbach's alpha coefficients, Mean, Standard deviations (SD) for scale(s) used in the research

4. Empirical data and analysis

The relationships (Pearson correlation coefficient) between the scales (mean value) are presented in Table 2. As expected, it was found that entrepreneurial digital knowledge and skills was strongly positively related to entrepreneurial knowledge and skills ($r=.85$; $p<0.00$) and ICT knowledge and skills ($r=.81$; $p<0.00$). Furthermore, results of Pearson correlation show that ICT knowledge and skills correlated strongly and positively with intention to use new model(s) of digital entrepreneurship ($r=.61$; $p<0.00$). Also, there was a strongly positive relationship between attitude(s) toward the use of ICT for business and intention to use new model(s) of digital entrepreneurship ($r=.79$; $p<0.00$).

Scale	1	2	3	4	5
1. Entrepreneurial knowledge and skills	1	.85**	.69**	.51**	.51**
2. Entrepreneurial digital knowledge and skills	.85**	1	.81**	.52**	.58**
3. ICT knowledge and skills	.69**	.81**	1	.54**	.61**
4. Attitude(s) toward the use of ICT for business	.51**	.52**	.54**	1	.79**
5. Intention to use new model(s) of digital entrepreneurship	.51**	.58**	.61**	.79**	1

Table 2. Pearson correlation coefficients (r) between scales used in the research
Note: **p<0.01; Source: Authors' calculation

The results of the multiple regression analysis are presented in Table 3. Results show that entrepreneurial digital knowledge and skills (mean value of the measurement scale) was predicted by entrepreneurs' knowledge and skills (β=0.56, p=0.00) and ICT knowledge and skills (β=0.43, p=0.00), resulting in an explained variance of 82%. The regression model obtained is statistically significant (F = 256.56, p <.001).

Variables	***Beta***	***t***	***Sig.***
Entrepreneurial knowledge and skills	.56	10.16	.00
ICT knowledge and skills	.43	7.76	.00

Table 3. Results of regression analysis of entrepreneurial digital knowledge and skills
Note: p<0.01, *Source:* Authors' calculation

Table 4 presents the results of the multiple regression analysis of intention to use new model(s) of digital entrepreneurship (mean value). Results show that the only significant predictor is the variable attitude(s) toward the use of ICT for business (β=0.65, p=0.00) and this predictor can explain 68% of the variance of intention to use new model(s) of digital entrepreneurship for small and medium-sized entrepreneurs. The regression model obtained is statistically significant (F = 59.55, p <.001).

Variables	***Beta***	***t***	***Sig.***
Attitude(s) toward the use of ICT for business	.65	9.99	.00

Table 4. Results Of Regression Analysis Of Intention To Use New Model(S) Of Digital Entrepreneurship
Note: p<0.01; *Source:* Authors' calculation

Furthermore, results (Table 5) show that the variable (mean value of the measurement scale) ICT knowledge and skills (β=0.35, p=0.007) has the greatest predictive power. This predictor can explain 33% of the variance of attitude(s)

toward the use of ICT for business by small and medium-sized entrepreneurs. The regression model obtained is statistically significant (F = 18.89, p <.001).

Variables	*Beta*	*t*	*Sig.*
ICT knowledge and skills	.35	2.73	.007

Table 5. Results of regression analysis of attitude(s) toward the use of ICT for business
Note: p<0.01; Source: Authors' calculation

4. Results and discussion

The findings of this research suggest that the entrepreneurial attitude toward the use of ICT for business can explain 68% of the variance in relation to intention to use a new model of digital entrepreneurship by small and medium-sized entrepreneurs. If entrepreneurs have mostly positive attitude toward the use of ICT for business, they will have a higher level of intention to use ICT in their business environment. These findings confirm the results of previous research (Ajzen, 1991). In addition, entrepreneurial attitude was strongly positive in relation to entrepreneurial knowledge and skills and entrepreneurial digital knowledge and skills. Results of research indicate that ICT knowledge and skills can explain 33% of the variance of attitude toward the use of ICT for business by small and medium-sized entrepreneurs.

The findings show that entrepreneurs who have a higher level of knowledge and skills will have higher levels of positive attitude toward the use of ICT for business. These findings confirm the results of previous research (Ajzen, 1991). Also, the results of this research show that SME entrepreneurs who have a higher level of entrepreneurial knowledge and skills and ICT knowledge and skills will have higher levels of entrepreneurial digital knowledge and skills. Those predictors can explain 82% of the variance of entrepreneurial digital knowledge and skills by SME entrepreneurs. The potential explanation for these results is that digital entrepreneurship in small and medium enterprises is a relatively new model in Croatian SMEs, thus entrepreneurs lack the knowledge and skills needed for the use of a higher level of digital business process in the global market. This research has several important theoretical and practical contributions. The findings of this research expand the knowledge on the acceptance and adoption of digital entrepreneurship by SMEs and support the results of earlier research. In addition, the results were confirmed by the entrepreneurial knowledge and skills, entrepreneurial digital knowledge and skills, and intention to use new model(s) of digital entrepreneurship and the correlation between entrepreneurial knowledge and skills and ICT knowledge and skills.

This research can help policy makers and educational leaders, as well as all those who want to increase the use of digital innovations by entrepreneurs of SMEs, especially in the Istria County and the Primorje-Gorski Kotar County. Since SMEs are of great value for economic growth, it is necessary to develop such policies and strategies to help entrepreneurs develop their own

competencies for introducing digital innovations in their business (e.g. workshops, seminars, etc.). Entrepreneurs of SMEs do not have the same opportunities for their development as large companies, therefore, SME entrepreneurs' adoption of new business models that include the use of ICT is very slow. Future research can involve a larger number of Croatian counties and may include a larger number of factors related to adoption of innovations.

5. Conclusion

Based on theoretical and empirical research and authors' practical experience, 3 following scales were developed in this research: entrepreneurial knowledge and skills, entrepreneurial digital knowledge and skills and ICT knowledge and skills. All of the scales in our questionnaire had a satisfactory internal consistency (above 0.90).

The results of the empirical research have indicated that ICT knowledge and skills is one of the main factors in influencing attitude(s) toward the use of ICT for business. Furthermore, attitude(s) toward the use of ICT for business can explain 68% of the variance of intention to use new models of digital entrepreneurship. Results have also shown that entrepreneurial knowledge and skills and ICT knowledge and skills can explain 82% of the variance of entrepreneurial digital knowledge and skills.

In this research, attitude(s) towards the use of ICT for business is the strongest factor regarding the intention of using and the actual use of digital innovations in entrepreneurship. However, if the entrepreneurs do not have sufficient entrepreneurial knowledge and ICT knowledge and skills, they will not be able to develop a positive attitude toward the development of digital entrepreneurship and will not use ICT in their business process. It will be useful to encourage entrepreneurs to be more interested in developing their ability to use ICT or digital skills in the entrepreneurial context, which then will likely encourage them to develop a positive perception of the value of digital entrepreneurship, which will consequently result in positive attitude(s) toward ICT use in their business activities.

Research findings have shown that most small and medium-sized entrepreneurs in the Istria County and the Primorje-Gorski Kotar County in only one year (52.4%) develop their competencies for business by attending workshops, courses, seminars etc. Also, only 24.6% of entrepreneurs were using digital and print resources to gain entrepreneurial knowledge, skills and abilities. These results indicate that most entrepreneurs of SMEs in the Istria County and the Primorje-Gorski Kotar County do not develop their entrepreneurial competencies.

Based on the above-mentioned, it can be concluded that education of entrepreneurs for digital entrepreneurship is an important strategic decision for every country, including Croatia. Finally, this research can contribute to a better understanding of attitudes of small and medium-sized entrepreneurs in the process of adoption and implementation of innovative digital entrepreneurship in the Istria and Primorje-Gorski Kotar counties.

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PART 4

DOCTORAL STUDENT WORKSHOP

CHAPTER 14

From analytic to predictive digital performance measurement - A new challenge for controlling

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ABSTRACT

Recently, digital technology enables companies to use a large amount of variety information with high velocity which could be used in decision – making. The focus is on «Big Data» which enables that vast amounts of transactions are quickly created from a wide variety of sources. Due to data and information explosion we need more than ever to develop analytical methods and models that will satisfy efficient business decision making. Controlling as one of the important functions in any company that provides analytical processing and creation of information for decision-making purposes is now deeply affected by the challenges of digital technologies. Analytic or retrospective view of performance measurement is changing to predictive or proactive. Big Data enables controller's to use more accurate data and develop forward-looking measures. The emphasis is on the prediction of future problems or identification of potential opportunities which will lead to the growth of added value. As a result, the role of controllers as a business partner needs to be further strengthened through its holistic analytical prospective thinking that will contribute to more efficient decision making.

The aim of this research is to present possibilities for controlling on regard of digitally oriented performance measurement and proactive role in decision making. The goal is to develop a conceptual model of "digital proactive/prospective controlling" useful for predictive analysis in any company using a range of "information literacy". The research is based on case study method followed by interviews with controllers and responsible management in key positions of selected companies.

Key words: digitization, performance measurement, controlling, prediction,

JEL classification: M41

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1. Introduction

Today in the global world the number of information is enormously increasing and therefore selection need to be made for decision making purposes. Decisions are made on the basis of analytically processed data and the decision-making itself is a process of making choices from a number of alternatives for the purpose of achieving desired results (Eisenfuhr, 2011). Respectively, it is 'the process of making choices by identifying a decision, gathering information, and assessing alternative resolutions' (Atstaja et al, 2017: 26). One of the most important steps, on which the final decision depends mostly, is the information gathering and analysis through adequate methods and models. In today's era of Big Data and more than ever digitalized technology companies are enabled to use a large amount of variety information with high velocity. Therefore, we need more than ever to develop analytical methods and models that will enable efficient business decision making suitable for todays and future fast-growing environment. Like in all other corporate functions (Vasarhelyi et al., 2015) the Big Data effect has also deeply affected controlling, as one of the most important functions for providing analytical processing and creation of information for decision-making in any company. Hence, the performance management shifts from reactive analytic to proactive and predictive analysis (Kieninger et al., 2016). Together with that the role of the controller as a register, navigator, innovator and business partner (Weber and Schäffer, 2014, Möller et al., 2017) needs to be further strengthened through its holistic analytical prospective thinking that will contribute to more efficient decision making. Only companies that will consistently adapt to further trends and be able to predict their outcomes will be capable of surviving and developing. Therefore, it is of great importance that controllers have the ability of developing forward-looking measures and make performance measurement adjustable to the digital area. Big Data is the concept that enables them to do that more precisely than ever before. Who is the person who will be in charge i.e. have the knowledge to collect the required data and information from an unstructured pile of data, is the question that arises due to the information role of controllers. Will that be the task of the controller or the data scientist i.e. will the controller be forced to become a data scientist to survive in an era of digital data and will the role of controller in general be changed? How will that impact the performance measurement system? All this questions arises from the growing need for prediction of future problems and identification of potential opportunities which lead to the growth of added value.

Therefore, the aim of this research is to present the possibilities for controlling on regard of digitally oriented performance measurement and his proactive role in decision making. More accurate, the goal was to develop a conceptual model of "digital proactive/prospective controlling" useful for predictive analysis in any company using a range of "information literacy". In order to develop the model a literature review of current Big Data impact on controlling was carried out, followed by interviews with controllers and responsible management in key

positions of selected Croatian companies. The primary findings are that the controllers role will be party change due to the new digital era through constant skills and knowledge improvements.

2. Digitalized controlling - a review of literature

During past few years the term 'Big Data' has been defined from many authors. Boyd and Crowford (2012 :663) define it as a cultural, technological, and scholarly phenomenon that rests on the interplay of technology, analysis and mythology. Moffitt and Vasarhelyi (2013: 2) called it - the "pervasive phenomenon of Big Data, while Gray and Alles (2015: 26) called it the "black data". According to Giri and Lone (2015) it is used as a term for a collection of data sets so large and complex that it becomes almost impossible to process them due to the multiplicity, heterogeneity and autonomy of the sources of information characterizes with complex and evolving relationships, with constantly growth. Zakir et al. (2015: 81) are defining it as 'an important concept, which is applied to data, which does not conform to the normal structure of the traditional database'. Even there are many other definitions no one of them is a universally accepted definition of Big Data. But according to most literature Big Data is usually described as datasets that contain volumes of differently structured, semi structured and unstructured data (Giri and Lone, 2015) mostly characterized using 4 or 5 Vs: large volume of data, high velocity- analysis of streaming data, high variety- analysis of different types of data structures, information assets that demand cost- effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation (Gartner, 2016), veracity- data from different sources, data accuracy and reliability, and value-examines the cost-benefit of collecting data (Zhang et al., 2015, Merrit-Holmes, 2016). Within these characteristics what is important for accountants, auditors and controllers are veracity and value, i.e. cost benefit of collecting data.

The goal of accounting has always been to provide information to decision makers (Capriotti, 2014), while the task of controlling was to use them i.e. analyze and present them to upper-level decision makers. Due to the new era of technology controllers, who strive to the strategic, more future-facing role, must go beyond traditional accounting data (Gray and Alles, 2015), or even beyond current early stage of modern controlling data use. The sources of today's data are numerous. Whether they are internal, like archives and data storage, external eg. public web, or both internal and external, like media, documents, business apps, social media, sensor or machine log data (Kapow Software, 2013), controllers must be capable to quickly identify which of them their company should collect, how to analyze them, and what action plan the analysis demands (Gray and Alles, 2015). Hence, the role of accounting as one of the internal data collectors will significantly decrease considering the total number of external data that controlling will use in purpose of their analysis i.e. predictions. Therefore, controlling will be forced to improve his skills and knowledge in order

to be able to help reach the efficiency and effectiveness of set goals. Although there is not much research regarding Big Data and controlling jet, the question on which most authors base their research is the future of controlling with regard to his survival and future tasks and corporate role.

Kieninger et al. (2016:2) point out that 'it is hardly surprising that the current wave of digitalization, and Big Data in particular, will have a considerable influence on controlling of the future'. They see the changes as a huge impact on methods, instruments, skills and organizations that will consequently redefine the entire world of controlling, and therefore suggest an overall concept for analyzing, forecasting and optimizing all business activities using Big Data. Weichel and Herrmann (2016) highlight that controllers can benefit of Big Data, especially the area of planning/forecasting, analysis, reporting and also the business partner role, through the construction of analytical models. Mehanna (2014) on the other hand highlights three main prerequisites that controllers need to fulfil beside technical requirements to successfully implement monitoring, prediction and prescriptive into their process: 1) strong governance through controlling, 2) quantified and dynamic entrepreneurial models and 3) personal development and change. Although so far controllers weren't taught modern data analysis technique, in order to fulfil their prediction role, authors referred to the essential role of various techniques, like 'Data Fracking Strategy', 'Data Mining' i.e. business intelligence (BI), data analytics, predictive analytics, and prescriptive analytics, as a condition for execution of the future role of controlling (Gentsch, 2003, Gray and Alles, 2015, Wang and Wang, 2015, Wang and Wang, 2016, Appelbaum et al., 2017). Additionally, in 2013 The Chartered Global Management Accountants (CGMA) has already reported that 51% of corporate leaders consider Big Data and data mining as one of the top ten corporate priorities fundamental for the data-driven era of business (CGMA, 2013). According to that they point out that controllers have four potential roles: Data scientist, Data manager, Data champion and Business partner (CGMA, 2014). There is no doubt that the mentioned techniques are already needed in all companies to make quick and accurate decisions. But the question that arises is if the use of them should be in the department of the controller or the data scientist, and will that mean that the data scientist as a more digitalized profession will reduce the controller's role in the future?

Al-Htaybat and von Alberti-Alhtaybat, (2017) through their interview based research, came to the conclusion that controllers continue to play an important role in their respective field by incorporating Big Data and its analytics. But what is more important, regarding the role, skills and influence of data scientists, is the conclusions that the years of training, acquired and tacit knowledge of an controller aren't replaceable, unless there is a data scientists with years of education and practice in controlling (Al-Htaybat and von Alberti-Alhtaybat, 2017). The best data scientist are comfortable speaking the business language, but people with all this skills are hardly to find, especially in a great demand that we are facing together with the future digitalization (McAfee and Brynjolfsson, 2012). Therefore, even though data scientists are seen as new breed of mana-

gerial decision supporters, controllers are expected to break with their traditions and collaborate with data scientists for mutual benefits (Osimitz Wieder et al., 2018). Of course, controllers will have to improve their skills according to the new techniques (Seufert and Treitz, 2017), but they will not have to become a programmer and statistician i.e. date scientist and vice versa. Therefore, the controlling that we knew and whose task was to support the decision making on base of already existing data, is rapidly changing and becoming more dependent to other corporate functions. Hence, todays controlling needs to start from the problems or appearance that need to be solved i.e. predicted, and accordingly to that find information that will give the answer for solving them and keeping under control. Here comes the role of the data scientist – mining and fracking of needed data, that controlling will finally transfer into information and knowledge for decision making.

3. Research

For the purposes of creating conceptual model we first conducted an exstensive desk research which involved the current situation relating to the knowledge of Big Data and its use in controlling. Following the secondary and initial data collection, structured interviews were then conducted with chairmen of controlling departments in 20 middle and large companies from different branches. We chose interview method because of more accurate and reliable received data. A self-administered questionnaire (17 questions in total) was used to analyze the controller's:

- knowledge of Big Data concept
- recent usage of operative system
- the future role of controller
- advantage and disadvantage of Big Data implementation

Most of the interviewed companies had little knowledge of the Big Data concept in generally. Only 25 per cent of the companies confirmed that they are fully acquainted with the term 'Big Data', and only 12 per cent had no contact with the therm. For example, some of the definitions they gave as their perception of Big Data are:

> *"Big Data is a technology that allows the collection and processing of large quantities of structured and unprocessed data in real time."*
>
> *"Processing large amounts of data."*
>
> *"The use of public networks and media data."*
>
> *"A large quantity of unrelated data that are raw material for the production of information."*
>
> *"Relational databases."*
>
> *"Data processing software."*

The first definition is from one of the companies that were fully acquainted with the term, while the other ones are from those who implied that they have little knowledge of it. That is especially evident from the last definition, which in no way corresponds to the definition Big Data. Hence, in generally they knew the meaning of the concept. The half of the companies use Big Data and they do it through web pages, internal archive, mobile sales application and other web sources.

Most of the companies (75%) make forecasting and projections. The forecasting is approximately on 3 years period and projection over 5 years with the use of experience methods in most cases. A few of them (38%) use additionally statistical methods, like regression and time-series, and just 25 per cent of them use more complex mathematical-statistical methods, like scenario methods and Delphi method. Used operative systems are different (SAP, ORACEL, BW, USALI,…) and partly satisfy their current needs in the controlling department.

According to the results, the controller's role is definitively changed and their knowledge should be more comprehensive including not only accounting and finance knowledge but also skills of business analyst, econometric knowledge as well as informatics. The professional profiles that will be required more than ever due to the on-going orientation to prediction are controllers, business analysts and data scientists. Accordingly, forecasting and projections will be the future orientation of controller's, but in the correspondence with the data scientists, what confirmed all respondents.

Controller's consider introducing Big Data into everyday's job as an advantage for their profession. Big Data will give them possibility to get new sources which enable them to get the overall picture of analysed phenomena. Considering possibility of volume, velocity and variety of data, interviewers expressed a kind of risks in recognizing the "right things"! There is a fear of being irrational in general because of rationality in detail. The comprehensive holistic approach required wider knowledge and skills which goes beyond what is known today.

4. Digital Prospective Controlling – DPC model

The main role of controlling is to convert data into useful business decision–making information. Thus the current wave of digitization, particularly Big Data will have important influence on controlling in the future. In the 4th industrial revolution, which characterized robotization and digitalization, information collected by Big Data sources will definitively have impacts on various aspects of controlling. Knowing relationship between manager and controller, which today is very often described as "business partners", leads to the first question: Whether the relations between manager and controller will change due to the digital environment? Probably requirements from the manger will be more oriented to the risk avoidance and its prediction.

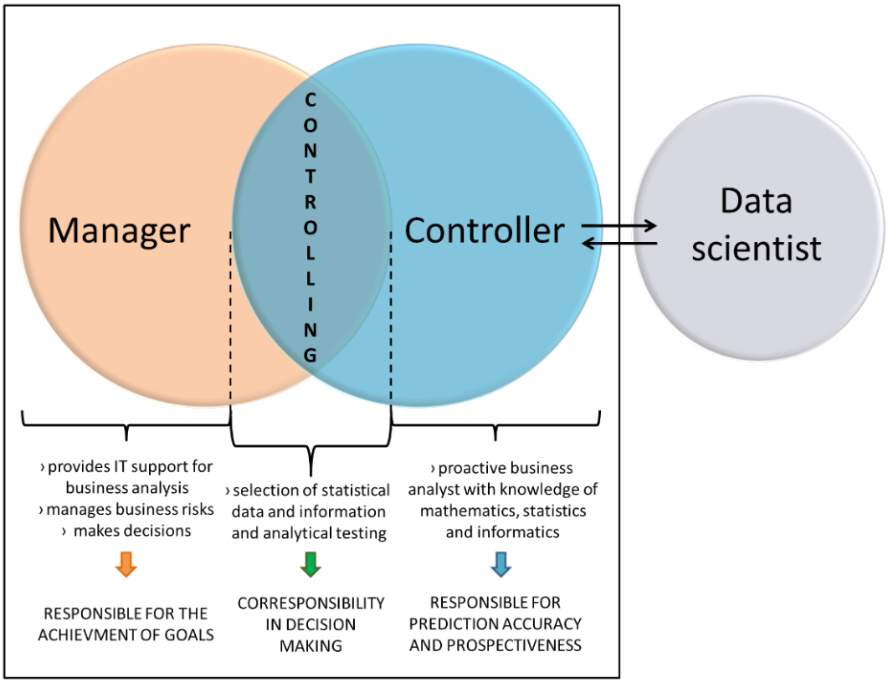

Figure 1. Future relationship between manager and controller

Source: Authors

For the purpose of achieving the stated objective controlling has always been a process that has emerged as a result of common efforts of management (individual or team) and controllers (Luković and Lebefromm, 2009). Therefore, in today's digital era i.e. the Era of Big Data, it is the manager's job to provide adequate digital support that will enable the largest use of Big Data sources for the achievement of set goals. The controller as the business partner on the other hand, needs to be capable to accurately predict and prospect future phenomena. Controlling as process and needs to clarify, asses, evaluate and make conclusions and suggestion due to selected statistical data and other information.

The second question which arises is whether the controller's orientation in investigation will be changed? The proactivity is already a characteristic of controller, but with Big Data and risky environment predictive and prospective view will be more pointed. Today's analytic assessment of current situation based on historical accounting data will be changed with predictive and prospective planning system. Therefore, business analytics will be the critical area of their professional work, which mean the use of big volume of data, selection of key one's, make proper interpretation and conclusions and give reasonable propositions.

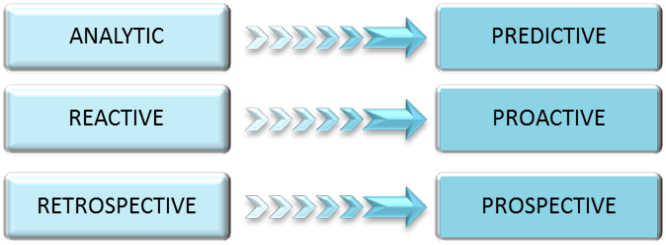

Figure 2. Shift in controllers' orientation
Source: Authors

The third question is put on controller's methods. Whether they should be more comprehensively oriented to statistics and mathematics? The interviews confirmed that the role of controller's will be more oriented to forecasting and projections. Precisely, the skill method is still the most used but with shift to simple statistical methods like regression, times-series and descriptive statistics.

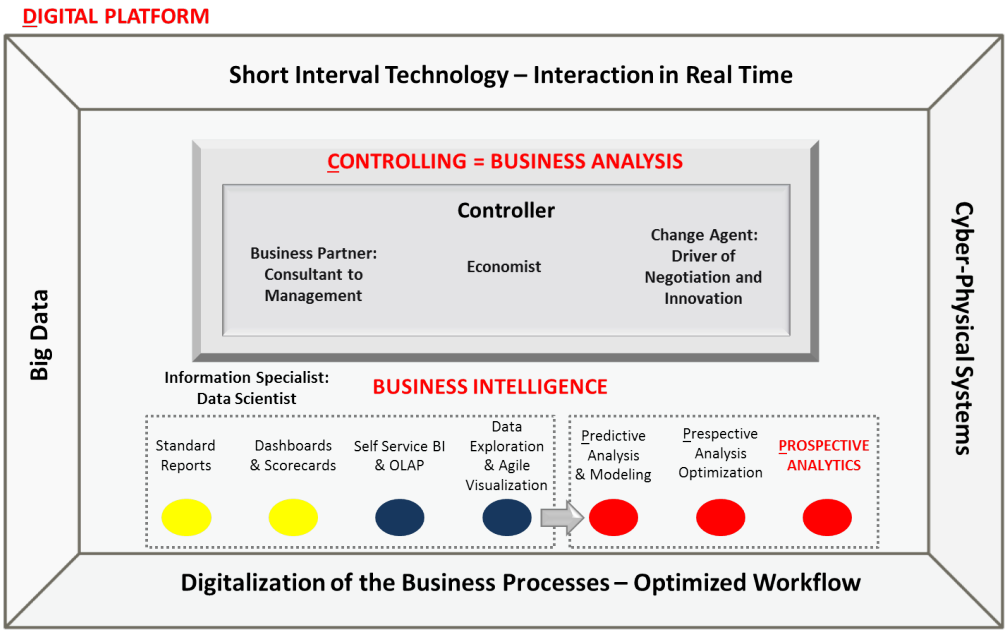

Figure 3. Digital prospective controlling – DPC conceptual model
Source: Authors

The Manufacturig Execution Systems (MES), which is used for Optimized Workflow in the production area, is not only the extended machine controller or the extension of an Enterprise Resource Planning (ERP) system. In recent years, the MES was widely seen as key figures generator for production. MES is an element of planning and quality assurance, with the short-term by optimizing production efficiency and control can be increased considerably. A modern production must be reactive in order to respond quickly to an ERP System. ERP

provides an integrated view of core business processes, often in real-time, using common databases maintained by a database management system. They also track business resources - cash, raw materials, production capacity - and the status of business commitments: orders, purchase orders and payroll. The applications that make up the system share data across various departments (manufacturing, purchasing, sales, accounting, etc.) that provide the data.

Further, Short Interval Technology (SIT) is the concept, to monitor the business processes in general and the production processes in detail, to be able for fast reaction. On the technical side, the Information Technology (IT) system enables for predictive maintenance. The system detects a technical problem in future which enables the production control to plan the process for Enterprise Asset Management. The technical components of SIT are sensors, actuators and communication technologies like Radio Frequency Identification (RFID).

Cyber-physical systems are distributed networked production units - intelligent objects that are linked in a web of data and services with each other and be controlled autonomously. This involves the virtual image of the real world of production and supplemented by information. This virtual image can be found in the application system of the IT, making visible all possibilities of the manufacturing participants – human being and machines.

The use of Big Data, which can be characterized through different feature descriptors, is associated with the role of Data Scientist. Big Data can lead to a management revolution, if it is possible to generate the economic benefits of Big Data. For this purpose, however further qualified personnel is necessary that is specialized in terms of methodology in the analysis of data (Horváth et al., 2015). A recent study by the Institute for Business Intelligence shows the fundamental importance of Data Scientists. The role of the Data Scientist is required for the conversion of data from Big Data in information. Only with the obtained information the benefits of Big Data can be obtained at all. Therefore, the development of appropriate skills and a sensible organizational integration of the role of the Data Scientist is the critical point for a value-added contribution of Big Data. The role profile is described in the paper by Horvath, which relies on the contribution of Davenport (Horváth et al., 2015).

Therefore, in the digital environment supported by innovative forms of information processing, and according to the strategic and operative level of controlling, the controllers role of selecting and processing data into key business decision-making information can be classified in following business analytic use:

- Descriptive analytics - What happened? i.e. PAST orientation
- (use of financial data and other quantitative data - Ratio analysis, Clustering, Process mining…)
- Predictive analytics - What could happen? i.e. FUTURE orientation
- (use of forecast, probability models, statistical analysis and scoring models)

- Prescriptive analytics - What should be done? i.e. FUTURE orientation
- (based on the descriptive and predictive analytics leads to optimization)

Hence, for the last two analytics the overall name that comes is prospective analytics. Obviously the controller profile goes to the direction of combination with data scientist although fundamentally remains business analyst. For sure the controller need to have knowledge of informatics beside wider knowledge of economy and econometrics, but because of mentioned characteristic and more holistic approach to the concept of controlling in the future, term controlling is not adequate- business analysis goes beyond controlling.

5. Conclusions

Controlling as one of the important functions in any company is now deeply affected by the challenges of digital technologies. Big Data certainly enables controller's to use more accurate data and develop forward-looking measures. Beside this advantage, there is also a need to define controller's extended knowledge of other interrelated disciplines- mathematics, econometrics and informatics. Due to his future role in the business and requested skill the opens the question of the controller/controlling terminology. Collaboration with data scientist depends of the knowledge of both sides but the level of each others knowledge is questionable. Hence, the good communication and future mutual benefits depend on that level. Interviews confirmed that Big Data will have a notably share in the future role of controlling i.e. for the projection and forecasting in one word- prospective analytics. Theoretical research and practical view of controlling gained by interviews enabled developing a new model named the "Digital prospective controlling – DPC" which will be useful for predictive analysis in any company using a range of "information literacy".

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CHAPTER 15

Digital Economy in Europe: Evaluation of Countries' Performances

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ABSTRACT

The accelerated expansion of the Internet as a communication tool, the mobile internet, and the social networks and commercial platforms, commonly observed as digitalisation, have greatly affected the functioning of the economy and with it also businesses, public institutions, and individuals. This paper investigates how the on-going digital transformation and Information and Communications Technologies (ICT) are manifesting in the economies across Europe. We have collected the publically available data on digital economy indicators in countries of European Union (EU) and used them to perform a multivariate statistical analysis on countries' performances. Using the Composite I-distance Indicator (CIDI) methodology, we have created a multivariate indicator that can serve as a measurement of digital economy performances. Digitalisation makes information and knowledge easy to store, access, and modify, which links all parts of social and economic life, but EU businesses are still not taking full advantage of these advanced technologies or the innovative business models offered by digitalisation. The state of the digitalisation of business and industry varies between EU countries and regions. Each economy struggles to keep up with digitalisation in order to keep their productivity and achievement on a high level. In this research, we used CIDI methodology to evaluate and rank 28 countries in European Union (EU-28), based on their digital performances. We made an in-depth comparative analysis of countries in Europe, providing each economy with information on where they currently stand in terms of digital economy and what steps they need to undertake to improve and boost up their position in an overall world of digitalisation.

Key words: Digital economy, Ranking, CIDI, Evaluation of Countries, EU Countries

JEL classification: C30, C49, O52, P51

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1. Introduction

Economies across the world are greatly affected by the expansion of the World Wide Web, the mobile internet, and the social networks and commercial platforms. These are the common elements of the global term of digitalisation, which nowadays makes an increasingly significant contribution to economic growth. Digital technologies create an instrument that increasingly links all parts of social and economic life, because digitalisation makes knowledge and information easy to store, access, and modify (European Commission, 2018a). The influence of digitalisation is spread out over businesses, public institutions, and individuals, and, while it has brought many benefits, it has also generated new problems and policy issues and challenges that policymakers are struggling to resolve.

Digitalization in Europe has been considered as a significant driver of innovation and economic growth, giving rise to new methods and techniques that raise efficiency and productivity and create new products and services (European Economic and Social Committee, 2017).

The European Economic and Social Committee have conducted study during 2016. and 2017. in order to realize benefits and possible issues of the process of digitalization in European Union. This study focuses on the effects of digitalisation in the EU on traditional businesses and industries and the on-demand economy. It highlights the prospects and the obstacles that digitalisation creates, and underline the challenges for overcoming these obstacles (European Economic and Social Committee, 2017). What could be concluded from the study is that the process of digitalisation will both create new and destroy old jobs. Companies will create new methods and techniques that will lead to new jobs, but consequently it will also replace old activities and enhance worker's productivity that will affect olds jobs (European Economic and Social Committee, 2017).

The digital transformation offers a broad set of opportunities for Europe, presenting the enormous growth potential for business and society (Kamalipour and Friedrichsen, 2017). It is identified by a synthesis of advanced technologies and the integration of digital systems and innovative business models, and the creation of smart products and services (Matt, Hess and Benlian, 2015). It enables a business to build on its strengths in advanced digital technologies environment such as the big data, robotics, Internet of Things, 3D printing, and artificial intelligence (European Commission, 2018a). EU businesses are taking advantage of these advanced technologies to some extent, but the digitisation of industry diverge across areas, and between EU countries and regions. There are disparities between companies of different sizes (Chen, Jaw and Wu, 2016). Thus, there is always room for improvement. The smart use of ICT by enterprises and corporations in manufacturing and services is a crucial factor for success in competitiveness, innovation, and economic growth (Nadeem et al., 2018). Large companies are undoubtedly moving upwards to exploit the advantages offered by digitalisation. Smaller companies are striving to follow

behind, but they still are at risk of being left out of digital supply chains (European Commission, 2018a). World institutions are continually creating reports on how to stimulate the digital transformation of European economies and enterprises, and proposing short and long-term strategy on digital entrepreneurship to maximise its impact (Ardolino et al., 2017).

The importance of ICT has been recognized also by the World Economic Forum and it is included in its Global Competitiveness Index (GCI) that gas been issued every year (World Economic Forum, 2018). This Index asses 137 countries and presents insight into drivers of their prosperity and growth, giving economy scorecard of those countries. GCI consists of 12 pillars, one of witch, pillar 9th refers to technology used and part of this pillar is assessment of ICT use in every country. This driver – ICT use, measures Internet users, fixed-broadband Internet subscriptions, Internet bandwith and mobile-broadband subscriptions.

This paper investigates how the on-going digital transformation and Information and Communications Technologies (ICT) are manifesting in the economies across Europe. We have collected the publically available data on digital economy indicators in countries of European Union (EU) and used them to perform a multivariate statistical analysis on countries' performances. The data include an extensive evaluation of online platforms, EU data ownership, and digital media content. The large volumes of data are nowadays generated, which provide significant opportunities for innovation, new business models, and smart products and services (Wamba et al., 2017), and this is why it is crucial to include big data in the analysis (Huda et al., 2018). We also investigated digital skills of the public. One must bear in mind that digital skills are also a significant resource that influences the ability of EU businesses and economies to benefit from the opportunities of digitalisation (O'Donnell, 2016).

Based on the collected data, and using the Composite I-distance Indicator (CIDI) methodology (see Section 3), we have created a multivariate indicator that can serve as a measurement of digital economy performances. We used CIDI to evaluate and rank 28 countries in European Union (EU-28), based on their digital performances. We made an in-depth comparative analysis of countries in Europe, providing each economy with information on where they currently stand in terms of digital economy and what steps they need to undertake to improve and boost up their position in an overall world of digitalisation. We also strived to propose country-specific policy recommendations based on our findings.

This paper is organised as follows. The next section gives a comprehensive literature review. Section 3 describes the methodology used in the research and Section 4 illustrates the empirical data used in the research. Section 5 represents the results of the survey, while Section 6 gives some concluding remarks.

2. Literature review

In recent years, companies have conducted a number of initiatives to analyse new digital technologies in order to focus on their benefits. Digital transformation involves changes of key business operations, products, and processes. It goes even further requiring new management concepts (Matt et al. 2015). We argue that success of digital transformation depends on the development and innovativeness of different economies across Europe.

Before the analysis of the differences between countries in terms of digitalisation, it is important to understand the term "digital". McKinsey explains "digital" throughout three key points. Digitalisation is about creating value; it relies on process optimisation; and focuses on capabilities which support the whole business idea (Schallmo and Williams, 2018b). With the fast development in the field of ICT, countries, industries, and companies compete and create value in completely new ways (Hyvönen, 2018). Development of digital capabilities and resources is a consequence which is usually defined as digital transformation. Selected definitions of the term "digital transformation" could be found in Schallmo and Williams (2018a).

The term New or Digital Economy is tightly linked to digital transformation. Following the work of Johansson et al. (2006), we use the phrase digital economy in terms of "recent and still largely unrealised transformation of all sectors of the economy by the general spread of ICT". Moreover, digital economy is driven by development and active usage of modern ICTs. Carlsson (2004) defines the New or Digital Economy, pointing out that it is about dynamic efficiency. Moreover, the author emphasises results in new activities and products rather than higher productivity. Within the New or Digital Economy people face a new level and form of connections among all market players; ideas are widespread, and there is a high potential for creating heterogeneous and successful teams. Company's efficiency results in the long-term competitive position in the market. A new challenge is how to measure the impact of ICT in both emerging and well-developed countries. This paper is an attempt to define some of the digital economy performances.

Some EU countries are more focused on innovations and digital business environments which means that those countries actively use all benefits of digitalisation. In the last three decades, research moves from innovation systems to technological innovation system (Carlsson and Stankiewicz, 1991). Carlsson and Stankiewicz (1991) point out the importance of a particular technology or set of technologies, the networks through which people interact, and the institutional infrastructure. The purpose of technological innovation system is to provide connections among various parts of the system (Carlsson and Stankiewicz, 1991). Nowadays, the key idea is to use all ICT advantages for creating synergies, on the national, but also international level.

Not only that companies are aware of the pressure to innovate, but they spot all opportunities to connect across the world with other companies in order to

improve their products and services, as well as to distinguish their strategies from the key competitors. Till now, research has been limited in discovering and measuring the results of all these innovations and ICT developments. On the country level, researchers still measure national output in terms of GDP which leaves us without a clear picture of the true effects of the technology (Degryse, 2016). Billon et al. (2009) analysed countries' differences in terms of ICT development and found out that in well-developed countries digitalisation is explained by GDP, service sector, education, and governmental effectiveness. Moreover, authors pointed out that in developing countries population age and urban population are positively associated with the ICT adoption. Additionally, the results showed that in developing countries Internet costs are negatively associated with ICT adoption. This might be a valuable finding which should give the direction for the future activities in terms of ICT implementation in developing countries.

Moreover, Billon et al. (2010) found factors which explain the determinants of ICT adoption in different groups of countries. A significant impact on digital development for all country groups has only GDP. ICT and the Internet decrease production costs, enhance the creation and spread of new ideas, support knowledge, sharing, and improve R&D processes (Lucas, 1988; Romer, 1990; Aghion and Howitt, 1992; Meijers, 2014). The main conclusion is that ICT is tightly linked to higher economic growth. Therefore, we argue that countries should create strategies in order to use the potential that the digitalisation has.

Nadim et al. (2016) suggest that digitalisation includes new platforms that facilitate direct transactions, such as Airbnb and Uber, new activities such as crowdsourcing, a growing category of the freelancers and 'free' media services, supported by 'Big data'. Without ICT networking, learning, and innovation processes, the development on a country level would not be possible. Having the previous fact in mind, it is not strange that many researchers point out the importance of ICT, using it as a key factor for growth (Yousefi, 2011; Meijers, 2014). The usage of new communication technologies like the Internet, social networks, and commercial platforms improves knowledge and skills (Roller and Waverman, 2001; Czernich et al., 2011) which lead to higher satisfaction and better productivity.

The aim of Hanafizadeh et al. (2009) paper is to present a multi-stage methodology for constructing a composite index for measuring ICT infrastructure and access. Without an attempt to analyse the digital divide between countries, Hanafizadeh et al. (2009) emphasise that the most important factors in digital transformation are ICT infrastructure and access. Some studies focus on measuring and quantifying the digital divide (Corrocher and Ordanini, 2002; Bagchi, 2005; Vicente and Lopez, 2006). The multi-dimensional character of the digital divide has led to the creation and analysis of different ICT indexes. Therefore, we argue that there is a need for comprehensive research on indicators which will create an index, good enough to show the current situation and explain the ability of EU businesses and economies to benefit from all opportunities of digitalisation.

The contribution of ICT investments in terms of technological infrastructure, diffusion, and even usage has been in the focal point for many researchers and practitioners. The importance of ICT is out of the question, but still, there is a gap regarding measuring ICT development across countries. There are enormous imbalances in terms of access inequalities of location, age, gender, education, and income (Heeks, 2010). Using the Composite I-distance Indicator (CIDI) methodology, we have created a multivariate indicator that can serve as a measurement of digital economy development. Moreover, the opportunity for comparison between countries leads to better understanding of characteristics of economies which benefit the most from the usage of ICT.

Regarding the literature on the digitalisation, there are two main streams of research. The first is focused on the usage of digital technologies in both, macro and micro levels. The second stream deals with the digital gap - the differences in the development of digital technologies. Our analysis contributes to the second stream of the research aiming to find the unique set of criteria for comparing EU countries in terms of digitalisation level.

The Organization for Economic Cooperation and Development (OECD) has developed several studies, whereby different countries are compared in terms of access to ICTs and the Internet (OECD, 2000, 2001). The World Bank has also issued research on the measurement of the digital division (a section of the 'World Development Indicators') that analyses different factors of digitalisation. Usually, work on this topic is more informative rather than methodological (Corrocher and Ordanini, 2002). Therefore, we firmly believe that CIDI methodology has a potential to create an added value to the measurement of the digitalisation in EU countries.

3. Methodology

Composite I-distance Indicator (CIDI) is the methodology for calculating a multidimensional composite indicator. The general concept of CIDI is to calculate the weights for a set of indicators that create a composite indicator; in this case, it is a set of indicators that measure digitalisation of economies (see Section 4). The calculation of weights is based on the Pearson correlations between the values of the I-distance (see section 3.1) and a set of input indicators. Correlations are therefore altered appropriately to depict the importance of input variables.

3.1. I-distance

The I-distance method is a metric distance in an n-dimensional space (Jeremic et al., 2011, 2012; Dobrota, Jeremic and Markovic, 2012; Dobrota, Jeremić, et al., 2015), initially defined by Ivanovic (Ivanovic, 1973; Ivanovic and Fanchette, 1973). The methodology was developed to rank entities according to specific indicators of interest. The main issue was how to use all of the indicators to calculate a single indicator, which could be transformed into a rank, but to

overcome the common problem that a lot of different ranking methods possess, and that can affect the measurements and evaluation: possible biases and subjectivity. The procedure is the following (Jeremić et al., 2013; Seke et al., 2013; Dobrota, Jeremić, et al., 2015; Išljamović et al., 2015):

Let $X^T = (X_1, X_2, ...X_k)$ be a set of variables chosen to describe the particular set of entities. The I-distance between two entities $e_r = (x_{1r}, x_{2r}, ...x_{kr})$ and $e_s = (x_{1s}, x_{2s}, ...x_{ks})$ is defined as

$$D(r,s) = \sum_{i=1}^{k} \frac{|d_i(r,s)|}{\sigma_i} \prod_{j=1}^{i-1} (1 - r_{ji.12...j-1}) \quad (1)$$

where $d_i(r,s) = x_{ir} - x_{is},\ i \in \{1,...k\}$ is the distance between the values of the variable X_i for e_r and e_s, e.g. the discriminate effect, σ_i the standard deviation of X_i, and $r_{ji.12...j-1}$, is a partial coefficient of the correlation between X_i and X_j, ($j<i$) (Ivanovic, 1973; Ivanović, 1977).

Sometimes negative coefficient of partial correlation can occur when it is not possible to achieve the same direction of movement for all variables in all sets (Dobrota, Jeremić, et al., 2015). To conquer this problem, it is suitable to use the square I-distance, given as:

$$D^2(r,s) = \sum_{i=1}^{k} \frac{d_i^2(r,s)}{\sigma_i^2} \prod_{j=1}^{i-1} (1 - r_{ji.12...j-1}^2) \quad (2)$$

The I-distance is based on calculating the distances between the entities. It is important to fix one entity up as the reference entity (Dobrota, Savic and Bulajic, 2015). The ranking of entities in the whole set is based on the calculated distance from the reference entity (Ivanovic, 1973; Ivanovic and Fanchette, 1973).

3.2.Composite I-distance Indicator

The purpose of the *Composite I-distance Indicator (CIDI)* is to create such a ranking methodology which would be comparable and transparent as the broad set of biased ranking methodologies defined by experts, but which would overcome the problem of biases. The key to do so is to base a ranking methodology on an I-distance measure. Thus we could create the methodology which was unbiased as I-distance, but significantly more transparent and robust.

To create a CIDI, it is necessary to calculate the I-distance values based on a set of input indicators. After that, the Pearson correlations between the I-distance values and input indicators are calculated. Correlations are used because of the particular characteristic of the I-distance method: it can present the relevance of input indicators. The next step is to calculate the new weights for each of the compounding indicators, which are based on the appropriate correlations. Weights are formed by weighting the empirical correlations: values of correlations are divided by the sum of correlations (Dobrota, Martic, et al.,

2015; Dobrota and Jeremic, 2016; Dobrota et al., 2016). The final sum equals 1, thus forming a novel appropriate weighting system:

$$w_i = \frac{r_i}{\sum_{j=1}^{k} r_j} \tag{3}$$

where r_i ($i=1,\ldots k$) is a Pearson correlation between the i-th input variable and I-distance value.

3.3. Uncertainty and sensitivity analysis

To measure the stability of the given ranking system, we have performed the uncertainty and sensitivity analysis that is based on the relative contribution of the indicators. The relative contribution of the indicators to each entity score can provide useful information as to whether some indicators dominate the overall scores (Saisana and D'Hombres, 2008; Dobrota et al., 2016). It is estimated as a proportion of an indicator score multiplied by the appropriate weight with regard to the overall entity score. Using the Monte Carlo simulation method, the score results can be simulated a sufficient number of times, each time recording the results. After that it is possible to count the ranks for all the entities, thus measuring the amount of uncertainty of the ranking results.

4. Empirical research data

The data required to perform the study of how the digitalisation and digital transformations are affecting the economies in Europe are collected from Eurostat (ec.europa.eu/eurostat). All the data are public and available on a Eurostat website. We extracted a set of 13 variables that measure the influence that digitalisation has on the economies. Among them, eight variables are related to the enterprises (which could be defined as "E - economic") and five variables that are essentially related to households or individuals (which could be labelled as "P - private").

Eight indicators that are related to the enterprises (E1 to E8) are the following:

- *E1 E-commerce Purchases of Enterprises* – This indicator represents enterprises that have ever made any purchase through computer-mediated networks. It is measured in a percentage of all the enterprises, without financial sector (ten persons employed or more).
- *E2 E-commerce Sales of Enterprises* – The indicator represents the percentage of enterprises that are selling their products online (which covers at least 1% of their turnover). It includes all the enterprises, without financial sector (ten persons employed or more).

- *E3 Internet Advertising of Enterprises* – The percentage of enterprises that use any social media for advertising over the internet. It covers all enterprises, without financial sector (ten persons employed or more).
- *E4 Value of E-Commerce Sales of Enterprises* – The indicator that measures enterprises' total turnover from e-commerce. It is given as a percentage of total turnover and includes all the enterprises, without financial sector (ten persons employed or more).
- *E5 Computer Internet Connections used by the Employees in Enterprises* – Indicator represents the persons employed using computers with access to World Wide Web. It is measured as a percentage of total employment and covers all the enterprises, without financial sector (ten persons employed or more).
- *E6 Mobile Internet Connections used by the Employees in Enterprises* – This indicator counts persons employed in a company, which were provided with a portable device that allows a mobile connection to the internet for business use. It is measured as a percentage of total employment and covers all the enterprises, without financial sector (ten persons employed or more).
- *E7 Enterprises that have a Website* – Percentage of enterprises that own a website, enterprises without financial sector (ten persons employed or more).
- *E8 Enterprises that Employ ICT Specialists* – Indicator is given as a percentage of enterprises, without financial sector (ten persons employed or more).

Five indicators that are related to the households or individuals (P1 to P5) are the following:

- *P1 Level of Internet Access in Households* - Indicator is given as a percentage of households with internet access.
- *P2 Internet Use by Individuals* – Percentage of all the individuals that have accessed the internet in last three months.
- *P3 Mobile Internet Access by Individuals* – The percentage of individuals that have used a mobile phone (or smartphone) to access the internet.
- *P4 Use of Cloud Services by Individuals* – The percentage of individuals that have used internet storage space to save documents, pictures, music, video or other files.
- *P5 Internet Purchases by Individuals* – Percentage of all the individuals that have made an online purchase in the last three months.

All the indicators are normalised as they represent the percentage of all the observed entities (enterprises, households, or individuals). The variables as described above represent the input data for the CIDI indicator.

5. Results and discussion

The results of the CIDI analysis are given in Tables 1 and 2. Table 1 lists the set of 13 indicators described in Section 4 and the set of their weights calculated through the CIDI analysis.

IndID	Indicator	CIDI weight
E5	Computer Internet Connections used by the Employees in Enterprises	9.32%
P4	Use of Cloud Services by Individuals	8.84%
E6	Mobile Internet Connections used by the Employees in Enterprises	8.64%
P1	Level of Internet Access in Households	8.43%
P3	Mobile Internet Access by Individuals	8.16%
P2	Internet Use by Individuals	8.08%
P5	Internet Purchases by Individuals	8.06%
E1	E-commerce Purchases of Enterprises	7.82%
E7	Enterprises that have a Website	7.79%
E3	Internet Advertising of Enterprises	7.38%
E2	E-commerce Sales of Enterprises	6.98%
E8	Enterprises that Employ ICT Specialists	5.50%
E4	Value of E-Commerce Sales of Enterprises	4.99%

Table 1. Indicators that measure digitalisation in economies and their CIDI weights

The indicators in Table 1 are given in descending order according to weights obtained by the CIDI methodology. Weights given in Table 1 reveal some interesting findings. The most critical indicator in ranking countries according to their digital performances is *E5 Computer Internet Connections used by the Employees in Enterprises* with the largest weight of 9.32%. It is followed by *P4 Use of Cloud Services by Individuals* and *E6 Mobile Internet Connections used by the Employees in Enterprises*. First interesting and perhaps a bit unexpected finding is that the indicators are later followed by four "private" indicators by importance, and only at the end are remaining six "economic" indicators.

Second interesting and unexpected finding is regarding the importance of "financial" and "non-financial" indicators. Indicators *P5 Internet Purchases by Individuals*, *E1 E-commerce Purchases of Enterprises*, *E2 E-commerce Sales of Enterprises*, and *E4 Value of E-Commerce Sales of Enterprises* could somewhat be defined as "financial" indicators. While *P5 Internet Purchases by Individuals* and *E1 E-commerce Purchases of Enterprises* are relatively highly rated among indicators (with their respective weights 8.06% and 7.82%), other two are graded quite low. Indicator *E4 Value of E-Commerce Sales of Enterprises* has even obtained the lowest weight according to CIDI, only 5%. This signals that when it comes to the positioning of the economies based on their digital performances, the indicators that measure the internet use and the digitalisation access are more important than the amount of digital financial flow.

Table 2 presents the results of evaluation and ranking for 28 countries in European Union (EU-28), based on their digital performances.

Country	CIDI score	CIDI rank
Denmark	66.62	1
Sweden	64.63	2
Netherlands	61.68	3
Finland	59.98	4
United Kingdom	58.48	5
Ireland	56.27	6
Luxembourg	54.13	7
Germany	53.71	8
Belgium	53.43	9
Austria	53.30	10
Spain	49.00	11
Malta	48.66	12
France	48.49	13
Czech Republic	47.26	14
Estonia	45.86	15
Slovenia	45.28	16
Cyprus	44.86	17
Slovakia	43.74	18
Lithuania	42.46	19
Hungary	42.08	20
Portugal	40.03	21
Latvia	39.50	22
Croatia	39.41	23
Italy	39.07	24
Poland	37.67	25
Greece	35.86	26
Romania	31.40	27
Bulgaria	30.21	28

Table 2. CIDI scores and CIDI ranks for EU-28

The results of CIDI methodology place Denmark on the top of the digital performance ranking list. Denmark has accomplished the highest score of 66.62. Denmark is a country that stands out also when it comes to the publically available ICT Development Index (IDI), published by International Telecommunication Union (www.itu.int), the index that measures information and communication development of countries. With IDI, Denmark takes the fourth position out of the 176 analysed countries (ITU, 2017), and the first position if we extract EU-28. Top five countries according to CIDI scores are Denmark, Sweden, Netherlands, Finland, and United Kingdom. These countries also top IDI ranking list, in a slightly revised order, except for Finland whose position is notably lower with IDI. It is interesting to note that top five countries are not standing out

when it comes to some economic indicators, for example, trade surplus/deficit or unemployment (Djogo and Stanisic, 2016).

Another index created by European Commission is the Digital Economy and Society Index (DESI), a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU member states in digital competitiveness (European Commission, 2018b). The results of DESI index are similar as to CIDI index. UK is rated slightly higher by CIDI (5th place) than by DESI (7th place). CIDI index created in this survey differs from DESI index because it is more thorough and profound. It holds the values of digitalisation indexes that we defined as "economic" (see Section 4).

Lowest five rated countries in EU-28 are Italy, Poland, Greece, Romania, and Bulgaria, which have the lowest digital performances. A similar result is shown in IDI ranking (ITU, 2017) and DESI ranking (European Commission, 2018b). These countries have also shown the considerable economic disparities (Simionescu, 2016) or a more substantial risk of poverty (Iwacewicz-Orłowska, 2016) compared to other EU-28 countries. Poland, for example, is better rated by DESI (23rd place) than by CIDI (25th place).

Croatia is ranked 23rd by CIDI methodology according to countries digital performances. It is ranked 24th by DESI methodology, and it has made progress in IDI positions over the years. To understand the position of Croatia, we can extract the values of individual indicators that create CIDI. For example, *E5 Computer Internet Connections used by the Employees in Enterprises* is the most significant indicator when it comes to forming a CIDI. In Croatia, 44% of total employees are using computers with access to World Wide Web, while in Denmark this percentage is 73%, and in Sweden 75%, which is largest in the region. The second indicator is *P4 Use of Cloud Services by Individuals*. In Croatia, only 16% of individuals have used internet storage space to save documents, pictures, music, video, or other files. In Denmark, we have 69% of individuals, while the largest percentage is in the UK, 78%. Croatia stands out with the indicator *E6 Mobile Internet Connections used by the Employees in Enterprises* because there are 28% of employees, which were provided with a portable device that allows a mobile connection to the internet for business use. It is not a high percentage, but Croatia is ranked 6th by this single indicator among EU-28. Nevertheless, Croatia is struggling to keep up. For example, a company Hrvatski Telekom plans to invest more than 28 million euros in the digital transformation strategies in the next three years (www.t.ht.hr). In the business report for 2017, the company also stated that, in the mobile segment, the capacities of the 4G network were increased by 34%, and mobile internet speed was increased by 38%, reaching 350 Mbit/s (www.t.ht.hr). The objective of digital transformation is positioning of Hrvatski Telekom as the frontrunner in terms of user experience.

We also tested the stability of the CIDI indicator regarding the digital performances of countries for EU-28 in 10 000 Monte Carlo simulations. The results of the uncertainty and sensitivity analysis, as explained in Section 3.3., are given in Table 3 and Figure 1.

Country	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Denmark	10000																											
Sweden		10000																										
Netherlands			10000																									
Finland				9959	41																							
UK				41	9959																							
Luxembourg						9966	31	3																				
Germany						27	9558	342	72	1																		
Austria						4	143	8858	981	14																		
Ireland						3	268	795	7962	972																		
Belgium								2	985	9013																		
Spain											5633	4289	78															
Malta											3942	4659	1388	11														
France											425	1052	8337	185	1													
Estonia													184	7826	1900	90												
Czech Rep.													12	1936	6831	879	340	2										
Slovenia															703	5873	3424											
Cyprus													1	42	565	3156	5959	277										
Slovakia																2	277	9721										
Lithuania																			9249	751								
Hungary																			751	9249								
Latvia																					7493	2328	166	13				
Portugal																					2298	6910	791	1				
Italy																					207	723	5436	3548	86			
Croatia																					2	39	3579	6005	375			
Poland																							28	433	9534	5		
Greece																									5	9995		
Romania																											10000	
Bulgaria																												10000

Table 3. Uncertainty and sensitivity analysis of CIDI ranks

From Table 3, we can see that Denmark, Sweden, and the Netherlands are in all 10 000 simulations precisely on their acquired positions, not making any variations. Finland and UK have some slight deviations from their positions but only in 0.41% of cases (41 out of 10 000). Variations in ranks are increasing as we move down the ranking list. The largest variations could be found Ireland, France, Chech Republic, Cyprus, Latvia, and Croatia. For example, even though Cyprus takes 17th position, its rank varies from 13 to 18. Initially 23rd, Croatia varies from positions 21 to 25. Greece, Romania, and Bulgaria at the end, again have stabile ranks. Graphical representation of uncertainty and sensitivity analysis of CIDI ranks is given in Figure 1.

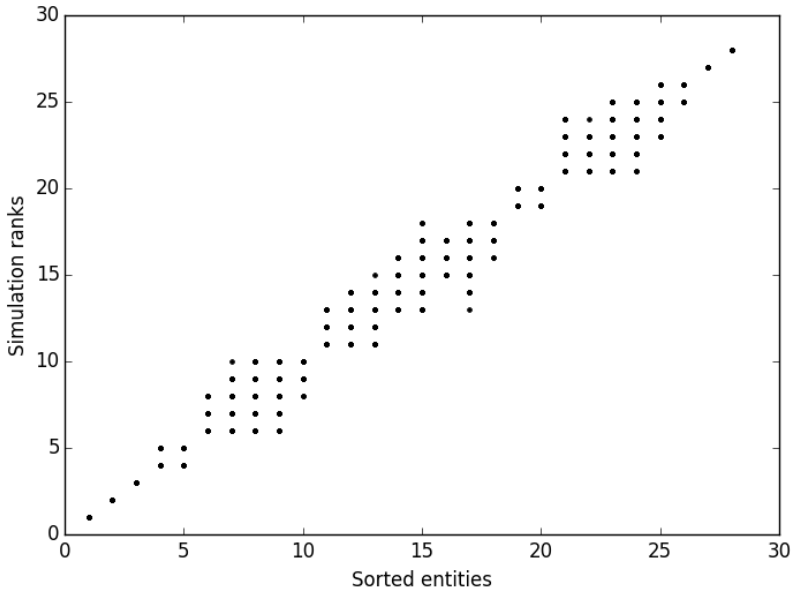

Figure 1. Graphical representation of uncertainty and sensitivity analysis of CIDI ranks

6. Conclusions

The main focus of his paper was to investigate how the digital transformation affects the economies across Europe. We performed a statistical CIDI analysis that allowed us to create a multivariate indicator that can serve as a measurement of digital economy performances. We have collected the publically available data on digital economy indicators in countries and created a CIDI to evaluate and rank 28 countries in EU.

According to the results, we can see that Denmark tops the ranking list, followed by Sweden and Netherlands. These countries stand out by their digital performances from other EU countries. Lowest ranked countries are Romania and Bulgaria. Croatia is struggling to find its place among other EU countries but still has a long way to go, since it is in the lower half of a ranking list (23rd position).

Croatian enterprises are at the cutting edge of digital openness, surpassing their regional counterparts, and they readily endorse digital technologies, especially in the area of e-commerce and cloud computing services. In spite of this, the pace of their digital transformation is being slowed down by the low-performance Internet infrastructure in the EU and the poor digital skills of human capital.

The most critical indicators in ranking countries according to their digital performances are *E5 Computer Internet Connections used by the Employees in Enterprises*, *P4 Use of Cloud Services by Individuals,* and *E6 Mobile Internet Connections used by the Employees in Enterprises*. We also found that "private" indicators tend to stand out by importance in comparison to the "economic" indicators. The "non-financial" indicators, ones that measure the internet use and the digitalisation access are more prominent than the "financial" indicators that measure the financial flow of digitalisation.

Limitations of this study encompass the fact that we have used secondary data that were publically available, while yet maybe some other significant indicators could more soundly contribute to the ranking of countries based on their digital performances. The study could be expanded to more countries other than EU in the future.

This survey would particularly be interesting to those countries that strive to join EU in the future. Researchers could use data from the survey to compare results from other countries to those of EU, and to propose recommendations and expose digital opportunities, both for businesses and people. In due course, this could lead those countries to get closer to prominent representatives of EU countries in this field.

This survey may serve as a guide for future policy developments in the digital domain. For future research, it would be profoundly interesting to exclude "private" indicators and to create CIDI only based on "economic" indicators. It would be interesting to see what kind of changes in scores and ranks would this variation cause. Another direction of future research can include the comparison of CIDI, IDI, and DESI index and to determine the difference in these indexes results, weights, and above all the stability, which could provide a detailed report of the state of digitalisation in Europe.

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CHAPTER 16

Applying system dynamics to model the world of cryptocurrency

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ABSTRACT

The world of cryptocurrency has been seriously criticized, encouraged, and disallowed. Regardless, its value and popularity has lately grown at the high rate. Among reasons for this are buzz and hype created by the mass media; easy access to cryptocurrency mining and exchange; and visible participation of retail and institutional investors. A lot of tech-enabled individuals grabbed the opportunity to access this rising market and gain some extra profit at low risk by cryptocurrency mining. Namely, cryptocurrency mining implies adding transaction records to cryptocurrency's public ledger of past transactions. This paper presents a model of cryptocurrency space and factors influencing its popularity and value. The model includes a wide range of variables and connections among them. Based on that, the system dynamics approach is identified as most appropriate for better understanding the phenomenon.

Key words: cryptocurrency, system dynamics, model, factors

JEL classification: E42, E50, N10, O42, C61

1. Introduction

Cryptocurrencies can be defined as digital, computer currencies whose implementation stands on the principles of cryptography, both to validate the realized transactions and to enlarge the currency in circulation (Cocco, Concas and Marchesi, 2017). Cryptocurrencies use only cryptography to control transactions, manage supply, and to prevent fraud. Each and every transaction has to be confirmed, stored digitally and recorded in a block chain. Block chain can be described as an accounting system. Nevertheless, it should be stated that all cryptocurrencies differ in terms of software design, ownership structure, decision rights, and degree of decentralization (Hsieh, Vergne and Wang, 2017).

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Mining is a necessary component of a cryptocurrency network which is carried out by specialized hardware with a certain amount of computational power, measured in hashes per second (Hayes, 2017). Mining activity is highly competitive. Namely, the more mining power (resources) a miner applies, the more chance he has to find new cryptocurrencies (Eyal and Sirer, 2014). Therefore, the amount of mining increases the number of currencies in circulation.

It is presumed that the miners would act honestly and equally share the reward for mining a certain cryptocurrency. Nevertheless, as mining carries monetary value, it is a valuable target of attacks. Dishonest behaviour in mining is defined as mining attack and implies various types of attacks to gain an unfair share of the mining reward (Nayak *et al.*, 2016). Well known mining attacks are selfish-mining (Eyal and Sirer, 2014) and eclipse attacks (Heilman *et al.*, 2015).

To better understand the cryptocurrencies and the cryptocurrency market, the evolution of digital currency from corporate-owned to truly decentralized platform is shortly described in the following paragraphs. The concept of digital currency started in the early stages of Internet. E-gold is believed to be the first one. It was created in 1996 and by 2009 it grew to five million users. The problems started when it became favourite in criminal circles and common hackers' target (Bloomberg, 2006). Several years later, the Moscow based company started a form of digital currency which has all elements of a cryptocurrency except decentralization. In 1998 it started WebMoney which offers all kinds of financial services. Thanks to changes in its services, it prevented usage for illegal activities. It is still operating and supporting various currencies, including bitcoin.

Liberty Reserve was Costa-Rica-based centralized digital currency service. It was founded in 2006 and shut down by United States government in 2013. Reason for that was intensive service abuse for criminal activities like money laundering, due to complete user anonymity. After the fall of Liberty Reserve, Perfect Money emerged (founded in 2007). It is still operational and offers multiple currencies, including bitcoin. It remained operational thanks to the changes in the policy. Namely, all accounts belonging to US citizens/residents/companies were disabled (Perfect Money, 2013).

The most well-known and widely used cryptocurrency is bitcoin. At the same time, this cryptocurrency has the greatest market valuation, usage, merchant acceptance and popularity (Hayes, 2015). Bitcoin was introduced in 2009, as the first decentralized digital currency platform, a currency which does not have central authority to validate and settle transactions (Gandal and Halaburda, 2016). Therefore, the bitcoin is a sophisticated cryptocurrency (Barber *et al.,* 2012). It can be observed that the tendency in cryptocurrencies is towards decentralisation.

In the following years other cryptocurrencies were launched. All cryptocurrencies that emerged after bitcoin are called altcoins. Some of the more popular altcoins nowadays are Litecoin (LTC), Ethereum (ETH), Peercoin (PPC),

Ripple (XRP), and Stellar Lumens (XLM). Namely, Ripple and Litecoin, have notable market capitalisations of $441 m and $66 m, respectively (Cheah and Fry, 2015).

As the Bitcoin is the most studied cryptocurrency, herein we will observe some of its pros and cons. No cryptocurrency is beyond critique, and the same accounts for Bitcoin. Barber *et al.* (2012) list several issues of the bitcoin such as potential deflationary spiral, technical vulnerability, malware attacks, and accidental loss of bitcoins. Yermack (2013) analyzed changes in bitcoin price against fiat currencies and showed that its volatility undermines its usefulness as currency. Moore and Christin (2013) empirically examined bitcoin exchange risk using survival analysis and showed that the exchange is a valuable target to thieves. Van Hout and Bingham (2014) pointed out that users transacting on Deep Web sites are using Electrum (an anonymous Tor server) to access a virtual wallet containing the Bitcoin. Although bitcoin was criticized, it has admittedly witnessed enormous success and popularity since its creation due to its added benefits. Some of the pros of bitcoin are anonymity, enhanced revenue, decentralized nature, and use of proof-of-work mechanisms (Moore and Christin, 2013).Nevertheless, the interest in trade with bitcoin has increased slowly, but surely. Therefore, it is of growing importance to understand the factors which eventually influence its market value (Hayes, 2017). The question which puzzles economists, IT experts, and the wider public is: Why do bitcoins have value and what impacts their value? Originally, it was presumed that, taking into account the construction of cryptocurrencies and the complex process of digital “mining”, the prices of cryptocurrencies would be relatively stable (Cheah and Fry, 2015).

This paper attempts to enlarge the current literature on cryptocurrency market modelling. According to the literature review, few researches have been conducted to model the cryptocurrency market. Therefore, we applied the system dynamics approach for modelling cryptocurrency space using a wide range of variables which potentially influence its popularity and value.

The remainder of the paper is organized as follows. A bibliometric analysis of cryptocurrency-related content in scientific papers is presented in section 2, including journals, research area and keywords used by authors. The following Section will provide a brief overview on the research done on modelling the cryptocurrency market. Section 4 firstly introduces the system dynamics approach and afterwards presents the model together with causal loops analyses. Finally, conclusion and some notes for the future research are provided.

2. Bibliometric analysis

Cryptocurrencies have not been a topic of great interest for scientific papers until recently. Namely, browsing the Clarivate Analytics Web of Science *Social Sciences Citation Index (SSCI)* and *Science Citation Index Expanded (SCIE)* with the topic *"cryptocurrency" OR "bitcoin"*, only 218 results were returned, 193 of them being published by the end of 2017 (Clarivate Analytics, 2018). Additionally, it should be mentioned that the oldest paper covered by the analysis was published in 2012 and that in total of two papers were published in the same year. Table 1 presents the number of papers published in the period 2012-2017. As it can be noticed, the number of papers on the two chosen topics published per year is steadily increasing. Whereas the greatest increase was between 2016 and 2017. Namely, 24 more papers were published in 2017.

Year	Papers
2012	2
2013	8
2014	22
2015	37
2016	50
2017	74
Total	**193**

Table 1. Number of cryptocurrency-related papers in the period 2012-2017
Source: Authors

The observed 193 papers were published in 115 journals. In Table 2 we present eight journals with at least five papers published in the period 2012-2017. The top contributor is the *PLoS One* with 12 papers published, followed by *New Scientist* with 11 published papers. This analysis can indicate that the papers related to bitcoin and cryptocurrency are widely published and that there is still no journal indexed on the *SSCI* and *SCIE* which is solely specialized on the topic.

Journal	Papers
PLoS One	12
New Scientist	11
Communications of the ACM	9
Technology Review	7
Economics Letters	6
Computer	5
Finance Research Letters	5
IEEE Spectrum	5

Table 2. Journals accounting for at least five papers
Source: Authors

Analysing the research area in which cryptocurrency-related papers are published, we can conclude that academia wrote the largest number of papers in the fields of *Business & Economics* and *Computer Science* (Table 3). This can be explained by cryptocurrency's economic purport and inevitable usage of modern computational technologies for doing anything related to cryptocurrency. It should also be noted that there have been 16 papers in the field of *Government & Law.* The use and abuse of cryptocurrencies have attracted the attention of governments. National bodies are, working in partnership with blockchain firms to fight corruption and illegal activity (Campbell-Verduyn, 2017). Also, government agencies seem to be willing to consider a trade-off to avoid outright prohibition in favour of pushing for a normalization of the bitcoin market (Thiemann and Hütten, 2017). Therefore, the governments' attitude toward bitcoin and cryptocurrency and the imposed related regulations are a prominent field of study.

Research area	**Papers**
Business & Economics	57
Computer Science	48
Science & Technology - Other Topics	41
Government & Law	16
Engineering	14
Telecommunications	10

Table 3. Most popular research area
Source: Authors

Additionally, we analysed the keywords used in cryptocurrency-related papers. Table 4 provides puzzling insights. The most commonly used keywords were "Economics", "Bitcoin", and "Money". However, they were used a small number of times, only nine and eight times. There are several possible reasons for such a result. First is that some journals do not have mandatory keywords. Second, that bitcoin have been related to multiple topics, and finally that the same keywords have been defined differently. For example, keyword "Market" can be used within keywords "Artificial Financial Market", "Market Simulation", "Cryptocurrency market", which are all counted differently in our analysis.

Keyword	**Papers**
Economics	9
Bitcoin	8
Money	8
Prices	6
Systems	6
Information	5
Model	5
Volatility	5

Table 4. Keywords used in cryptocurrency-related papers
Source: Authors

The presented bibliometric analysis indicates that the field of study of cryptocurrencies is developing, that journals indexed on *SSCI* and *SCIE* are recognizing the research conducted in the field, and that the issue of cryptocurrencies is multidisciplinary, but mostly related to economics.

3. Brief overview on modelling the cryptocurrency market

According to the literature review, we observed that the research on modelling the cryptocurrency market is in two directions. One direction examines the impact of individual variables on the cryptocurrency price, trade, and volatility. While the other direction aims to model the whole cryptocurrency market and its participants and interactions.

Kristoufek (2013) showed that the search queries and the bitcoin prices are connected. On the other side, Glaser *et al.*, (2014) examined whether user interest in cryptocurrencies at Wikipedia is due to interest in a new investment asset or in the currencies themselves and results showed that most of the interest is due to the asset aspect. Narayanan *et al.* (2016) showed that the supply and demand by investors determine cryptocurrency value. Wang and Vergne (2017) showed that the technology improvement needed to mine and perform block-chain is the main predictor of price increases (as captured by weekly returns).

Very few researches have been conducted to model the cryptocurrency market. Herein we present several papers which caught our attention. Namely, Hayes (2015) aimed to model the cryptocurrency price using computational power in GigaHashes per second, number of coins found per minute, the percentage of coins that have been mined thus far compared to the total that can ever be found, and number of calendar days from inception of the cryptocurrency.

Another interesting research is the one conducted by Bouoiyour & Selmi (2014). They aimed to create a regression model of bitcoin value using multiple variables such as market price of gold, occurrences of the word “bitcoin” in Google searches, and the velocity of bitcoin measured by transaction data. Interestingly, most variables were not statistically significant. Their result might indicate that many hypothesized and assumed variables might not eventually have impact on the value of bitcoin (Hayes, 2015).

Recently, Cocco et al. (2017) presented an heterogenous agent model of the Bitcoin market. Their model stand out as it includes different trading strategies, an initial distribution of wealth following Pareto law, a realistic trading and price clearing mechanism based on an order book, the increase with time of the total number of bitcoins due to mining, and the arrival of new traders interested in bitcoins.

Hsieh, Vergne and Wang (2017) conducted a valuable research in which they used multiple linear regression to model returns on cryptocurrencies using variables of internal and external governance variables. Internal governance variables were *Owner control*, *Formal voting*, and *Centralized funding*. While external governance variables were *Community governance*, *Negative publicity*, and *Public interest*.

As it can be observed most of the above-mentioned papers are related to bitcoin and variables which impact its volatility. However, as the majority of cryptocurrencies derive from bitcoin, they have the same set of built-in variables which have an effect on their price and trade (Hayes, 2015). Meaning, the same variables can be used to model their volatility and market. Therefore, the results of the above-mentioned papers acted as foundation for some of the relations in the proposed casual loop diagram of cryptocurrency value.

4. System Dynamics model of cryptocurrency value

System Dynamics Society (2018) defines system dynamics as "...a computer-aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economic, or ecological systems — literally any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality". System dynamic's basic tool is causal loop diagram, where elements are simply connected with pointed arrows with connection polarity indicated. Connection polarity can be either *positive* (+ or *s* meaning same direction) or *negative* (- or *o* meaning opposite direction). The heart of the system dynamics approach is feedback concept. Diagrams of loops of information feedback and circular causality are tools for conceptualizing the structure of a complex system and for communicating model-based insights. Important concept of the System Dynamics approach is loop polarity. If the tendency in the loop is to reinforce the initial action, the loop is called a positive or reinforcing feedback loop; if the tendency is to oppose the initial action, the loop is called a negative or balancing feedback loop (System Dynamics Society, 2018). Positive feedback loops are related to accelerated growth or fall, they are generally destabilizing the system. On the other side, negative feedback loops are connected with stabilizing behaviour. To our knowledge, system dynamics model regarding cryptocurrency has not been presented in scientific paper. Therefore, we aim to build system dynamics causal loop diagram, having in mind mineable cryptocurrency. The elements which will be used in the proposed model are listed in Table 5. We are aware that not all elements that can influence the cryptocurrency value are included. The presented model can act as starting point for a more in-depth analysis of the observed market. The causal loop diagram itself is presented on Figure 1.

Model element	Description
coin value	value of specific cryptocurrency expressed in fiat currency
trading value	value of cryptocurrency trade in specific time interval
trading volume	volume of cryptocurrency trade in specific time interval
total coin supply	cryptocurrency supply cap
current coin supply	cryptocurrency mined up to date
initial mining costs	costs of mining equipment
mining	mining cryptocurrency using specific equipment
mining difficulty	difficulty for mining new block
number of miners	number of miners currently mining specific cryptocurrency
potential miners	number of miners interested in mining specific cryptocurrency
search engine queries	number of searches for specific cryptocurrency
media presence	number of articles/reports regarding specific cryptocurrency

Table 5. Model elements described

Source: Authors

A few connections between elements will be explained here so as to facilitate the interpretation of the relationships presented in Figure 1. For example, when analysing the connection between *number of miners* and *mining* the higher number of miners leads to a higher volume of mining, meaning that more coins will be discovered. The presented relationship is positive and is marked with plus on the diagram. On the other hand, if the *current coin supply* increases, the *gap in coin supply* is going to decrease. Similarly, if the *gap in coin supply* lowers, the *coin value* will rise (Barber *et al.*, 2012). Those last two connections are in the opposite direction, and they are marked with minus on the diagram.

Besides introducing the positive and negative relationships between model elements, we will briefly present the negative feedback loop 5 (-FL5). In the chosen feedback loop, the Number of miners influences initial mining costs, whereas the change is in the same direction, as more miners leads to higher initial mining costs (Warren, 2018). The rise of initial mining costs leads to reducing the number of potential miners and number of miners. Mentioned three elements are forming negative, balancing, feedback loop (FL). This and some other feedback loops that define the behavior of the observed system are presented in Table 6. Namely, we have presented four negative and two positive feedback loops. Feedback loops' polarity is marked with "+" and "-" in front of the feedback loop name.

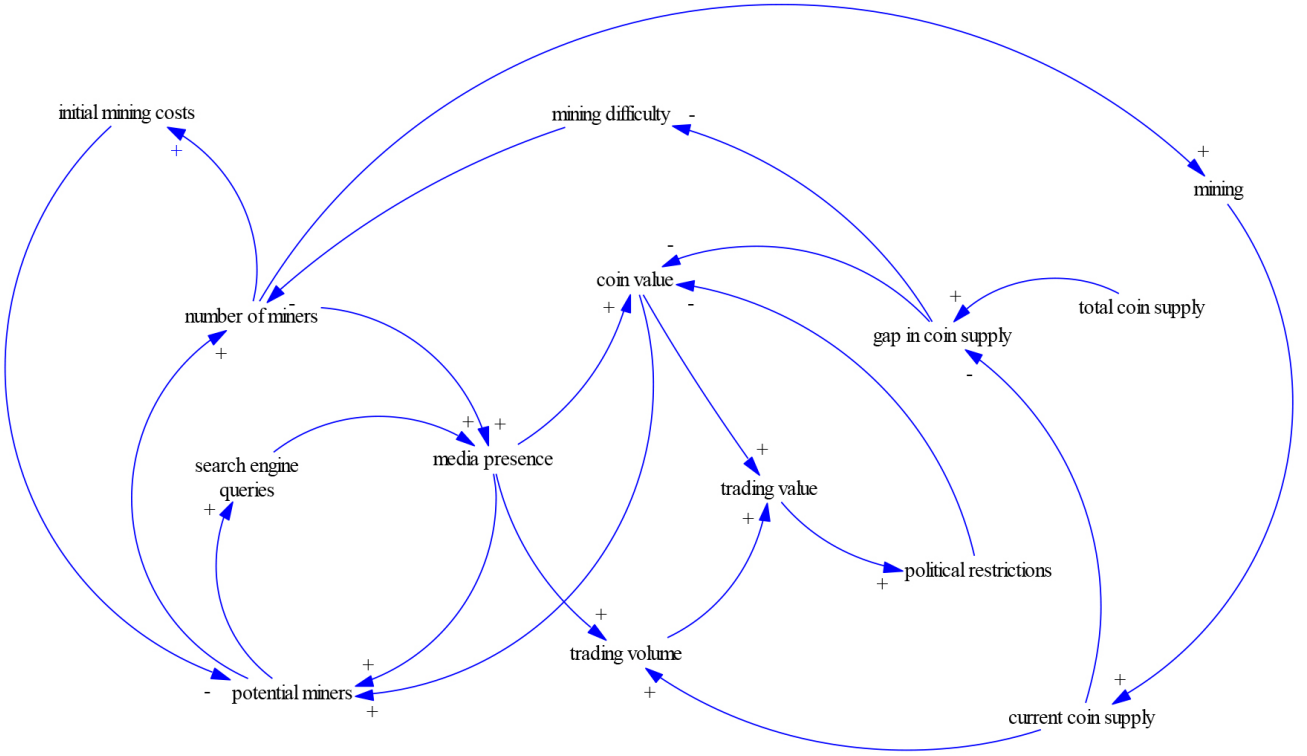

Figure 1. Causal loop diagram of cryptocurrency market

Source: Autors

Feedback loop		Description
+FL1	*coin value* *potential miners* *number of miners* *media presence*	Initial increase in coin value leads to increase of the number of potential miners, followed by the increase in the number of miners, which then increases the media presence and the coin value (Hayes, 2017).
-FL2	*coin value* *trading value* *political restrictions*	Initial increase in coin value leads to increase of trading value, which then attracts governments' attention and who then imposes restrictive measures in aim to control the decentralized cryptocurrency market. Those measures then reduce the cryptocurrency value (Parrish, 2018).
+FL3	*coin value* *potential miners* *search engine queries* *media presence*	Initial increase in coin value will cause increase in number of potential miners, which leads to more search engine queries, as they are acquiring information about cryptocurrency mining, strategies, technology, and prices. High interest in cryptocurrency leads to higher media presence and then back to increased coin value (Kristoufek, 2013).
-FL4	*number of miners* *mining* *current coin supply* *gap in coin supply* *mining difficulty*	If the number of miners increases, mining volume will be higher, meaning that more coins will be discovered (increase in current coin supply). Higher coin supply means smaller gap in coin supply, which leads to higher mining difficulty and that leads to decrease in number of miners (Kristoufek, 2015).
-FL5	*initial mining costs* *potential miners* *number of miners*	In the past, it was worthwhile to mine bitcoin on a standard home computer, which is no longer case (Gandal and Halaburda, 2016). Warren (2018) showed that with expansion of the cryptocurrency mining world of gamers encountered with high prices of GPUs (Graphics Processing Unit) and even shortages. The same applies to potential miners interested in stepping up and acquiring the mining equipment. These conditions might discourage potential miners. Therefore, this feedback loop is negative.
-FL6	*coin value* *potential miners* *number of miners* *mining* *current coin supply* *trading volume* *trading value* *political restrictions*	If coin value increases, the number of potential miners will also increase, leading to higher number of miners and higher mining volume. Coin supply, trading volume and trading value will also increase. This growth of cryptocurrency will attract governments' attention and new attempts of controlling the market. Feedback loop closes with influence in opposite direction from political restrictions to coin value, which means that initial increase in coin value will lead to changing the direction of its own influence – do decrease in value.

Table 6. Structure of feedback loops

Source: Authors

3. Conclusion

Bitcoin and other cryptocurrency markets have been under-explored academically in spite their rising popularity (Cheah and Fry, 2015). The scientific community has been fairly sceptic to embrace the field of cryptocurrency. Herein, we aimed to enlarge the current literature by proposing a model of cryptocurrency market and value using the system dynamics approach.

To encourage research on modelling cryptocurrency market, this paper summarised system dynamics' basic tool – causal loop diagram. Afterwards, the model was built using the mentioned methodology. Finally, the created causal loop diagram was discussed in terms of feedback loops existing in cryptocurrency market. Chosen negative and positive feedback loops were presented. Positive feedback loops are accountable for growth on the market (number of miners, trading volume, coin price, etc), while negative feedback loops are accountable for stabilizing behaviour (limiting growth of number of miners, trading price, trading volume, etc).

During research we could identify several future directions of the study. The first direction would be towards inclusion of more variables in the model. The second future direction could be gathering data, creating stocks and flows diagram and running simulation experiments. The third future direction could be the to conduct an agent-based simulation of the cryptocurrency market such as been done by (Cocco, Concas and Marchesi, 2017). We believe our paper might act as an incentive for further academic research on the application of system dynamics for better understanding of the bitcoin and cryptocurrencies value creation.

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CHAPTER 17

Public R&D Expenditure Efficiency and Knowledge Creation in CEE Region

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ABSTRACT

In this paper we use Data Envelopment Analysis (DEA) to analyze the efficiency of public expenditures on R&D in Central and Eastern European countries (CEE), using knowledge creation and knowledge diffusion as key output indicators. Our results show that most of CEE countries do not use public R&D resources efficiently and that current level of expenditures should generate much higher results on Global Innovation Index scale. So instead of increasing the level of public expenditures on R&D in our view CEE countries need to increase efficiency first. In order to do so those countries should continue to improve its institutional framework in terms of government effectiveness, business climate and suppression of corruption. Increase of R&D efficiency is of great importance for CEE countries as they seek for a new knowledge-based growth models, which are more challenging for policy makers than pre-crisis models, based on physical capital accumulation and adoption of technologies from abroad.

Key words: R&D, public sector, knowledge creation, DEA, CEE

JEL classification: O43, O34, O38

1. Introduction

According to Todaro and Smith (2014) there are three fundamental sources of economic growth: (i) capital accumulation, including all new investments in land, physical equipment, and human resources through improvements in health, education, and job skills; (ii) growth in population and hence eventual growth in the labor force and (iii) technological progress —new ways of accomplishing tasks. In this paper we will focus on the last growth factor as the contribution of technological progress to economic growth is becoming even more pronounced in new, digital era.

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The importance of technological progress was already recognized in a pioneer work by Solow (1956) in a neoclassical analytical framework. In these models technological change is exogenous, it comes as a *manna from heaven*, and it determines the long run growth rate of countries through the effects on long run productivity. Although these models were a breakthrough in the economic development and growth theory they missed to "internalize" the technological progress into the models.

The situation has changed in 1990 after Paul Romer published its seminal paper on endogenous technological change (Romer, 1990). In this paper Romer did not challenge Solow's main conclusions. Nay, in his view technological change provides the incentive for continued capital accumulation, and together, capital accumulation and technological change account for much of the increase in output per hour worked. However, Romer went a step further and explained that technological change arises in large part because of intentional actions taken by people who respond to market incentives and invest in research and development (R&D). In that sense technological progress in his model is endogenous and not exogenous.

However, level of R&D expenditures *per se* cannot ensure adequate private or social returns to investments in the economy. More precisely, if R&D resources are not used efficiently (we use term efficient in terms of technical efficiently) they can't generate adequate outputs needed for sustainable technological progress. Thus in this paper we will analyze not only levels of R&D expenditures but also the efficiency of these expenditures in CEE region. Our focus is on public expenditures on R&D as we are interested in the public policy perspective of this topic.

In order to determine the efficiency of public expenditures on R&D we use data envelopment analysis (DEA) approach. The key input in our analysis is the total size of government budget appropriations or outlays on R&D. The novelty in this paper is in chosen outputs as we don't use usual outputs such as number of patents or number of published scientific papers but the results of Global Innovation Report, which in our view contain more info on knowledge-creation, the key prerequisite for technological progress in some country. Our main hypothesis is that most of CEE countries do not use public R&D resources efficiently.

The paper is structured as follows. After the Introduction in the first part of the paper, in the second part we present a brief overview of existing literature, with the focus on papers using DEA approach. In the third part of the paper we briefly explain the methodology, i.e. data envelopment analysis, while in the fourth part we describe and analyze data used in the model. In the fifth part of the paper we discuss the results while the last part of the paper contains conclusions and policy recommendations.

2. Literature review

Werner and Souder (1997) divided research on R&D effectiveness and efficiency into two categories: macro and micro. Macro-level techniques focus on the impact of R&D on society as a whole. Micro-level techniques focus on the impact of a firm's R&D on its own effectiveness. In this paper we focus on macro-level approach, cross-country comparisons and papers based on DEA analysis. This literature is relatively scarce.

Although Teitel (1994) did not use DEA this paper is worth of mentioning as it represents one of the benchmark papers in this field. The author showed that investments to R&D can result in an increase of patents and improve scientific results in various countries. This result motivated future research on R&D expenditure efficiency.

Rousseau and Rousseau (1997) and Rousseau and Rousseau (1998) used DEA in the analysis of R&D expenditure efficiency in developed countries. They showed that there is a huge difference in efficiency across countries, meaning that even highly developed countries can position below the technological frontier. Based on DEA approach,

Lee and Park (2005) analyzed R&D efficiency in twenty-seven, mostly developed countries, and based on the results divided countries into four categories: inventors (Finland, France, Germany, Japan, and United States), merchandisers (Austria, Ireland, Norway, and Singapore), academics (Australia, Canada, Hungary, Italy, New Zealand, Spain, and United Kingdom) and duds (China, Czech Republic, Korea, Mexico, Poland, Portugal, Romania, Russian Federation, Slovak Republic, Slovenia, and Taiwan).

Wang and Huang (2007) analyzed R&D efficiency in thirty OECD and non-OECD countries also taking into account environmental factors such as knowledge of English language. They find that a large portion of the inefficiency can be explained by a countryjs English proficiency indicator.

Sharma and Thomas (2008) used DEA to examine the relative efficiency of the R&D process across a group of twenty-two developed and developing countries and documented a relatively high level of inefficiency in the R&D resource usage in both group of countries. Thomas, Jain and Sharma (2009) analyze R&D expenditure efficiency in twenty OECD countries, China and Russian Federations. The authors concluded that Asian countries have shown remarkable progress in R&D efficiency which seems to be at the cost of the leading nations like USA and the UK. As for the Asian countries, authors show that China exhibits a rapid increase in number of scientific publications while the Republic of Korea shows exemplary performance in patenting among residents

Cincera, Czarnitzki and Thorwarth (2011) analyze the efficiency of R&D in OECD and EU countries. The results show that to the most efficient countries in terms of R&D public support are Australia, Canada, Finland, Germany, Japan, Netherlands, New Zealand, Singapore, Switzerland, and the USA.

Most comparable research to ours is Aristovnik (2012). Based on DEA methodology, author measured relative efficiency in utilizing public education and R&D expenditures in the new EU member states in comparison to the selected EU and OECD countries. Results showed that Cyprus and Hungary dominated in the field of R&D sector. The empirical results also showed that, in general, new EU member states show relatively high efficiency in tertiary education, while lag well behind in the R&D efficiency measures.

3. Methodology

As we mentioned in the Introduction, in this paper we will use Data Envelopment Analysis to determine the technical efficiency of public R&D expenditures.

In order to better explain why we use this type of efficiency measures we have to remind that there are two main measures of efficiency in economics - allocative and technical efficiency. Allocative efficiency refers to how different resource inputs are combined to produce a mix of different outputs. Technical efficiency on the other hand is concerned with achieving maximum outputs with the least cost. The focus of this paper is on this type as we are interested in rational use of public resources.

Data Envelopment Analysis (DEA) is a a deterministic, non-parametric, linear programming technique for determination of so-called efficiency scores. DEA scores reflect the distance between the respective data point, in this paper a country, and the best practice point which lies at the frontier. The countries (data points) on the frontier are given score of 1 while those inside the frontier are given a score between 0 and 1. DEA provides a measure of relative efficiency, meaning that it indicates that a country is the more efficient relative to the other countries in the sample.

DEA can be input-oriented or output-oriented. Input-oriented method shows by how much input quantities can be proportionally reduced without changing the output quantities produced. On the other hand, output-oriented methods are focused on the question by how much output quantities can be proportionally expanded without altering the quantities of inputs used (for details see Coelli, 1996). Also, DEA can be based on the assumption of constant returns to scale (CRS) or variable returns to scale (VRS). In this paper we use output-oriented VRS approach as objective of R&D policies lies in increasing outputs rather than decreasing inputs (Lee and Park, 2005).

DEA linear program is defined as:

$$min \sum_{i=1}^{m} v_i x_{ik} \quad (1)$$

$$s.t. \sum_{r=1}^{s} u_r y_{rk} = 1 \quad (2)$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} y_{rj} x_{ij} \leq 0, j = 1, \dots, n \quad (3)$$

$$u_r \geq \varepsilon, r = 1, \dots, s$$

$$v_i \geq \varepsilon, i = 1, \dots, m$$

x_{ij} is the amount of the *i-th* input, y_{rj} is the amount of the *r-th* output, v_i is the weight given to the *i-th* input, u_r is the weight given to the *r-th* output, and *k* is the decision-making unit, in our case country, being measured. The ε constraints avoid any inputs or outputs being weighted at 0.

4. Data

As noted above, we are interested in the efficiency of public expenditures on R&D, which represent input in our DEA analysis. Although many researches use data on the share of public sector R&D expenditures in GDP we see this indicator as deficient as it strongly depends on the level of development of each country. Thus in this paper we use an alternative indicator, namely total size of government budget appropriations or outlays on R&D as a share of total government expenditures, obtained from Eurostat database. Indicator defined in this way partially annuls the effects of differences in the level of development among countries.

As for the outputs, in this paper we use data from Global Innovation Index (GII) report as in our view complex indicators from this report provide a better insight into the quality of knowledge and technology outputs than usually used indicators such as solely number of patents or published scientific papers across countries. Also, most of the indicators in this report are PPP-adjusted which makes cross-country analysis more robust. As main outputs we use two sub-categories of GII pillar VI "Knowledge and Technology Outputs" - *Knowledge Creation* and *Knowledge Diffusion*" (for details see Dutta et al., 2017).

Knowledge Creation indicator combines data on number of resident patent applications filed at a given national or regional patent office (per billion PPP$ GDP); number of international patent applications filed by residents at the Patent Cooperation Treaty (per billion PPP$ GDP); number of utility model applications filed by residents at the national patent office (per billion PPP$ GDP); number of scientific and technical journal articles (per billion PPP$ GDP).

Knowledge Diffusion indicator includes data on Charges for use of intellectual property n.i.e., receipts (%, total trade); high-tech net exports (% of total trade); telecommunications, computers, and information services exports (% of total trade); foreign direct investment (FDI), net outflows (% of GDP, three-year average)

Our sample includes eleven EU countries from Central and Eastern Europe (CEE) region: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Input is defined as 2011-2016 average, while outputs represent GII scores in 2017. Use of "lagged" values of inputs is a standard approach in DEA analysis as it takes time for inputs, in our case public expenditures for R&D, to give results in terms of outputs. For detailed discussion on the use of average data see Graves and Langowitz (1996).

	Definition	**Source**
Input	Government budget appropriations or outlays on R&D as % of total government expenditures	Eurostat
Outputs	*Knowledge Creation* score *Knowledge Diffusion* score	Global Innovation Index

Table 1. Inputs and outputs in DEA model
Source: Authors

Scatter diagrams in Figure 1 and Figure 2 present data in a way useful for understanding DEA analysis background. *X-axis* contains data on input and *y-axis* on output. Solid line "envelops" the sample by connection countries which produce maximum output at the given level of input.

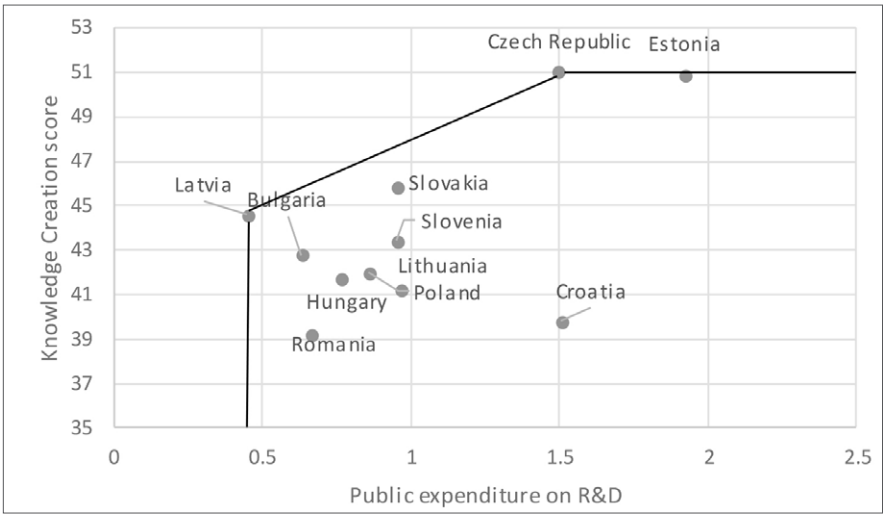

Figure 1. Government expenditure on R&D and *Knowledge Creation* score

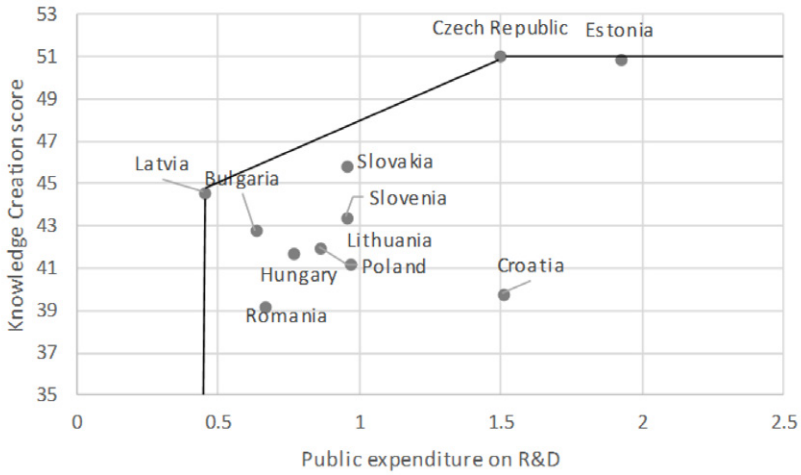

Figure 2. Government expenditure on R&D and Knowledge Diffusion score

Source: Authors

These figures indicate that there is a high level of dispersion among CEE countries in terms of R&D expenditure efficiency. In addition, these figures suggest that Czech Republic and Latvia could be regional leaders in that sense. It is also interesting to notice that positions of countries are relatively stable regardless which indicator we observe. In the next section we will give more analytical rigor to this discussion by employing DEA model on presented data.

5. Results and discussion

Tables presented below contain data on DEA efficiency scores θ and so-called "target" outputs which show by how much should output increase to obtain efficiency if the input stays unaltered. Score for efficient countries takes value 1 and those countries which are below "efficiency frontier" record scores in the interval $0 < \theta < 1$.

Country	Efficiency score	Target output	Required increase of output
Bulgaria	**1**	**23.1**	**0**
Croatia	0.41	46.8	27.5
Czech Republic	**1**	**46.8**	**0**
Estonia	0.66	46.8	15.5
Hungary	0.72	28.3	8.0
Latvia	**1**	**13.0**	**0**
Lithuania	0.43	33.6	19.0
Poland	0.78	31.0	6.8
Romania	0.37	25.7	16.2
Slovenia	0.79	33.6	7.1
Slovakia	0.62	33.6	12.9

Table 2. DEA results for knowledge creation

Source: Authors

Results presented in Table 2 show that three countries determine the "efficiency frontier" for that sample - Bulgaria, Czech Republic and Latvia. Efficiency scores for these countries equal 1. As these countries operate on the efficiency frontier the size of their target output corresponds the size of their real output, i.e. required increase of output is 0. Least efficient countries are Romania, Croatia and Lithuania. Target outputs for these countries suggest that, given the level of expenditures on R&D, Romania should increase its GII score by 16.2 points, Croatia by 27.5 points and Lithuania by 19 points. Notice that Croatia has higher efficiency score than Romania but requires stronger increase in output to become efficient. This is because those countries don't have same peers. Peers for Romania are Latvia and Bulgaria and for Croatia it is Czech Republic.

Country	Efficiency score	Target output	Required increase of output
Bulgaria	0.94	45.72	2.92
Croatia	0.78	51.00	11.20
Czech Republic	**1.00**	**51.00**	**0**
Estonia	**1.00**	**51.00**	**0.10**
Hungary	0.90	46.53	4.83
Latvia	**1.00**	**44.60**	**0**
Lithuania	0.86	47.76	6.56
Poland	0.89	47.12	5.12
Romania	0.85	45.92	6.72
Slovenia	0.91	47.68	4.28
Slovakia	0.96	47.69	1.89

Table 3. DEA results for knowledge creation

Source: Authors

As for the results on *Knowledge Diffusion*, our model also recognizes three benchmarks, but in this case those are Czech Republic, Latvia and Estonia. So Czech Republic and Latvia are benchmark countries again. The interpretation follows the lines from Table 2, meaning that now Czech Republic, Latvia and Estonia recorded efficiency scores of 1 and required increase of outputs of 0. Least efficient countries are again Croatia, Romania and Lithuania, but in this case Croatia is positioned last. Required output increase results show that Croatia would have to increase its GII score by 11.2 points, Romania by 6.7 points and Lithuania by 6.6 points. Peer for Croatia is now Estonia and for other two weak performers those are Latvia and Czech Republic.

6. Conclusion

There is no doubt that public investments in R&D are important part of broader economic policy, especially in modern economies where technological progress, often expressed through concept of total factor productivity (TFP), is becoming more important in growth creation process. However, the size of

investments cannot ensure the adequate social returns by itself. It is important that public R&D expenditures are used efficiently, meaning that for a given level of inputs they give maximum outputs. Efficiency of public expenditure is of great importance in CEE region as lot of countries have a history of fiscal unsustainability and were compelled to cut its budget spending during the period after 2008 financial crisis.

Results presented in this paper confirm our working hypothesis that most of CEE countries do not use public R&D resources efficiently, especially in knowledge creation process. Such inefficiency can partially explain relatively low ranks of CEE countries on Global Innovation Index scale, where those countries are among the weakest performers in European union. This is alarming as literature on economic growth shows that as economies' incomes rises, productivity growth fails to keep up, with countries finding it difficult to switch from a growth model based on investment and the adoption of technology to one involving innovation and the development of new technology. Most of CEE countries are in a category of high income countries (based on World Bank definition) and thus require new knowledge-based growth model. So instead of increasing the level of public expenditures on R&D in our view those countries need to increase the efficiency first. In order to do so CEE countries should continue to improve its institutional framework in terms of government effectiveness, business climate and suppression of corruption (it is interesting to point out that CEE countries are still ranked relatively low on Corruption Perception Index scale and that Romania and Croatia, which were marked as lest efficient in this paper, have among lowest scores in CEE).

The main contribution of this paper is the use of inputs and outputs which were not used in existing literature so far. As explained in the main text, in our view these variables are more adequate for the analysis than ones which are most commonly used. In addition, this is the first paper that investigates efficiency of R&D in terms of knowledge-creation and knowledge-diffusion in Central and Eastern Europe region. In the future research efficiency scores obtained from DEA analysis in this paper can be used in broader econometric analysis in which efficiency of public R&D expenditure could be regressed directly on GDP growth rates in order to show that R&D efficiency is more important for long term growth than levels of expenditures *per se*.

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CHAPTER 18

How does the digitalization impact society's sustainable development? Measures and implications

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ABSTRACT

This paper examines the relationship between digitalization and sustainable development and presents the composite index used for measuring the digital competitiveness of nations – the Digital Economy and Society Index (DESI). To be competitive on a global market, it is not enough just to have an efficient government and flourishing economy. Today's environment is highly dependent on the technological capabilities and keeping track with contemporary technological development is becoming crucial at both micro and macro level. One of the major revolutions in modern business is switching from traditional to digital business models for achieving higher competitiveness level. Digitalization is one of the major impetus of today's development. For accepting and implementing those changes, it is important to highlight the macromarketing role in this process. To identify the shortcomings, good practices, and track the development, it is necessary to have concrete measures. European Commission developed a composite index for measuring digital performance of European Union countries - DESI. This paper examines the methodology of DESI and observes how the digital performance of EU affects main sustainable development components: economic, social, and environmental. Thus, paper explores the correlations of DESI and other composite indices that measure sustainability components: competitiveness, innovation, gross domestic product, entrepreneurship, "goodness" of a country, and contribution to the sustainable development goals. In addition, paper examined the influence of Hofstede's cultural dimensions on digital performance. The highlight the importance of digitalization as another crucial component of sustainable development and society.

Key words: Digitalization, Sustainable development, Performance indicators, Society, Macromarketing

JEL classification: JEL_ Q01, JEL_E71, JEL_ M38

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1. Introduction

Throughout history, main radical changes that shaped today's society are industrial revolutions. Four eras of technology deeply changed everything that surrounds us, and affects everyday life (Schwab, 2016). Medicine, education, transport, manufacturing, banking, business, sports, food industry, etc.: everything changed under the influence of these major changes. In this world of fast changes, man forgot about his natural habitat, his environment. We are constantly developing technologically, but sometimes the costs are great. Thus, it is important to measure the impact that technological changes have on *sustainable* development, the synergistic development of economy, society, and environment.

Recently, there is an emergence of various measures of national performance. Numerous indices are used with aim to measure different aspects of a nation's economic development: competitiveness, innovativeness, entrepreneurial activity, etc. (Jovanović et al., 2017). However, there are indices oriented towards measuring different national phenomena, such as goodness of a country, which inspects contribution of a nation to the humanity; or overall sustainability, measuring contribution to sustainable development goals. In these recent trends, another index emerged because of the rapid digital development: The Digital Economy and Society Index (DESI). In this paper, we examined the digitalization impact on the main sustainability components: economy, society, and environment. We inspected the correlation of DESI with selected methodologies that measure different aspects of sustainability dimensions. We also examined the relationship between cultural characteristics and digitalization level of a country by exploring correlations of Hofstede's cultural dimensions and DESI.

Next section explains main concepts examined in this paper: digitalization, sustainable development, macromarketing, relationship between sustainable development and digitalization, with special emphasize on DESI. This section is followed with the section that presents the methods used for the research, and with section where results of the research are presented as well as discussion and implications are provided. Finally, we complete the paper with the conclusions of the research.

2. Literature review

Today's environment is highly dependent on technological capabilities and keeping track with contemporary development is becoming crucial at both micro and macro level. Today's societal characteristics are highly influenced by the industrial revolutions occurred in the last three centuries. Revolutions have occurred throughout history when new technologies and novel ways of perceiving the world trigger a profound change in economic systems and social structures (Schwab, 2016). From the steam machine in 1760's technology has developed exponentially, by constantly developing itself and behaving as a sort

of recursion where new technologies were created on a basis of the old ones. Schumpeter explained this phenomenon through his waves of innovation (Figure 1), explaining that each wave of innovation does not lasts equally, and that their length is shortened due to the rapid development of new technologies (The Economist, 1999; Levi Jakšić et al., 2018). Currently, we are living in the 5th wave of innovation, where digital solutions are becoming the leading impetus of change.

One of the major revolutions in modern business is switching from traditional to digital business models for achieving higher competitiveness level. In this, fifth wave of innovation, we can distinguish three eras of digital transformation (I-scoop, 2016):

1. Digitization: where the analog items are converted into digital versions (i.e. electronic version of paper documents);
2. Digitalization: where digital technologies are used to change business models, create revenue, improve business and value-producing opportunities; and
3. Digital transformation: where digital technologies are used to change all business aspects.

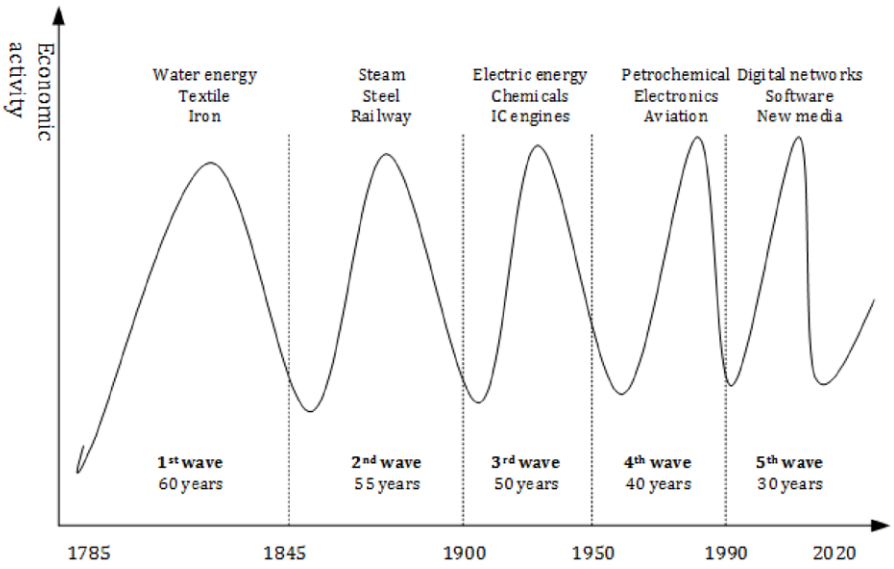

Figure 1. Schumpeter's long waves of innovation

Source: Levi Jakšić et al. (2018)

Chronologically speaking, we live in the third era of digital transformation, and new challenges are put in front of governments, companies, entrepreneurs, and customers/consumers (Schwab, 2016). Schmarzo (2017) stresses that this era of digital transformation represents "application of digital capabilities to processes, products, and assets" all with aim to "improve efficiency, enhance

customer value, manage risk, and uncover new monetization opportunities." Similarly, others (Bertini, 2016) points out that digital transformation is influencing not just lives but also individual's experiences.

Dang & Pheng (2015) explored new theories of economic development, and well noted, "on the way to achieve rapid economic growth, countries around the world have been exploiting their natural resource reserves at alarming rates". Both science and society have noticed this occurrence, and consequently *sustainable* development has been increasingly highlighted as a priority for nations and enterprises. Brundland Commission (1987, p. 41) states that: "*Sustainable development (SD) is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*. This concept suggests that the well-being of humanity can be achieved only by the synergistic of three basic pillars: economic growth, social equity, and environmental protection. Additionally, due to the complexity of today's society, culture has been identified as the fourth dimension of sustainable development (Commonwealth Secretariat, 2007; Hawkes, 2001). Organization Culture 21 states that "culture ultimately shapes what we mean by development and determines how people act in the word" (Culture 21, 2014). This component of SD is important because it determines how the changes will be accepted in the society. Thus, it could be a crucial factor for adoption of digital transformation process. Some authors in criticizing the SD definition given by the Brundland Commission even consider 5 determinants of sustainable development (Seghezzo, 2009): *Place*: with three dimensions of space; *Permanence*: dimension of time; and *Persons*: human dimension. However, this concept is too abstract to be applied, and not sufficiently explored and scientifically confirmed. Recent researches also examine the influence of culture on accepting digitalization. Benner (2017) analysed the impact of the cultural acceptance of digitalization on the GDP in East and West Germany. The research based on measuring the data form Google Trend, where the term "Facebook" occurred as a search term. The results showed that positive cultural acceptance of digitalization increases GDP. However, this research did not include the remaining SD dimensions. On the other hand, Hegyes, Csapó, & Farkas (2017) examined the problem of digitalization and sustainable development by comparing Hungary with other EU countries. The research based on the European Comission reports and empirical research in secondary education. Again, the results did not give the whole picture of the digitalization impact on sustainable development components, but they put the focus on Hungarian performance in comparison to EU.

In these kinds of societal changes, macromarketing is also getting the attention. In this paper, we want to highlight the importance of this concept, which has been unfairly neglected and in the shadow of micromarketing. In every industry, managers are paying special attention to the marketing activities. Often, marketing determines the success of the companies, distinguish them from the competition, and not so rarely brings the competitive advantage on the market.

When it comes to macromarketing, the concept itself is not so familiar.

Unlike micromarketing, macromarketing is more oriented toward social aspects of marketing and institutions (Bartels & Jenkins, 1977). This concept tries to explain the functioning of complex marketing mechanisms of economic and social environments. As such, it is identified as an important determinant of sustainable development. Kilbourne, McDonagh, & Prothero (1997) claim that only macromarketing can effectively examine the relationship between sustainable consumption and quality of life. They recognize four dimensions: technology, economics, ethics and politics as crucial for determining sustainable consumption. By fostering macromarketing activities and mechanisms for action (information, individual actions, participation of business, mesuring indicators, political support of government) it is possible to transform society from the state of hyperconsumption to the desired state of sustainable consumption (Kilbourne, McDonagh, & Prothero, 1997). Macromarketing activities are the ones that encourage behavioral change of society by rising awareness, and are also responsible for accepting the radical technological changes (i.e. digital transformation) (Shultz, 2007). Shultz & Peterson (2017) noticed socioeconomic transition in Vietnam to a market-oriented economy, and thus examined the macromarketing aspect of their performance. They examined the Sustainable Society Index values with macromarketing activities and concluded that it is crucial to foster macromarketing activities in order to achieve sustainable society. In the process of adopting changes macromarketing can be used as a tool that takes into consideration different cultural aspects of the society where the change is being implemented. Consequently, in the process of digital transformation of the society it is important to consider different cultural dimensions.

Having in mind the emergence of digital transformation process, importance of sustainable development issue, and the intermediary role of macromarekting, we proposed two research questions:

Whether and to what extent digital transformation affects the sustainable development and its components?

Whether digital transformation level is affected by the cultural characteristics of a society?

Thus, in this paper, we compare the measures of digitalization performance with measures of sustainable development (as a whole concept, as well as the components). For the purpose of the research, we observed the cultural dimensions as an important component of both sustainable development and macromarketing. We based our conclusions on a set of 28 EU countries. For a measure of digitalization, we observed The Digital Economy and Society Index and compared the results with the rest of the indicators related to the sustainable development components.

2.1. The Digital Economy and Society Index

To measure the level of achieved digitalization in a country, European Commission developed The Digital Economy and Society Index (DESI), a composite measure that summarises indicators related to the digital performance and digital competitiveness of the EU member states. It is compounded of a set of indicators related to the digital policy mix, and has a three-layer structure (European Commission, 2017). At first level, there are five principal dimensions: Connectivity, Digital skills, Use of Internet, Integration of Digital Technology, and Digital Public Services. Second level has 12 sub-dimensions, and the third level has 31 individual indicators. Complete structure of DESI with the weighting system is presented in Figure 2. The five principal dimensions are defined by the five principal policies for digital economy and society. European Commission (2017) claims that the digital development of the economy and society can only be achieved by interconnected development of these areas (European Commission, 2017). As technological changes occur, this index is also changing the methodology, so in 2016, they included some new indicators in calculation (i.e. 4G coverage).

Considering weighting system used for the computation of the final DESI score not all the dimensions have the same share: Connectivity and Human Capital are having the largest impact with 25% each, then Integration of Digital Technology with 20%, while Use of Internet and Digital Public Services have the lowest impact of 15%. Within dimensions, the sub-dimensions also have different weighting system shown in Figure 2 (European Commission, 2017).

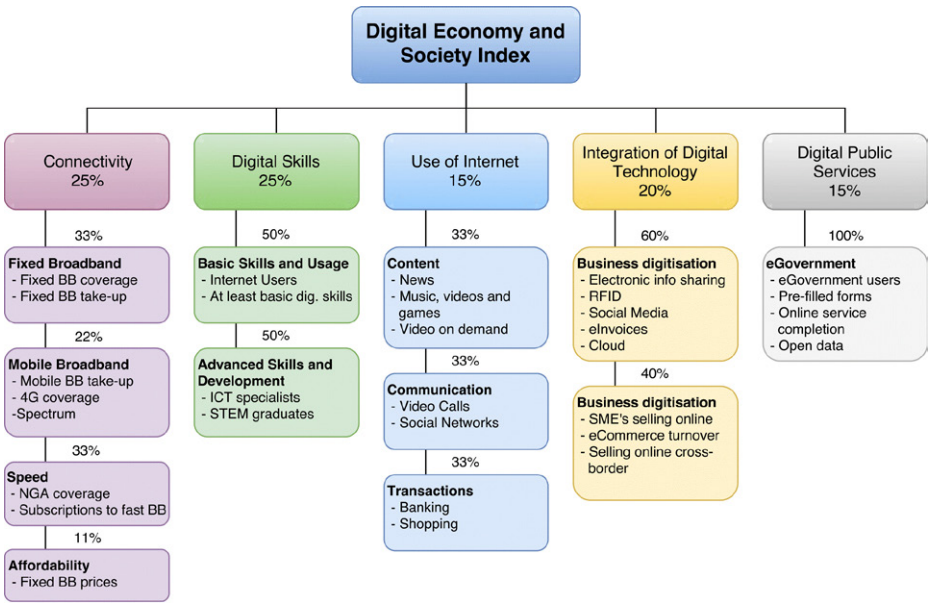

Figure 2. Digital Economy and Society Index structure

Source: Authors, based on European Commission (2017)

Analysing the structure and methodology used for computation of the DESI, we can conclude that the indicators are carefully examined, selected and in accordance with the problem they should measure. Also, since one of the biggest shortcomings of numerous global index methodologies is equal weighting system (Jovanović et al., 2017), we can say that this is not the case with DESI, and that different significance of certain digitalization aspects has been taken into account. Finally, all indicators at the lowest level of hierarchy are quantitative, so they provide objective measures of performance in terms of achieved level of digitalization.

To objectively examine the relationship between the digitalization process and sustainable development, we measured the correlation between the DESI and selected set of indicators that measure certain (or all) aspects of sustainable development. We compared the DESI results with the following global methodologies:

- Global Competitiveness Index
- Global Innovation Index
- Gross Domestic Products
- Global Entrepreneurship Index
- The Good Country Index
- Sustainable Development Goal Index
- Sustainable Society Index

There are still not methodologies widely accepted for measuring overall concept of sustainability, but still including one or more SD dimensions. In this research we use indices explicitly defined for this purpose, but since these are young methodologies (Sustainable Development Goal Index started being measured in 2015), or not measured each year (as Sustainable Society Index), we used measures that relate to some SD dimensions and are widely accepted.

We wanted to examine macromarketing role in the process of digitalization, so we included measures of Hofstede's cultural dimensions in the research. Also, culture is identified as a fourth dimension of SD, but not included in any official methodology for measuring sustainability level. Thus, this was another reason to include cultural aspect in the research.

Since not all the indices are related to measuring all SD components, we classified them based on set of indicators they are compounded of (Table 1). After the explanation of each methodology, we noted the dimension they relate to.

3. Methodologies used in the research

Further, we will briefly explain the subject matter of each index. *Global Competitiveness Index (GCI)* is index measured by the World Economic Forum, and assesses the global competitiveness of 137 countries. It also gives an insight into the catalysts of the economy that are crucial for the further development and prosperity (WEF, 2017). The indicators of this methodology are oriented on economy (i.e. quality of roads, pay and productivity, company spending on R&D, etc.) and society development (i.e. Secondary education enrolment rate, Internet users, quality of education, etc). *Global Innovation Index (GII)* measures innovation performance of 127 world economies. Cornell University, INSEAD Business School, and World Intellectual Property Office annually publish The Global Innovation Report and provide data related to the innovative activity of countries through the set of 81 indictors (Cornell University et al., 2017). As with GCI, the components this index relates to are economy and society. As only single indicator used for the comparison with the digitalization level we included *Gross Domestic Product (GDP),* as one of the main indicators of a country's economic performance (Syrquin, 2011). We also examined the scores of *the Global Entrepreneurship Index (GEI)* published by the Global Entrepreneurship and Development Institute. This index measures the health of 137 entrepreneurial ecosystems by measuring entrepreneurial attitudes, abilities and aspirations (GEDI, 2017). Although, entrepreneurial activities are not an explicit part of the sustainable development, they relates to the social activities within the economic system, so it is also connected to the economy and society dimensions of SD. Another global index examined in the research offers a slightly different perspective – *the Good Country Index (GoCI).* Unlike other indices that are oriented mostly towards economic and social performance, this index measures the contribution of a country to "the common good of humanity" (Good Country, 2016). The Good Country organization collects the data from the official institutions and evaluates the "goodness" of a country through its contribution to seven dimensions: Science and Technology, Culture, International Peace and Security, World Order, Planet and Climate, Prosperity and Equality, and Health and Wellbeing. Unlike previous indices, we compared this index with all the dimensions, since it relates to all three sustainability aspects: economy, environment and society. The listed indicators are not primarily oriented towards measuring sustainability, but are focused on one or more dimensions. Thus, we included methodologies developed solely to measure the sustainable development: Sustainable Development Goals Index and Sustainable Society Index.

Sustainable Development Goals Index (SDGI) is the result of a worldwide study that evaluates how much each country contributes achieving the Sustainable Development Goals. The Sustainable Development Solutions Network and the Bertelsmann Stiffung annually publish these reports with guidelines to leaders how can identify priorities and track progress in achieving the goals. *Sustainable Society Index (SSI)* is another measure of sustainability level that the Sustainable

Society Foundation publishes every two years. The SSI framework calculates the performance at three levels: 21 indicators, 7 categories, and 3 basic SD dimensions (Economic, Environmental, and Human Wellbeing) (SSF, 2016a). However, specifics of this index are that it does not provide aggregate measure of sustainability, but three different scores for each dimension. Thus, we compared the DESI result with each of three SSI components.

Since none of the listed indices does not include cultural perspective of a nation, although it is identified as an important component of adopting technological changes, we included Hofstede's cultural dimension results for the selected set of countries, as Hofstede's cultural dimensions approach to measuring culture is one of the most widely used values surveys (Masleand & Hoorn, 2009). We explored correlations with each of six defined dimensions. Each country achieves a certain score on a scale from 0 to 100. *Power Distance* dimension describes the level of orientation towards hierarchy. Those countries that have high scores on this dimension accept unequal distribution of power, since low scores mean that power is equally distributed among society. *Individualism vs. Collectivism* describes the strength of the community in the society. High score on this dimension means that people are not willing to take other people's responsibility, unlike those with low scores that are loyal to the group they belong to and stand for their interest. *Masculinity vs. Femininity* describes the roles of men and women in society. Highly masculine societies defer the roles depending on the gender, and money and achievement are important determinants of success, while the feminine societies more orients towards the quality of life, and it is considered that men and women roles are overlapping. *Uncertainty Avoidance* measures the level to which people are willing to deal with the anxiety and are capable to accept the risk. High scores on this dimension defines that society prefers situation that they can control and situations that can predict, while the lower score signifies the relaxed and opened communities. *Long-term orientation* describes the degree to which people are oriented on past and tradition. Low score nations are more religious, nationalists, and are not easy to accept societal changes and thus are marked as short-term oriented, while high scores describes the nations which are more persistent, pragmatic, thrifty, and respect education. *Indulgence vs. Restraint* measures the society's characteristics in terms of enjoying life. Nations with low scores are restraint, pessimistic and are regulated by strict social norms, while high score describes societies that are more optimistic and focused on personal happiness (Hofstede G., 2011).

4. Research results and discussion

To compare the results and derive conclusions, we collected data from 2014 to 2017 (since the European Commission started measuring DESI in 2014) for EU countries (the scope of DESI). SDGI values are available only for 2016 and 2017, while SSI is measured every two years and thus the results are provided only for 2014 and 2016.

Measure	SD component		Data source
GCI	**Economy, Society**		WEF (2014) WEF (2015) WEF (2016) WEF (2017)
GII	**Economy, Society**		Cornell University, INSEAD, & WIPO (2014) Cornell University, INSEAD, & WIPO (2015) Cornell University, INSEAD, & WIPO (2016) Cornell University, INSEAD, & WIPO (2017)
GDP	**Economy**		Eurostat (2018)
GEI	**Economy, Society**		GEDI (2014) GEDI (2015) GEDI (2016) GEDI (2017)
GoCI	**Economy, Society, Environment**		Good Country (2017)
SciTech		Economy	
Culture		Society	
Intern.Peace & Security		Society	
World Order		Society	
Planet & Climate		Environment	
Prosperity and Equality		Economy, Society	
Health and Wellbeing		Economy, Society	
SDGI	**Economy, Society, Environment**		Kroll (2015) Sachs et al. (2016) Sachs et al. (2017)
SSI	**Economy, Society, Environment**		SSF (2016b)
HCD	**Culture**		Hofstede Insights (n.d.)

Table 1. SD dimensions and data source for the selected indices
Source: Authors

All data was collected from the official reports, websites, and databases, and the sources are given in Table 1. Also, in the table are listed the dimensions of sustainable development which performance is measured by the selected indices, since not all of them are focused on all SD dimensions. For the calculation of correlation, we used StatSoft's software *Statistica* (StatSoft, 2018). We measured the Spearman's correlation coefficient for comparing the Good Country Index and DESI since the data from the GoCI methodology is ordinal (ranks). For the rest of the data, we calculated Pearson's correlation coefficient. The results are presented in Table 2.

The results sow that the most of the measures significantly correlate with the DESI values (numbers flagged). GCI, GII, and GEI have strong positive correlation with DESI for each year (from 0.7667 to 0.8856) which means that the

highly digitalized countries are more likely to be more competitive, innovative, and entrepreneurially oriented on the global market. The similar situation is with the GDP level, which show high positive correlation from 0.6125 to 0.6623 with DESI index, which is expected, because higher digitalization level can be related to the higher standard level of the countries. However, it is not as high as the previous measures, which proves that the economic standard is not the only aspect that is related to the more digitalized societies.

Measure		SD component	DESI			
			2014	2015	2016	2017
GCI		**Economy, Society**	0.8047*	0.8655*	0.8546*	0.7667*
GII		**Economy, Society**	0.8071*	0.8745*	0.8682*	0.8564*
GDP		**Economy**	0.6687*	0.6827*	0.6614*	0.6883*
GEI		**Economy, Society**	0.8797*	0.8712*	0.8856*	0.8521*
The GoCI		**Economy, Society, Environment**	0.6125*	0.6623*	0.6519*	0.6377*
SciTech		Economy	0.3175	0.3290	0.3372	0.2874
Culture		Society	0.7767*	0.8095*	0.8161*	0.8084*
Intern. Peace & Security		Society	0.2759	0.3131	0.3098	0.2868
World Order		Society	0.5249*	0.5397*	0.5008*	0.5101*
Planet & Climate		Environment	0.1527	0.1587	0.1637	0.1544
Prosperity and Equality		Economy, Society	0.5435*	0.5955*	0.6015*	0.5709*
Health and Wellbeing		Economy, Society	0.7225*	0.7564*	0.7493*	0.7504*
SDGI		**Economy, Society, Environment**	N/A	N/A	0.8302*	0.6771*
SSI		**Economy, Society, Environment**	N/A	N/A	N/A	N/A
Human Wellbeing		Society	0.5488*	N/A	0.6132*	N/A
Environmental Wellbeing		Environment	-0.5642*	N/A	-0.5890*	N/A
Economic Wellbeing		Economy	0.3156	N/A	0.3199	N/A
Hofstede's dimensions	Power distance	Culture	-0.7201*	-0.7079*	-0.6992*	-0.5613*
	Individualism	Culture	0.5593*	0.5607*	0.5528*	0.5980*
	Masculinity	Culture	-0.3814	-0.3610	-0.3870	-0.3465
	Uncertainty Avoidance	Culture	-0.6427*	-0.6598*	-0.6470*	-0.5791*
	Long term orientation	Culture	-0.0681	-0.0772	-0.0920	0.0295
	Indulgence	Culture	0.6932*	0.7092*	0.7246*	0.6844*

Table 2. The correlation results significant at p< 0.05; N/A – the data was not available for the observed years

Source: Authors

The Good Country Index also has strong positive correlation with DESI (from 0.6125 to 0.6623). These results show that countries with higher level of digitalization also contribute more to humanity. This can be also viewed as a

certain aspect of sustainability, if we conclude that these kinds of contribution and responsible behaviour are leading towards higher sustainability. If we examine the components of GoCI, Science and Technology development have low positive relationship with DESI, which at first do not seem logic, but this value in the GoCI methodology computes on a basis of number of international students, journal exports, international publications, Nobel prizes, and patents, and is not closely linked to ICT development. Cultural component, however, has strong positive relationship with digitalization level, as well as Health and Wellbeing. World order, and Prosperity and Equality have medium positive correlation with the level of digitalization. These results again emphasize that social components of the countries are influenced positively with the process of digitalization. On the other hand, for International Peace and Security it is not identified statistically significant relationship, although it is positive. In addition, for Planet & Climate component, the only component related to environmental dimension, there is a weak positive correlation, which means that does not have statistically significant relationship with digitalization level.

If we look into the sustainability indices, SDGI also strongly correlates with the DESI with correlations of 0.8302 and 0.6771. This implicates that, according to these methodologies, more digitalized societies tend to perform better in achieving sustainability goals. Yet, to have another perspective, we can look into the SSI correlation results, since this index diversifies three components related to the sustainability dimensions and does not provide a single (composite) measure of sustainability. Human Wellbeing component related to the society dimension has positive relationship with the digitalization, meaning that digitalized societies have more satisfied basic needs and better education. Yet, in comparison to Environmental Wellbeing, DESI has negative relationship. This is an important implication, since it signifies that societies with higher digitalization level are scoring low in terms of climate, energy use, renewable energy, consumption etc.

From a cultural perspective, the results show that Power Distance dimension has high negative correlation with DESI. The result indicates that societies with high hierarchical structures are less digitalized than the ones with the equally distributed power. Also, Individualism has medium positive correlation with digitalization (0.5528 to 0.5980), which shows that collectivistic societies have lower level of digitalization than the individualistic. Although the relationship is not statistically significant, Masculinity has weak negative correlation with DESI, which is very specific, since the masculine societies are driven by the success, competition and achievement. The results also show that countries that are more risk oriented (have lower Uncertainty Avoidance scores) tend to be more digitalized according to the medium to strong negative correlation scores (-0.5791 to -0.6470). Surprisingly, Long term orientation does not detect any relationship with the digitalization level. That signifies that there are no differences found in accepting the digitalization between the traditional societies and those that are future oriented. In the end, Indulgence has strong positive correlation with the level of digitalization. This result indicated that the level of

digitalization is higher in the societies, which are freer to enjoy life and have fun in comparison to the restraint countries that resist the fulfilment of their desires.

4.1. Limitations and future research directions

Although we have derived important implications, this research has certain limitations. Firstly, the set of countries is narrowed to 28 EU countries because of the scope of DESI. This is important because cultural differences may be even stronger, and conclusions may significantly differ when the rest of the world countries are included (especially Asian and African). However, this is not possible to change if some new official measure occurs or the European Commission methodology changes the scope for DESI. Regarding methodologies for measuring sustainable development, SDGI is still young methodology, and SSI is not measured annually and does not provide unique score on sustainability. In this research, we used Hofstede's model of cultural dimensions exploring values and relationship with society impact on DESI, but there are other methodologies that can be examined for this purpose and to determine relationship with macromarketing efforts. Fons Trompenaars and Shalom Schwartz developed their own models of cultural dimensions (Fons Trompenaars & Charles HampdenTurner, 2000; Schwartz, 2006), so the examination of relationship between these two modes and digitalization and sustainability will be the subject of further research. Also, in future, there is a possibility to structure the model of implications for policy makers with specific macromarketing tools that should be applied for easier implementation of technological changes into society based on the cultural dimensions.

5. Conclusions

Technological changes are rapid. They are significantly shaping our society. Since the length of the waves is shortening, it demands quick and agile reaction on the market. Currently, we are living in the era of digital transformation. Digital technologies are changing all business aspects and new challenges are occurring. In adopting these changes, macromarketing has a special role with its specific tools. Nonetheless, man must not forget his natural environment in chasing the economic development. Thus, developing sustainably has been set as a priority action. Two questions emerge: Whether and to what extent digital transformation affects the sustainable development and its components? and Whether digital transformation level is affected by the cultural characteristics of a society?

For answering posted questions, we conducted a research where the digitalization measure of EU countries is compared with other established methodologies that measure one or more sustainability components. The results show that digitalization significantly relates with the sustainable development components. The higher digitalization level is in a relationship with the economic

development through higher competitiveness, innovativeness, and entrepreneurial activities. Also, GDP is higher in more digitalized countries. Nevertheless, not just economic development, but the social aspect is also positively influenced by the digitalization. However, environment is neglected with medium negative impact of the digitalization. Based on correlations results between different Hofstede's cultural dimensions and digitalization it is noted that cultural differences have large impact on the process of digitalization. More hierarchy, individualism, risk orientation, and readiness to enjoy life are leading to higher digitalization. On the other side, traditional societies has the similar digitalization level as the future oriented ones. This also leads to the conclusion that macromarketing has an important role in accepting digitalization, if the tools are used and shaped in accordance with nation's cultural characteristics.

It has been noted during the research that methodologies used for measuring the sustainability level are not developed enough, and that more focus is put on the economic and social development. Also, we based our conclusions on DESI, measured only for the EU countries. We examined the methodology and derived the conclusion that it has been carefully developed, with the appropriate structure and weighting system. Since the digitalization is an important aspect of today's development, DESI should have wider scope than 28 countries. This would enable future research with a more representative set of countries for deriving conclusions, especially in terms of cultural characteristics that are important for shaping the implementation set of actions.

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PART 5

CONTEMPORARY ISSUES OF LOCAL ECONOMIC DEVELOPMENT

CHAPTER 19

Smart city concept and alternative procurement models as instruments for reduction taxpayers and authority agency costs in public investment projects

Damir Juričić[1]

ABSTRACT

Stakeholders in corporations like owners, managers, suppliers or lenders are well informed about agency costs caused by informational asymmetry. This topic is, on a corporate level, comprehensively researched and well known for a long time. However, agency costs, caused by informational asymmetry on a public organisations level like cities, counties or public corporations, caused informational asymmetry which have stakeholders like taxpayers, public management (mayors, public managers), members of the city councils, are insufficiently explored, specially instruments for reduction of agency costs.

The new paradigm of collecting, managing and using information, as well as alternative public investment procurement models within the concept of "smart cities", could be a significant factor in reducing information asymmetry among entities in public organizations, thus increasing the efficiency and effectiveness of public organizations and value for taxpayers money.

In this paper the attention will be focused to defining of taxpayers agency costs caused by informational asymmetry in relation taxpayers – authority as well as authority – corporations in traditional and alternative procurement of public investment projects. Also, there are a brief review of possible instruments for reducing principal' cost in monitoring the agent.

Key words: Agency costs, informational asymmetry, value for money, taxpayers, project finance

JEL classification: G38, H80

1. Introduction

The whole process of contracting a specific business relationship can be divided into two sub-processes: a sub-process that determines relationships and behaviors prior to the conclusion of the contract and the sub-process that relates to the period after the contract is concluded (its execution). The basic feature of both processes is that, in most cases, the contracting parties have

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different information on the contracting subject (procurement, delivery, production and the like) which is referred to as the asymmetric information relationship. This informational asymmetry between the contracting parties, for the party with less information on the subject of the contract, creates costs that are called agency costs in economic theory. A contracting party with more information on the contracting subject is called the agent while the contracting party with less information is called the principal. In such an asymmetric relationship the agent achieves a benefit in relation to the principal, e.g. in the position to appropriate most of the total created value deriving from the contractual relationship.

Agency costs are manifested, at least it's presented like so in theory (Sung, 2005), through two forms of behavior: adverse selection and moral hazard. Adverse selection occurs usually in the period before the contract is concluded, while moral hazard occurs after the contract has been concluded. Adverse selection represents the situation within which the principal selects the agent in the circumstances when the principal does not have enough relevant and available information about the agent and that information won't have until the agent is selected. Moral hazard represents the relationship in which the agent, who is now engaged by a principal to perform a particular job, uses excess information in relation to the principal for the purpose of engaging a minimum effort to execute a contract, e.g. the agent acts as an opportunity.

Described universals and processes can be observed in the public sector among different participants. Firstly, that is the relationship between voters and candidates in the election process. In this process, voters have less information about the final execution of the promises of the candidates when they come in to the power. In this relation, voters are in the position of principal while candidates are in a position of agents. Voters are exposed to adverse selection risk. Secondly, when the candidates came to the power they become the authority and are now in the position to deliver promises to voters (who now come in the role of taxpayers and users of public services). Thirdly, the authority delivers public projects (public services, public infrastructure, in general, public projects), especially infrastructural ones, higher capital value, in the way so that they engage other people with whom they enter in contracting relationship. However, in this relationship the authority is in the role of principal while the third party (more frequently, construction companies) are in the role of agent, Now the authority is exposed to adverse selection risk in the procurement process (before concluding the contracts), while after the conclusion of the contract the moral hazard risk is exposed.

In this paper, instruments that could be used by taxpayers and authorities for the purpose of reducing agency costs and preserving value for money are being analysed. It is about the potential of applying alternative procurement models (concessions, PPP, EPC etc.) and ICT (smart city concept).

2. Literature review

Agency costs theory has been used in numerous fields as accounting, economics, finance, marketing, political science, sociology, insurance and many others. It is about very complex analyse tool (Eisenhardt, 1989) in which it wants to be explain complex relationships between agent (person who represent the principal and act in the name of the principal) and principal (person who engage the agent to manage the asset in the name of the principal). Agency costs arise from behaviour in principal-agent relation where principal bears the costs of monitoring the agent.

The situation where two parties negotiating about potential transaction do not have the same information on the transaction value is called the status of asymmetric information. Asymmetric informations are continually emerging in society mainly due to the degree of general availability of information, but also the degree of education. In economy and commerce, the process of creating asymmetry in information can be viewed as a process that precedes a profitable transaction. A person who has more information on the subject of exchange will probably have a higher value added. When two groups are trading, the more knowledgeable group will have more information that can lead to higher productivity. This group will have a greater business value.

This is a positive example of asymmetric information. However, there are numerous negative examples as a consequence of asymmetry in subject and way of business. In the case where a person has information that could, in a case reacheable to the opposite party, reduce the benefit or increase costs, that person will conceal such information until the transaction is concluded in the manner and under the conditions appropriate to the person hiding the information. It is about manifesting the negative consequences of asymmetry in information between two people in a potential business relationship - adverse selection. According to the definition (Encyclopedia Britannica), adverse selection is a case in which one person tries to conceal the information that, for her, might negatively affect the final outcome of the transaction.

Examples are numerous and noticeable in many areas of life: selling of disposable things (the seller has more information on the subject of the sale and tries to discard it in order to achieve a higher sales value), insurance (the insured has information on the likelihood of risky behavior he strives to insure to the insurer in order to achieve less (the candidate pursues only positive features and knowledge to increase the likelihood of employment), finance (the manager decides to finance new asset with shares in case the value of the share of the company exceeds the real value). Behavior of entities in the circumstances of adverse selection is a behavior before concluding a transaction or concluding a contract. The second manifestation of negative effects of asymmetric situations is a moral hazard. According to the definition (Kunreuther, 2008; Auronen, 2003) it is a situation in which a person who is insured against certain risks in the future is inclined to assume either or part of the risks that are secured

because any materialisation of the risk will produce costs on the other party, insured parties for the reason of higher value of the cost of the materialized risk in relation to the premium for the transferred risk.

There are numerous examples of moral hazard in different areas of life: insurance (the insured will be exposed to greater risk and activation of the insurance policy because the premium is paid less than the materialized risk), employment (the employee will use the benefits less contractually regulated by creating additional costs (to the employer), finance (the credit borrower will be in a state of reduced ability to pay obligations based on a credit), trade (a product buyer with inappropriate use of the product and caused damage will be entitled to refund or replacement). According to Sungu (2005) in practice, the relationship between principal and agent is not divided into two components, respectively adverse selection and moral hazard. The theory, which attempts to explain the complexity of the situation, describes separately these information asymmetry effects. Adverse selection problems arise from information asymmetry before and / or after contracting, while moral hazard problems stem from the unobservability of managerial effort only after contracting

The effects of asymmetric information have been intensively investigated in the business, especially the financial and insurance sector in the last 40 years. The work of Stiglitz and Weissa (1983) is well known, which presents the application of the conclusions of the asymmetric information theory in the financial sector. Stiglitz and Weiss are investigating the effects of contracts with options of suspended termination (possibility of termination of contract, contingency contract) on the behavior of contracting parties that contribute to the reduction of adverse selection and moral hazard. For example, adverse selection, that is, those who apply for the credit get riskier on average, and the incentive effect, that is the ones applying credit have an incentive to spend it on riskier projects (Stiglitz, Weiss, 1981). Samuelson (1984) investigates the effects of asymmetric information in the bargaining process and concludes that it is useful for the negotiating parties to engage the mediator if the costs of engaging the mediator are lower than the potential agency costs. Hansen (1987) has come up with similar conclusions regarding the mediator or broker, pointing out that the selection of mediators in merger proceedings can reduce agency costs and increase transaction success. Mattsson (2002), using the theory of asymmetric information, explains the relationship between entrepreneurs and equity investors. Recently, with the theory of asymmetric information, the aim is to explain and improve different solutions with subcontractors (Auronen, 2003).

Within the scope of this paper, special emphasis is placed on the use of asymmetric information theory in the area of application of project financing techniques because the public authority chooses between two public procurement models: traditional and alternative. When applying an alternative model, as a private entrepreneur takes on the risks of design, construction, maintenance and financing, he applies project financing techniques, thus creating agency relationships between equity investors and managers, equity investors and

creditors, and management and long-term suppliers. Namely, Shah and Takor (1987) provide asymmetric information and signalling theory in response to questions about the capital structure in projects using project financing techniques. Finerty (1996) argues that the choice of project financing techniques, especially in public infrastructure projects, is result of higher probability of agency costs being reduced due to more effective management control by the owners of managing the cash flow of the public project and reducing the risk of underinvestment with parent companies already in charge of other projects. Esty (2003) comes to similar conclusions, pointing out that the parent companies (SPV[2] owners in project financing) increase their value precisely because of the reduction of agency costs and the risk of underinvestment. Agency costs arise because of asymmetric information between managers (who control public investment and its cash flows), and entities that provide funding sources and public investment (equity and debt holders). Certain property characteristics can cause agency costs. Assets that generate high profit margins and high EBITDA[3] cause underperforming creative efforts and above-average earnings (private benefit managers). Conflict arises in the decision on allocation of EBITDA; whether the majority of available EBITDA will be reinvested or distributed by sources of funding or reinvested. Project financing here solves the agency's conflict with the imperative of paying off excess money through funding sources, preventing reinvestment and limiting the duration of the project (contract).

Processes based on asymmetric information are, of course, also present in the public sector. The main-agent problem arises in the public sector due to the existence of public policies and its manifestation differs somewhat from the private sector manifestation. Namely, there are claims (Lane, Ersson, 2003) on the difference between the principal-agent problem in the public and private sector due to the difference in the delivery of goods and services. In that sense, the difference arises whether the agents are to allocate public goods (non-excludable, jointness) or whether they also supply private goods (excludability, rivalry). It is also interesting that a public sector has a double principal-agent interaction, first between electorate and politicians (political parties), then politicians and bureaucrats. Thus, principal-agent interaction in the public sector could be more complex then in the private sector. Adverse selection in public sector can be met when public authorities buy goods and services. Cox (1996) stresses that public procurement can not be effective until the information asymmetry has been reduced or eliminated. Adverse selection occurs when the government accepts the bid of an inefficient producer because it can not observe the bidders' expected production costs before awarding the contract (Cox et al. 1996 in Attila, G.)

Until now, in the literature, the agency problem is mainly referred to as a relationship between the authority and the business organization that delivers public services. However, he gets the impression that the agency problem with

2 Special Purpose Vehicle.

3 Earning Before Interest, Tax, Depreciation and Amortization.

his manifestations caused by asymmetric information such as adverse selection and moral hazard is also present in the relation between the voter and the future mayor, in the relationship between the mayor and the administration and in relation to the authority and the provider of public services.

3. Agency problem in public investment

In this paper attention is focused in two processes. First process is related to relationship between taxpayers (voters) and political candidates in period before they come in to power (new authority has been established) during the period of democratic election within which political representatives presents their plans for the investments in the case in which they would be selected.

This relationship is represented in Figure 1:

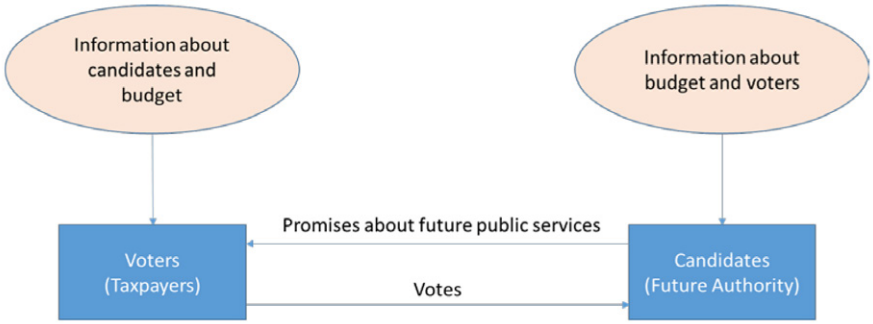

Figure 1. Relation between voters and candidates in the election process

Voters have less information regard candidates and budget (fiscal capacity) then candidates have, so in this relationship exist significant asymmetry between information they have.

After the end of the election process, candidates become the official representatives (authority) of the voters and, from that position, deliver promised public investments and public services to the citizens (taxpayers). Authority finances deliveries of public investments and services from taxes levied by taxpayers (voters).

Relationship between taxpayers and authority after the election process is shown in Figure 2:

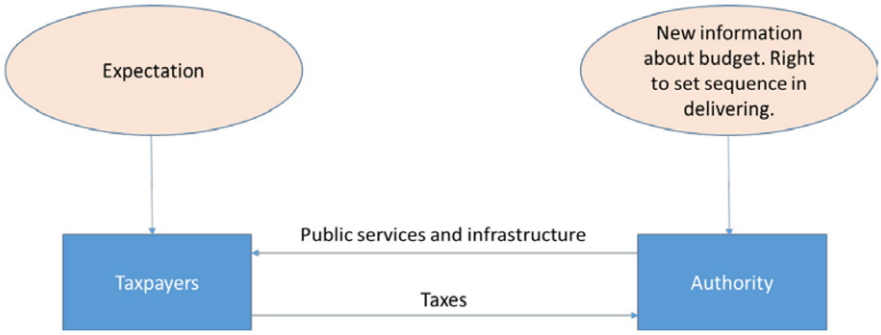

Figure 2. Relation between taxpayers and authority after election process

The order and quality of delivered public services depends on information, fiscal capacity and authority preferences. After establishing the authority, the authority coordinates the information on the fiscal capacity and develops its own priority sequence of delivered public services and infrastructure. This (new) priority list could be different than one in election process.

Taxpayers expect the value of public services adequate to the cash that with the tax they pay into the budget. If the standard of public services is commensurate with the money paid, it may be argued that the taxpayers, or the final users of the services, receive a value equivalent to the money paid. However, the value of public services may be less than the value of the money paid, which results in a lower value received for paid money. Thus, the reduced standard of public services compared to the payroll tax payers or final users results in a lower value for money.

In relation to the authority and taxpayers (final users), the authority has much more information than taxpayers about the possibilities of delivering public services with the most common fiscal capacity and the priority delivery of new and existing public services. This difference in information between the authority and taxpayers is referred to as the status of asymmetric information resulting to an agency problem in which the authority is agent and the taxpayer is principal. In this situation, the principal carries the agency's costs.

However, in this relationship is an interesting comparison of the behavior of authority before and after the election process. Namely, the behavior of candidates (who came to power) before and after the elections may not be the same. Specifically, the authority does not have to deliver the public services in the order and quality as promised in the election process. In other words, the authority can change the behavior in relation to the election process. By acting rationally in the sense of staying in power, the authority can try to maximize the delivery of the promised public investments, but due to limited fiscal capacity, with a reduced public service standard. Payments of taxpayers remained unchanged. Thus, taxpayers in these cases bear agency costs.

Agency problem's second case can be found in the relationship between the authority and the contractors of the works on the public infrastructure. This relationship is shown on Figure 3:

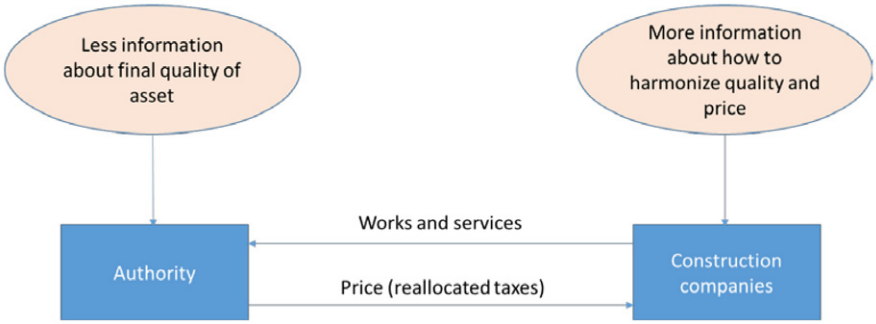

Figure 3. Relation between authority and construction companies

Namely, for the purpose of delivering public services to the final users (taxpayers) authority engages contractors for work in public infrastructure through the intermediary of delivering public services to the final users. For example, a public education service is provided through a built school, a public health-curing service provider through built-up hospitals, a public transport service through a built-up motorway or railroad, and the like. In the process of preparation and final delivery of the project the authority is exposed to the risk of finishing the infrastructure development consistent with the basic idea and the desire of the authority, and later, after the conclusion of the contract, to execute the tasks in accordance with the contract. In this relationship, the contractor has more information on the subject of procurement, so he is in the role of the agent while the authority is in the role of principal. Due to different information on the subject of procurement, the authority will bear the costs of various types of surveillance in order to reduce the asymmetry. This relationship also identifies the potentials of changing the behaviour of the contractor after the contract is a moral hazard.

4. Possible instruments for reducing taxpayers agency costs in public investment

In order to reduce the asymmetry of information between taxpayers and authorities, on the one hand, the authority and project contractor on the other, there are various instruments available to the entities, which could, by appropriate application, reduce agency costs and increase the value of the services or works paid for.

4.1. Potential instruments for reducing the asymmetry of information between taxpayers and authorities

The agency costs incurred by taxpayers (as principals) in relation to the authority (as agent) are manifested in the form of impaired value of services received

in relation to the money paid (tax). In order to receive the value of the delivered public services adequate to the money paid, the taxpayers will insist on defining the standards of public services as well as payment mechanism. For example, for an efficient and effective public education service, it is necessary to provide adequate space through which public education services (school, classroom, gymnasium etc.) will be delivered.

The construction of the school is funded from the taxpayer's taxes. For the paid ammount of tax, taxpayers have the right not to get any school building, but a school building that is energy efficient (reduced energy consumption for achieved heating and lighting), effective (long term achievement of energy standards, CO2 reduction, energy production and the like), thermally stable (room temperature appropriate for activities, season and outdoor weather conditions), illuminated according to the activities (classroom lighting, lighting in the sports hall, lighting in halls and dressing rooms, and the like).

Certainly, a standard so defined must be delivered to the building's whole life (school), which brings the authority to the position of regular maintenance obligations, thereby balancing the benefits (delivered standards) and the costs (paid taxes) of existing and future generations of taxpayers or final users of the school. The relationship between taxpayers and authorities in the circumstances of reduced agency costs is shown in Figure 4:

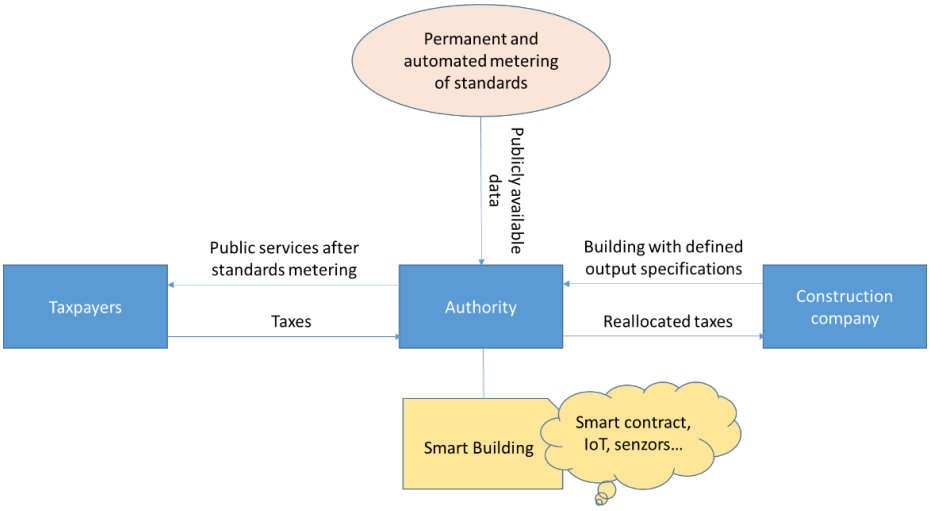

Figure 4. Possible relationship between taxpayers and the authority in the case of reduced agency costs.

It is about so-called building's output specifications that can be continuously and automatically measured, especially with the use of smart sensors, smart contracts and IoT[4] technology. The measured data, processed in information about the delivered standards, can be the basis for evaluating the relationships

4 Internet of Things.

planned and realized. Thus, the authority is in a position to take over the risk of delivering a certain (contracted) standard of public service for collected taxes from taxpayers. Measured standard delivered in a transparent way, throughout the lifetime of the building (school), all participants are informed about achieving adequate value for money. Such results will serve the authority as a set of data for the purpose of correcting its activities and policies while serving taxpayers as a real proof of the efficiency of their administration.

4.2. Potential instruments for reducing informational asymmetry in authority – construction company relationship

The main assumption on Figure 4 is that the authority procures the works. This means that a construction company will conclude a building contract (eg school). It is a traditional procurement model (TPM) within which the authority, after the built school, continues to maintain and manage the building itself (in house). The basic feature of such a procurement model is that the authority takes over a majority part of the school's risk in its whole life. This further means that the authority, with its administration, will be responsible to the taxpayers for the delivery of defined school premises. At such a procurement model, the authority decides when its administration is capable of managing all the risks of such a project.

However, one should ask whether this is always the case for any type of public service or public building? If the authority and its administration do not possess the necessary knowledge and skills in managing overall project risks, the risk of excessive and unexpected materialization of the risk is expressed, which will result in suboptimal delivery of the standard and consequently lead to reduced value for the taxpayer's money. Also, the authority is exposed to the risk of information asymmetry and moral hazard. Namely, the construction company will behave rationally and strive to win in the public procurement process. Since the construction company has far more information on the subject of procurement, it will seek through economics of built-in materials and building logistics to reduce the costs of construction, which will maximize the success of the bid if its bid is competitive[5]. However, after the construction company supplies the building, it leaves the contract and the maintenance costs are left to the authority.

However, the authority can be protected from materializing such risks and transferring these risks to the construction company. If the project documentation is prepared professionally and in accordance with good world practice, the authority may successfully transfer the design, construction, maintenance, financing and operational risk to the construction company by applying an alternative procurement model. The relationship between authority and construction company when applying an alternative procurement model (APM) is shown in Figure 5:

5 This costs could be reduced if the open public procurement procedure is replaced with competitive dialog.

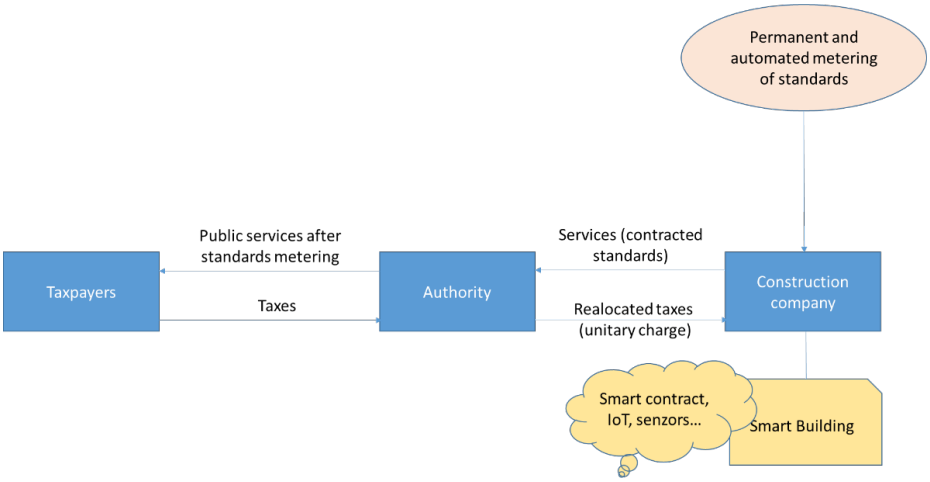

Figure 5. Possible instrument for reducing agency costs in authority – construction company relationship

Applying the APM authority no longer acquires the building (school) but the schoolroom conditions it needs to deliver the basic public service: education. Construction company will build the school, finance the construction and maintain it in accordance with agreed standards. As long as construction company supplies space requirements in accordance with agreed standards, the authority will pay unitary charge. In the case of delivery of reduced space conditions, according to payment mechanism, the authority will reduce the fee. This payment mechanism solely to the standard delivered is directly related to the preservation of value for the taxpayers money.

Economic theory suggests that, in the presence of positive externalities, asymmetric information problems and lack of contractibility of quality dimensions, alternative procurement models can result in better-quality infrastructures and services and in lower whole-life costs than traditional procurement (Iossa, Saussier, 2018).

5. Conclusion and further research

Complex relations between taxpayers, authority and construction companies are continuously exposed to asymmetry in information and interests. Because of this asymmetry, the participants in each other's relationships have certain costs depending on the role of the agent and principals. Economic theory and practice seek to understand these relationships and to propose instruments for reducing agency costs. In this paper they are particularly prominent the relations between the taxpayers and the authority (the relationship between the taxpayers in the role of principal and the authority in the role of the agent) and the authority and the construction company (relationship in which the authority is in the role of principal and a construction company acting as an agent).

This problem is seen from the aspect of the development of culture and the practice of defining public service's standards (soft and hard) and their permanent measurement and comparison of planned standards with realized using smart city technologies and applied alternative procurement models, within which the authority is no longer focused on the owning of public buildings and procurement of works but the focus is diverted to the availability of public buildings and the role of supervisors of the standards delivered. The main benefit of the authority using this position came from transferring the project's risks to construction company not with procuring building but already providing availability of building.

This change in the role of authority and appropriate preparation of documentation in accordance with good world practice could create the potential to reduce the agency costs of all participants in the project, increase value for taxpayers' and end users' money, increase end users satisfaction, and work and efficiency of public administration to quantify in the purpose of a better election process. Academia and policy makers should promote more information sharing among administrations and the use of model tenders (standardized tenders) and model contracts (standard contracts) to improve the tendering and contracting of administrations. Open data and open government would also facilitate learning and accountability, paving the way for more efficient and effective alternative procurement models such as PPPs, concessions and the like (Iossa, Suissier, 2018).

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CHAPTER 20

The Impact of Internet of Things (IoT) and Digital Transformation on Smart Environments and Integrated Ecosystems

Milos Loncar[1]

ABSTRACT

The research investigated the potential influence of IoT as well as digital transformation on building smart environments such as smart cities and smart workplaces along with integrated ecosystems. The research described how successfully technological developments through Internet of Things have contributed in developing smart environment. It pinpointed the technologies like sensors, vision processing and application-oriented approach for human central thinking. The research highlighted various types of smart environments that were created due to technological developments of the IoT through technologies like robotics, HCI, computer networking techniques, mobile devices, collaborative thinking and computing. The research adopted qualitative methods of data collection, analysis and observation for the interpretation of results and indicated that IoT has made significant influence on building technologically developed smart environments. It explored that Internet of Things have contributed greatly in development smart environments to improve living and working of people at technologically developed living and workplace environments. It has improved the living of the people through communication and interaction modals with humans, practical design solutions and multi-faceted conceptual development and algorithmic considerations of the seamless business operations.

Key words: Smart environments, integrated ecosystems, Internet of Things, Improved living and information sharing, technology developments

JEL classification: Q57

1. Introduction

1.1. Introduction

The current research identifies the importance of IoT & digital transformation that contributes greatly in building smart environments and highly developed and integrated ecosystems. It describes the services of IoT in making the environments healthier due to latest technological developments. It presents how

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successfully IoT has enabled physical world to adopt actuators, sensors and computational elements to maintain continuous work connectivity. When the physical environments are effectively interconnected through latest technologies and computational elements, they form a smart environment and contribute greatly in providing healthy living environment to their residents. A smart environment is highly essential to provide necessary support to the residents of a region by improving their abilities to execute health tasks. The research examines how successfully these environments facilitate the living of people by investing their potential influence of IoT-based smart environments on common people. The IoT-based these environments and ecosystems provided technologically developed solutions such as enhanced communication networks, local area wireless standards and characteristics. IoT-based smart environments and ecosystems have brought about new opportunities for people to make positive and healthy effects on their living (Ahmed et al., 2016). The research highlights that smart environments with integrated ecosystems could contribute greatly to promote the participation of different communities to adopt several enabling technologies to improve their living through multi-modal sensing, vision processing, application-oriented approach for human-central thinking. The smart environments also contribute through robotics, HCI, networking, mobile, collaborative thinking and pervasive computing. Therefore, smart environments are developed through IoT and digital transformation and contribute greatly in serving and developing interaction modals with humans, practical design solutions and multi-faceted conceptual developments as well as algorithmic considerations for seamless operations (Ashton, 2009).

The research highlights interconnected smart world where humans are connected with devices due to smart environments. The exchange of data has become easier for better decision making due to better environments and ecosystems. The increased utilization of internet has provided us great opportunity to continuously adopt and use computer networks as smart devices, phones, people and communities. A digitally developed and well connected ecosystem was developed based on different layers of data including the layer representing communication between people or entertainment and the virtual life in second layer where human and objects were interconnected to a local network. The technological developments based on Internet of Things and digital transformation has contributed greatly in offering seamless connectivity to people with smart devices and objectives to improve their living. The research determines how successfully these environments and ecosystems through integrated mechanism are developed by adopting latest technologies such as small ubiquitous devices like sensors, RFID tags, actuators, smart phones and the embedded ecosystems. But, these networks and devices are associated with some challenges or discrepancies due to their narrowing capabilities in resources. The research also addresses that issues to ensure IoT and digital transformation has helped us to overcome these issues and to improve the connectivity of smart objects to local networks under the latest technological developments in IT (Petroulakis, Askoxylakis & Tryfonas, 2012).

1.2. Background of the Research

The research conducted by Petroulakis, Askoxylakis & Tryfonas (2012) pointed out that Internet of Things has contributed greatly to develop smart cities and smart workplaces through IoT in technologically developed environments. The modern-day ecosystems and interconnected devices with local networks have created smart environments by improving the capabilities of devices, building, places and people. It improved internal and external interfaces of the technologies with these devices, buildings and people by developing smart cities. The research highlights that Internet of Things has become essential in developing Smart Planet as well as connectedness among communities through smart devices and communication solutions. The author pointed out the important elements of the smart environment such as smart objects that interact with the environment and make it worthwhile for living. The second important component of smart environment was based on the interconnection between the smart objects and the local networks that promote communication and integrated ecosystems. According to the information presented in the research, the life-logging was the third important component of smart environments that showed its interrelationship with the smart environment (Rajguru, Kinhekar & Pati, 2015). The structure of the these environments and ecosystems was highlighted in the figure given below;

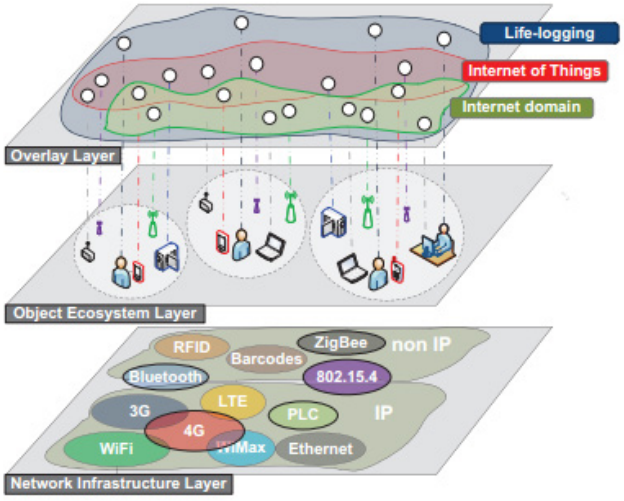

Figure 1. Smart ecosystems

The research conducted by Vermesan & Friess (2014) examined IoT by identifying their influence to converge latest technologies into smart environments and highly integrated and developed ecosystems. The authors pointed out that IoT is interconnected with several combinations that are essential for the growth of smart environments through smart devices including computational, wireless and data storage devices in the real world. These technological developments

have provided greater chances to the organizations to overcome their major challenges to ensure these environments by overcoming interoperable technologies and standards, information and data management issues, their privacy and security concerns and skills needed to manage the complexity of growing IoT in the technologically developed organizations. The research highlighted that the management of organizations is responsible to take holistic view of their IoT approach to examine opportunities it offers and challenges it addresses through these environments. IoT has found to be responsible to build strong business cases to enhance revenues with increased market share, profitability and increased efficiency of the businesses. It has also increased the competitiveness of the businesses by improving their asset management and making them compatible with associated environments (Cognizant, 2014). The management of fast growing highly competitive organizations is also responsible to master their skills in IoT to identify business operations or areas of concerns where IoT-based smart systems could be implemented and significant benefits could be achieved. The development of robust data along within technologically developed environments & ecosystems has become very crucial for the businesses to mine valuable insights in the process of generating data by important business transactions and interactions that could happen through the IoT integrated ecosystems. The information that surrounds people, businesses, their operations, processes and products and services is always important to be protected through integrated databases. Code information could be effectively used in managing IoT-based environments & ecosystems that generate data for the development of improving business cases, training skilled talent and achieving their desired goals and objectives. The research pointed out that IoT-based environments and ecosystems could be associated with several technologies and devices that could be adopted through the interconnectivity of different networks (Jerald, Rabara & Bai, 2015).

1.3. Research Aims and Objectives

The main aims and objectives of the research are based on following points:

- To investigate how effectively IoT could make significant influence on environments to make them smart environment associated with ecosystems
- To examine various tools and techniques in the context of IoT that could enable the businesses to work in smart industries and smart business environments
- To determine how IoT has transformed the rapid convergence of information and communication through Cloud, data and communication networks by ensuring smart environments and ecosystems in business environments
- To explore how successfully IoT and digital transformation address smart environments by transferring physical business activities into digital activities

- To evaluate how successfully IoT strategies and innovation directions ensures these environments & ecosystems due to latest technological developments
- To describe how successfully IoT and digital transformation has enabled the businesses to adopt automated, self-controlled and innovative business solutions through built-in fault detection and diagnostic capabilities to ensure smart environments and ecosystems in which they work

1.4. Importance of the Research

The research examined the influence of latest technological developments like IoT & digital transformation on developing smart environments that are highly important for businesses that work in highly competitive business environments. Internet of Things has enabled the business organizations to adopt latest technological solutions to address their business requirements in these environments to provide notifications, save energy, ensure safety and security of their products and services, production processes, and highly interconnected ecosystems with shared interface. The research paper is highly important in addressing the business concerns to adopt latest technologies to enhance integrated communications through these smart environments and ecosystems. These technologies would enable the businesses to improve their business performance through Internet of Things including sensor networks, M2M, RFID, integration of semantic data, semantic search and IPv6 etc. The technologies such as Cloud computing, virtualization of the networks and embedded systems would be helpful for the businesses to enhance their capability to be connected all the times everywhere (Jerald, Rabara & Bai, 2015).

The current research on identifying the influence of IoT on smart environments and ecosystem indicates that these systems including hardware and software integrate growing community of commercial and consumer IoT users. It enabled the businesses to save their business data through IoT data security, protect personal privacy and intellectual property and encourage interoperability among IoT-based devices and systems. The application of IoT and digital transformation in creating smart environment & ecosystems has made potential influence on changing the lifestyle of people. Now people can adopt technologically developed tools and techniques to live a healthy environment with increased fitness to avoid diseases and living a healthy life. The application of IoT to businesses in creating technologically developed environments & ecosystems have benefited businesses and human assets significantly by reducing communication time, saving money and creating greater value for consumers by designing technologically developed products and services meeting their desired expectations. Overall, the latest technological developments like IoT & digital transformation has contributed greatly in building the trust of the customers on their products and services by developing new business models and bases of competition for them (Nguyen & De Cremer, 2016).

2. Literature review

2.1. Review of the Literature

The research work conducted by Vermesan & Friess (2013) investigated the conversion of latest technologies on building smart environments for better productivity and enhanced performance at the industrial level. IoT in developing these environments has become central point among majority of governments in Europe and Asian countries. Large numbers of businesses has given necessary attention to the IoT with added additional components to improve the associated business environments and ecosystems. The authors pointed out that businesses operating in the private sectors and their end-users are opting for significant components of IoT to deal with smart devices and networked applications. It has continued to develop and has the potential to combine relevant technologies all together such as the technologies of Cloud, Big Data, Semantics, robotics and Future Internet. When the technologies associated with the IoT are better exploited, they work for a stronger cross-domain interactivity, increased awareness of the businesses about problem-solving and achieving better productivity and competitiveness in comparison to other market players. The authors highlighted that time for conversion has arrived and the businesses could take up smartphone platforms or user-driven applications that could run on multiple level through the successful connectivity of various sensors and the objects (Kortuem et al., 2010). The increased use of latest technologies in the IoT could bring together a number of distinct constituencies to develop integrated ecosystems. IoT has revolutionized the world by providing technological developed solutions to their business problems to adopt innovation, creativity and integration of their business processes with associated external environments through digitally connected solutions. It has provided huge variety of solutions to the business enterprises to actuate and sense their capabilities, process information and adopt generally apprehend objects as entities with a growing intelligence and patterns of autonomous behaviors. It has increased the interactivity of the coherent applications by reducing the complexity and modulation and boundaries between the applications and services. The IoT has enhanced the coherence between the real world and the virtual worlds by facilitating the businesses to store big amounts of data at their database and increase networks and information processing capabilities (Jones, Suoranta & Rowley, 2013).

Sniderman, Mahto and Cotteleer (2016) pointed out how effectively modern enterprises can adopt latest technologies to improve their productivity and business performance through technologically developed environments & ecosystems. IoT has contributed greatly in getting increased connectivity of manufacturing organizations by getting more sophisticated data collection and enhanced analytical capabilities of the businesses to shift their focus towards information-based economy. The research also highlighted that increased use of latest technologies such as technology related to industry 4.0 could be effectively used by the management of industrial organizations to reduce their

business risks and to enhance their productivity. These technologies with IoT have helped the management to effectively plan their business processes, predict changes and respond to business changes in real time. Effective planning at production processes was observed to be helpful for the operational managers and manufacturers to overcome uncertainties and risks across their manufacturing processes. Large numbers of businesses in the industrial sectors have adopted IoT as their major technological developments to ensure their manufacturing and production processes have achieved smart environments with integrated ecosystems. The business performance has also been increased due to the applications of digital technologies to operate effectively in the industrial environments by adopting augmented reality, controls, sensors and wearables at the industrial level. The Industry 4.0 technologies have been developed through the utilization of IoT for smart environment and integrated ecosystems to enhance labor productivity and effectiveness and ensure successful achievement of business goals and objectives for their management (Jones, Suoranta & Rowley, 2013).

It has successfully automated the scaling of manufacturing processes aftermarket operations. According to this facility, when a product is developed according to the requirements and expectations of the clients, it is shipped and sold out to the clients where Industry 4.0 technology supports the management in three major areas. The management of various businesses in the industrial sectors has adopted IoT for smart environments through IT/OT applications to ensure productivity of the businesses. It contributes greatly for asset intelligence and effective industrial productivity to improve the confidence of employees at competitive business environment. Therefore, the research explored that increased use of IoT has enabled the management of various industrial units to effectively manage talent and workforce, data ownership and control, ensure standards and interoperability, and improve security and business performance by developing smart workplace environments. Overall, the research work conducted by Sniderman, Mahto and Cotteleer pointed out that increased use of IoT could be helpful for the management of businesses to ensure effective flow of information to ensure business growth and operational competitiveness. It could be transformed into enhanced satisfaction of the major stakeholders of the business such as business directors, investors, suppliers and customers. The effective implementation of Industry 4.0 technology with the help of IoT has enabled the businesses to get clear understanding of the ways by which physical activities of the business could be transformed into digital activities to achieve their long-lasting business goals (Bi, Xu & Wang, 2014).

Patel and Patel (2016) investigated the potential impacts of IoT on smart environments by indicating that the development of these technologies has enabled the organizations to compete well, increase their market share, produce innovative products and services for their clients and address future business-related challenges successfully. The constant application of this technological development to business processes has enabled the businesses to acquire contextual information successfully, process it and improve their security and privacy.

The IoT has contributed greatly in developing smart devices to enhance the interconnection of physical and digital worlds to allow the businesses to have real-time information to be successfully collected and processed. The business owners and managers could be various types of sensors for different purposes to take the measurements of the associated temperature, air quality, humidity, speed, pressure, flow, electricity and movement. The IoT has enabled the businesses to use gateways and networks to improve their business performance by using robust and high performing wireless network infrastructures. The businesses could meet their customer requirements by executing latest technological solutions based on IoT services and applications for high speed business transactions and context-aware applications. Large numbers of business organizations have been found adopting IoT for organizational interoperability to ensure effective communication and data transfer by adopting a variety of information systems over widely used different infrastructures across different regions and cultures. Overall, this technological development has enabled the management of fast growing and competitive business organizations to work in a fully interoperable environment by using IoT devices to enable them to connect with other devices or systems and exchange or share information successfully. Varying degrees and different layers were used for ensuring interoperability among IoT devices to ensure the required business environments & ecosystems in which businesses operate and produce products and services for their customers. When the businesses are physically and digitally interconnected and exchange of data is ensured through multiple systems across a variety of networks, businesses succeed in achieving their smart workplace environments and working in interconnected ecosystems (Bi, Xu & Wang, 2014).

3. Research methodology

3.1. Explanation and Justification of Research Methodology

The research methodology in the context of current research on smart environments along with integrated ecosystems could be defined as the process by which necessary information on IoT, digital transformation and their influence on smart environments and ecosystems be collected to make better decisions in adopting latest technologies for business competitiveness. The research methods could be adopted according to the requirements of the research to prove theories depending upon exploratory, descriptive or explanatory methods to be used for the purpose of data collection. The research has investigated how successfully latest technologies have improved in the form of IoT and digital transformation and contributed for the technologically developed environments and ecosystems.

3.2. Exploratory Research

The exploratory research is defined as the process that could be effectively used in the current research to define the initial hypothesis or theoretical idea

and it is explored in social science research. In the current research, the ideas of IoT, digital transformation and their influence on environments and ecosystems have been discussed to elaborate their significance in the form of smart environments as well as ecosystems. It attempts to determine the potential influence or impacts of IoT on smart environments and integrated ecosystems. In order to get in-depth information and data on possible influence of IoT on smart environments and ecosystems, the research attempts to laydown necessary foundations to observe and explain the relevance of the study through existing theoretical content on the relevant technological developments in the industry.

3.3. Research Design

A good research design is always essential for a social science research to explore the impact of independent variable on dependent variables. It describes the research framework that a researcher could adopt by describing detailed processes and procedures of getting necessary information to solve the research problems and to achieve desired research goals (Driscoll, 2011). The research design is selected with an objective whether to adopt exploratory or explanatory design studies to the potential influence of latest technological developments of the smart environments as well as technologically integrated ecosystems. The exploratory research is only concerned with the qualitative methods of data collection, analysis and observation on the given topics in the areas of social science.

3.4. Research Methods

The current research will examine the research methods based on qualitative as well as quantitative methods of data collection, analysis and observation to achieve the desired outcomes of the research. The qualitative research is associated with theoretical or non-numerical data and it is concerned in gathering the verbal information either through the research work of other researchers or through primary sources of data collection. It examines the data without numerical measurements and gathers the information without doing any analysis in the interpretation of results in more subjective, impressionistic or even in the diagnostic manner. The primary objective of selecting qualitative research method is concerned in providing complete and detailed description of the research while quantitative research method provides statistical inferential techniques to gather analyze and predict the accuracy of the information. Qualitative research in the context of current research is ideal.

3.5. Research Strategy

The research strategy is focused to adopt deductive research approach to gather necessary information from the respondents regarding smart environments and smart ecosystems and to examine their relationship with the technological developments of the latest technologies. The deductive approach is highly

focused to investigate theories on given topic to observe their contribution in the areas of technological development and smart environments. The research strategy is guided according to the research aims and objectives to investigate the impacts of IoT on smart environments and ecosystems at industrial organizations. In developing the research strategy, it examines the extent of existing knowledge, the amount of time involved in doing the research and using available resources strategically in accordance with philosophical assumptions of the research. The strategy also evaluates the data collection methods through surveys, interviews and published sources to examine the contribution of relevant research topics in the areas of technological and industrial development.

3.6. Research Ethics

The principles of ethics and morality are highly important in conducting the research on current topic to ensure that the information collected, shared and distributed based on legal and ethical grounds. The information selected qualitatively or quantitatively about the impacts of IoT on creating smart environments & ecosystems that will be kept highly confidential. The research will also avoid adopting ethical and moral grounds to observe the impacts of IoT on smart environments to contribute greatly to enhance public welfare by avoiding unnecessary physical and mental sufferings of the people. The research observed two important types of implications of the research including psychological and social implications through the breach of confidentiality.

4. Analysis and discussions

The current research was conducted to examine the potential influence of the IoT on establishing smart technological environments along with integrated ecosystems to achieve improved results for the businesses. It examined different technological solutions that the management of businesses could execute to enhance the performance and productivity of their business by integrating their business operations to smart environments and technologically developed integrated ecosystems. The research paper investigated how successfully IoT has transformed in the past decades due to rapid convergence of the information and communication through Cloud, data integration and communication networks into technologically developed smart environments. It highlighted the strategies that businesses have adopted to convert their businesses from physical environments into smart technologically developed environments with enhanced business performance and productivity. It evaluated the successful strategies of the technologically developed business solutions in providing innovative directions to the businesses to succeed in achieving their business goals and objectives. In evaluating the aims and objectives of the research, it described how successfully IoT and digital technologies have enabled the businesses to adopt automated self-controlled and innovative business solutions by setting up in-built fault detection and diagnostic capabilities in developing

smart environments to improve their business performance and productivity (Ou et al., 2012).

The research pointed out that rapid convergence of information and communication through latest technological solutions such as Cloud computing and communication networks has contributed greatly in developing or transforming the physical business activities into digital business activities in the form of technologically developed smart business environments. These environments have become the center of successful developing of technologically developed platforms. It enabled them to continue their business operations by adopting multidisciplinary user-driven applications by connecting various sensors and objects (Wang et al., 2012). These technologically driven super-stack environments in the digital world have contributed greatly to improve the level of communication and information sharing within the business operations. The latest technological development has performed wonderfully well to enable things to be connected in a digital environment anywhere anytime and anyone would be able to ideally use it through a service network. IoT along with digital transformation has revolutionized the world and objects could be integrated digitally to make better organizational decisions through effective information sharing. People connected through digital & smart business environments could enjoy greater access to the business information aggregated by highly complex business services (Porter & Heppelmann, 2014).

The research results obtained from already published indicated that latest technological developments have been transformed into technology-driven smart environments & highly integrated ecosystems by transmitting broad range of data at one place to help the businesses to create better products and services for their customers in competitive industry. The platforms of transformative technologies have been used to enhance the integration and connectivity of physical objects into digital objects by using Cloud and other technological developments in the industry. The Cloud technology has enabled the businesses to develop an effective business infrastructure at global level to generate new services by allowing their users to create content for global application users (Jaykumar & Blessy, 2014). The research results showed that IoT along with digital technologies has improved the access of the users to global network of things. These technologies have created new opportunities to the businesses and their customers to create new content and generate and purchase new business services online. The integrated networks have enhanced the business activities into positive direction by allowing different things to integrate and to become more valuable in generating better services. The IoT has enabled different technologies to integrate into productive ecosystems through sensor networks, M2M, RFID, mobile internet connections, semantic data integration and the semantic search engines. These networks were grouped into three important categories and contributed greatly in acquiring new technologies to enable things to get contextual information, to process contextual information and to improve the security and privacy of the information (Zanella et al., 2014).

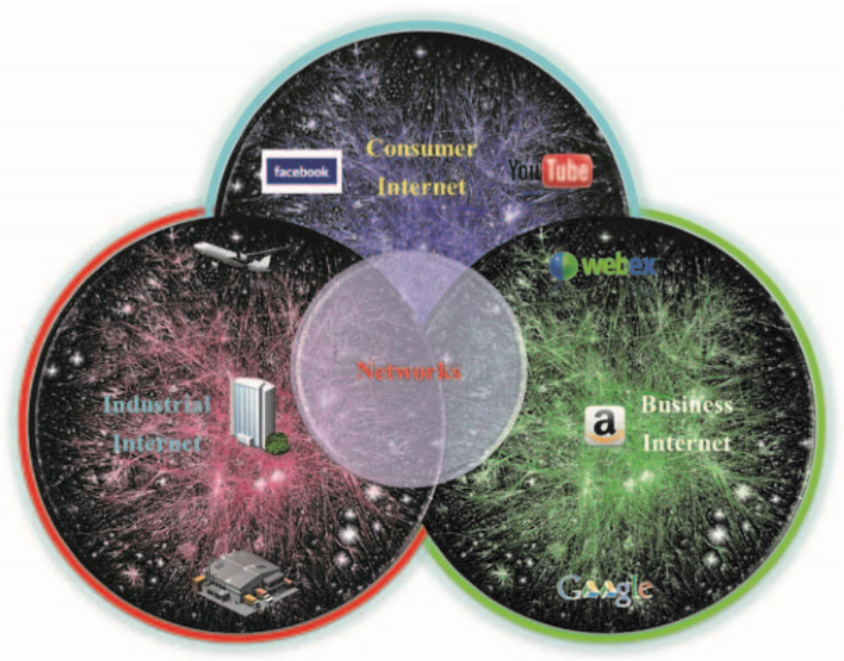

Figure 2. Smart environments through convergence of technologies

The research pointed out technologies associated with the IoT has enabled the businesses to work in smart environments with considerable improvements in business processes and operations. The results gathered, collected and analyzed from already published sources described that IoT has presented the environment in which physical items were connected with the digital ones and served the customers digitally with improved business services than before. New technologies were used to control these things remotely with the help of latest technologies like IoT where users can access anything anywhere through smart digital environments as well as technologically integrated ecosystems. The latest technology developments have contributed greatly in supporting the users to get huge opportunity of economy and individualism with better and more productive scientifically developed services. The technology improvement in the communication and information sharing has enabled the businesses to serve more effectively to their customers through sensors or built-in devices to ensure enhanced interaction among people all over the world (Wang et al., 2012). The scope and applications of the IoT were further expanded over the passage of time and helped the businesses and their management to adopt digital business solutions rather than concentrating on physical solutions. It helped the businesses to succeed and to grow effectively efficiently without any delays in the free transportation services due to worldwide applications of the global delivery systems. It helped the societies to build smart buildings that were much better than past physical infrastructures through controlled energy,

security, health and wellness. These environments were further developed in the forms of smart watches, phones and personalized inputs that optimized and enhance the benefits for common people in the society (Jaykumar & Blessy, 2014).

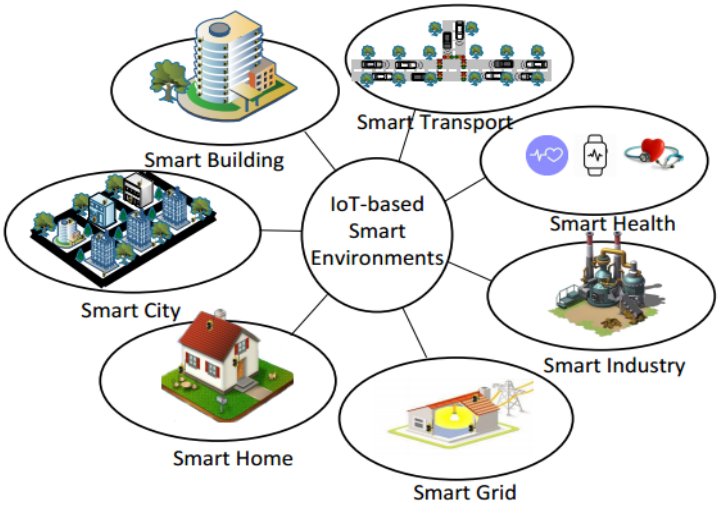

Figure 3. IOT-based smart environments (Ahmed et al., 2016, p. 2).

The research results also indicated that latest technological developments in the form of IoT have transformed in greater information sharing through convergence of technologies like Cloud and communication networks. The rapid advancement of these communication networks have enabled the physical world to integrate with the digital world through sensors, cloud, or other communication networks. The continuous connectivity of the physical objects into the computational elements has formed smart environments. These environments supported the dwellers to perform exciting tasks by navigating the unfamiliar space and movements to the heavy objects for the elderly people (Perumal et al., 2014). The research results pointed out the development of technology in the IoT has contributed greatly in converging the information and communication into smart environments through Cloud, data and information sharing. It has facilitated our lives by enabling IoT-based smart environments to improve our living through network types, technologies, local areas wireless standards and objectives and characteristics. The research also explored that the development of latest technologies into smart business environments have enabled the business to adopt automated, self-controlled and innovative business solutions through built-in fault detection system and diagnosing capabilities to ensure smart environments in which they work (Kim & Lee, 2015).

The current research explored that these technological developments in the form of IoT has contributed greatly to create smart environments in the form of smart transportation, smart cities, smart building, smart rural areas, smart health and smart living. At the cities level, effective integration of technology and data has led to highly coordinated and effective civil response to the security and safety of their users. At the building levels, the smart environments were developed for the end-users by leveraging technology into multiple applications such as HR application, customer behavior in retail application and attendance application etc. An increase in the development of smart vehicles has also been experienced where infrastructure was effectively interconnected with the objects or materials. Similarly, auto manufacturers have started adopting smart materials for their users due to technological developments (Ahmed et al., 2016). The development of smart environment were only possible due to IoT that were associated with optimized resources by providing different benefits to the end-users such as traffic congestion was reduced due to smart cities, faster services for travel were possible at various destinations and increased accessibility of essential services became possible. Intelligent security systems were developed into smart cities where markets and applications showed continuous evolution and therefore, their economic potential made significant influence in addressing the societal trends and challenges for the next decades. The technologically developed environments and ecosystems contributed further to improve the health and wellness of the people, transport and mobility improvements, energy and environment, communication and e-society was developed. These trends indicated that enhanced opportunities were created for markets and their consumers in consumer electronics, automotive electronics, medical appliances, information technology and communication (Gaikwad, 2016).

5. Conclusion

The main objective of conducting this research was to investigate how successfully latest technological developments in the form of IoT have contributed greatly in building smart environments for better productivity and services in the form of smart homes, smart cities and smart workplace environments. It examined how successfully physical work practices are integrated or converted to digital environments through latest technological devices. The research highlighted the importance of smart environments to improve the living and working of the end-users. It examined how successfully digitally created smart environments enhance communication, information sharing and improvement of services. The technology-driven smart environments along with highly developed and integrated ecosystems have created new business and living opportunities for users by making positive healthy effects on their living (Ahmed et al., 2016). The research pointed out that smart environments have contributed greatly in promoting the increased participation of communities through latest technologies that enabled increased communication and information sharing through multi-modal sensors, vision processing, application-oriented approach

for human-central thinking. The research explored how successfully smart environments could contribute their part through latest technological developments such as robotics, HCI, networking, mobile devices, collaborative thinking and pervasive computing (Jones, Suoranta & Rowley, 2013).

In conducting the current research, the qualitative methods of data collection, observation and analysis were investigated by analyzing already published books, journals and online materials. The in-depth analysis of qualitative data indicated that the contribution and impacts of IoT on developing technologically developed environments and ecosystems are phenomenal and could never be overruled in the recent years. It described that Internet of Things and digital transformation has contributed greatly in developing smart environments such as smart homes, smart cities, smart workplaces and smart organizations through well-developed and integrated ecosystems. The newly developed smart environments and ecosystems have contributed greatly in improving the levels of communication and interaction modals with humans, practical design solution and multi-faceted conceptual development as well as algorithmic considerations for seamless operations (Ashton, 2009).

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PART 6

ORGANIZATION: ISSUES AND CHALLENGES IN DIGITAL AREA / DIGITAL PUBLIC ADMINISTRATION AND ACCOUNTING

CHAPTER 21

Social Media: Towards open government

Dražena Gašpar[1], Mirela Mabić[2]

ABSTRACT

An open government paradigm is based on transparency (public access to information about the work of the government), participation (citizen engagement in the creation of social policies) and collaboration (partnership and cooperation with citizens and private organizations). The use of social media (Facebook, Twitter, YouTube) has potential to increase visibility and transparency of the work of government and to ensure communication channel for the idea and information exchange between government and citizen, making the process of creating policies more inclusive and increasing confidence between government and citizens. The goal of the paper is to explore and compare presence and activity on social media in those Western Balkans countries that were belonging to one state in the past (Bosnia and Herzegovina, Kosovo, Montenegro, Serbia and the former Yugoslav Republic of Macedonia). These countries were chosen because of a similar level of economic development and reforms in government institutions. The content analysis of their governments' websites was conducted, together with an analysis of links to social media platforms. The results show that these governments have links to social media on their websites, with Twitter and Facebook as the most used platforms. The frequency and the content of posts significantly vary from country to country, as well as the activities of citizens. Although chosen countries accept social media as a communication channel, there is still missing two-way communication with citizens. The governments mostly publish promotional information about their work, and the consequence is a relatively small number of friends/followers/subscribers and comments/shares/likes on social media.

Key words: Social media, Open Government, Facebook, Twitter

JEL classification: H7, L86

1. Introduction

With an emerging development of Web 2.0 technologies, specifically social media, a significant shift in everyday usage of technology happened. Kaplan and Haenlein define social media as "a group of Internet-based applications

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that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content" (Kaplan and Haenlein, 2010: 61). As most of the authors stressed, social media significantly changed the way how people communicate to each other (Kietzmann et al., 2011; Solomon and Schrum, 2010; Song, 2010) by allowing them to actively design content through cooperative participation and permanent connection (Wirtz et al., 2014). Kaplan and Haenlein (2010) defined the following social media categories: blogs, collaborative projects, social networking sites, content communities, virtual social worlds and virtual game worlds.

For the needs of presented research, the authors decided to analyze only social networking sites (SNSs) because they are used by all governments of Western Balkan Countries (WBC). As a web-based services, SNSs enable individuals creation of their a public or semi-public profile within a bounded system, creation of a list of users (friends) with whom they want to share a connection and to view and traverse their list of connections and those made by others within the system (Boyd and Ellison, 2007). They are social media tools designed to facilitate the creation and maintenance of social relations. Today, some of the most popular social network sites are Facebook, Twitter, LinkedIn, and Google+.

Since social media offer the richness of interactions, they are fostering the involvement at the individual level providing potential for true collaboration (Srivastava, 2016). Governments and public agencies recognized the potential of social media and started to use them around 2009 (Klang and Nolin, 2011). Since then, they have tried to harness social media's potential for public purposes and the fulfillment of the open government promises (Gunawong, 2015).

Although there is an overall agreement that former USA president Obama with his *Memorandum on Transparency and Open Government* directing the implementation of Open government plans by federal agencies (Orszag, 2009) and had huge merit in the popularization of the term open government, the concept itself is not new. The first written references dates back to 1957 when Parks (1957) published "The open government principle: applying the right to know under the Constitution." Later, in the 1970s, the British government promoted several initiatives aimed at achieving more information freedom and more access to government's activity and, therefore, at reducing opacity (Chapman and Hunt, 2006).

In 2010 the European Commission (EC) Directorate General for Communications Networks, Content and Technology (DG CONNECT) launched the *Digital Agenda for Europe* (European Commission, 2014) with the aim to support the open government initiative and to foster citizen participation and engagement by getting the most of digital technologies, particularly social media (Karakiza, 2015).

The political instruments for implementation of the Digital Agenda are the eGovernment Action Plans which should advance the modernization of public administrations across the European Union. The Digital Single Market Strategy for Europe (DSM) announces the launch of a new eGovernment Action Plan

for 2016-2020. The main purpose of a new Plan is to remove existing digital barriers to the Digital Single Market and to prevent further fragmentation arising in the context of the modernization of public administrations. The final goal is that by 2020, public administrations and public institutions in the European Union should be open, efficient and inclusive, providing borderless, personalized, user-friendly, end-to-end digital public services to all citizens and businesses in the EU (European Commission, 2016).

While OECD defines Open Government as a "transparent, accessible and responsive governance system, where information moves freely both to and from government, through a multitude of channels" (OECD, 2009: 8), according to Evans and Campos open government "is widely understood as the leveraging of information technologies to generate participatory, collaborative dialogue between policymakers and citizens" (Evans and Campos, 2013: 173). The basic idea of the open government concept is to increase citizen trust into the government through transparency, participation, and collaboration (Janssen et al., 2012; Lee and Kwak, 2012; Reddick and Ganapati, 2011, Wirtz and Birkmeyer, 2015, United Nations, 2014). What transparency, participation and collaboration mean in the context of open government is summarized in Table 1.

Principe	Related concepts
Transparency	Information access Accountability Legitimacy and trust in government
Participation	Consultation and deliberation with citizens Participation in decision-making processes Participation in public policy design
Collaboration	Interoperability Co-production (Social) innovation

Table 1. Open government principles and related concepts (Gascó, 2013)

Open data and open action are two essential tools which government can use to foster transparency, participation, and collaboration, e.g., to put into life main open government principles. Open data refers to data available in standardized, structured and machine-readable formats. Open action means the use of web 2.0 tools and, particularly, of social media and blogging (Gascó-Hernández and Fernández-Ple, 2014).

However, despite huge potential of social media in providing open government, the governments generally lack to exploit them to the full capacity. The results of research presented in this paper try to answer to question: what is the situation regarding use of social media as a tool for ensuring open government in transition countries, in this case Western Balkans countries that were belonging to one state in the past (Bosnia and Herzegovina, Kosovo, Montenegro, Serbia and the former Yugoslav Republic of Macedonia).

The authors decided to analyze those countries because of a similar level of economic development and reforms in government institutions. Although governments of chosen countries accepted social media as a communication channel, they used them mostly to publish promotional information about their work, while two-way communication with citizens is still missing.

2. Literature review

Although most of the authors agree that social media have a huge potential in addressing the open government challenge (Bonsón et al., 2012; Evans and Campos, 2013; Lee and Kwak, 2012), the governments still struggle with implementation of social media. According to (Wirtz et al., 2017) the scientific literature related to the use of social media as a tool that fosters open government can be divided into three groups (Table 2) regarding:

1. Implementation process and maturity
2. Social media deployment and use
3. Coproduction factors and benefits.

	Authors (year)	Research orientation
1. Implementation process and maturity	Dadashzadeh (2010)	Social media usage at local, regional, and national public authorities (governments) should be the result of strategic planning at all levels.
	Mergel and Bretschneider (2013)	They suggest that the implementation and use of social media applications follows a three-step process: from experimental and informal, via informal standards, to formalized policies.
	Lee and Kwak (2012)	They provide a maturity model on social media for open government. They propose a sequential development of open government principles with increasing social media-based public engagement. These studies outline technological and functional development stages and implementation processes.
	Criado and Rojas (2012)	The use of social media by public administrations is an expanding and multidisciplinary phenomenon.
	Landau (2011); Lindsay (2011)	Social media's attributes (immediacy, ubiquity, and availability) make them very useful in sharing, especially in times of crises or emergency situations
	Picazo-Vela et al. (2012)	Public administrations use social media with different purposes: to carry out recruiting tasks, to reach citizens and other stakeholders, to share information with other public organizations, to promote citizen participation in public issues or to improve transparency.

	Authors (year)	Research orientation
2. Social media deployment and use	Sandoval-Almazan and Gil-Garcia (2012)	Address the development of local government portals in Mexico regarding collaboration and participation. They showed that only a fifth includes tools for interaction and participation, concluding that open government initiatives should be supported by social media
	Bonsón et al. (2012)	Analyzed the use of Web 2.0 and social media within local governments in the European Union. They concluded that social media implementation shows a heterogeneous picture and that full potential of social media is not exploited.
	Unsworth and Townes (2012)	Analyzed social media use by the United States Department of Agriculture. Their key outcomes are that social media are not used in a way that promotes open government.
	Katz and Halpern, 2013; Ma, 2013; Riarh and Roy, (2014)	Empirical studies are dealing with the adoption of social media in an open government context of different countries. The studies show relatively low social media adoption rates and unsatisfactory utilization of installed applications
	Bryer (2011)	Analyzes challenges of the deployment of social media in the context of public participation. The study emphasizes the importance of considering multi-stakeholder relationships instead of unidirectional or asynchronous communications ways
3. Coproduction factors and benefits	Meijer's (2011)	The study highlights the role of virtual communities for networked coproduction in the public sector.
	Linders (2012)	Focuses on the coproduction factor and emphasizes the importance of citizen coproduction in the delivery of public services in the age of social media.
	Chun and Cho (2012)	Study the implementation and outcomes of a social media participation platform that is used for citizen participation in policy decision-making in Korea.

Table 2. Short literature review according to Wirtz et al. (2017) Classification

This short literature review presented in Table 2 shows that the authors are aware of the importance of social media for citizen collaboration and as a tool that can foster transparency and participation. The authors recommend implementing social media within open government initiatives, but they stressed the necessity to better exploit advantages and disadvantages of social media (e.g., Bryer and Zavattaro, 2011; Chun and Cho, 2012; Linders, 2012).

Regarding research related to Western Balkans countries, the ReSPA (Regional School of Public Administration) together with its E-Government Network members and respective regional and international experts, conducted two comparative studies. The first one was conducted in 2013, and it was devoted to e-government in the Western Balkan region. In 2015, the second one, follow up study - "From E- to Open Government" was made.

The results of the last study showed that Bosnia and Herzegovina is performing less well than the regional average on both e-government and open government. Namely, BiH had relatively well results referring to transparency, but less well on collaboration and poorly on participation. Regarding the former Yugoslav Republic of Macedonia (FYRM) is, similar to BiH, performing less well than the regional average on e-government, but it had an exceptional performance as a leader on transparency and a good performance on participation in the context of open government. According to this study, Kosovo is the weakest of the six participants in both e-government and open government. As opposed to other WBC Kosovo started later and still has huge political and institutional challenges. The study showed that Montenegro is a regional leader in both e-government and open government. Montenegro is doing extremely well on participation and very well on collaboration compared with the average, but related to transparency has only an average score. Regarding Serbia, the study showed the average level of both e-government and open government. Serbia has very well results related to transparency and participation, but it has lack of any real efforts regarding collaboration (ReSPA, 2015).

The ReSPA studies showed that, in spite of all challenges, WBC try to catch up with developed countries related to both e-government and open government. In line with that efforts, the researchers from WBC have become more interested in analyzing the use of social media as a tool for fostering open government in their countries (Mabić et al., 2017; Rexepi et al., 2016; Đurić-Atanasievski and Bobar, 2016; Budinoski and Trajkovik, 2012).

2.1. Western Balkans countries and open government initiative

The literate review shows that the governments all over the world have become aware of the requirements of their citizens for more transparent, collaborative and participant government. This was the main driver in establishing the Open Government Partnership (OGP) as a multilateral initiative that aims to secure concrete commitments from governments to promote transparency, empower citizens, fight corruption, and harness new technologies to strengthen governance. The Open Government Partnership formally started in 2011, when the 8 founding governments (Brazil, Indonesia, Mexico, Norway, the Philippines, South Africa, the United Kingdom and the United States) endorsed the Open Government Declaration, and announced their country action plans. Since 2011, OGP has welcomed the commitment of 67 additional governments to join the Partnership (OGP, 2017).

In its current strategy, OGP defined that its "*vision is that more governments become more transparent, more accountable, and more responsive to their own citizens, with the ultimate goal of improving the quality of governance, as well as the quality of services that citizens receive*" (OGP, 2016: 2).

The analysis of the first five OPG's years showed that the national OGP process has helped countries establish institutional mechanisms that give continuity and legitimacy to open government reforms, made dialogue and co-creation regular features of the interactions between OGP reformers, and initiated reforms that change the status quo and benefit citizens (OGP, 2016).

However, there are significant differences by OGP's membership countries related to establishing necessary institutional mechanisms as prerequisites to open government reforms and in achieving government's transparency, partnership, and collaboration. In Table 3 is presented current status in OPG by WBC, except Kosovo which is not a member of OGP.

Country	Joined	No. of Commitments	No. of theme covered	Action Plan Thematic focus (themes that governments have focused on in their commitment development)	Status in OPG
Bosnia and Herzegovina	2014	0	0	Bosnia and Herzegovina did not submit National Action Plan	The government of Bosnia and Herzegovina has a new deadline of August 31, 2018, to submit a two-year national action plan ending on June 30, 2020
Montenegro	2011	56	0	20% Conflicts of interest 18% Legislation and Regulation 14% Private sector	Inactive (The Government of Montenegro has not submitted its new NAP) Montenegro has now acted contrary to the OGP process for three consecutive action plan cycles: 2014, 2015 and 2016
Serbia	2013	27	11	71% Legislation and Regulation 57% Public participation 50% Public service delivery	Second National Action Plan 2016-2018 is posted
The Former Yugoslav Republic of Macedonia	2011	120	22	47% e-government 32% Legislation and Regulation 29% Subnational	National Action Plan 2016-2018

Table 3. Open government partnership – WBC status

Source: https://www.opengovpartnership.org/participants [Accessed: March 21, 2018]

As it is visible from Table 3, there are substantial differences between WBC in status in OGP. The situation is slightly different from the ReSPA research from 2015. Namely, in the ReSPA study, Montenegro was a leader in both e-government and open government (ReSPA, 2015), but currently has inactive status in OGP because it did not submit obligatory a two-years National Action Plan on Implementation of the Open Government Partnership Initiative since 2014 and did not cover any of committed themes. As expected, BiH just signed a partnership, without any defined nor covered committed themes. Also, BiH did not submit a two-year National Action Plan on Implementation of the Open Government Partnership Initiative till now.

3. Methodology/Method/Model/Conception of analysis

The empirical research included the government of Western Balkans countries (WBC): Bosnia and Herzegovina, Kosovo, Montenegro, Serbia and the former Yugoslav Republic of Macedonia. These states have belonged to one state in the past and today have a similar level of economic development and reforms in government institutions. Except for these countries, the analysis was carried out for Croatia and Slovenia. These counties are already members of European Union, but share the same past with WBC (former Yugoslavia). It is interesting to compare them with WBC in order to see if there are any differences, e.g. if EU membership influenced their progress in the use of social media in government.

Table 4 shows a list of countries included in research and their governments' web addresses.

Country	Official website of the Government
Bosnia and Herzegovina	http://vijeceministara.gov.ba/Default.aspx?langTag=hr-HR&template_id=91&pageIndex=1
Kosovo	https://www.rks-gov.net/sr-latn-cs/pages/fillimi.aspx
Montenegro	http://www.gov.me/naslovna?alphabet=lat
Serbia	http://www.srbija.gov.rs/
The former Yugoslav Republic of Macedonia	http://www.vlada.mk/
Croatia	https://vlada.gov.hr/
Slovenia	http://www.vlada.si/

Table 4. List of countries included in research

Source: Authors' preparation

The content analysis of their governments' websites was conducted, together with an analysis of links to social media platforms.

Activities of WBC on social network sites were analyzed through two aspects. It was investigated whether the links to social network sites were available on

official WBC's websites and whether these links were valid and active. If the links were not found on the home page, it was checked whether they were available on the contact page. Availability of the WBC's web pages on social network sites was also checked directly by searching on the social networks sites.

Basic characteristics of official profiles of the governments (numerical indicators available on the social network sites and published content) were analyzed on the most common social networks sites. The analysis was conducted during March 2018.

The descriptive statistical analysis was performed about the adoption and use of each social media application by the government of Western Balkans countries.

This paper presents the empirical research related to the Western Balkans countries' social media adoption and use. The main research questions are how social networks were adopted and used by Western Balkans countries, and are they active or passive users? Also, the results of research can be used for analyzing these countries related to the context of open government, and for the evaluation of previously taken activities on transparency and collaboration with citizens.

4. Empirical data (documentation background) and analysis

Table 5 shows social network sites where the analyzed countries have official pages. Data related to Kosovo did not found, so Kosovo is excluded from this analysis.

Countries	Used Social Network Sites (link available on official websites)
Bosnia and Herzegovina	Twitter, YouTube, Facebook*
Montenegro	Twitter, Google+, Facebook*
Serbia	Twitter
Macedonia	Facebook, Twitter, Flickr, YouTube, Instagram
Croatia	Facebook, Twitter, Flickr, YouTube, Instagram, LinkedIn
Slovenia	Facebook, Twitter, Flickr, YouTube, Instagram, LinkedIn

Table 5. Use of SNS across governments

Note: *the profile founded by additional search (Google or SNS search)

Source: Authors' preparation

It should be stressed that the search on Facebook for specific countries offers profiles that look as official, but neither one has a note that confirms that it is an official profile. Also, some of the profiles in their description have statements that resemble official government portal (description of one of the founded profiles of the Government of the Republic of Serbia on Facebook is Education Website). Official profiles of the countries included in the research are on local

language, except the Government of Republic of Slovenia which has two official profiles, one on the Slovenian and other on the English language.

The analysis of the link accessibility to SNS on official websites of researched countries gave some interesting results. Namely, on the websites of Montenegro and Serbia governments exists the option of e-Government. Website of Montenegro government has a link to Open Government Partnership site. RSS (Really Simple Syndication) – as an option which logged users notify about new posts was founded at the official websites of the Kosovo, Montenegro and Serbia governments. At the website of the Council of Ministries of Bosnia and Herzegovina exists logo for e-Government, but clicking on it nothing happened. At the same website on the menu exists option eGovernment which offers two possibilities: the sitemap and the sessions, but under sessions, there is no any information.

Regarding the fact that it was founded that most of the researched countries have an official profile on Twitter and Facebook, detailed analysis of the official profiles on SNS was conducted only on Twitter and Facebook.

Table 6 shows numerical data of official SNS profiles.

	BiH	Montenegro	Serbia	Macedonia	*Croatia*	*Slovenia*
TWITTER						
Tweets	783	3947	2711	10.7 K	*58.5 K*	*16.4 K*
Following	349	291	120	177	*19.3 K*	*10.2 K*
Followers	807	8293	12.5 K	6840	*168 K*	*63 K*
Likes	2	1526	207	269	*5553*	*303*
Last activity	29.3.2018	1.4.2018	28.3.2018.	2.4.2018	*2.4.2018*	*30.3.2018*
Joined	April 2016	December 2011	June 2012	September 2011	*December 2011*	*June 2009*
Photos/ videos	360	1867		830	*6666*	*1477*
Lists		1		1	*15*	
FACEBOOK						
Like	60	11249		24381	*156115*	*3247*
Follow	60	11417		24508	*152827*	*3351*
Last activity		1.4.2018		2.4.2018	*29.3.2018*	*1.4.2018*
Joined						

Table 6. Numerical characteristics of official profiles on SNS

Note: Analysis completed on 02/04/2018;

Source: Authors' preparation

Table 7 shows numerical analysis of the last 30 tweets for analyzed countries.

	Period (Days)	Tweet /reTweet (% reT)	Reply /Retweet /Like	
			Total	Average
Bosnia and Herzegovina	16.3.-29.3 (14)	22/8 (26.7 %)	2 /44 /160	0.07 /1.47 /5.3
Montenegro	23.3.-1.4. (10)	27/3 (10 %)	7 /44 /239	0.2 /1.5 /8
Serbia	26.1.-28.3. (62)	29/1 (3.3 %)	18 /220 /395	0.6 /7.3 /13.17
Macedonia	28.3.-2.4. (6)	23/7 (23.3 %)	18 /81 /207	0.6 /2.7 /6.9
Croatia	30.3.-2.4. (4)	28/2 (6.7 %)	66 /53 /169	2.2 /1.8 /5.6
Slovenia	29.3.-1.4. (4)	4/26 (86.7 %)	36 /136 /292	1.2 /4.5 /9.7

Table 7. Numerical analysis of the last 30 tweets

Source: Authors' preparation

5. Results and discussion

The results of the conducted research show that WBC have a significant lag in using SNS compared to neighboring countries, Croatia and Slovenia, which are members of EU. Croatia and Slovenia have official profiles on six SNS, while most of WBC have one to two SNS, except Macedonia, which has profiles on five SNS. Regarding the links to SNS on official websites, BIH has two links, Montenegro and Serbia have one, Macedonia has five, while Kosovo has no links to SNS. Additional search on Google and specific SNS showed that Montenegro and BiH have official profiles on Facebook although they are not specified in the official websites of these countries.

According to the dates of last posts and the analysis of the time for the last 30 tweets on Twitter, it can be concluded that researched governments relatively actively use their Twitter profiles. The only exception is Serbia because it was realized its 30 Tweets in considerably longer time compared to other countries (Serbia through two months, while other countries through two weeks). The activities on other SNS are not indicative. The posts are especially rare on YouTube and Google+.

The analysis of the activity and attractiveness of analyzed governments on SNS, based on numerical data available on official SNS profiles, shows that Bosnia and Herzegovina has considerable lag compared to other countries. This lag refers to the number of followers, number of following, number of likes and shares, except for the number of posts. The reason for this lag can lay in the fact that the Council of Misters of BiH has presented on Twitter just since the April 2016, while the governments of other countries have been on Twitter more than five years. But, on the other hand, if the frequency of post and the

reactions of the followers, e.g., citizens on the governments' posts, is analyzed, then there is no significant difference between BiH and other countries. However, the Twitter analysis showed that WBC have lag related to a number of their followers' comments compared to Croatia and Slovenia.

Once again, it should be emphasized that Serbia realized its 30 tweets through considerably longer time than other WBC, although the number of comments to tweets of Serbia is relatively similar to the results of other WBC. The analysis of the official Twitter profiles showed that some countries have a specific number of retweets, e.g., sharing of somebody else's tweets (Slovenia leads in that). The share of retweets in WBC regarding last 30 Tweets is up to 30% that shows that the own tweets are prevailing (BiH and FYRM are near the upper limit, while Montenegro and Serbia have considerably less number of retweets).

About the fact that the governments of countries were analyzed, as expected, the content analysis of SNS's profiles showed a high diversity of posts. Namely, the governments have different portfolios, duties, and responsibilities, so it makes sense that the posts are uneven.

Published content mostly includes messages with announcements or schedules about activities to be held by the government or some their institutions or public agencies. Above all, there is the information about the meetings of governments' officials with officials from foreign countries, as well as the information about participation at different events. All that information belonged to the promotion. It is clear that citizens should be informed of these activities, but for them are more important the information about the concrete activities that governments take and which influence their quality of work and life in the specific country. The analysis showed that such information are not usual on SNS profiles. It should be stressed that on the Twitter profile of BiH government one can find agendas for some sessions of the Council of Ministries of BiH, while that is not the case with other WBC.

6. Conclusions

The results of the conducted research show that WBS are present on SNS. According to the numeric indicators (number of followers, the frequency of posts/tweets), the situation is relatively good, and with some exceptions (retweets) it is not dramatically different compared to the situation in EU members - Croatia and Slovenia.

But, the conclusion regarding activities of WBC governments on SNS cannot be based only on the number and frequency of posts/Tweets, retweets, followers. In spite of some positive results (number of posts/tweets), WBC lack of collaboration and participation of their citizens which is contrary to open government initiative. Namely, although maybe older population is not familiar with SNS, for the younger population the SNS is part of their everyday life and usual way of communication. Unfortunately, WBC governments are still not aware

that social media, especially SNS should be used as a communication channel with their citizens that provide them with the opportunity to be more included in the decision-making that influences the way how they work and live.

It is necessary to say that frequency of posts/tweets can be one of the reasons for the passivity of the followers. Although there is an opinion that the frequent posting of content on SNS, with the aim to inform public with the activities of governments, foster transparency, the truth is that too many unplanned posts can generate surfeit by information and citizens' SNS passivity. Inevitably, the question is, are governments posting on SNS the contents that are important to their citizens or themselves? Also, the question is have the governments developed a strategy for the presentation on SNS, especially related to frequency, timing and content of the posts in order to influence SNS activity of citizens. Considering these questions in the context of conducted research, the answer intrudes that some WBC started their SNS story following the general principle "everybody is present on SNS, so we also should be there." But, the analysis of the WBC status in OGP (Table 3) shows that there are significant differences related to establishing necessary institutional mechanisms as prerequisites to open government reforms and in achieving government's transparency, partnership and collaboration (FYRM and Serbia are leaders, Montenegro lags, BiH is at the beginning, while Kosovo is not member of OGP).

On the one hand, transparency means that data and information related to the activities of government should be presented to citizens, but it is not enough. In order to achieve open governance, the government should find a balance between transparency, participation, and collaboration. Unfortunately, that is not the case with WBC because participation and collaboration are still huge challenges for their governments. The publishing of just promotion activities and the announcement of events makes an impression on citizens that all SNS activities are in service of government's officials promotion and for the sake of keeping their positions and benefits.

SNS is just one of the different social media that can support governments in the implementation of open government initiative. Since Millennium generations have accepted SNS as a natural way of communication and collaboration, the governments should understand that SNS can be a powerful tool in fostering open government initiative if they are used adequately. As OPG proposed, WBC should adopt strategic approach related to the implementation of SNS in order to establish institutional mechanisms that will provide continuity and legitimacy to open government reforms.

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CHAPTER 22

Happy organization - myth or reality for Croatian organizations

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ABSTRACT

Human resource management, a well-established discipline, is constantly searching for new ways to provide a leading edge to companies. A connected concept of employee engagement, a hot topic amongst managers, consultancies, governments and academics alike, is likewise considered crucial for successful management of a productive workforce in organizations (Farndale and Vidovic, 2017). The employee engagement, which can be considered as the holy grail of human resource management activities, has also been providing new insights into building a successful global company. Engaged employees are said to be optimistic, highly focused on their work, enthusiastic and willing to go the extra mile to contribute to sustainable organizational success on a long-term basis (Jose and Mampilly, 2012). It is exactly the aspect of optimism, positivity and happiness, that this paper will seek to further explore and build up on, in order to provide a new boost for contemporary global competitiveness. As a part of the research, the authors organized a survey to collect further insight into the perceptions of Millenials that are preparing to enter the workforce. The survey targeted 167 sophomore and junior college students from business schools, collecting information on their perception of happiness, and the expectations they have of achieving happiness in the workplace. The survey also collected data regarding the importance of various factors influencing their perception of the happy organization, and the possibility of building one. Based on the research data, the paper provides valuable feedback on the most important aspects the companies should focus on in order to provide their employees with a happiness-enabling working conditions. By doing so, the paper aims to effectively describe a blueprint for building sustainable happy organizations.

Key words: happy organization, happiness, employee engagement, human resource management

JEL classification: M12, M14, M59

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1. Introduction

Companies that belong to the contemporary complex, ever-changing and networked society are constantly on the lookout for new ways of conducting business ever more successfully. The society that values sustainability, self-organization, development and learning is pushing for companies to become more creative, innovative and global.

People, their experience, talents and competencies, have long been considered a key source of sustainable competitive advantage (Frank and Taylor 2004; Lewis and Heckman 2006, Berisha Qehaja and Kutllovci 2015, Maric, 2015). It is exactly the employees that make a difference between a successful and non-successful company. Based on this premise, many of the disciplines revolving around managing employees are nowadays searching for new and innovative ways to capture the essence that distinguishes fast-growing, desirable companies.

Human resource management, a well-established discipline, is constantly searching for new ways to provide a leading edge to companies. A connected concept of employee engagement, a hot topic amongst managers, consultancies, governments and academics alike, is likewise considered crucial for successful management of a productive workforce in organizations (Farndale and Vidovic, 2017). The employee engagement, which can be considered as the holy grail of human resource management activities, has also been providing new insights into building a successful global company. Engaged employees are said to be optimistic, highly focused on their work, enthusiastic and willing to go the extra mile to contribute to sustainable organizational success on a long-term basis (Jose and Mampilly, 2012). It is exactly the aspect of optimism, positivity and happiness, that this paper further explores and build up on, in order to provide a new boost for contemporary global competitiveness.

2. Building employee well-being as a base for happy organizations

The meaning of well-being in the context of business is not easy to define, it is a quite complex and multidimensional term because it questions the meaning of organizational and individual happiness. Well-being, could be described as a positive approach to life and health, that involves the whole person – physically, emotionally and on the psychological level (Schultz & van der Walt, 2015). Harrison (2016) summarizes the diverse offer of well-being definitions. He argues that for some, the expression refers to an individual's mental health; for others, an individual's overall health – mental, physical and emotional. Further, he points that for some, well-being refers to a work initiative or programme focused on bolstering education and understanding of what it takes to stay well, while for others it's a central tenet of an organization's purpose, to create positive outcomes for all employees; balancing this need against the demands of shareholders or owners, taxpayers or customers.

Researching well-being in organizations is gaining more popularity in the recent years, because management, and human resource managers especially, are aware that employee well-being is connected with high performance, and must be pursued at the individual, organizational and societal level.

The pursuit of happiness is a concept not only known in business, but even more in private lives of all humans. To be happy is certainly one of the basic human desires. The earliest researcher to recognize the importance of individual happiness for the businesses was Abraham Maslow, describing it in his famous „hierarchy of needs". His theory sets the foundations for understanding human motivation, by outlining several levels of aspirations that humans seek to accomplish. The base of the pyramid make the physiological needs for air, food and water, followed up with a need for safety, and a need for love and belonging. The higher level of pyramid is made of needs that are presumed to become evident only after these basic survival needs are being met. The top motivational needs are the need for esteem, both self-esteem and respect, recognition and status, and self-actualization. Maslow insists that the urge for self-actualization is deeply entrenched in the human psyche, but only surfaces once the more basic needs are fulfilled (Setton, 2018).

Some of the factors that are known to contribute to individual happiness are the feelings of freedom, choice, creativeness, dignity, well-balanced relationships with the people around them, achieving a good work-life balance, having a decent salary and recognition for their work. Employees further seek that their jobs should be challenging, interesting and creative, allowing for their individual potentials to shine. Arguably, majority of these factors are closely related to the business environment, making the pursuit of happines highly-dependent on business decisions and business practices. In simple words, well-being is a personal state that ebbs and flows throughout the working day (Bailey, 2016, 36).

Ricard (2008) points out that passionate search for happiness is a goal that deserves at least as much energy as any other in our lives. Wealth? Fitness? Career success? How can we possibly place these above true and lasting well-being? A personal well-being lifestyle is associated with good physical health, emotional stability, improved personal relationships and increased career satisfaction (Schultz & van der Walt, 2015). Further, employee happiness is associated with a variety of positive outcomes, such as creativity (Lyubomirsky et al., 2005, Csikszentmihalyi, 1997), better physical health (Veenhoven, 2008). On the other hand, unhappy employees are fond the be less innovative (Dolan & Metcalfe, 2012) and more prone to take sick days off (Soane et al., 2013).

In his book Happiness By Design, Dolan (2014), argues that happiness should be defined as the flow of pleasure and purpose over time. Therefore, he argues, a happy life is one in which an individual has daily experiences that generate a good balance between fun on the one hand and fulfillment on the other. Experiential evidence suggests that people who experience more purpose at work are not only happier, but also more productive (Steger et al., 2012).

Well-being is now seen to be a fundamental aspect of an organization's human capital: the knowledge, skills and experience of employees (Roslender et al 2009). Creating the conditions that promote healthy and productive working environments is now part of most HR professionals' roles, and it is this management of employee well-being which has become a central activity for high-performing organizations (British Psychological Society 2010). In other words, pursuing employee well-being needs to be a combination of people-focused HRM policies and practices, adequate fit between employees and the organization and continuous focus on achieving and sustaining well-being (Figure 1).

Figure 1. Well-being in an organization

3. Building a healthy workplace

An increasing number of organizations, small and large, local and global, now recognize that they are only as strong as their people. They depend on having a healthy and productive workforce and they know that when employees feel their work is meaningful and they are valued and supported, they tend to have higher well-being levels, be more committed to the organization's goals and perform better (Farmer, 2016).

So how exactly do companies build a healthy workplace, that promotes employee well-being? Dodge and colleagues (2012, 230) claim: „stable well-being is when individuals have the psychological, social and physical resources they need to meet a particular psychological, social and/or physical challenge". Also, there is good evidence that positive features of the employment relationship are associated with higher well-being (Guest, 2016, 6-7). Donald-Feilder and Lewis (2006) researched healthy organizations and found that creating a healthy organizational context is vital to developing and supporting good leadership and management.

The literature is clear on the key domains that influence well-being in the workplace, as well as the suggestions of the most effective people-oriented practices to support sustainable well-being, as outlined in Table 1.

Domain	Elements	Examples of well-being initiatives/activities
HEALTH	Physical health	Health promotion, good rehabilitation practices, health checks, well-being benefits, health insurance protection, managing disability, occupational health support, employee assistance programme.
	Physical safety	Safe working practices, safe equipment, personal safety training.
	Mental health	Stress management, risk assessments, conflict resolution training, training line managers to have difficult conversations, managing mental ill-health, occupational health support, employee assistance programme
WORK	Working environment	Ergonomically designed working areas, open and inclusive culture.
	Good line management	Effective people management policies, training for line managers, sickness absence management.
	Work demands	Job design, job roles, job quality, workload, working hours, job satisfaction, work–life balance.
	Autonomy	Control, innovation, whistleblowing.
	Change management	Communication, involvement, leadership.
	Pay and reward	Fair and transparent remuneration practices, non-financial recognition.
VALUES/ PRINCIPLES	Leadership	Values-based leadership, clear mission and objectives, health and well-being strategy, corporate governance, building trust.
	Ethical standards	Dignity at work, corporate social responsibility, community investment, volunteering.
	Diversity	Diversity and inclusion, valuing difference, cultural engagement, training for employees and managers.
COLLECTIVE/ SOCIAL	Employee voice	Communication, consultation, genuine dialogue, involvement in decision-making.
	Positive relationships	Management style, teamworking, healthy relationships with peers and managers, dignity and respect.
PERSONAL GROWTH	Career development	Mentoring, coaching, performance management, performance development plans, skills utilisation, succession planning.
	Emotional	Positive relationships, personal resilience training, financial well-being.
	Lifelong learning	Performance development plans, access to training, mid-career review, technical and vocational learning, challenging work.
	Creativity	Open and collaborative culture, innovation workshops.

Table 1. Five domains of well-being

Source: Miller and Suff (2016: 18)

Building upon all these findings we can construct the model of a healthy workplace, that includes the elements as shown on Figure 2.

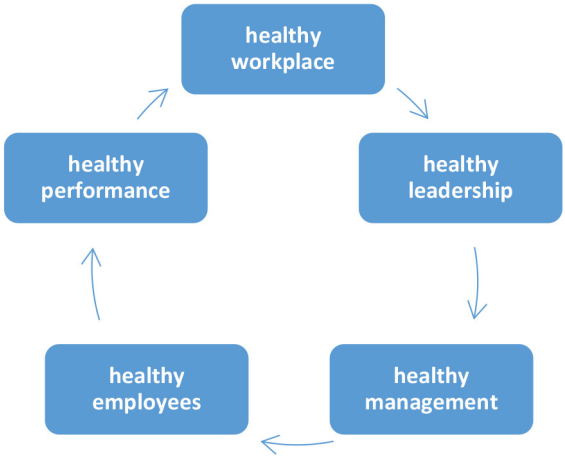

Figure 2. Five dimensions of a healthy workplace in the context of promoting well-being

4. Research methods and results

As a part of the empirical research for this paper, authors aimed to capture the perceptions of Millenials, that are preparing to enter the workforce, on the topic of well-being and a happy organization. The specific Millenials' cohort that was chosen for this study is the cohort of young future professionals, currently pursuing higher education, and with a fairly limited exposure to the real business world. Targeted participants were sophomore and junior college students, specifically from business schools, as the ones perhaps the most focused on joining the business world of tomorrow.

In order to collect the most thorough data, the authors applied two-tier research approach. In the first step, a qualitative research analysis was applied, followed by a second step with a quantitative research method. The qualitative research consisted of conducting a focus group interview with a selected group of students from a business school at a public university. Through that focus group, initial data was gathered to help explain the initial viewpoints that Millenials have on the topic. Quantitative research collected information on Millenials' perception of happiness, and the expectations they have of achieving happiness in the workplace. The survey also collected data regarding the importance of various factors influencing their perception of the happy organization, and the possibility of building one.

The qualitative part of the study was focused on searching for the right association for a term „happy organization". Millenials found different meanings for the term – form happiness, creativity to high-quality interpersonal relationships. The most common terms found to be most closely related to the concept of a

happy organization included: happiness, creativity, passion to work, high pay, stimulation, flexible working hours, team building, sport, healthy snacks, free time, social atmosphere, high-quality interpersonal relationships.

Following up on the initial results, that proved Millenials view happiness as being closely connected to both personal and work-related roles and goals, the authors designed a research questionnaire. The questionnaire was administered to students in a pen-paper form, collecting their further responses on the topic. The questionnaire was filled by 167 Millenials, with the following characteristics (Table 2).

Characteristic	Results
Gender	Male (37,72%), female (62,28%)
Type of college	Private (53,89%), public (46,11%)
Work experience	Not at all (15,04%), up to 3 months total (21,56%), up to 6 months total (20,96%), up to one year total (14,30%), more than one year in total (28,14%)

Table 2. Characteristics of the reserch participants

Using a Likert-type scale of 1 to 5 to describe the degree in which they agree with a statement (from 1= completely disagree, up to 5 = completely agree), the Millenials provided the following insights (Table 3).

Statement	Average	St. Dev.
On average, employees are happy in their workplaces	2,85	0,63
It is important that an employee is happy in the workplace	4,84	0,78
It is important to me personally that I am happy in the workplace	4,88	0,65

Table 3. The degree of agreeing with the proposed statements

Based on the results from the previous table, it is evident that Millenials find it highly important that they are happy in the workplace. Interestingly, on average, Millenials find that other people are slightly less concerned with being happy in the workplace, which perhaps indicates an understanding that the younger generations might be more interested in organizational happiness than the more experienced ones. On the other hand, an increasingly worrying observation the Millenials are making, is that on average, employees are not happy in Croatian workplaces. The mismatch between the importance of a concept, and the reality in the workplace, clearly calls for action.

Further topic researched through the quantitative study was the importance of four key factors for the happiness in the workplace. The key factors that were researched were: (1) the salary, as measured through regularity of salary payments, the level of salary and the possibility of salary growth through time; (2) interpersonal relationships in the workplace, as measured through communication quality with the closest associates, with direct superiors, trust amongst

employees in the workplace and the level of respect that employees receive in the workplace; (3) the type of job an employee is performing, as measured through clear purpose, influencing organizational performance, participation in the decision-making process, perceiving a job as play and enjoyment, challenging tasks as part of the job, independence in creating and performing the job, the possibility of learning and development and the possibility of climbing the corporate ladder; and (4) aligned personal and organizational values, as measured through perception of the product/service as important and valuable, and trusting the decisions made by the managers. The questionnaire was capturing the level of agreement with the statements, again using the Likert-type scale of 1= not important at all to 5= extremely important. The results for the average importance are shown in Table 4.

Factor	Average	St. Dev.
The salary	4,56	0,41
Interpersonal relationships in the workplace	4,50	0,51
The type of job an employee is performing	4,21	0,47
Aligned personal and organizational values	4,09	0,62

Table 4. Importance of different factors influencing happiness in the workplace

Aligned with the general perception of Millenials as being highly materialistic and focused on the salary (Poloski Vokic & Vidovic, 2017), the research results show the vast influence the salary is having on the happiness in the workplace, as perceived by the Millenials. In their opinion, it is the salary that is the dominant drive of happiness in the workplace, slightly overshining the interpersonal relationships in the workplace, which are still found to be significantly important. On the other hand, the type of job an employee is performing, although important, could not be defined as extremely important to Millenials. Probably again reflecting their inherent materialistic desires. Again, drawing on Maslow's hierarchy of needs as described earlier in the paper, it could be that the young soon-to-be-professionals are currently focused on meeting the basic needs of food and shelter, and are hence perceiving the salary as the means to achieve this. It could be expected that young professionals that fall in the Millenial cohort, but already have more substantial work experience, are starting to change their preference towards salary as opposed to other workplace characteristics.

One of the characteristics that became apparent from this survey is the fact that Millenials tended to put a higher emphasis on the regular salary payments (avg=4,77; SD=0,49), than the opportunity for salary growth with time (avg=4,54; SD=0,65). And both of these characteristics were apparently more important than the actual level of salary (avg=4,37; SD=0,58). These results further prove the assumption that the young Millenials are looking to have a sustainable source of income to cover the basic life requirements.

Finally, the respondents were asked about the responsibility to build the happy workplace and the happy organization. Being able to choose between should the responsibility lie in the hands of the individuals, organizations or the society in general (defined as political, legal, economic and cultural factors), these are the respondents' preferences (Table 5).

Stakeholder	Average	St. Dev.
The individual	4,16	0,84
The organization	4,27	0,76
The society	4,02	0,89

Table 5. Responsibility of different stakeholders for building happiness in the workplace

Judging from the data available, the Millenials seem to agree that the most responsible stakeholder for building a happy workplace should be the organization. The individual itself is only in the second place, followed by the society in general. To put it in other words, Millenials seem to agree that it is exactly the HR policies and practices that the organization is fostering, that are building or breaking the happiness in the organization.

5. Discussion

Taking into consideration the theoretical and empirical research and results, it is obvious that there is a lot of room for people-focused practices that should be targeting the goal of building a happy organization. The future young professionals and young executives seem to put a lot of emphasis on the importance of a happy organization, seemingly expecting that the organization should be the one taking care of the process.

In reviewing the most important actions that the organizations can make in order to foster a happy workplace, it seems that the opportunity to satisfy the most basic human needs, the needs for food, and a place to live, is the top priority. Followed by providing meaningful interpersonal relationships in the workplace, Millenials are again proving the value of Maslow's hierarchy of needs. Both the motivational theory and the research results show that after satisfying the basic human needs, the need for social acceptance and forming interpersonal relationships appear. According to Maslow's theory, the desire for self-actualization, as the final step in the hierarchy, can only be achieved after realizing the lower-level needs. Similar to the concept of happy organization, seems that the employee productivity and employee engagement, stemming from a happy organization, can only be achieved as the crown of satisfying lower-level human needs.

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CHAPTER 23

Financial position and sustainability of associations in Croatia

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ABSTRACT

Multitude and heterogeneity of associations represent the fundamental infrastructure of civil society and they are dominant part of the non-governmental non-profit sector. Development, performance and significance of the non-profit sector are primarily defined by non-financial and qualitative indicators of impact on narrow interest groups and their contribution to the development of society as a whole. The development of the non-profit sector is also considered to be one of the important indicators of the degree of development of a country's democracy. Although volunteering is largely voluntary, the viability of citizen associations and other non-profit organizations is conditioned by the availability of adequate economic and financial resources. Funding sources of NGO vary and according to their non-market and non-profit orientation they are to a lesser extent generated on the market in the sphere of social entrepreneurship.

This paper presents the research results of the funding sources, economic financial potential and the elements of economic performance of citizens' associations in the Republic of Croatia. The survey sample includes over 20,000 associations of citizens and their associations which have delivered financial reports to the Registry of Non-profit Organizations in accordance with the statutory obligation.

The research is based on aggregated data reported in the Balance Sheet and Performance Report for years 2015 and 2016 and competent institutions reports on public funding of associations' general activities.

The results of the research provide valuable information and complete the picture of the impact and economic importance of this segment of civil society in the national socio-economic context.

Key words: associations, financial position, funding sources, performance

JEL classification: G34, M14, M41

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1. Introduction

Development, performance and importance of civil society organizations in wider society is usually measured and evaluated using non-financial, qualitative criteria of their impact on narrow interest groups and their contributions to the development of society as a whole. While economic and financial component of civil society organizations and non-profit sector is neglected not only in professional analyzes and scientific research, but also for the purposes of macroeconomic management at the national level.

Activities of non-profit sector attract public and regulator's attention only sporadically in the context of major political campaigns, large-scale humanitarian actions or financial affairs involving prominent public figures. There is systematic neglect of the fact that a significant volume of civil society organizations activities are funded from public sources and that there is high possibility of the exploitation of their economic and financial unattractiveness and their relatively privileged tax position. For these reasons, the main aim of this paper is, as a result of the research, to present some of the key indicators of financial position and financial performance of associations as the most important group of civil society organizations and non-governmental non-profit sector in the Republic of Croatia. For overview of the sample quality, scope of non profit sector, and in particular the formal-legal framework and territorial distribution of its most significant segment - citizens' associations and their alliances, will be presented in the paper. Special focus in the research will be put on funding associations activities from public sources.

2. The scope of non-profit sector in Republic of Croatia

The characteristics of a non-profit organization do not necessarily depend on its legal form, i.e. the activities and the purposes of the organization are more important than the character of its legal identity. Non-profit organization is defined as a legal entity whose purpose and objectives of establishment and functioning are not directed towards profit generation, but towards satisfying general interests and common needs of the wider community (Vašiček and Vašiček, 2016). Governmental non-profit organizations also meet this definition, but since as budget users they are merely funded from budget they are part of the public sector, not non-profit sector[4]. According to international statistical classification[5] non-profit sector includes only nongovernmental nonprofit organizations

4 See more: Croatian Bureau of Statics: Sektorska klasifikacija institucionalnih jedinica, (S.13), http://www.dzs.hr/app/sektorizacija/Documentation/SektorskaKlasifikacija.pdf and The Rulebook on Determining Budget and Extra-budgetary Users of the State Budget and Budget and Extra-budgetary Users of the Budget of Local and Regional Self-Government Units and on the Method of Keeping the Register of Budgetary and Extra-budgetary Users, Official Gazette 128/09, 142/14

5 European Commision, EUROSTAT, European system of accounts - ESA 2010, *Classification of the purposes of non-profit institutions serving households* (COPNI), http://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-02-13-269, Str.545

founded on a private initiative that are dominantly financed through donations, grants, membership contributions and other similar specific forms of financing that are, as a rule, based on voluntary and humane grounds (European Commission, 2010). So, non-profit sector in Croatia includes (Croatian Bureau of Statistics, ny):

1. Trade unions, professional or school associations, consumer associations, political parties, churches or religious associations (including those financed but not controlled by the state), and social, cultural, recreational and sports clubs;
2. Charitable organizations, aid providing organizations that are financed through voluntary transfers in cash or noncash transfers from other institutional units.

However, according to the Act on Financial Operations and Accounting of Non-Profit Organizations (Official Gazette 121/2014), the non-profit sector of the Republic of Croatia, with the exception of civil society organizations (non-governmental domestic and foreign associations and their alliances, trusts, foundations, art associations, trade unions, employer associations) also includes all other legal entities that are non-profit by nature, although they are founded and financed under special regulations (institutions, chambers, ...). Except for the proclaimed non-profit character, the common denominator of these entities is a unified system of accounting and financial reporting through the Register of Non-profit Organizations (RNOs) managed by the Ministry of Finance in common.

Because of the heterogeneity and the broad scope of the non-profit sector in Republic of Croatia, the focus of the analysis is on the economic and financial potential of associations and their alliances, which according to current data from the RNO make up 33,191 organizations out of 35,780 non-profit organizations or more than 92% of the non-profit sector of the Republic of Croatia[6].

3. Citizens' associations in the Republic of Croatia

Associations are the most common form of organized voluntary organization of civil society that allow individuals to step out of their private sphere of family and/or professional life without leaving them and influence on how common and public functions are fulfilled. Law on Association (Official Gazette 74/17, 70/17), which regulate the establishment, registration, legal status and termination of existence of associations, as well as the registration and termination of activities of foreign associations in the Republic of Croatia, define association represents any form of a free and voluntary association of several natural or legal persons, who shall, in order to protect their benefits or stand ups for the protection of human rights and freedoms, as well as the ecological, humanitarian, information, cultural, ethnic, pro-natality, educational, social, professional, sports, technical,

6 Only organizations that have fulfilled their legal obligation to register in the Register are included.

health, scientific or other believes and goals that are not in contravention of the Constitution, without an intention of gaining profit, comply with the rules that regulate the organization and activities of such a form of association.

The Association as a non-profit organization does not perform its activity for the purpose of gaining profit for its members or third parties. However, the non-profit character of the association does not mean that the association can not engage in social entrepreneurship, i.e. associations can perform revenue-generating activities (in the market), but the revenue generated must exclusively be used for the performance and improvement of the activities of the association that enable achieving goals set by the statute. In that way, a non-profit organization is not limited to earning income by performing "profitable" activities.

Legislative regulation on the "profit" activity of a non-profit organization is based on assumption that these activities make relatively small part of overall economic activity which, in spite of the tax-privileged position of non-profit organizations, does not disturb market competition, and that income earned in those activities is intended to be consumed in accordance with the activity of non-profit organizations, and not for making profit. Nevertheless, in spite of the public benefit of its activity, the association becomes a taxpayer when it continuously performs more significant scope of market activities with the aim of gaining economic benefits, thus seeking to eliminate its relatively privileged tax position in compare to other economic entities[7].

The association acquires its legal personality by registration in the Register of Associations of the Republic of Croatia managed by the Ministry of Public Administration. According to official data, on June 30 2017 there were 52,227 associations registered in the Register of Associations (Ministry of Public Administration, 2017). This number also includes associations which are considered inactive because not convening assembly for more than eight years. Currently there are even 24,440 associations in Register (46.8% of total registered associations) that can be based on that criteria considered inactive. In the context of the application of the Law on Association, 25,109 associations have aligned their statutes with the provisions of the Law on Association, and for 4,637 associations the statute is in the process of harmonization.

The number of associations as an important form of civil society organization is an indicator of the social activities of citizens, their involvement in social processes and the level of social capital (Putnam, 2000; Deakin, 2001 according to Bežovan, 2002). Since the number of associations is often used as the main indicator of civil society development, Table 1 shows the total number of associations, the number of associations per 1,000 inhabitants, the absolute and relative share of associations that have aligned their statutes and absolute and relative share of associations that are officially considered inactive in the each county of the Republic of Croatia in 2017.

7 See more: Instructions from the Central Tax Administration Office, KLASA: 410-01/15-01/1590, URBROJ: 513-07-21-01/15-1

According to data from Table 1, the average number of associations per 1.000 inhabitants in the Republic of Croatia is 12.2 and ranges from 15.8 in the City of Zagreb and the Dubrovnik-Neretva County to 9.4 in the County of Krapina-Zagorje. Thereat only 35.3% of associations in the City of Zagreb have aligned their statutes, and even 52.2% of associations are considered inactive because not convening assembly in last eight years. In contrast, in the Krapina-Zagorje County even 75.8% of associations have align its statutes, and only 37.4% of associations are considered inactive. Counties, which according to the number of associations per 1,000 inhabitants recorded above average civil society activity in the Republic of Croatia, excluding City of Zagreb and the Dubrovnik-Neretva County, are: Istria, Primorje-Gorski Kotar, Osijek- Baranja, Lika-Senj and Šibenik-Knin County. The lower level of civil society activity is recorded in the Krapina-Zagorje, Vukovar-Syrmia, Zagreb, Sisak-Moslavina and Virovitica-Podravina County. The largest share of inactive associations registered in the Register of Associations was recorded in Zagreb, Šibenik-Knin and Lika-Senj County, while in Krapina-Zagorje, Međimurje, Sisak-Moslavina and Virovitica-Podravina County high share of associations have aligned their statutes with the Law on Associations.

Of the total number of associations registered in the Register of Associations (52,227), only 33,191 associations are also registered in the Register of Non-profit Organizations managed by Ministry of Finance of the Republic of Croatia. This register is set up for the purpose of monitoring the financial performance of non-profit organizations through the data and information from annual financial statements. Given the ascertained significant number of inactive associations, it can be concluded that the number of associations signed in the Register of Non-Profit Organizations at the Ministry of Finance (32,542) more realistically reflects the number of active associations today.

County	Number of registered associations	Number of associations per 1.000 inhabitants	Of the total number of registered			
			Associations that have aligned their statutes		Inactive associations	
City of Zagreb	12,500	15.8	4,410	35.3%	6,519	52.2%
Dubrovnik-Neretva	1,934	15.8	1,032	53.4%	899	46.5%
Istria	3,008	14.5	1,298	43.2%	1,387	46.1%
Primorje-Gorski Kotar	4,082	13.8	1,909	46.8%	1,701	41.7%
Osijek-Baranja	3,896	12.8	2,392	61.4%	1,569	40.3%
Lika-Senj	647	12.7	392	60.6%	348	53.8%
Šibenik-Knin	1,344	12.3	695	51.7%	719	53.5%
Bjelovar-Bilogora	1,386	11.6	893	64.4%	656	47.3%
Koprivnica-Križevci	1,323	11.4	759	57.4%	406	30.7%
Karlovac	1,439	11.2	897	62.3%	601	41.8%
Požega-Slavonia	852	10.9	556	65.3%	369	43.3%
Split-Dalmatia	4,863	10.7	2,872	59.1%	2,525	51.9%
Zadar	1,762	10.4	824	46.8%	778	44.2%
Međimurje	1,162	10.2	841	72.4%	418	36.0%
Brod-Posavina	1,607	10.1	797	49.6%	894	55.6%
Varaždin	1,778	10.1	1,162	65.4%	612	34.4%
Virovitica-Podravina	839	9.9	596	71.0%	354	42.2%
Sisak-Moslavina	1,696	9.8	1,211	71.4%	710	41.9%
Zagreb	3,103	9.8	1,892	61.0%	1,685	54.3%
Vukovar-Syrmia	1,752	9.8	1,208	68.9%	821	46.9%
Krapina-Zagorje	1,254	9.4	951	75.8%	469	37.4%
TOTAL	**52,227**	**12.2**	**27,587**	**52.8%**	**24,440**	**46.8%**

Table 1. Number of associations in Republic of Croatia on June 30 2017

Source: Authors calculations based on data from Register of Associations of Republic of Croatia and date from Croatian Bureau of Statistics (Population contingents, by towns/municipalities, Census 2011)

4. Economic and financial potential of citizens' associations in the Republic of Croatia

The analysis and assessment of the economic and financial potential of a citizen's association is based on information presented in financial statements. Information is generated according to nonprofit accounting system of Croatia which based on accrual accounting principle since 2008. According to the Act on Financial Operations and Accounting of Non-Profit Organizations (Official Gazette 121/2014), the reporting and accounting system is rationalized by the size and economic importance of a non-profit organization. Accounting methods and financial reporting vary based on the revenue and asset value of

certain non-profit organizations[8]. So called small non-profit organizations are enabled to apply simplified cash basis accounting, while others apply accrual accounting and the system of integrated financial reporting.

Of the total number of associations registered in the Register of Non-profit Organizations, 54% apply accrual accounting principle and are required to submit complete set of financial statements. The remaining 46% are so-called small associations that apply simple bookkeeping and submit only annual financial report on receipts and expenditures at the end of the year. This complicates an integrated overview and the analysis of the non-profit sector, because it requires the reclassification of data expressed on different methodological bases.

An analysis of the overall financial performance of the associations in the Republic of Croatia is even more complicated due to fact that only about 70% of associations registered in the Register of Non-profit Organization have fulfilled their statutory obligation to submit financial reports for 2016, namely 75% of associations applying accrual accounting and the system of integrated financial reporting and about 65% of associations applying simplified cash basis accounting. Although the percentage of associations that had fulfilled their statutory obligation to submit financial reports has increased in comparison to 2015, the degree of transparency of financial operations and financial discipline of associations is still unsatisfactory in Croatia.

Despite the fact that only 70% of associations registered in the Register of Non-profit Organization have fulfilled their statutory obligation to submit financial reports for 2016, the available data represents a valuable source of information on financial aspects of the activities of associations. Nevertheless, at the level of macroeconomic management to this group of entities is not given adequate importance. Probably because of their low fiscal potential and relatively small share of the total number of workers they employ.

Associations that are required to submit complete set of financial statements reported in aggregate Income and Expenditure Report in 2016 total revenues exceeding HRK 5.6 billion, or 13.7% more than in 2015 and expenditures in excess of HRK 5.4 billion which is 9% higher than in 2015. According to date from aggregate Balance sheet, the value of the assets of associations of citizens and their alliances in the Republic of Croatia at the end of 2016 amounts to HRK 5.26 billion, which is 4.4% higher than in the previous year.

Small associations, that apply simplified cash basis accounting, in aggregate Report of the Receipts and Expenditures in 2016 reported receipts 17.7% higher than in 2015 (HRK 411.6 million) and expenditures 20.1% higher than in 2015 (HRK 400.8 million).

8 Single bookkeeping can be applied by non-profit organization whose revenue and value of asset does not exceed HRK 230.000 in last three years. More on non-profit accounting system in Republic of Croatia: Vašiček, V. and Vašiček, D. (2016) „Računovodstvo proračunskih i neprofitnih organizacija“, Ekonomski fakultet Sveučilišta u Rijeci, Rijeka

Human resources, especially those working for associations, are key factor for sustainability and development of the same. Employment data (based on hours worked) show that associations in Croatia employ a total of 18,800 workers, which is 6.5% more than last year. This number of workers account for more than 0.86% of the total number of employees in the Republic of Croatia[9].

The 2016 summary report shows that aggregated employment data and performance elements of associations and their alliances are steadily increasing, suggesting that in economic terms, due to their non-market orientation, unfavourable economic conditions have not adversely affected the activities of associations in the Republic of Croatia. It should also be borne in mind that, although since the financial reporting obligation of all non-profit entities has been introduced in 2015, still a large number of associations do not fulfil their obligation to register in the Registr of Non-Profit Organizations and their statutory obligation to submit financial reports, making it difficult to fully analyze and create an overall picture of economic strength of the most represented form of civil society organizations.

5. The sustainability of citizens' associations in the Republic of Croatia

Certain amount of funding is necessary to cover the costs of activities of each association. Sustainable development and long-term stability of civil society organizations are linked to possibilities of collecting necessary financial resources from different sources. Sources of financial resources required for the operation of the association are private donations of economic entities and citizens, public grants awarded by governments, counties, cities and municipalities or public companies and organizations, then membership fees or funds provided by members of individual associations and the funds allocated to them from foreign programs intended for the development of civil society (Bežovan & Ivanović, ny). The existence of various sources of funding associations' activities indicates that society has recognized the strength and important role of civil society in the development of society. Unfortunately, most of the organizations have one or two sources of funding, which, in the long run, imply a great financial instability of such organizations (Bežovan, 2004). In addition, the number of sources most often depends on the area of activity of an association (Bežovan & Ivanović, ny).

In 2016, donations make up the largest proportion of sources of income for non-profit organizations (28%), of which 60% are donations from the budget, followed by revenue on the basis of special regulations (27%). Membership fees account for 14% of income, while on the basis of social entrepreneurship 19% of revenue is generated (Vašiček, Sikirić & Čičak, 2017). The aforementioned indicates that the financing of the non-profit sector is mostly obtained

9 Authors Calculation based on data from Croatian Bureau of Statistics *(Employed by occupation, age and sex, by towns/municipalities, Census 2011)*

through donations. It is noticeable that the revenues of social entrepreneurship are relatively poorly represented, which leads to the conclusion that this form of action needs to be stimulated through the legal and tax system.

The Regulation on the Criteria, Standards and Procedures for Financing and Contracting Programs and Projects of Public Benefit Interest Implemented by Associations (Official Gazette 26/15) defines the standards of financing and measures that associations and other civil society organizations must fulfill when implementing programs and projects of general interest financed from public sources. One of the basic prerequisites is the registration in the Register of Non-profit Organizations, which aims to increase financial transparency of the operations and activities of non-profit organizations According to the Report on the Financing of Civil Society Organizations Projects and Programmes from Public Sources in 2015, adopted by the Government in April 2017, 36.104 different programs and projects of general interest implemented by associations and other civil society organizations were financed from the public sources, and through a public call a total of HRK 1.672.699.179,11 was awarded by direct grants, donations and sponsorships. The amounts awarded according to the sources of funds at all levels in 2015 are shown in Table 2.

Source of funds	Amount awarded	Relative share (in %)
Funds from the city budgets	397,157,789.76	23.74
Funds from the part of the revenues from games of chance	359,741,156.20	21.50
Funds from the state budget	304,952,647.99	18.23
Funds from the budget of the City of Zagreb	215,041,315.26	12.86
Funds from the municipal budget	139,042,928.02	8.31
EU funds	99,907,093.72	6.00
Funds from county budget	98,226,989.68	5.87
Funds from the income of companies owned by the Republic of Croatia and local and regional self-government units	31,236,798.32	1.86
Funds from the part of the income of tourist boards	16,913,422.31	1.01
Funds from part of the income from the HRT fee	4,079,162.55	0.24
Funds from fees for environmental protection	3,343,477.44	0.20
Funds from other foreign funds (European Economic Area countries and the Kingdom of Norway)	2,339,624.31	0.14
Non-financial funds	332,400.91	0.02
Total:	**1,672,699,179.11**	**100.00**

Table 2. The amounts awarded according to the sources of funds at all levels in 2015

Source: Report on the Financing of Projects and Programs of Civil Society Organizations from public funds in 2015 (UZUVRH 2017)

State administration bodies, Croatian Government offices and other public institutions at the national level financed 7,540 civil society organizations' programs and projects with HRK 774,747,534.86 and HRK 332,400, 91[10] of non-financial funds in 2015, which is 31.73% more than in 2014 when only 5,724 civil society organizations' programs and projects were financed. The largest amount of funds, 24.1% of the total amount, was allocated to social activities. 22.5% of total funds were allocated for the activities in the field of culture and art and 17.6% for sports projects. Most of the funds (40.36%) were awarded through a public call/invitation. Sports competition are the most financed activity with 16% of the total amount, followed by organizational capacity building activities with 14.06% and activities aimed at raising the quality of life of people with disabilities with 9.64% (Office for the Cooperation with NGOs, 2017). It can be concluded that at national level, civil society organizations' programs and projects are increasingly seen as an investment in community and development of a society as a whole, and not as a cost.

In 2015, counties, the City of Zagreb, cities and municipalities allocated a total of HRK 849,469,022.72, or 50.78% of total funds[11]. 66% of county's funds, 75% of city's funds and 40% of municipality's funds were awarded by public calls. All counties and the City of Zagreb allocate their funds based on strategic and/or program documents. While, only around 50% of cities and about 25% of municipalities have strategic documents based on which funds should be allocated (Office for the Cooperation with NGOs, 2017).

5.87% of total funds were allocated from the county's budget using which 6.068 civil society organizations projects and programs were financed, which is 16.94% less than in 2014. 1.814 civil society organizations' projects and programs were financed by more than HRK 215 million[12] from the budget of City of Zagreb which represents 12.86% of total public funds. The largest amount of funds was allocated to the field of sport, almost 31% of the total public funds from county budget and 71.55% of the total amount from the budget of the City of Zagreb. Following is the area of culture and art, financed with a share of 20.14% of funds from county budget and with 11.39% of funds from the budget of the City of Zagreb, and the area of social activity[13] funded with 11.37% of funds from county budget and 7.1% of total budget funds of the City of Zagreb (Office for the Cooperation with NGOs, 2017).

From city budgets HRK 397,157,789.76[14] or 23.74% of total public funds was awarded. Using those public funds 8,721 civil society organizations projects and programs were financed. City of Split awarded 8.37% of total amount of funds from city budgets, City of Rijeka 6.5% and City of Dubrovnik 5.2%. 56,2%

10 46,31% of the total amount allocated from public sources.

11 In 2014 HRK 1.014.347.095,41 or more than 60% of total public funds was awarded by local self-government units.

12 19,83% less than in 2014

13 Financial support for people with disabilities, people with special needs and socially vulnerable groups

14 14,45% less than in 2014

of total funds from city budgets or HRK 223.371.963,89 is used for financing activities in field of sport followed by activities in field of protection and secure with share of 10,74%, and projects and programs in a field of art and culture with 10,68%.

The largest share of funds (40.65%) were allocated for the realization of public needs programs established by a special law. 40.21% of the funds were awarded through public calls. 10.1% funds are used for the implementation of public authority entrusted by the special law. While HRK 8,283,172.66 or slightly more than 2% of the total allocated funds were by the decision of the mayor allocated outside the public call to unplanned activities (Office for the Cooperation with NGOs, 2017).

From municipal budgets 8.31% of total public funds (HRK 139.042.928,02) were allocated for implementation of 5,687 projects and programs. The highest amount of HRK 3,505,679.50 was allocated by the Municipality of Podstrana, which is 2.52% of the total amount of funds from State administration bodies, Croatian Government offices and other public institutions at the national level financed 7,540 civil society organizations' programs and projects with HRK 774,747,534.86 and HRK 332,400, 91[15] of non-financial funds in 2015, which is 31.73% more than in 2014 when only 5,724 civil society organizations' programs and projects were financed. The largest amount of funds, 24.1% of the total amount, was allocated to social activities. 22.5% of total funds were allocated for the activities in the field of culture and art and 17.6% for sports projects. Most of the funds (40.36%) were awarded through a public call/invitation. Sports competition are the most financed activity with 16% of the total amount, followed by organizational capacity building activities with 14.06% and activities aimed at raising the quality of life of people with disabilities with 9.64% (Office for the Cooperation with NGOs, 2017). It can be concluded that at national level, civil society organizations' programs and projects are increasingly seen as an investment in community and development of a society as a whole, and not as a cost.

In 2015, counties, the City of Zagreb, cities and municipalities allocated a total of HRK 849,469,022.72, or 50.78% of total funds[16]. 66% of county's funds, 75% of city's funds and 40% of municipality's funds were awarded by public calls. All counties and the City of Zagreb allocate their funds based on strategic and/or program documents. While, only around 50% of cities and about 25% of municipalities have strategic documents based on which funds should

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142 companies owned by the Republic of Croatia and local and regional self-government units funded 2,231 projects with more than HRK 31 million. More than 80% of donations and sponsorships came from companies owned by the Republic of Croatia, such as Hrvatska elektroprivreda d.d. with 74,5% of total amount, INA d.d. with 7,4% and Croatian bank for reconstruction and development with 6.3%. Among the companies owned by local self-government units, i.e. cities and municipalities, the highest amount was awarded by

18 Financial support for people with disabilities, people with special needs and socially vulnerable groups

19 14,45% less than in 2014

Zagrebački holding (26.4%), followed by Vodovod i odvodnja Šibenik d.o.o. (10.37 %), GKP Komunalac d.o.o. (3.36%) i Montraker d.o.o. Vrsar (3,36%). Most of the funds were awarded in the form of sponsorships, to be exact more than HRK 18 million, predominantly to the field of sport, followed by the area of social activity, and the area of culture and art (Office for the Cooperation with NGOs, 2017).

Most of the donations and sponsorships from the public companies are not awarded on the basis of strategic documents and in 2015 only a few companies awarded their donations on the basis of a public call, considering that the prescribed standards of planning, allocation and monitoring of allocated funds do not apply for them, which indicates a low level of awareness of need for transparent spending of public funds in public companies (Office for the Cooperation with NGOs, 2017).

36 tourist boards awarded 1.01% of total allocated funds from public sources for implementation of civil society organizations projects and programs in the field of tourism. The highest amount was awarded by the Tourist Board of the City of Zagreb with a share of 65.42%, followed by Croatian National Tourist Board (8.71%), Tourist Board of the City of Poreč (with a share of 5.66%), Tourist Board of the Municipality of Medulin (3.89%), Pula Tourist Board (2.44%) and the Split-Dalmatia County Tourist Board (2.25%) (Office for the Cooperation with NGOs, 2017).

6. Conclusions

The development of a civil society, as part of a non-governmental non-profit sector, is one of the key indicators of the degree of development of a country's democracy. In addition, citizens' associations with their multitude and heterogeneity of activities represent the fundamental infrastructure of civil society and are the dominant part of the non-governmental non-profit sector. Due to countries, particularly transitional and post-transitional countries, dedicate special attention to institutional and legislative creation of conditions for their establishment and operation which is reflected in the creation of a broad and liberal legal framework, certain tax benefits, institutional support and public funding. Although citizen's associations operate predominantly on volunteer basis, the viability of the activities of citizen associations and other non-governmental non-profit organizations is conditioned by the availability of appropriate economic and financial resources. Citizens' association's sources of funds vary and, in accordance with their non-market and non-profit orientation, are only to a lesser extent generated on the market in the sphere of social entrepreneurship.

The development, performance and importance of the non-profit sector is primarily evaluated by non-financial, qualitative criteria of their influence on political decisions and their contribution to the development of society as a whole, while systematic monitoring of economic and human potential and financial

sustainability of citizen's associations is absent. The research results presented in this paper show a significant number of citizens' associations and significant regional diversity of their activity in relation to the number of inhabitants. Also, research results show that the degree of financial discipline and formal legal arrangements are still low. This is reflected in the disproportion of the total number of registered associations in relation to the number of associations that have aligned their statues with the Law on Association and a significant number of associations that did not fulfill their statutory obligation to submit financial statements. These facts make comprehensive economic financial analysis of the entire group of associations difficult. However, available data show that associations represent a respectable socio-economic segment in the Republic of Croatia. Annual revenues and assets of this group of legal entities are continuously increasing and continuously exceed HRK 5 billion, while effective employment, expressed in hours of work, reaches almost 1% of the total number of employees in the Republic of Croatia. Although to a large extent based on voluntarism and private sources of funding, public funds still represent the most important source of financing civil society organizations activities. While income from social entrepreneurship is still underrepresented, pointing to the conclusion that this form of action is necessarily to more systematically stimulate through the legal and tax system.

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CHAPTER 24

Constructing financial statements and the framework of accounting

Lidija Romic[1]

ABSTRACT

This paper introduces each of the principal financial statements, beginning with the Profit and Loss account and Balance Sheet. It begins with an overview of the regulations governing financial statements and describes the matching principle, which emphasizes prepayments, accruals and provisions such as depreciation. Accounting provides an account – an explanation or report in financial terms – about the transactions of an organization. Accounting enables managers to satisfy the stakeholders in the organization (owners, government, financiers, suppliers, customers, employees etc.) that they have acted in the best interest of the stakeholders rather than themselves.

This explanations are provided to stakeholders through financial statements or reports, often referred to as the company's accounts'. The main financial reports are the Profit and Loss account, The Balance Sheet and the Cash flow statement.

The presentation of financial reports must comply with Schedule 4 to the Companies Act, 1985, which prescribes the form and content of accounts. Section 226 of the Act requires the financial reports to represent a 'true and fair view' of the state of affairs of the company and its profits. The companies Act requires directors to state whether the accounts have been prepared in accordance with accounting standards and to explain any significant departures from those standards. For companies listed on the Stock Exchange, there are additional rules contained in the Listing Requirements, commonly known as the Yellow Book, which requires the disclosure of additional information.

Key words: accounting, financial statements, profit, loss, cash flow

Jel Classification: M 53

1. Introduction

There is a legal requirement for the financial statements of companies (other than very small ones) to be audited. Auditors are professionally qualified accountants who have to conduct an audit – an independent examination of the financial statements – and form an opinion as to whether the financial statements form a true and fair view and have been prepared in accordance with the Companies Act.

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Although the requirement for a true and fair view is subjective and has never been tested at law, it takes precedence over accounting standards.

Accounting standards are principle to which accounting reports should conform. They are aimed at:

- Achieving comparability between companies, through reducing the variety of accounting practice:
- Providing full disclosure of material (i.e. significant) factors through the judgements made by the preparers of those financial reports, and
- Ensuring that the information provided is meaningful for the users of financial reports

However, a criticism of the standards is that they are set by the preparers (professional accountants) rather than users (shareholders and financiers) of financial reports.

Financial Reporting Standards (FRSs) are issued by the Accounting Standards Board (ASB) and Statement of Standard Accounting Practice (SSAPs) were Issued by the Accounting Standards Committee, which preceded the ASB. FRSs and SSAPs govern many aspects of the presentation of financial statements and the disclosure of information (for a detailed coverage, see Blake, 1997) Examples of commonly applied standards include:

SSAP9 Stocks

SSAP13 Research and Development

SSAP21 Leases

FRS10 Goodwill

FRS12 Provisions

FRS15 Fixed Asset and Depreciation

A Financial reporting Review Panel has to power to seek revision of a company's accounts where those accounts do not comply with the standards and if necessary to seek a court order to ensure compliance.

Interestingly, the US equivalent of the true and fair view is for financial statements to be presented fairly and in accordance with Generally Accepted Accounting Principles (or GAAP). There is a move towards the harmonization of accounting standards between countries through the work of the International Accounting Standard Board (IASB). This has been a consequence of the globalization of capital markets, with the consequent need for accounting rules that can be understood by international investors. The dominance of multinational corporations and the desire of companies to be listed on several stock exchanges have led to the need to rationalize different reporting practices in different countries. In Europe, all listed companies of member states of the European Union have to comply with IASB standards by 2005.

2. Literature review

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3. Metodology

Management is responsible for the preparation of financial statements and therefore plays a key role in the financial reporting regulatory environment. This is reflected in Figure 1. Derry Cotter (2012)

One could view management's role as being simply to report objectively in accordance with the various regulatory requirements. In doing so, management may nonetheless exercise accounting policy choice in a manner that is in its own interests or that of the entity. For example, in a time of rising property prices, profit could be increased by using the fair value model to account for investment property.

Watts and Zimmerman (1978) have used positive accounting theory (PAT) to explain management's choice of accounting policies. PAT contains three hypotheses:

- Bonus plan hypothesis. Management whose bonuses are based on accounting profits are likely to use accounting policies that increase profit,
- Debt: equity hypothesis. Firms with high level of borrowing are likely to use accounting policies that increase profit. This will assist highly geared firms to meet lending conditions such as the time interest covered ration (i.e. profit before interest/interest) and thereby avoid penalties.[2]

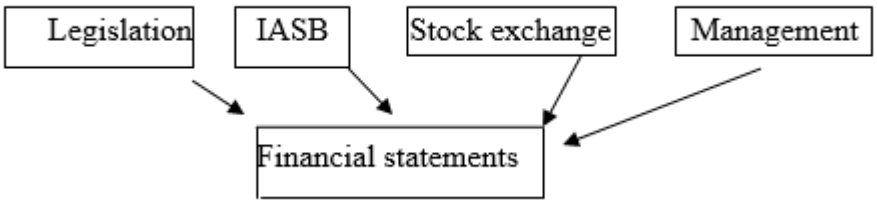

Figure 1. Factors determining the content of financial statements Derry Cotter (2012)

3.1. Size hypothesis

Large firms are more likely to use accounting policies that reduce profit, so as to avoid any unfavourable attention that high profits might attract (e.g. oil companies may want to avoid government controls on petrol prices).

Management may also decide to employ creative accounting techniques for any of the following reasons:

- To reduce taxation,
- To control dividends,
- Pressure from analysts and big institutional investors to meet profit targets and
- Big bath theory, which maintains that new management will maximize losses and blame them on their predecessors. This should result in the new management taking credit for improved results going forward.

It is essential when accounting standards are being developed, that regulatory bodied such as the IASB are fully cognizant of management's part in the process. As outlined above, when preparing financial statements management will seek to achieve objectives that are in their own interests and that of their firm. Through their interpretation and application of accounting standards, and their

2 Wall Street Journal (2002) Elan's revenue gets a quick lift from its complicated accounting 29 January

choice of accounting policies, management plays a critical role in the preparation and presentation of financial statements. By being aware of the factors that influence and motivate management, the IASB can be more effective in fulfilling their regulatory function.

The foregoing discussion has focused on the issues that determine the content and presentation of an entity's financial statements. So as to fully appreciate the role of the regulatory process, it is also important to understand the impact which financial statements have on the various user groups and on society in general. This impact is outlined in Figure 2. Derry Cotter (2012)

3.2. Economic consequences

Throughout most of the twentieth century, business corporations were benignly regarded as the primary drivers of wealth creation. Accountability was rarely an issue, as employees and other stakeholders offered unconditional loyalty to the corporate ethos. An example was the US tobacco industry which though raising serious health concerns since 1950s, did not succumb to the first successful legal action until 1996 .Daynard R a, Bates C. and Francey, N (2000)The industry's primary defence during that time was to blame smokers for choosing to use their products despite the known risks.

Zeff S. (1978) however, explains how in the 1970s, society began to hold its institutions responsible for the social environmental and economic consequences of their actions. A prime example was the Challenger space shuttle disaster in 1986, which resulted in the deaths of all seven crew members. The Rogers Commission which investigated the accident was critical of NASA's safety culture, and the US House Committee on Science and Technology concluded that the fundamental problem was poor technical decision-making by top NASA and contractor personnel.

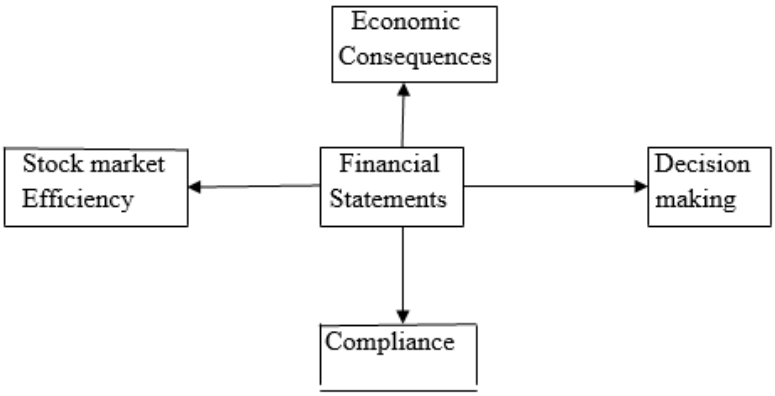

Figure 2. Impact of financial statements Derry Cotter (2012)

A similar culture of accountability has evolved in the area of financial regulation. For example in 2000, theUK standard setting body, the ASB was held partially responsible when employers began to replace defined- benefit pension plans with defined-contribution plans. The change resulted in a transfer of risks to employees, as employee pension under defined-contribution plans depend on the future performance of fund assets, rather than being guaranteed by employers. The allegation against the SB arose from the publication of FRS 17, Retirement Benefits, which required that pension scheme deficits should be recognized immediately as a liability, rather than being amortised over the expected service lives of employees in the scheme. This requirement meant that pension deficits crystallised immediately in the financial statements, making defined- contribution plans less attractive from an employer's perspective.

As noted previously, the IASB's requirement for financial assets to be stated at fair value was widely perceived as contributing to the recent global financial crisis. This requirement was relaxed after the IASB came under intense pressure from international governments.

Thus, it is generally accepted that financial statements have significant economic consequences.[3]

3.3. Stock market efficiency

Stock market efficiency is assessed by the speed and accuracy that share prices reflect new information. Many studied have shown that share prices react to new accounting information, which confirms that published financial statements contribute to stock market efficiency. Thus, financial statements have an important role in ensuring that quoted share prices reflect the fair value of an entity's securities.

3.4. Compliance

Financial statements play a crucial role in enabling businesses to fulfill their statutory obligations. This includes the submission of tax information to the revenue authorities, the furnishing of annual financial statements to shareholders, the fulfillment of a company's audit requirement, and the filing of an annual return with the Companies Registration Office or similar authority.

3.5. Decision making

Financial statements serve as a valuable tool for decision making purposes, such as the purchase and sale of shares. They are also used by lending institutions when assessing credit applications, by creditors when evaluating orders for goods or services, by governments when allocating grants and subsidies and by trade unions as part of the wage-negotiation process.

3 Near J.P (1989) Whistleblowing:encourage it. Business Horizons 32 (1) pp.2-7

4. Empirical data and analysis

Creative accounting can be defined as the presentation of information in a manner that is inconsistent with the underlying facts. It has been a problem throughout the twentieth century and continues to challenge regulators into the new millennium. Madbid.com provides a good example of how numbers can be presented in a creative way. On the Madbid website, the BBC is quoted as saying that Goods can be won for a fraction of their retail price. The Times is quoted as saying that the average saving on high street prices is 98%. A closer examination of the Madbid website reveals a somewhat different story. Bids which have a face value of 1 cent, cost up to 33 cents each to purchase from Madbid. During an auction the price of an item increases by 1 cent every time that someone places a higher bid. However the cost of placing a bid that is 1 cent higher varies between 25 and 33 cents.

For example the Madbid website features an Audi 1.2 Sportback which was auctioned for 2529 € in January 2011. The total amount paid by bidders (only one of whom could win) was between 63225€ (i.e.25 x 2529€) and 83457€ (i.e 33x 2529€) based on a listed recommended retail price of 16320€, Madbid earned a profit of at least 46905€, and possibly as much as 67137€ from the auction of the Audi.

Creative accounting can have significant economic consequences. For example, if it is used to reduce a firm's tax charge, there is a transfer of resources from society to the firm. If creative accounting is used to overstate a firm's share price, there will be a transfer of resources from investors to the firm when new shares are issued. Share price overstatement will also result in investors who are selling the company's shares benefiting at the expense of buyers. If management uses creative accounting techniques to maximize their level of remuneration, there is a transfer of resources from shareholders to management.

4.1. Reasons for creative accounting

There are many reasons that provide an incentive for management to engage in creative accounting. Watts and Zimmerman's (1978) positive accounting theory maintains that management is influenced by:

- The size hypothesis
- The debt/equity hypothesis
- The bonus plan hypothesis

The size hypothesis argues that large firms may want lower profits so as to avoid unfavourable political costs, such as government-imposed price restrictions on their products or services. Firms with high debt/equity ratios may wish to increase their profits in order to comply with loan agreements, which typically require profits to be a certain multiple of the interest charge for the period. Thirdly, management may be motivated to increase their firm's profit where managerial bonuses are based on accounting earnings.

The big bath theory provides another rationale for the use of creative accounting practices by management. This involves new management maximizing a firm's losses immediately following their appointment. The objective is to hold their predecessors responsible, while allowing the new management to take the credit for enhanced future profits. In this paper we reports on the reasons given by auditing practitioners and management for the use of creative accounting practices. These are summarised as follows:

- To meet the limits on borrowing and gearing
- Desire to reduce taxation
- Desire to control dividends
- Pressure from big institutional investors

4.2. Examples of creative accounting

There are many examples of creative accounting practices. Some of these are discussed below:

(i) Obfuscation hypothesis
This involves communicating good news with clarity and the use of short words. Bad news, on the other hand, is communicated in a manner that is more difficult to comprehend. The use of obfuscation is most commonly found in those parts of the annual report that involve a significant amount of narrative, such as the Chairman's Statement.

(ii) Earnings management
The earnings management literature outlines how management may engage in income smoothing practices so as to reduce the risk perception of their firm:

1. Smoothing through allocation over time. Management can manipulate the periods in which expenses are recognized. For example, the useful life of assets can be adjusted, thereby affecting the amount of depreciation charged as an expense.

2. Use of discretionary accruals. Income can also be smoothed by the use of discretionary accruals. For example, management can determine the amount to be provided as a provision for bed debts, or the amount of a provision in respect of a warranty on a company's products or services

(iii) Off - balance sheet financing
This involves a firm's debt being committed from its statement of financial position. This was the main creative accounting technique employed by Enron, prior to its bankruptcy in 2001. Using other companies, called special purpose vehicles (SPVs), Enron raised enormous amounts of debt funding. Although Enron exercised control over these SPV's, the

loans raised by them were not included in the statement of financial position of the Enron Group. This had the effect of significantly understating the amount of loans outstanding.

(iv) Revenue recognition
There are many ways in which companies can use creative accounting techniques to recognize revenue before it is earned. One such practice, known as channel stuffing, involves a distributor supplying more goods to retail outlets that can be sold to customers. The distributor records these goods a revenue, thereby inflating profits, but the goods are later returned by the retailers as they cannot be sold.

Another technique to distort revenue has been employed by the pharmaceutical company Elan. This practice which involved the sale of product lines, was uncovered by the Wall Street Journal in 2002. For example, when Elan was selling the rights to a drug called Permax for $ 47.5M, it recorded the sale as part of product revenue. This gave the impression that Elan's drug sales for the period had increased by $ 47.5M, whereas in fact this increase related to the disposal of an asset. The correct treatment would have been to record the proceeds of $ 47.5M separately as Profit on disposal of a product line and to ensure that this amount was excluded from revenue in the income statement.

(v) Overstating assets
This involves the failure by a firm to record impairments relating to the value of assets such as machinery, property, inventory, investments and receivables.

(vi) Aggressive capitalization of costs
Some firms may decide to capitalize costs (e.g. research development) which others write off routinely.

4.3. How effective is creative accounting?

The jury is still out on this question. An increase in a company's earnings might be achieved by using longer asset lives, resulting in a lower depreciation charge. As this can be easily observed, however, the users of the firm's financial statements are unlikely to be misled. Some creative accounting techniques are not easy to spot however. For example, Enron's use of off- balance-sheet financing was difficult to detect, even for the company's auditors.

It has also been found that financial analysts, who have expertise in interpreting companies' financial statements, may not always be able to detect a firm's use of creative accounting. (see Breton and Taffler 1995). Likewise, Naser (1993) documents the case of the UK conglomerate, Polly Peck, whose impending demise was camouflaged by the use of creative accounting techniques.

4.4. How can creative accounting be prevented

It is unlikely that creative accounting can ever be eliminated entirely. A number of approaches can however, be effective in reducing its incidence.

4.5. Financial regulation

Legislation provides the basic weaponry in the war against creative accounting. In prescribing the statutory regulations that must be complied with, the companies' Acts establish a solid platform for the prevention of creative accounting.

Legislative requirements have also become more onerous since the collapse of Enron in 2001. For example the Sarbanes-Oxley Act enacted in the United States in 2002, requires compliance with a rigorous set of new rules.[4]

Financial reporting standards also have a crucial role to play. Regulatory bodies, such as the IASB, are constantly revamping their accounting standards in order to combat creative accounting. There is for example a continuing effort to make accounting rules more uniform, so as to reduce the flexibility for firms to engage in creative accounting practices.

4.6. Monitoring enforcement and penalties

An external audit of a company's financial statements plays a crucial role in the prevention of creative accounting. This involves an independent assessment to determine whether the financial statements give a true and fair view of a company's performance and financial position.

In the post-Enron world, a large number of additional policing bodies have been established worldwide, to monitor and enforce companies' accounting and legal requirements. These include oversight bodies which monitor the conduct of the accounting and auditing professions.

Harsher penalties can act as a deterrent against breaches of regulatory rules. A prime example is the 25-year prison sentence passed down to Bernie Ebbers, former CEO of WorldCom. Ebbers was convicted of fraud and conspiracy in 2005, as a result of WorlCom's false financial reporting which resulted in a loss of $100 billion to investors.

4.7 .Corporate governance

Adherence to a Corporate Governance Code can enable a company to establish appropriate structures to prevent the use of creative accounting practices. For example, the appointment of a majority of non-executive directors on a company's board acts as a control against abuses by management. Corporate governance is discussed in further below.

4 Nadler J. and Schulman M (2006), www.scu.edu/ethic

4.8. Focus on ethics

An emphasis on ethics in education can also play a significant role in helping to reduce the use of creative accounting practices by management. This is discussed in greater detail below.

4.9. Creating a culture of whistle-blowing in organizations

Insiders are often aware of creative accounting practices long before they become known to those outside an organization. Management can help to eradicate creative accounting practices by providing support for a culture of whistle-blowing in their organization. This can assist in bringing accounting irregularities to light at an early stage. Whistle-blowing is discussed in greater detail below.[5]

4.10. Corporate social reporting

Creating a culture of good citizenship in an organization helps to extend management's focus beyond the needs of the shareholder/investor group. Thus, a commitment to corporate social reporting makes management reportable to a broader range of stakeholders, thus reducing the motivation to engage in creative accounting. This is discussed in greater detail below.

Corporate governance is defined by the Australian Stock Exchange as the system by which companies are directed and managed. It influences how the objectives of the company are set and achieved, how risk is monitored and assessed, and how performance is optimized.

Munzing (2003) outlines how the need for corporate governance is directly linked to the separation of ownership and management. Essentially, it involves a manager (i.e. the agent) raising capital from shareholders (i.e. the principal) for the purpose of investing in a company. The shareholders need the manager to generate a return on the funds invested, but have no guarantee that their funds will not be expropriated or used for projects that involve an excessive level of risk. This dilemma is described as the agency problem The agency problem involves what is known as oral hazard, which exists when one party is responsible for the interests of another but has an incentive to put his or her own interests first. For example, a manager may have an incentive to invest in high risk projects knowing that, should the investment fail, it is the shareholders who will suffer a loss of capital.

Contracts are therefore drawn up between the agent and principal, with a view to ensuring that the agent's actions are in the best interests of the principal. For example, management remuneration levels might be based on corporate earnings, or significant investments of capital in individual projects might require prior shareholder approval.

5 Near J.P (1989) Whistleblowing:encourage it. Business Horizons 32 (1) pp.2-7

A key objective of corporate governance is therefore to ensure that contracts between management and shareholders are implemented effectively. The role of corporate governance, however, extends beyond that of establishing and monitoring between managers and shareholders.

The modern corporation is seen to have broader societal responsibilities which include a commitment to a code of ethical behavior and good citizenship. The role of corporate governance therefore extends to ensuring that corporation also fulfill their commitments to stakeholders such as employees, suppliers of goods and services, conservationists and other interest groups who have a valid claim on an entity's resources.

The following statement Johnson illustrates the group's commitment to corporate governance:

The values embodied in Our Credo guide the action of the people of the Johnson family of Companies at all levels and in all parts of the world. They have done so for more than 60 years. These Credo values extend to our accounting and financial reporting responsibilities. Our management is responsible for timely, accurate, reliable and objective financial statements and related information. As such:[6]

1. We maintain a well- designed system of internal accounting controls,
2. We encourage strong and effective corporate governance from our Board of Directors,
3. We continuously review our business results and strategic choices,
4. We focus on financial stewardship.

4.11. Corporate governance failures

The most infamous case of corporate governance failure involved the US power giant Enron, which filed for bankruptcy in 2001. Enron was the seventh largest company in the United States, and its collapse, which also took down its auditors Arthur Andersen, sent shock waves thorough the entire community. Munzing (2003) identifies the following corporate governance failures in Enron:

1. Management was not acting in the best interests of shareholders, which in effect was a manifestation of the principal-agent problem.
2. Management used sophisticated techniques to produce misleading financial results
3. Due to the lack of board independence (Enron management had a major board presence) management was able to extract excessive remuneration at the shareholders' expense.

6 Johnson, S A, Moorman T.C and Sorescu S.M. (2009) A reexamination of corporate governance and equity prices with updated and supplemental results. The Review of Financial Studies 22 (11) pp 4753-786

An additional problem was that Enron insisted on investing its employees' pension funds in the company's own equity shares. This failed to provide the employees with an acceptable level of risk diversification resulting in widespread hardship when the stock price collapsed.[7]

4.12. Policy response to corporate governance failures

There was a widespread regulatory response to the failure of Enron and the subsequent demise of other companies such as WorldCom (the largest bankruptcy filing in US history prior to Lehman Brothers in 2008) The most important policy response has arguably been in the US where the Sarbanes-Oxley Act was passed in the summer of 2002. Provisions of the act include the prohibition of insider lending to a firm's executives and directors penalties for accounting restatements reflecting misconduct and a requirement that members of audit committees be independent. The act also strengthens auditor independence by limiting the scope of non-audit and consulting services for audit clients. Cornford (2004)

Other jurisdictions also have corporate governance codes. For example. The UK Corporate Governance Code, which is based on principles rather than rules, sets out best practice guidelines. Companies listed on a stock exchange must explain if they do not comply with the provisions of the UK Corporate Governance Code.

4.13. Does corporate governance increase shareholder value?

One rationale for the increased focus on corporate governance in recent years is that improved monitoring leads to an increase in a company's share price. Another is that it reduces excessive risk-taking. There is a little empirical support, however, for the above hypotheses, and several studies have found no significant linkage between corporate governance and the level of shareholder wealth Johnson (2009).

In the absence of an established benefit to shareholders, Miller (2010) poses the question as to why firms are willing to commit resources to improve corporate governance. Perhaps, Miller suggests, it is because benefits from an enhanced corporate governance may actually accrue to a wider set of stakeholders than shareholders. It is also likely that the increased focus on corporate governance is not voluntary, a regulatory changes may have left firms with no option but to take corporate governance issues more seriously than therefore.[8]

7 Jensen, Michael and Meckling, William (1976) Theory of the firm; managerial behavior, agency costs and ownership structure, Journal of Financial economics, 3 pp. 305-60

8 Hope, A and Gray, R (1982) Power and policy making: the development of an R&D standard, Journal of Business Finance and Accounting, Vol. 9, No.4 Winter,pp 531-58

4.14. Whistle blowing

Whistle-blowing has been defined by Nadler and Schulman (2006) as calling attention to wrongdoing that is occurring within an organization. Management can aid the early detection of creative accounting in their organization by encouraging a culture that encourages and supports whistle-blowing.

Whistle-blowing has however, had a difficult evolution. Boatright (2003) describes how in a 1071 speech, James M. Roche, then chairman of the General Motors Corporation, attacked the process of whistle-blowing:

Some of the enemies of business now encourage an employee to be disloyal to the enterprise. They want to create suspicion and disharmony, and pry into the proprietary interests of the business. However this is labeled-industrial espionage, whistle-blowing or professional responsibility – it is another tactic for spreading disunity and creating conflict.

Glazer (1983) identified 10 cases of whistle-blowing and examined the personal consequences for each of the whistle-blowers. The cases include that of Justin Rose who has hired as an in-house attorney in 1973 by Associated Milk Producers Incorporated where he quickly became aware of illegal payments being made to politicians. [9]

Parmarlee and others (1982) surveyed 72 women who had filed complaints of unfair discrimination with Wisconsin's Equal Rights Division. Following their complaint, the woman reported being excluded from staff meetings, suffering a loss of perquisites, receiving less desirable work assignments, obtaining a heavier workload, having their work more stringently criticized and being pressured to drop their action. Similarly, in survey of other whistle-blowers, Jos and others (1989) found that 69% of those in the private sector and 59% of those in the public sector lost their jobs. Others, in the same survey, experienced a reduction of responsibilities or salary, or suffered harassment or work transfer.

These cases demonstrate that, traditionally, whistle-blowers have frequently met with severe retaliation by their own organizations. This is likely to be a response to the uncertainty that whistle-blowers create, and retaliation may be intended to silence the perpetrator, or prevent the complaint from being made public. It may also be intended to discredit the whistle-blower, or to deter others from complaining in the future. [10]

4.15. Changing attitude towards whistle-blowing

Zeff (1978) explains how in the 1970s, the traditional view of organizations began to change. Hitherto seen as providers of employment and creators of wealth, in the 1970s organizations began to be held responsible for the social,

9 Griffiths I (1986) Creative accounting London: Unwin Hyman Limited

10 Glazer, M (1983) Ten whistleblowers and how they fared, The hasting Center Report, 13 (6) pp. 33-41

economic and environmental consequences of their transactions. The late 1970s saw an explosion of lawsuits in the United States, and huge awards were made against companies, resulting in an insurance crisis as insures refused to provide an adequate level of product liability cover.

Referring to ill fated Challenger space shuttle flight in 1086, Near (1989) outlines how Morton Thiokol manufactures of the defective O-rings in the booster rockets had ignored the pre-flight protest of one of their engineers. As a result of the crash, Morton Thiokol faced lawsuits from the families of the seven astronauts who died, and were forced to withdraw from future bids for NASA contracts.

As companies were made more accountable for their actions, the attitude towards whistle-blowers also began to change. Gradually, whistle-blowing became more acceptable and various authors began to expound its virtues.

Boyle (1990) explains how the actions of whistle-blowers can benefit society:

The potential negatives of organizational power and generally kept in check by a combination of market forces and government regulation. However, situations occur that the market and government are not able to correct before society is adversely impacted. In these situation it is incumbent upon the individual to intercede (i.e. blow the whistle) on behalf of the common good.[11]

Paul and Townsend (1996) advise to create an atmosphere of trust in an organization, thereby encouraging employees to report wrongdoing without fear of reprisal. Allard (2006) maintains that organizations without reporting mechanisms, such as whistle-blower hotlines, suffer fraud-related losses that are more than twice as high as those which employ such mechanisms.[12]

Arguably the most famous whistle-blower is Sherron Watkins who, as Vice president of Corporate Development is credited by many as having exposed the Enron scandal in 2001. Her actions, which uncovered numerous unacceptable practices, have been an influential factor in elevating the whistle-blower to a figure who is not merely socially responsible but who can also add value to a company.[13]

4.16. Legislative support

As the perception of the whistle-blower's role has continued to improve, legislative changes have also offered support. The Sarbanes-Oxley Act, enacted in the United States in 2002 contained measures designed to protect whistle-blowers against retaliation by employers. The Whistleblower Protection Act was enacted in the United States in 2007, and was further amended in 2009.

11 Derry Cotter (2012) Prentice Hall Pearson
12 Nadler J. and Schulman M (2006), www.scu.edu/ethic
13 Conford A (2004) Enron and internationally agreed principles for corporate governance and the financial sector, G-24 Discussion Paper Series, No 30 June

There have, however also been setbacks in the regulatory area with the US Supreme Court in the case of Garcetti v. Cerballos (2006) ruling that government employees did not have protection from retaliation by their employers under the First Amendment of the Constitution .[14]

4.17. Results of empirical studies

Applebaum and Mosseau (2006) report that 44% of non management employees do not report misconduct that they observe. Similarly Gurchiek (2006) maintains that only 47% of individuals are likely to report unethical activities that occur in the workplace. Buckley and others (2010) reported a generally positive attitude to whistle-blowing among the employees of an Irish financial services company. They also found that employees cited a sense of responsibility to their organization as a significant reason for not whistle-blowing. This suggests that organizations need to be more active in espousing the advantages of whistle-blowing if their employees are to be convinced of its benefits. A further finding of the same study was that female employees are more willing to whistle-blow than their male counterparts.[15]

4.18. Corporate social reporting

Corporate social reporting (CSR) can be defined as a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis. (European Commission)

CSR can help to protect the environment conserve natural resources and encourage companies to address and resolve societal issues. It can however, also contribute to profitability by boosting a firm's competiveness. The 2008 European Competiveness Report found that CSR can have a positive impact on six different components of competiveness: cost structure, human resources customer perspective, innovation capacity, management of risk and reputation and financial performance.

In her book Just Good Business, Kellie Mc Elhaney describes how Darell Meyers, Wall- Mart employee, suggested that light bulbs should be removed from the company's vending machines. His idea was adopted, resulting in savings of more than $ 1 million dollars a year.

CSR can also help to establish a reputation for good citizenship, which can be a valuable asset should a company come under critical scrutiny. An example is Starbucks which has been a target of anti-globalisation activists. Starbubuck's active involvement in CSR, however has helped to provide a defence against its detractors. This includes paying a premium for coffee beans grown on envi-

14 Joss. P. H Tompkins, M.E and Hays, S.W (1989) In praise of difficult people: a portrait of a committed whistleblower, Public Administration Review 40 (6) pp. 552-61

15 Vasella D (2002) Temptation is all around us. Fortune 18 November pp. 132-33

ronmentally and socially responsible farms. Starbucks also makes donations to local literacy organizations, regional AIDS walks and other worthwhile causes.[16]

The development of a CSR strategy highlights the need for companies to account to stakeholders beyond the traditional shareholder/investor grouping. These additional stakeholders are employees, suppliers, customers, the environment and society in general. As outlined above, the principal drivers of creative accounting include a desire to reduce taxation and to control dividends, both of which are designed to enhance the wealth of a firm's shareholders. As CSR results in a broadening of corporate accountability, the interests of shareholders are less likely to be pursued at the expense of other stakeholders. Consequently, as companies increase their focus on CSR this may lead to a reduction in the use of creative accounting practices.[17]

4.19. Environmental accounting

In recent years there has been an increasing awareness of the impact of business on the world's natural resources. The destruction of the rain forest and the onset of global warming have contributed to extreme weather conditions and left several species of animals facing extinction. The widespread flooding in Australia in January 2011 is indicative of the fact that the world is facing serious climate change issues that will have to be addressed urgently.

The potential for business to seriously damage our ecosystem has been made starkly evident by the magnitude of BP's oil spill in the Gulf of Mexico in April 2010. It is feared that oil from what is America's second largest oil spill (the Exxon Valdez 1989 spill is the largest) may have serious long-term consequences for the entire Gulf region. It is believed that the undersea oil has posed a direct threat to large marine wildlife such as sharks and also tiny life forms such as shrimps, crabs and worms. By endangering the latter population which are the foundation of the marine food chain, the oil could potentially have a chronic long-term effect on the wider Gulf ecosystem.[18]

4.20. Disclosure of environmental information in the companies' annual reports

It has become increasingly common for companies to disclose environmental information in their annual reports. This has been motivated largely by investors' concerns about the risk posed by environmental issues such as emission levels and toxic waste management. Improved disclosure has also resulted from a realization that a company's commitment to using renewable energy sources, rather than fossil fuels, enhances its corporate image and its long-term business prospects.

16 Coase, Ronald (1937), The nature of the firm, Economica, 4, 386-405

17 Buckley, C Cotter D, Hutchinson, M and O' Leary C (2010) Empirical evidence of lack of significant support for whistleblowing, Corporate Ownership Control & (3) Spring pp.275-83

18 Munzing P.G. (2003) Enron and the economics of corporate governance. Department of Economics, Stanford University Available at http:// www.econ.stanford.edu

Baxter International Inc., a global healthcare company, puts environmental issues at the front of its agenda by issuing a separate Sustainability Report. In respect of its operations and products Baxter states its priorities as follows:[19]

1. Baxter will drive a green supply chain
2. Baxter will drive reductions in its carbon footprint
3. Baxter will drive reductions in its natural resource use
4. Enhanced product stewardship.[20]

In its 2009 Report Baxter committed itself to the following environmental goals by the year 2015:

1. Reduce the carbon footprint of Baxter's US car fleet by 20% from 2007 baseline
2. Incorporate green principles into Baxter's purchasing programme with its top 100 suppliers
3. Reduce greenhouse gas emissions by 45% indexed to revenue, from 2007 baseline
4. Increase energy usage of renewable power to 20% (of total)
5. Reduce total waste generation by 30% indexed to revenue from 2005 baseline
6. Eliminate 5,000 tonnes of packaging material from products sent to customers
7. Reduce water usage by 35% indexed to revenue from 2005 baseline
8. Implement two projects to help protect vulnerable watersheds or provide communities with enhanced access to clean water
9. Identify new opportunities to replace, reduce and refine (3Rs) the use of animal testing.

Baxter's commitment to environmental sustainability is to be lauded and the disclosures in its Sustainability Report are extremely informative. There is, however a lack authoritative guidance among standard setters such as the IASB regarding the disclosures that should be provided in respect of environmental issues. This leaves investors unable to adequately assess a company's exposure to environmental risks, or to carry out a reliable comparison of companies in this respect.[21]

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19 Breton. G and Taffer R. (1995) Creative accounting and investment analyst response, Accounting and Business Research 25 (98) pp. 81-92

20 Daynard, R A, Bates C. and Francey, N. (2000) Tobacco litigation worldwide, British Medical Journal, 8 January,pp. 111-13

21 Nasser K.H.M (1993) Creative financial accounting: Its nature and Use, Prentice Hall International (UK) Limitied

4.21. Accounting for environmental costs

To date, the IASB has dealt with environmental accounting issues in its mainstream standards. For example, IAS 36 Impairment of Asset and IAS 37 Provisions, Contingent Liabilities and Contingent Assets refer to environmental issues. Other standards, such as IAS 16 Property, Plant and Equipment can also be employed to deal with issues of an environmental nature. It is likely, however, that the IASB will issue more specific reporting requirements for environmental matters in the future. This is likely to result from increased legislative requirements relating to environmental issues. For example, in the future, a company may have to obtain a certificate to verify its use of renewable energy sources.[22]

5. Results and discussion

Business exist to make a profit. Thus, the basic accounting concept is that:

Profit = income-expenses

However, business profitability is determined by the matching principle –matching income earned with the expenses incurred in earning that income. Income is the value of sales of goods or services produced by the business. Expenses are all the costs incurred in buying, making or providing those goods or services and all the marketing and selling, production, logistics, human resource, IT, financing, administration and management cost involved in operating the business.

The profit (or loss) of a business for a financial period is reported in a Profit and Loss account. This will typically appear as in Table 3.

The turnover is the business income or sales of goods and services. The cost of sales is either:

- The cost of providing a service, or
- The cost of buying goods sold by a retailer, or
- The cost of raw materials and production costs for a product manufacturer.

However, not all the goods bought by rather or used in production will have been sold in the same period as the sales are made. The matching principle requires that the business adjusts for increases or decreases in inventory – the stock of goods bought or produced for resale but not yet sold. Therefore, the cost of sales in the accounts is more properly described as the cost of goods sold, not the cost of goods produced. Because the production and sale of services are simultaneous, the cost of services produced always equals the cost of services sold (there is no such thing as an inventory of services). The distinction between cost of sales and expenses leads to two types of profit being reported: gross profit and operating profit.

22 Miller A.D.(2010) Book review, The British accounting Review 42 pp.132-33

Gross profit is the difference between the selling price and the purchase (or production) cost of the goods or services sold. Using a simple example, a retailer selling baked beans may buy each tin for 5p and sell it for 9p. The gross profit is 4p per tin.

Gross profit = sales –cost of sales

Turnover	2 000 000
Less: cost of sales	1 500 000
Gross profit	500 000
Less: selling, administration and finance expenses	400 000
Operating profit before interest and tax	100 000

Table 1. Profit and loss account

Expenses will include all the other (selling, administration, finance etc) cost of the business, that is those not directly concerned with buying, making or providing goods or services, but supporting that activity. The same retailer may treat the rent of the store, salaries of employees, distribution and computer costs and so on as expenses in order to determine the operating profit.

Operating profit = gross profit – expenses

The operating profit is one of the most significant figures because it represents the profit generated from the ordinary operations of the business. It is also called net profit, profit before interest and taxes (PBIT) or earnings before interest and taxes (EBIT).

The distinction between cost of sales and expenses can vary between industries and organizations. A single store may treat only the product cost as the cost of sales and salaries and rent as expenses. A large retail chain may include the salaries of staff and the store rental as cost of sales with expenses covering the head office, corporate costs. For any particular business, it is important to determine the demarcation between cost of sales and expenses.

From operating profit, a company must pay interest to is lenders, income tax to the government and a dividend to shareholders (for their share of the profits as they -unlike lenders - do not receive an interest rate for their investment) The remaining profit is retained by the business as part of its capital (see Table 1).

Not all business transactions appear in the Profit and Loss account. The second financial statement is the Balance Sheet. This shows the financial position of the business – its assets, liabilities and capital – at the end of a financial period.

Some business payments are to acquire assets. Fixed assets are things that the business owns and uses as part of its infrastructure. There are two types of fixed assets: tangible and intangible. Tangible fixed assets comprise those physical assets that can be seen and touched, such as buildings, machinery,

vehicles, computers etc. Intangible fixed assets comprise non-physical assets such as the customer goodwill of a business or its intellectual property, e.g. its ownership of patents and trademarks.

Current assets include money in the bank, debtors (the sales to customers on credit, but unpaid) and inventory (the stock of goods bought or manufactured, but unsold). The word current in accounting means 12 months, so current assets are those that will change their form during the next year.

Sometimes assets are acquired or expenses incurred without paying for them immediately. In doing so, the business incurs liabilities. Liabilities are debts that the business owes. Liabilities – called creditors in the balance Sheet – may be current liabilities such as bank overdrafts, trade creditors (purchases of goods on credit, but unpaid) and amounts due for taxes etc. As for asset, the word current means that the liabilities will be repaid within 12 months. Current liabilities also from part of working capital.

Long term liabilities or creditors due after more than one year cover loans to finance the business that are repayable after 12 months and certain kinds of provisions. Capital is a particular kind of liability, as it is the money invested by the owners in the business. As mentioned above, capital is increased by the retained profits of the business (the profit after paying interest, tax and dividends).

The Balance Sheet will typically appear as in table 5. In the Balance Sheet, the assets must agree with the total of liabilities and capital, because, what the business owns is represented by what it owes to outsiders (liabilities) and to the owners (capital) This is called the accounting equation:

Assets = liabilities + capital

or

Assets - liabilities = capital

Operating profit before interest and tax	100 000
Less: interest	16 000
Profit before tax	84 000
Less: income tax	14 000
Profit after tax	70 000
Less: dividend	30 000
Retained profit	40 000

Table 2. Profit and loss account (extended)

However, the capital of the business does not represent the value of the business- it is the result of the application of a number of accounting principles.

In addition to the Financial Reporting Standards and Statements of Standard Accounting Practice referred to earlier, there are some basic accounting principles that are generally accepted by the accounting profession as being important in preparing accounting reports. However, an important principle that is particularly relevant to the interpretation of accounting reports is the matching principle.

The matching (or accruals) principle recognizes expenses when they are incurred (accrual accounting) not when money is received or paid out (cash accounting). While cash is very important in performance of a business from year to year.

6. Conclusions

This paper has presented the regulatory environment within which financial statements are prepared.

The International Accounting Standards Board is a key contributor to the regulatory process. Motivated by its desire to achieve global convergence of financial reporting practices, the IASB accepts submissions from various interested parties as part of the process of developing international financial reporting standards. The IASB's conceptual framework is an important component in ensuring that its IFRSs are based on a set of internally consistent principles.

Legislation and stock exchange rules are other key sources of financial reporting regulation.

Management also has a crucial role to play in determining the content of financial statements. Positive accounting theory proposes three hypotheses to explain how management may exercise its choice of accounting policies. Reasons are also offered as to why management may elect to employ creative accounting techniques when preparing financial statements.

The use of creative accounting practices in the corporate sector can have negative economic consequences for society. Left unchecked creative accounting has the potential to undermine an entire economic system. This paper outlines the reasons why companies engage in creative accounting and provides examples of techniques that have been uses in practice. It is argued that a range of measures, when used together, present the best means of preventing the practice and spread of creative accounting.[23]

23 Akerlof, G (197)) The market for lemons, quality uncertainty and the market mechanism, Quarterly Journal of Economics, 84, pp 488-500Akerlof, G (197)) The market for lemons, quality uncertainty and the market mechanism, Quarterly Journal of Economics, 84, pp 488-500

Financial reporting regulation which is a key defence, includes both legislation and the accounting standards of bodies such as the IASB. The discourage creative accounting regulatory requirements must also be enforced and monitored with appropriate penalties being imposed for non compliance. Commitment to a corporate governance code can also help by establishing solid organizational structures, designed to discourage the use of creative accounting.

If creative accounting is to be eradicated however, it will also be necessary to reshape corporate culture. An increased focus on ethics in education has a role to play in emphasizing the importance of integrity when making business decisions. A commitment to corporate social responsibility and to an environmentally friendly company culture can also contribute by creating a culture of good citizenship, and a realization that firms are accountable to a broad range of stakeholders. Finally, providing a supportive environment for whistle-blowers will ensure that when creative accounting abuses do occur, they will be exposed as early as possible.

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CHAPTER 25

Blockchain accounting: Trailblazers' response to a changing paradigm

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ABSTRACT

Blockchain is a secure distributed ledger promising to change the principles of centuries-old double entry based accounting. Practitioners worldwide have embraced this concept and an immense funds and effort has been invested into mastering new features of blockchains and its use in day-to-day transaction recording. On the other side, scholars are not keeping the pace with the practice. The phenomenon of blockchain technology has been out of the research radars by now. This paper aims to explore the drivers of blockchain technology use in accounting. Based on the Unified Theory of Acceptance and Use of Technology, we developed a questionnaire to examine the tech-savvy accountants (trailblazers). In total 85 respondents indicated that the future use of the technology will mostly depend on the performance expectancy and social influence.

Key words: Blockchain, Blockchain Accounting, Technology Acceptance, Trailblazer Analysis

JEL classification: M41, O33, D23

1. Introduction

A double-entry accounting has not changed its basic principles since the period of Renaissance. This method which has assured arithmetic integrity and accountability for five centuries might be at its dawn (Kokina, Mancha & Pachamanova, 2017). The paradigm of double-entry accounting could be revolutionized with the triple-entry accounting empowered by the use of blockchain technologies. Blockchain is a distributed ledger technology that provides nearly immediate record of transactions without the need for a third-party assurance (auditing).

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Ever since its introduction a decade ago, blockchain accounting has attracted an immense attention among practitioners worldwide. Major consulting companies even perceive it as an utmost game-changer in the accounting industry (Deloitte, 2016). Although conventional wisdom assumes that accounting scholars should be at the forefront of the examinations of potential uses of blockchain technology in accounting, it seems that they have not firmly embraced the idea of this technological revolution yet. Only a paucity of papers in high-end accounting journals even mention the idea of blockchains (Kornberger, Pflueger & Mouritsen, 2017; Sunder, 2016), let alone its possible uses. To our knowledge, our work marks the first empirical exploration of this phenomenon.

We aim to fill the gap in the current body of knowledge by identifying the main constructs associated with the potential use of blockchain accounting. We based our study on the Unified Theory of Consumer Acceptance Technology (Vankatesh, et al., 2003) and analyzed how 1) performance expectancy, 2) effort expectancy, 3) social influence, 4) facilitating conditions affect behavioral intention to use blockchain for the accounting purpose among the fintech trailblazers.

The rest of paper proceeds as follows. In Section 2 we review the literature related to the blockchain accounting – the meaning, possible implications to the accounting profession and the main risks associated to its use. Section 3 elaborates on the methodology. In Section 4 we deal with the survey findings. Continuing with the results, we place our work in context with the related work in the field in Section 5, which is reserved for the discussion and conclusions.

2. Literature review

2.1. Blockchain accounting – a jack-in-the-box

Blockchain technology has been steadily developing in the last decade. It was initiated in 2008 as a core component to support transaction of bitcoin - the most widespread cryptocurrency (Zao, Fan & Yan, 2016). It the most general sense blockchain is a distributed digital ledger with the chronological records of transactions available to all those who have the access to view recorded data. The information in the blockchain can be viewed but copying or altering the data is impossible (Scull, 2017).

As for the accounting practice, “the technology is expected to affect auditing, cybersecurity, and financial planning and analysis” (Tysiac, 2017). “The Big Four” accounting firms are investing heavily in the technology, and they already have several dozens of blockchain prototypes.

A myriad of reasons is indicated as a promising benefit of distributed ledgers:

- First, blockchains are powerful databases with fast communication. The circulation of data is more efficient compared to existing software applications which ultimately improves the efficiency of transaction recording.

- Second, data entry is automated with the use of smart contracts. As such, most of the accounting entries are automated which significantly decreases the possibility for any operational (human-based) error.
- Third, the database is distributed with each party having access to all previous transaction. This improves the ever-needed transparency in business reporting.
- Fourth, the transmission is based on peer-to-peer bases and communication does not require any central node (for instance bank or any other payment system agent). This reduces the costs of transactions.
- Fifth, the records are irreversible. Once recorded, transaction can not be altered because the blocks in the blockchain are immutable. Therefore, any attempt of fraud is almost impossible. It would require changes on all copies of distributed ledger at the same time to modify the record which is only possible in theory.
- Sixth, having in mind the fact that all the transactions are digital makes them highly programmable. This means that one can insert any computational logic to transaction and they can become fully automated.
- Seventh, they can minimize the need for or utterly change the auditing profession. As the transactions are verified by nods, they have a "near real-time" approval and assurance that consequent financial reports will lack of any (or at least materially significant) errors. Some blockchains even experiment with node-less verification of transactions (such as IOTA) based on directed acyclic graphs, or Tangles. Nonetheless, these algorithms have not been fully tested for the proof-of-work and they are more promising in terms of cracking the problem of scalability.

Even though blockchain technology may revolutionize the way of recording transactions, the path for the full application of these principles has many impediments. Some flaws for a secure alternative to the extant accounting ledgers have already been identified in the current body of knowledge.

In a very narrow (purely accounting-based) sense, Coyne & McMickle (2017) emphasize that blockchains are designed for the purpose of cryptocurrencies. They exist within the blockchain, whereas other still remain. Also, a dithyramb on immutability of blockchain is related to the solution of the Byzantine Generals' Problem, guaranteeing consistency even if there is a potentially malicious participant that behaves arbitrarily (Gramoli, 2017). This is a fundamental contribution to the decentralization and distribution of databases, but it relies on the presumption of the blockchain consensus – proof-of-work or proof-of-stake. Not only that they raise general problems - wasting to much electric energy or getting the rich even richer (Zheng, et al., 2017) – but it does not conform inter-organizational setting and seems rather inapplicable in the business environment. Rückeshäuser (2017) examined the possible case for the blockchain accounting use with the malicious involvement of top management where the

top management has a possibility to exert the majority of computer power. Accordingly, it would be harder to circumvent internal and external control than to execute fraudulent behavior in a blockchain setting. More generally, blockchain technology has some additional flaws for being fully applicable in everyday transaction recording. One such issue is the scalability of the system and a need for the improvement in throughput. Peters and Panayi (2015) states that 'current blockchain structures, requiring the repetition of computation on all network nodes, will rapidly run into scalability issues, and this will require consideration before mass adoption becomes possible'. However, much of it has already been indicated as a solution to this problem (Herrera-Joancomartí, J., & Pérez-Solà, 2016). Other issues are related to smart contracts - self-executing scripts that reside on the blockchain – which have hitherto been fairly simple and inconvenient for accounting and wider business purposes (Christidis & Devetsikiotis, 2016).

The blockchain for the accounting purpose is still at its infancy. However, as for the other foundational technologies, it will pave its way to the broad use. In a recent IBM study, the first-movers have already embraced commercial application of blockchain technologies (Figure 1).

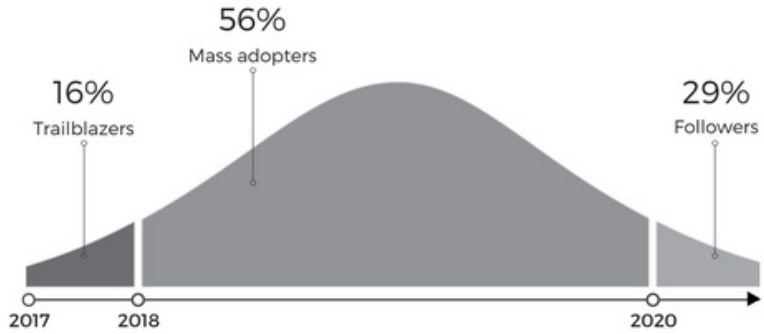

Figure 1. Commercial adoption of blockchain
Source: IBM (2016)

2.2. Theoretical background and the research model

For the purpose of building the theoretical model on the use of blockchain accounting, we adopted the Unified Theory of Acceptance and Use of Technology developed by Vakatesh et al. (2003). The model has been widely used for all emerging technologies, such as the use of social media (Curtis et al., 2010), the use of newly implemented Enterprise Resource Planning systems (Sykes & Vakatesh, 2017), 3G technology in mobile communications (Xu, Thong & Tam, 2017).

The theory posits that 1) performance expectancy, 2) effort expectancy, and 3) social influence are the main determinants of user behavior, and indirectly affect the potential use of certain technology, whereas the facilitating conditions directly affect the use of technology.

By analogy, this should be a proper model for the examination of blockchain technology usage in accounting. Nevertheless, the use of blockchain accounting is a complex phenomenon. As inferred by Byström (2016), "in accounting, blockchains could potentially improve the quality of information reaching investors in two ways; by making the accounting information more trustworthy and by making the information more timely". This is broad and hard-to-operate definition. More precise adoption of this technology is elaborated in Iansiti and Lakhani (2017). They state that the use is still in the early phase (single use). As the technology further develops, it will substitute current practices in accounting or be locally used. However, the peak is reached in the transformation quadrant illustrated in Figure 2.

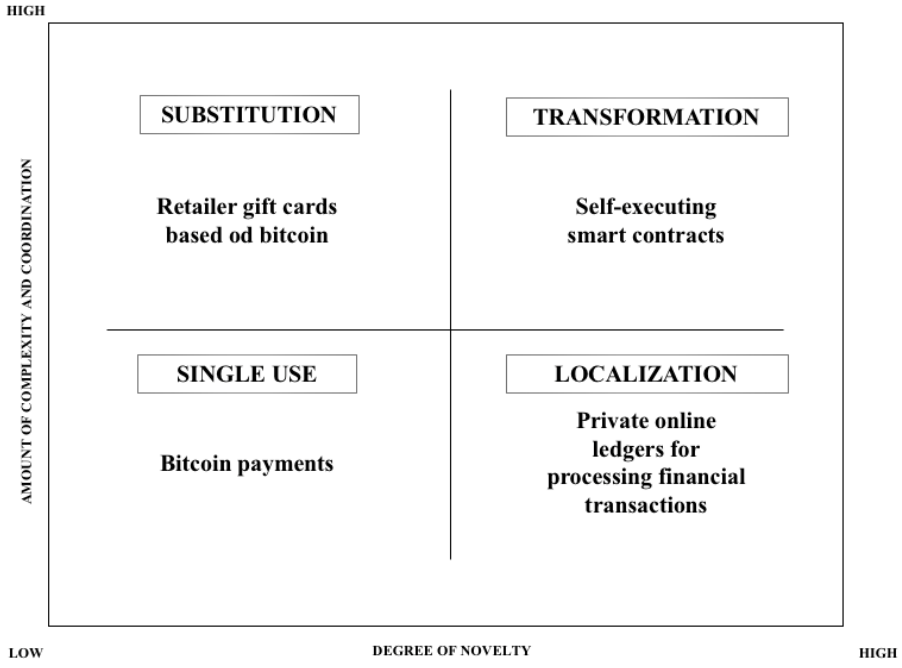

Figure 2. The adoption of blockchain

Source: Adopted from Iansiti and Lakhani (2017)

Following the main determinants and the main aspects of blockchain usage in accounting, we constructed the set of hypotheses illustrated in the theoretical model (Figure 3).

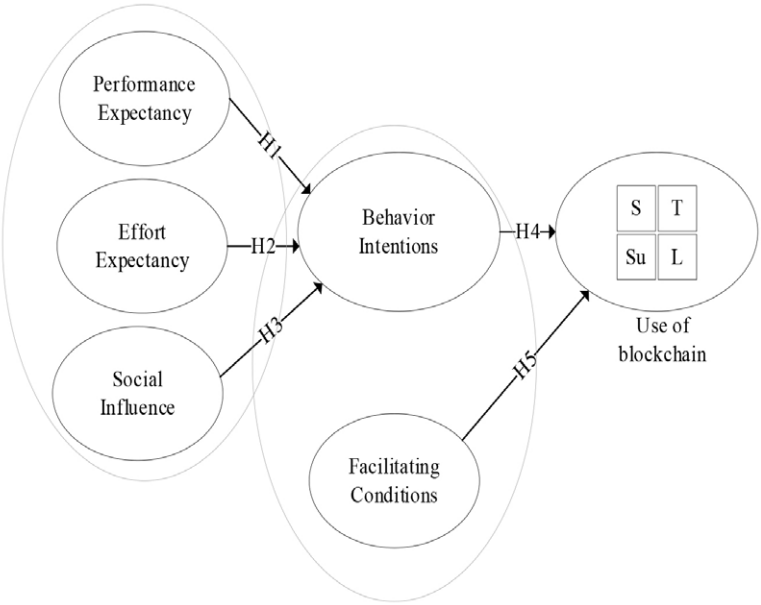

Figure 3. Theoretical model

3. Methodology

3.1. Research variables and measures

We based our study on primary data and employed a questionnaire as a research tool. The questionnaire had four sections. The first section dealt with the demographics of examinees.

The second section encompassed all the constructs of blockchain usage determinants rewarded from Vakatesh et al. (2003), which included performance expectancy, effort expectancy, social influence, facilitating conditions and user behavior. The third section included the stages of the blockchain use following the recommendations of Iansiti and Lakhani (2017). All the survey items are presented in the Appendix 1.

To ensure the construct validity, relevant constructs from other studies were adapted. After the questionnaire was pretested by 6 faculty members from the Faculty of Organizational Sciences in Belgrade, some items were slightly modified to best fit the context of the study. All the items were measured on a Likert-type scale (responds were coded from 1 – strongly disagree, to 5 – strongly agree).

3.2. Sampling procedure

The questionnaire was distributed to trailblazers using a paper-and-pencil approach. Trailblazers or 'first movers' were interviewed at two fintech conferences. To consider some examinee to be a trailblazer, one had to fit following two criteria:

- A minimum of 5 years of experience in accounting,
- A minimum visit to one conference on financial technologies.

As the total population of such a cohort is unknown (to the best of our knowledge there is no global database of tech-loving accountants), we based the study on a "snowball" sampling technique (Biernacki and Waldorf, 1981). This sampling relies on peer-to-peer recruitment of study participants and formation of a referral chain (Bodin et al., 2016). Although it can be a subject of various biases (see Avrachenkov, Neglia and Tuholukova, 2016), the referral chain was actively controlled – particularly its initiation, progress and termination. Using the coded questionnaires, the number of referrals was controlled to limit the clustering within organizations.

3.3. Data collection and analysis

Data was collected in the period January-February 2017 by a group of trained assistants. Afterwards, the data was entered in SPSS (Statistical Package for Social Sciences). Quantitative data was analyzed with descriptive statistics: percentages, means and standard deviations. Interdependence of determinants (independent variables) and contract management efficiency (dependent variable) was determined by correlation (Pearson moments two tailed correlation coefficient analysis) and multiple regression.

4. Empirical data (documentation background) and analysis

4.1. Sample description

The study was conducted among the accountants and business analysts that attended fintech conferences (which was used as a proof of their 'trailblazer' status). In total 28 examinees filled the questionnaire at the conferences. They were also used to create a referral chain which led to a total of 85 respondents. Regarding their gender status, the sample was relatively balanced (58.82% were women). Most of them worked in large companies (33.7%) and medium sized companies (28.9%). Examinees were well balanced in terms of the industry background (Information and communication – 16.5%, trade and commerce – 15.3%, consulting – 10.6% and other services14.1% had more than 10% representation in the sample).

4.2. Pre-analysis

Before we tested the hypotheses of the study, we conducted a pre-analysis of data. For these purposes we analyzed descriptives – means and standard deviations, and correlation analysis. The data is shown in Table 1.

	Mean	StD	1	2	3	4	5	6
Performance Expectancy	3.00	.94	1	.136	**.459**	-.053	-.007	**.580**
Effort Expectancy	3.30	.56		1	.096	.141	.142	.059
Social Influence	3.73	1.08			1	**.390**	**.415**	**.484**
Facilitating Conditions	3.86	.86				1	**.961**	.181
Behavioral Intentions	3.93	.86					1	**.249**
Use of blockchain	2.91	1.10					*	1

Table 1. Descriptive statistics and correlation matrix for research variables
bold – significant at 0.05; Cronbach's Alpha for the use of blockchain= .823
Source: authors' calculation

All the measures were composite. The first five of them were rewarded from other studies and tested for internal consistency. The last one - Use of blockchain – was developed for the purpose of this study and computed as an arithmetic mean of four possible uses of blockchain in accounting. Accordingly, we conducted the internal consistency test and calculated Cronbach's Alpha (.823). Using the rule of thumb for this indicator we concluded that internal consistency could be marked as good ($.9>\alpha\geq.8$)

As displayed in Table 1, we identified a strong positive relation between a number of variables. The highest correlation coefficients were calculated for Performance Expectancy ($r=.580$, $p<.01$) and Social Influence ($r=.484$, $p<.01$). Also, significant correlation was found for Behavioral Intentions.

4.3. Main analysis

Since the study found a number of significant positive correlations, the next step was the examination of the influence and intensity of variables seen as independent to Behavioral Intentions (dependent variable) in the first model. The results of the regression analysis indicated that the research model predicted 25% ($R^2=.25$) of the variance which is displayed in Table 2. As Durbin-Watson was $d=1.719$ (between two critical values $1.5<d<2.5$), it could be assumed that there is no first order linear autocorrelation in the multiple linear regression data. Multicollinearity was further examined with the variance inflation factor, and we have not found high values for VIF.

Variable	Coefficient	Std Error	t-statistic	Prob
Constant	2.543	.600	4.239	.000
Performance Expectancy	-.261	.106	-2.470	.016
Effort Expectancy	.195	.160	1.217	.228
Social Influence	.414	.091	4.533	.000
R square	.250	F		7.657
Adj R square	.217	Sig		.000
SE of regression	.759	Dependent variable: Behavioral Intentions		

Table 2. Regression model for behavioral intentions as a dependent variable
Source: authors' calculation

As indicated in Table 2, the study confirmed hypotheses H1 and H3, but the hypotheses H2 lacks of empirical validation.

In the second model, we tested the intensity of the relationship between Behavioral Intentions and Facilitating Conditions, on one side, and the Use of blockchain, as a dependent variable on the other. The results are displayed in Table 3.

Variable	Coefficient	Std Error	t-statistic	Prob
Constant	1.643	.631	2.604	.011
Behavioral Intentions	1.140	.506	2.252	.027
Facilitating Conditions	-.841	.509	-1.653	.103
R square	.097	F		3.846
Adj R square	.071	Sig		.026
SE of regression	1.051	Dependent variable: Use of blockchain		

Table 3. Regression model for the use of blockchain as a dependent variable
Source: authors' calculation

As the Durbin-Watson was 1.493, we checked for multicollinearity in the data. We found strong multicollinearity between Facilitating Conditions and the Use of Blockhain. Accordingly, we excluded Facilitating Conditions as a predictor of the dependent variable. In the nutshell, the study confirmed hypothesis 4, but hypothesis H5 is unverified.

5. Results and discussion

5.1. Key findings, contributions and implications

The aim of this paper was to identify the main constructs associated with the potential use of blockchain for accounting purposes. Based on the Unified Theory of Acceptance and Use of Technology, we developed a theoretical model for the future acceptance and use of blockchain accounting. We analyzed the

responses of 85 ‘first movers’ in accounting and financial technologies (fintech). Following the results presented in the previous section, we constructed the verified model, which is illustrated in Figure 4.

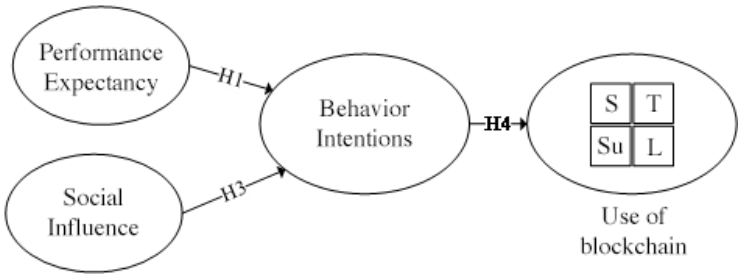

Figure 4. Verified model

The main drivers for the behavioral intentions in the use of blockchain as a cutting-edge technology in accounting are performance expectancy and social influence. As for the performance expectancy, the extant literature provides several explanations. Watson (2017) states that ‘accountants often struggle to manage and understand the data of the ever-growing volume of transactions, prepare trial balances and financial reports, and analyze results in a timely manner’. Blockchain can improve the efficiency by enabling the automation of reporting with ever-growing data. Moreover, there are promises that blockchain will foster a real-time, verifiable, and transparent accounting ecosystem (Dai and Vasarhelyi, 2017).

With regards to the social influence and its relation to the behavior intentions, it seems that the buzz created around blockchains is paving the way for the future use of this technology in everyday accounting operations. Some authors even address it as a fintech tsunami and the driver of the Fourth Industrial Revolution (Chuen & Lee, 2017). However, most of this show-off for the blockchain technology is affected by cryptocurrencies, rather than the true applicability at the moment.

The main implications of this study are twofold. First, this paper marks the first empirical testing of the drivers of blockchain use in accounting. We adapted and refined the constructs used for the measurement scales for these specific purposes. Also, we added some empirical evidence on the possible future use of blockchain in accounting to very humble academic body of knowledge. Second, this paper has implications for practitioners. As a technology still at its infancy, they can benefit from the analysis of the main drivers of its use in years to come. The crucial thing that technology developers should focus on is the performance for the accounting ecosystem.

5.2. Limitations and further recommendations

The main flaw of this study is the size of the sample. This raises the question of the generalizability (and consequently external validity) of the study findings. Even though the study is funded on a fundamental technology acceptance theory, the findings should be considered as an attempt to provide an early overview, rather than be conceived as an utter addition to the theory. Nevertheless, this is an opportunity for future research. By using the same methodology and sampling outside the 'first movers' in accounting technology, they would improve the validity of this findings.

The study examined the technology not yet firmly incorporated and rooted in everyday accounting operations. The respondents based their answers on the potential, rather than real benefits of the technology. Although the technology is not far away from blueprinting new economy (Swan, 2015) and changing the way we account transactions, the use is still in a very early stage. This creates an avenue for further research. The main fields of explorations should be centered around the real cases of blockchain application to accounting systems of different organizations.

This study is cross-sectoral and captures only a static dimension of the drivers oh blockchain use. The blockchain technology is developing at an amazing pace (Nguyen, 2016). For more prolific results, a new study with the time-series analysis would be needed. Only then would the evolutionary characteristics of the research phenomena be captured.

6. Conclusions

This paper discusses how blockchain technology can revolutionize the accounting profession. Having in mind that these changes will materialize in the following years, we examined readiness of tech-savvy accountants to adopt new technology. Moreover, we empirically confirmed that the main drivers for the behavioral intention to use technology are expected performance and social influence. Accounting professionals have had small-scale (r)evolutions related to the implementation of spreadsheets or use of computers for day-to-day operations, but this novel technology is expected to change the landscape of accounting profession as we know it. Still, this statement is in a rather clairvoyant-fashion. As a centuries-old discipline, accounting should seek for the real proof-of-work for the blockchain technology and stick to the principles of professional skepticism.

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Appendix 1 Survey items

Performance expectancy (PE)

PE1. I find blockchain transactions to be useful in my daily life.

PE2. Using blockchain transactions will increase my chances of achieving things that are important to me.

PE3. Using blockchain transactions will help me accomplish things more quickly.

PE4. Using blockchain transactions will increase my productivity.

Effort expectancy (EE)

EE1. Learning how to use blockchain transactions is easy for me.

EE2. My interaction with blockchain transactions is clear and understandable.

EE3. I find blockchain transactions to be easy to use.

EE4. It is easy for me to become skillful at using blockchain transactions.

Social influence (SI)

SI1. People who are important to me think that I should use blockchain transactions.

SI2. People who influence my behavior think that I should use blockchain transactions.

SI3. People whose opinions that I value prefer that I use blockchain transactions.

Facilitating Conditions (FC)

FC1. I have the resources necessary to use blockchain transactions.

FC2. I have the knowledge necessary to use blockchain transactions.

FC3. Blockchain transactions is compatible with other technologies I use.

FC4. I can get help from others when I have difficulties using blockchain transactions.

Behavioral intentions (BI)

BI1. I intend to use blockchain transactions in the future.

BI2. I will try to use blockchain transactions in my daily life.

BI3. I plan to use blockchain transactions frequently.

Use

Please choose your usage frequency for each of the following (frequency ranged from “never” to “many times per day”):

a) Retailer gift cards based on bitcoin.

b) Self-executing smart contracts.

c) Bitcoin payments.

d) Private online ledgers for processing financial transaction

PART 7

INNOVATION ECONOMICS / BIG DATA IN BUSINESS AND ECONOMICS

CHAPTER 26

What determines an optimal moment of accession to the EU? Evidence from later enlargements

Srđan Marinković[1], Zenaida Šabotić[2], Dragić Banković[3]

ABSTRACT

The formation of the European Union (EU) was a very demanding and hard work, but its preservation seems to be even harder. Despite all the difficulties that had been exposed during development, EU managed to preserve the core values on which it was based. Many countries are trying to harmonize national economic policy with economic policy of EU and became the members of the same. However, for the future and stability of the EU and all member countries, it is important to assess when is the best time for new enlargement. In this paper, we have tested a number of macroeconomic and macro-financial variables in order to test whether a number of countries were ready to join the EU, as well as, when the candidates will be ready to do so. Some variables present criteria of nominal convergence, as defined in Maastricht Treaty, while the rest of variables indicate the level of real convergence. Univariate analysis has indicated that the membership in the EU is significantly affected by the current account balance (% of GDP), GDP per capita, final consumption expenditure, the gross national expenditure and inflation. Following the univariate binary logistic analysis and separation of variables that affect the individual membership in the EU, a multivariate regression analysis was applied, including in the model some previously excluded variables. Multivariate binary logistic regression confirmed significance of final consumption and consumption expenditure, while Gross capital formation has had only indicative effect on membership in the EU. The analysis indicated the importance of selecting the timing of accession in terms of the achieved economic development, expressed through the selected macroeconomic indicators.

Key words: macroeconomic indicators, European Union, monetary integration, convergence criteria

JEL classification: F15, F16, F45

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1. Introduction

The first step for candidate countries to join the European Union (EU) is demanded by several criteria of which only one is clearly economic in its nature. Namely, perspective new members should prove their ability to sustain competitive pressures within the EU in the systemic framework that would not give protection that goes beyond the institutions acceptable for a fully-fledged market economy. The other two elements concern political criteria (stable institutions that guarantee democracy, rule of low, human rights, and the protection of minorities), and adherence to the aims of political, economic and monetary union (adopting acquis communautaire, the complete framework of the EU legislation). Interestingly, even the last line of Copenhagen criteria for accession contains institutional elements that demand from candidates to have already remarkable achievements in terms of liberalisation, monetary and fiscal discipline. Just to mention, acquis communautaire includes free capital account (capital flows should be restriction-free not only within the EU but also vis-à-vis third countries), central bank independence, and no monetary support of government finances. Therefore, for accession countries it is strongly advisable to use pre-preparatory phase to accomplish their transition or advance economic development before the very entry into the EU.

In this paper, we have tested a number of macroeconomic and macro-financial variables in order to check whether some countries were ready to join the EU, as well as, when the candidates will be ready to do so. The analysis includes 40 countries, 28 EU members (the analysis includes Great Britain, because the data cover the period 2000-2014) and 12 countries that were not members. Some variables present criteria of nominal convergence, as defined in Maastricht Treaty, while the rest of variables indicate the level of real convergence. We know from the very persuasive “gravity model” of international trade that trade between a pair of countries is proportional to their economic strength (“mass”) and inversely proportional to the distance between them (alike to force of gravity in Newtonian physics). Knowing that bilateral trade is a function of national income, the same as it may explain the way that Foreign Direct Investment (FDI) and other forms of capital and labour move within the integrated area, we expect that Gross Domestic Product (GDP) figures play a big role in explaining perspective gains from an integration. Our empirical findings are strong in favour of importance of GDP figures. Namely, GDP is one of the best fitted synthetic indicators of economic strength, able to capture many dimensions of prosperity and development of nations.

The rest of the paper is structured as follows: in the first section, we give some remarks on the contemporary theory’s stance in matters of economics of regional integration. The second section is devoted to empirical literature on various effects that fully-fledged integration of goods, services, capital and labour markets may have on countries that merges into common market. Third section gives economic rationale for the chosen data set, by reviewing the matter

of nominal and real convergence between units that integrate. Section four explains data set and employed research methodology, while section five discusses the main findings. Consequently, the last section concludes.

2. Economics of regional integration – Theoretical remarks

Strictly theoretically, economic or welfare gains from forming a regional integration can be divided into three lines: allocation, accumulation and location (Baldwin and Venables, 1995). Allocation effects are static in its nature and assume perfect competition. Factor endowments are considered unchanged. A decrease or a complete removal of trade barriers (trade costs) within the integrated area makes the trade between members less costly, boosts the trade and output within the area. The positive net welfare coming from this increase is attributable to trade creation effect. However, since this effect is initiated by discriminatory trade liberalisation it may also harm interest of outside countries, as well as inside countries. Trade diversion comes as a consequence of removal or tariffs decreasing in trade between two regions which favours trade between those regions on the expense of third region lowest-cost supplier which is now prohibited by existing tariffs. The effects of trade diversion on the integrated import countries' welfare may be ultimately negative. Besides negative effects borne by importing country, trade diversion also damages global allocation of resources since it moves allocation of production away from one directed by comparative advantage principle. Note that trade creation benefits depend on the assumption that resources are fully employed. If this holds, the lower cost imports will replace inefficient domestic production in domestic consumption and consumer gains will exceed production loses (plus government tariff revenue loss). However, if less efficient imports from the member country replace the more efficient (cheaper) import from rest of the world, domestic prices will not converge to the world prices, and overall welfare effect will be negative. According to a theory (Matthews, 2003, p. 18), net effects of trade creation and trade diversion, which fully reflect allocation type of welfare outcome of trade integration, should be positive if the integration takes place between comparably developed economies, with complementary (rather than competitive) economic structures, and economies that already reached high level of mutual trade.

Accumulation, or dynamic, effects demand different assumption about the nature of competition. If the competition was imperfect because of pre-existing trade barriers, lifting the barriers will bring new opportunities but also new challenges on producers. An access to a larger (common) market allows producers to take advantage of economies of scale, to undergo specialisation of production and motivates them to reduce costs of production and increase quality of products in order to endure increased competition. From the side of consumers, also the variety effect is important, i.e. availability of large varieties of the same industry products, which is easier to trade within the integrated trade area.

Location effects are especially important if two regions, that are significantly different in economic size and strength, are merged. Those effects are more likely for more advance integrations that imply also free movement of production factors (labour, capital etc.) beside free movement of goods and services. Though one can expect that capital moves toward the areas where the capital is scarce and labour is cheaper, it is also possible that labour migrates toward the places where the capital is abundant and jobs are available at higher wages. It may in fact amplify differences in markets size, since producers tend to locate production capacities close to large markets, while at the same time, the decision to locate production there in turn increases market size, by increasing demand for intermediate and final products, the regularity known as circular causality (Baldwin, 1997). Then, there is a chance that all mobile factors will agglomerate or concentrate around a few central locations. Because of potential location effects, a regional integration becomes a sensitive political question. If at the end of the day, a periphery may become even more distant from the core in terms of economic development then the overall welfare implications of regional integration for less developed peripheral countries are questionable.

The EU presents the most completed type of regional integration. Besides removal of tariffs (as well as non-tariff barriers) for trade between members (free trade union), and unified trade and tariffs' policy for rest of the world (custom union) it allows free movement of economic factors along with free movement of goods and services (well-known four freedoms), so it belongs to "common market type" of regional integration agreements.

Calculating costs and benefits of an integration process is all but easy process. Fortunately, at least identification of types of costs and benefits may be completed since the economic theory has some answers on it. According to the theory of regional economic integration (Baldwin and Venables, 1995), there are to be several benefits of the integration: i) savings on costs related to trade, e.g. tariffs; ii) beneficial effects of forming single (larger) market that will bring more competition and improved efficiency, and iii) easier movement of factors of production, like foreign direct investments and labour in opposite direction. If integration is followed by institutional financial support of incumbent to new member countries, as it is the case with the EU, the budgetary transfers should also be taken into account. Off course, those transfers are distributional and do not change the position of the whole. An assessment of benefits of new member states that would come from financial transfer demands a careful scenario analysis. Making inferences and drawing conclusions simply based on recent history of enlargements (other countries' experience) may be misleading. Since transfers are benefits of new member states and adequate costs that are to be borne by old member states, old member states that are in charge for making (revising) rules can act on accommodative way (Kandogan, 2000; Csaba, 2001). It is exactly what happened with the Treaty of Nice (Heinemann, 2002). Hopefully, economic gains that are expected to come from new enlargements are well above direct transfers from the EU budget. The highest on the list are

benefits of a larger (single) market free of tariffs that could boost trade within the EU. Moreover, some benefits are expected from capital movements and labour migration, together with budgetary transfer that would go from incumbent countries toward new members.

3. Empirical evidence on costs and benefits of integration

There are variety of models and calculations used for assessing economic effects of such a unification project. The main challenge is to cover all possible effects and to express net effect using a single measure. Most often researchers use GDP trajectories to measure effects, but there are other equally comprehensive approaches. For example, Kohler (2004) used welfare effects instead GDP figures, and made assessment for each country separately, starting from the assumption that a common enlargement shock may have different effects on both incumbent and new member states, depending on their specific economic structure. This justifies looking at enlargement as it is an exogenous shock that would lead to asymmetric disturbances across the EU. According to a comprehensive ex ante assessment (Breuss, 2002) of effects that so called fifth enlargements may have on existing and new member states, a group of new member states was expected to gain around ten times more from the enlargement than the incumbent countries. It was estimated that distribution of gains will be directed according to the size of economies and strength of economic ties. It is also stressed that the absorption/merging of such an inhomogeneous group of countries brings some risks, i.e. it may postpone business cycle synchronisation across the EU.

3.1. Trade consequences

Trade consequences of a regional integration are not easy to catch fully and reliably. Firstly, there has to be already discussed conventional effects from trade creation vs. trade diversion. Secondly, the trade effect of unification depends on business cycles synchronisation. If economic activity moves in the direction opposite to that of main trade partners, current account imbalance might have a depressive effect on trade flows (Maurel, 2004). Trade intensity between countries (or regions) has direct influence on their business cycles synchronicity, which is per se a factor that justifies regional integration. However, though the influence must be there, the nature of this influence seems a case specific. More trade between countries (regions) may lead either to less synchronised business cycles, in case of specialisation of countries exporters motivated to take advantage of comparative advantage, or exactly opposite, more synchronised, if the business shocks are monetary or trade is largely intra-industry type. Moreover, historically, the impact has been more like the letter one (Rose, 2000). Finally, it seems that other aspects of integration, e.g. monetary integration, may also exert some effects on trade. More advanced type of regional integration that includes also integrated monetary affairs may

account on some extra benefits in trades within the integrated area. However, evidence is mixed. In a seminal paper, Rose (2000) proved empirically that trade between countries that share the same currency tend to be several times higher that between countries that retain separate legal tenders. The result was robust even after controlling the effect of exchange rate volatility on trade. It may mean that a common currency area is a way more effective solution that currency peg policy option. The author contemplates that a part of this effect comes because an adapting of common currency is far more "serious and durable commitment than a fixed rate" (Rose, 2000, p. 9). A common currency prevents beggar-thy-neighbour policy of competitive devaluation that potentially may destroy the achieved trade integration. Casual empiricism supports above argumentation. We would say that the recent Greek shock on the EMU showed that the exit from the monetary union is extremely complicated, both economically and politically. Moreover, well-evidenced "home bias", i.e. strong propensity to trade within the country (currency area) relative to trade out of the country, can be at least partly explained by the common currency effect.

Empirical evidence on above effects is as mixed as the prognostics based on the international trade theory. For example, Nahius (2004) simulation based on the gravity model of foreign trade gave estimate of two digit increase of internal EU market, mostly based on reduction of tariffs and non-tariff barriers. The countries that are assessed to take most benefits in that manner were Austria, Germany and Greece. The model also indicates that accession countries will likely gain more benefits than old member states. The trade increase is also concentrated around agriculture and some industries. Curran and Zignano's (2012) research, based on extensive data set on volume and structures of trade, not only supports the hypothesis that formal integration of two regions will bring more intense trade between the regions, but also reveals the fact that countries of fifth enlargement significantly increased their mutual trade without breaking the trade relationships with outside countries. However, not all empirical studies justify optimism. For instance, Maurel (2004) questioned any trade creation effect in case of some earlier enlargements, e.g. when Austria, Sweden and Finland entered the EU. Similarly, running the same estimation procedure as in Rose (2000), the author found weak effect of currency union on trade increase.

3.2. Factor movements: FDI, capital and labour

According to neoclassical growth model, providing that capital is mobile, i.e. no restriction is applied to cross-country movements, the capital is expected to flow out of capital abundant more developed economies into capital-scarce countries. The driving force is the law of diminishing returns that implies that marginal productivity of capital in the latter economies exceeds the same in the former economies (Buch, 1999, p. 635). This process will eventually lead to equalisation of marginal return and increase of welfare in both capital exporting and capital receiving countries. In that analytical framework, regional

integration is seen as a case of capital flow liberalisation. In a dynamic general equilibrium model based on neoclassical intellectual tradition, Garmel et al. (2008) found the welfare effects of increasing capital flows between incumbent and new members rather large, persistent and mostly attributable to the model-specific elimination of costs related to managing and monitoring cross-border investments (therefore original term “border-costs”). Although, in this study, effects are defined in monetary terms, as cost reduction or elimination, merely for the sake of elegance of the model, there are many benefits or conveniences that go with doing business in the same legal and regulatory environment, above all, access to large market, and externally supported devotion to politically stable and progressive market economy. If we add factor endowment (skilled labour etc.) and available structural funds, it is then clear that new EU member states are likely to draw capital for their investments more easily both from the EU and the rest of the world than a non-EU country, ceteris paribus. It was the fact in previous EU enlargements that many accession countries have taken steps toward capital market integration years before their actual year of EU entry. Thus, a rational market player may foresee successful enlargements and behave anticipatory. This is why effects of integration would develop gradually, over a period of time, with some appearing already at first sign that membership is granted (anticipatory) and some even after the formal accession (prolonged or ex post effects).

However, the evidence provided by Buch (1999) does not suggest that EU membership has had a significant impact on the accession countries to draw on foreign savings. The author assessed how close the dynamics of savings is to that of investments, running the procedure for a group of old members (South European countries) and new entrants. It appeared unlikely that membership alone may be attributed to capital account openness, but at the same time, it seems that the membership may influence the structure of capital flows. Buch and Piazolo (2001) have shown that not only capital-oriented measures, e.g. international bank claims, portfolio investments and FDI, but also trade developments, share a number of common determinants. Regarding all different types of capital inflow, as well as trade, GDP per capita (taken to be a proxy of host economy’s state of development and market size) appears to be significant variable. Thus, the benefits that a country may expect from the launching a process of regional integration, as well as the membership effect itself, regarding the increase in trade and different types of capital inflow depends on the level of its market size and the state of development of the host economy, inter alia. The empirical research also gives some clue about the origin of those benefits. Buch and Piazolo (2001) found the integration beneficial especially for foreign direct investments, since it reduces uncertainty about perspective business conditions. Therefore, it appears that a sort of “credibility effects” explains at least a part of positive effects that the integration may have on both trade and capital (FDI) dynamics.

Further on, it comes that not only FDI is responsive to the increase of “credibility” but also capital markets. Dvořák and Podpiera (2006) tested so called entry

announcement effect on the stock markets of accession countries and found that a large percent of a dramatic rise in local stock prices can be attributed to re-pricing systemic risk. Therefore, integration effects can be rather significant in terms of its impact on temporary revaluation of local financial assets.

By applying the same economic logic, one would expect that regional integration bring equalisation of factor prices, and that it might also hold for labour. The region with abundant labour (higher level of unemployment, lower unit labour costs) will take position of a labour sending region and the region with abundant capital (labour deficient one) will be receiving labour, providing that trade liberalisation have not already removed incentives for such labour migrations. Such a labour movement across the regions will contribute to income and wages convergence. It does not have to happen if industry is imperfectly competitive, and if there are described location effects, which are empirically proven (Crozet and Koenig Soubeyran, 2004). Industry agglomeration will do exactly the opposite, that is, the divergence of wages between the regions.

At the same time, unit labour costs, or wages, represent a decisive factor of paramount importance in shaping attractiveness of a country for inward FDI, and competitiveness in the common market (Belke and Hebler, 2000). Thus, if FDI moves from one to another region, based on differences in unit labour costs, it will diminish incentives for labour to move in the opposite direction. However, in reality both movements will probably take place at the same time.

Some previous estimates (Breuss, 2002; Kohler, 2004) were prone to assign welfare losses to accession countries based on anticipated labour migrations from Central and Eastern to Western Europe. Joining the EU for countries that entered fifth enlargement, meant migration of labour with some effects on wage level, especially for more mobile young working population. According to some recent studies (Elsner, 2013), lifting restriction on labour migration within the EU contributed to new wave of emigration that accounts for six to nine percent decrease of workforce in Latvia, Lithuania, Poland and Slovakia. Consequently, the movement of labour contributed to wage increase among most mobile young population in home countries.

Last but not least, regional integration may be also seen as a productivity shock with potential effects on efficiency. It is not an issue frequently studied as trade and productive factors developments, but there is some research. Halkos and Tzeremes (2009) by using DEA window analysis found the countries of Eastern Europe increase their economic efficiency relative to the old Europe in the period that surrounds their EU entry, although the outcomes were far from homogenous for both group of countries. The countries that compete more directly with new entrants (labour-intensive production, FDI dependent growth etc.) were particularly limited in efficiency growth.

From the discussion above, it comes that a country will be ready for EU entry if it succeeds to strengthen their political and economic relationships with the EU, and adapt the same institutional framework, already in the pre-accession

period. The same holds if we consider benefits that an accession country may have from the integration. However, since accession preparation takes some time, and there may be also hold-up tendencies, in the meantime the private sector of accession country anticipatory invest in EU-related investments, what increases economic dependence from the EU, and leaves the country with costly option to abandon negotiations.

At the end of this part, before we turn to discuss the Western Balkans specificity, we would underline very insightful conclusions drawn from the model of Wallner (2003). The author concludes that applicants' costs of joining the EU change the welfare effect of membership, so that it can be eventually negative. As for the costs of joining the EU, the author lists a number of examples, ranging from large costs of compliance with environmental regulation to investments in EU safety and technical standards that are costly and make accession countries' products uncompetitive in alternative (lower-income) markets. There is a number of less visible irreversible costs related to trade specialisation, breaking up economic relationship with previous trade partners, premature privatisation of un-restructured domestic industries that allow EU investors to acquire the control of valuable assets at bargain prices.

If the EU acts strategically and on selfish way, it will take advantage of the weaker bargaining position of the applicants and try to extract a rent by imposing entry requirements that will ensure benefits for the EU on the expense of the applicants. Commenting "all public declarations of common interests and charitable EU motivations", author said: "it is somewhat of a mystery how one can aggregate 15 selfish countries and arrive at an altruistic total".

This formally modelled behaviour seems more likely in future enlargements than it was in previous ones. Previous enlargements left Europe with new instruments that can be effectively used in order to postpone new enlargements. There is also stronger pressure for controlling costs that are to be borne by incumbent states. As far as the Western Balkans is concerned, things are looking in some ways the same, but in some important ways different. Among similarities, their transitional past and (near) future is highest on the list. Moreover, as we have seen, that distribution of enlargement benefits among old member states depends largely upon strength of existing economic ties between each incumbent and perspective member state. For Western Balkans countries, Germany and Austria are the most important trade and investment partners, with Italy and Greece holding a way better position than in previous enlargements (Vachudova, 2014, p. 127). Finally, relative to the size of the EU, Western Balkans countries are almost irrelevant economies. Although, it is true that even the fifth most massive round of enlargement brought into the EU economies of rather incomparable size, overall importance of those two groups of countries is significantly different.

The most prominent difference between earlier and future enlargements are the benefits that in the latter case will come well above and beyond economic gains.

Western Balkans is in desperate need for speeding up democratisation process and settling down regional disputes (Elbasani, 2008; Vachudova, 2014). Because of this specificity, for Western Balkans the EU is probably still one-way path to stability and prosperity. But there are also new challenges that may change the outcome of the whole project (Panagiotou, 2013). One should wait and see how future enlargements will fit into new cracks of Europe, id est North-South, and core-periphery collisions.

4. Nominal and real convergence as alternative ways to assess preparedness to unification

Theoretically, based on predictive power of (neo)classical (growth) model of diminishing returns, regional integration is expected to ensure growth convergence, since it enhances factor movements that will eventually come to equalisation of factors' productivity and rewards, namely relative factor prices, i.e. wages and profit will come into alignment (Barro and Sala-I-Martin, 1991).

Scientific evidence on preparedness of countries to join the European Monetary Union (EMU) is by no means scarce. A thorough review of earlier studies one can find in Koukoritakis and Michelis (2006), while more recent evidence is provided also in Marelli and Signorelli (2010), Bongardt and Torres, (2013) and Dauderstädt (2014), with novel research being more pessimistic then early assessments. It is expected that convergence issue draws more attention in cases of monetary integration since Maastricht criteria of nominal convergence are put as a formal barrier only to the more advance step into the EMU. However, it would be wrong to neglect importance of the convergence, especially real convergence even if the EMU is considered short-term option for accession countries. Namely, if an accession country fails to converge with the rest of the Union, it will question long-term sustainability of the integration project. For example, Koukoritakis and Michelis (2006) tested whether ten Eastern European and Mediterranean countries from fifth enlargement were ready to join the Eurozone based on a set of nominal and real convergence criteria. Their choice of indicators is especially interesting for our study. For nominal convergence, full set of the Maastricht criteria was analysed, while real convergence was tested using real exchange rates and the real per capita GDP data. Authors employed co-integration and common trends techniques, using official data span that goes back as far as ten years from the year of entry, and found that the countries of interest partially converged with the two core EMU countries (France and Germany) in terms of monetary policy as well as economic structures. Full convergence is evidenced only in co-movements of inflation differentials, while data showed no convergence at all in case of two fiscal variables, namely, deficit to GDP ratio and public debt to GDP ratio.

Real convergence becomes important issue in our discussions, as it captures long-standing benefits of lower-income countries to join the EU. Their ultimate wish is to have income level and living standards of developed Western democracies.

However, what is real convergence, at all? What should converge and how can we measure it? By real convergence, opposite to nominal one, we mean that vital measures of economic performance and success moved or tend to move in direction that discrepancies (gaps) between two units (countries or regions) get decreasing or disappearing. What is appropriate to use in order to present economic success based on increase of productivity (rise in value added per hour of employee)? The best measurable candidate is real per capita (GDP) growth (controlled for the equality of income distribution), while some other more direct measures of welfare are worth considering, e.g. life expectancy, unemployment rate, social deprivation, calorie consumption, available living space etc. (Dauderstädt, 2014). From the technical (measurement) point, based on well-accepted literature there are two basic indicators of convergence/divergence and consequently two concepts. We can either measure statistical dispersion of the chosen variable within the group of units, which is known as *sigma* convergence, or measure the rate of convergence based on speed at which units with lower initial value increase relative to units with higher initial value, known as *beta* convergence (Barro, 1991).

From the empirical point of view, there are no strong empirical records that regionally integrated countries outperform autarchic areas in terms of their potential to catch up with their better-performing peers. Further on, it seems that it does not even ensure real convergence between members of economic integration. There are a number of studies that investigate the convergence/divergence empirics within integrated Europe with overall result of earlier studies being inclined to existence of real convergence trend, though the estimates indicate various strengths of the catching-up process (for a review see Dauderstädt, 2014). Novel research that covers period after the global crisis not only contradicts previous results but also questions the above finding in the sense that the optimistic results now apply only temporary. The growth in Southern Europe periphery not even failed to converge to that of the core, but also turned into full-blown economic recession.

The distinction between nominal and real convergence is very important for the political economy. Nominal convergence, as defined in the Maastricht criteria for EMU, is mainly the interest of EMU, while real convergence captures the best hopes of accession countries. Much less stress in accession negotiations are put on real convergence since disappointing results in that manner will not put the entire integration project in danger and harm the interests of the club of existing members. Therefore, for the EMU, which imposes the rules on candidates, nominal convergence criteria look like “right” instrumentarium to reach “false” goal of real convergence, while for the candidate countries, the criteria may look like “wrong” instrumentarium to reach a “genuine and ultimate” goal. Thus, dichotomy between nominal and real convergence is just a manifestation of dichotomy of interests of those two groups of countries.

An open dilemma for acceding countries is how much their commitment to nominal convergence criteria may go without sacrifices, i.e. output and employment losses (Rossi, 2004). It is a question of aligning stability to growth goals. From the very beginning, EMU have had a problem with initiating real convergence, probably because nominal convergence was put in the forefront of policy discussions, as the first and foremost goal. The vast experience of previous enlargements shows that real convergence is lagging behind nominal convergence. Moreover, Tykhonenko (2013) found that fifth enlargement (CEECs) led to a variable-speed Europe of real convergence, while Bação et al. (2013) found that deterioration of key macroeconomic variables appeared after Portugal adapted common currency. Therefore, historical experience told us that the success of the process of nominal convergence can be expected at the expense of real divergence among the member countries. For, nominal convergence, which is defined in the Maastricht Treaty as a set of requirements need to be fulfilled by countries intending to join the EMU, requires clear stabilisation-oriented policy. In order to boost economic growth, improve the well-being of population, a new EU member should significantly increase public investments and speed up the restructuring of its economy and other structural reforms. These undertakings may be strongly infringed with the policy strictly oriented to financial (nominal) stabilisation. Thus, a rational path for an acceding country is to postpone EMU entry and work hard on tasks that will help undergo real convergence (Rossi 2004).

5. Empirical analysis

The analysis used data for 40 countries, 28 EU countries (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom) and 12 countries that are not members of the European Union, but with a tendency to become a member (Serbia-Candidate since 2012; Montenegro-Candidate since 2010; Bosnia and Herzegovina-Potential Candidate since 2014; Macedonia-Candidate since 2005; Albania-Candidate since 2014; Moldova, Ukraine and Georgia - signed Association agreement with EU in 2014; Belarus, Azerbaijan and Armenia-Members of the Eurasian Economic Union; Switzerland – Withdraw its Application for the Membership in 2016) in the period from 2000 to 2014. The variables used in the analysis have their starting point in the convergence criteria also, but they were primarily selected as the most important macroeconomic indicators that provide an insight into the level of the economic development of the countries surveyed. The analysis included: GDP per capita (PPP, current international, $); current account balance (% of GDP); real interest rate; trade (export plus import as % of GDP); GDP per capita growth (annual percentage change); cash surplus/deficit (% of GDP; cash surplus or deficit is revenue (including grants) minus expense, minus net acquisition of non-financial assets. In the 1986 GFS manual non-financial as-

sets were included under revenue and expenditure in gross terms. This cash surplus or deficit is closest to the earlier overall budget balance (still missing is lending minus repayments, which are now a financing item under net acquisition of financial assets); FDI net inflows (% of GDP); FDI net outflows (% of GDP); general government final (GGF) consumption expenditure (% of GDP); gross national expenditure (% of GDP); gross savings (% of GDP); expense (% of GDP); deposit interest rate (in %); government expenditure on education (% of GDP); gross capital formation (% of GDP); long-term unemployment (% of total unemployment); merchandise trade (% of GDP); money and quasi money M2 (% of GDP); research and development expenditure (% of GDP).

The sources of the data are statistical database of the European Union (Eurostat) and the statistical database of the World Bank (World Bank Data). The essence of the analysis is to identify those variables that proved to be the most important indicators of successful membership in the European Union whose value reflects the possibility of enjoying all the benefits of membership.

Statistical analysis shows that the difference of mean values regarding inflation rate, final consumption expenditure, GDP per capita, consumption expenditure, gross national expenditure and current account balance between members and non-members of the EU are statistically significant (Table 1).

Indicators	Not member of EU	Member of EU	p
Inflation rate	3.72 ± 5.77	0.21 ± 0.75	0.031
Final consumption expenditure	88.14 ± 16.72	75.79 ± 8.26	0.012
GDP per capita	15.50 ± 14.44	35.72 ± 15.66	0.000
General government final consumption expenditure	15.64 ± 3.60	20.03 ± 3.30	0.004
Gross national expenditure	110.71 ± 15.59	95.78 ± 7.24	0.002
Gross capital formation	23.59 ± 6.00	20.11 ± 3.60	0.082
Current account balance	–4.84 ± 8.13	1.59 ± 3.87	0.021

Table 1. Difference of mean values for selected indicators

Source: authors' calculations

Regression analysis is used to determine the intensity of the changes of the dependent-variable variable that are associated with changes in the independent-variable variables. Using the regression model, it is possible to determine the relationship or association between the dependent and independent variables, and in such a way that it can determine to what extent the change of the dependent (categorical) variable is caused by a change of the independent variable. Logistic regression enables testing the model for prediction of categorical outcomes with two or more categories. Binary logistic regression is used to investigate the dependence of a binary variable to one or more independent variables. The binary variable is usually taken to be the value of 0 or 1.

Independent variables can be numeric and categorical. These variables are called the predictor variables, because by using them the probability of a binary variable that receives the value 1 is predicted. The aim of the application of the statistical methods described above is to identify the variables that have the greatest impact on the change of the categorical variables (membership in the EU) through the univariate and multivariate regression analysis.

The univariate binary regression analysis indicated that the membership in the EU is significantly affected by the current account balance (% of GDP). The odds ratio is 1.250, which means that its increase by one increases the chance for the country to become an EU member by 25%. Gross domestic product per capita has been confirmed as statistically significant for the EU membership. The odds ratio is 1.172 which means that its increase by 1, increases the chance for the country to become an EU member by 17.2%. Final consumption expenditure, has a significant impact on the EU membership. Final consumption expenditure (formerly total consumption) is the sum of household final consumption expenditure (private consumption) and general government final consumption. The odds ratio is 0.907, which means that its increase by one, decreases the chance for the country to become an EU member by 9.3%. Similar results are for the gross national expenditure. This measure is the widest of all tested consumption measures. Apart of private (household) final consumption and general government final consumption it includes also gross capital formation (formerly gross domestic investment). The odds ratio is 0.856, which means that its increase by one, decreases the chance for the country to become an EU member by 14.4%. The odds ratio for general government final consumption expenditure (formerly general government consumption) is 1.578, which means that its increase by 1, increases the chance for the country to become an EU member by 57.8%. This measure of aggregate consumption includes all government current expenditures (goods and services purchased and compensation of employees) and excludes expenditures that go to government capital formation category. Thus, it is included in both final consumption expenditures and gross national expenditures. The membership is also significantly affected by gross capital formation. The odds ratio is 0.836, which means that its increase by one, decreases the chance for becoming an EU member by 16.4%. Inflation also shows significant impact. The odds ratio is 0.431, which means that its increase by one, decreases the chance for becoming an EU member by 56.9%.

Following the univariate binary logistic analysis and separation of variables that affect the individual membership in the EU, a multivariate regression analysis was applied, including the previously excluded variables in the model. Multivariate binary logistic regression shows that final consumption has a significant impact on the EU membership. The odds ratio is 0.723, which means that its increase by 1000, decreases the chance for the country to become an EU member by 27.7%. Significant impact also shows GGF consumption expenditure.

The odds ratio is 3.091 which means that its increase by 1000, increases the chance for the country to become an EU member 3.091 times. Gross capital formation has indicative effect on membership to the EU (close to statistical significance). Results are shown in Table 2.

Indicators	Univariate binary regression		Multivariate binary regression	
	Odds ratio	p	Odds ratio	p
Inflation rate	0.431 (0.204–0.912)	0.028		
Final consumption expenditure	0.907 (0.840–0.979)	0.012	0.723 (0.545–0.960)	0.025
GDP per capita	1.172 (1.057–1.301)	0.003		
General government final consumption expenditure	1.578 (1.121–2.220)	0.009	3.091 (1.147–8.324)	0.026
Gross national expenditure	0.856 (0.765–0.957)	0.006		
Gross capital formation	0.836 (0703–0.995)	0.044	0.744 (0.526–1.052)	0.094
Current account balance	1.250 (1.059–1.475)	0.008		

Table 2. Univariate and multivariate binary regression

Source: authors' calculations

Used multivariate binary logistic regression provides the following model:

$$\textbf{Model} = 100 \cdot e^{sum}(1 + e^{sum}) \quad (1)$$

where is sum = – 0.324·Final consumption expenditure + 1.128·GGF consumption expenditure – 0.296·Gross capital formation + 13.877.

We used new variable, named Model, whose value can be calculated for all countries that are included in analysis. For example, Serbia has a value model 30.48, Montenegro 11.00, Austria 99.66, Bulgaria, 75.73. etc.

The ROC curve is a graphical representation of the sensitivity and specificity for each possible boundary score in the coordinate system, where the values of sensitivity (probability of detecting the presence of the correct attribute) are shown on the ordinate (y), and the abscissa (x) shows the values of specificity (probability of incorrect detection of the presence of the feature).

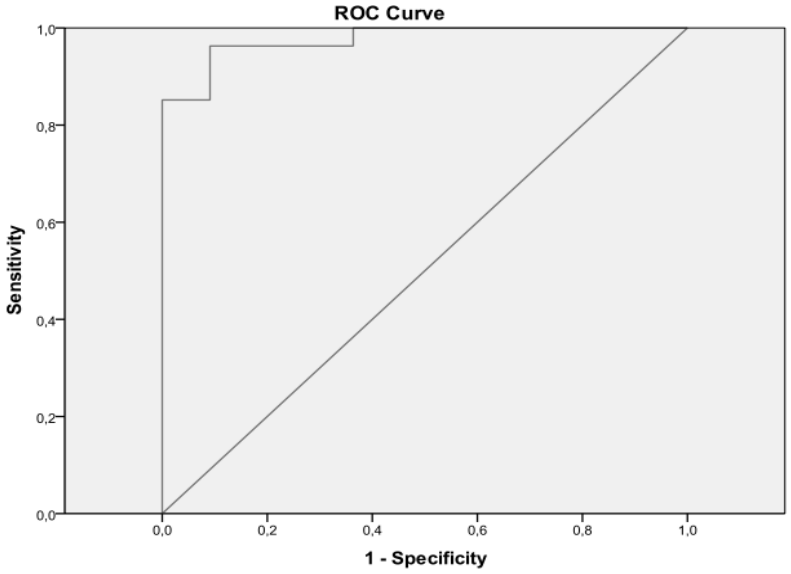

Figure 1. ROC curve

ROC curve shows that our model can be an excellent marker for distinguishing between EU member states and non-member countries (area=0.976, p<0.0005). Cut-off is 55, the sensitivity and specificity were 0.963 and 0.909. This means that 96.3% of the EU member states has a value greater than our model 55, and 90.9% non-member has the value of our model that is less than the 55.

6. Results and discussion

Analysing 40 countries, all 28 EU countries and 12 countries aspiring to become its members, for the period of 14 years and the use of a large number of macroeconomic variables, which found its footing in the criteria of a common currency, and from them derived the convergence criteria, it is shown that GDP per capita is a statistically significant indicator of the membership in the European Union. The subsequently conducted univariate analysis indicated that the membership in the EU is significantly affected by the current account balance. The impact of GDP per capita has been confirmed as statistically significant for the EU membership. Similar results we have got for final consumption expenditure, the gross national expenditure and inflation. Following the univariate binary logistic analysis and separation of variables that affect the individual membership in the EU, a multivariate regression analysis was applied, including in the model previously excluded variables. Multivariate binary logistic regression shows that consumption expenditure variables have significant impact on the EU membership, with gross capital formation that has only indicative effect on membership in the EU (close to statistical significance). Interestingly, it appears

that a lower share of private (household) final consumption and a higher share of government final consumption in GDP increases the likelihood of a candidate to become a member of EU. Although we cannot be sure of the impact of domestic investment on chances to become a member, it seems that it is negative. It is hard to give a rationale for the observed regularities. One possible answer is that the increase in governmental spending was needed (for example during the preparatory phase) in order to strengthen institutional capacities for accession. As an alternative answer, it could be simply that the countries that initially formed EU, and entered EU in successive enlargements, largely had higher government spending as a common economic feature.

Our model based on ROC curve allows reasonably accurate classification of countries on member and non-member countries, and sorting of potential candidates with respect to achieved criteria. From economic point of view, that is confirmation of importance of reaching a threshold defined in macro-economic indicators which have confirmed a statistically significant difference between members and non-members of the EU, and only then a country should become a full member of the wider community. Otherwise, it would be on the side-lines, without much benefit for itself and for the Union as well. The new variable which we created shows that for all new entrants it is very important to reach this level (cut-off) of 55, that is, to make their economic position strong already in pre-accession process. That should help policy-makers to make adequate decisions in the present, which would contribute to achieving macroeconomic resilience in the future.

7. Conclusion

The European Union has been exposed to numerous challenges. Some of them were concerned to the question of her survival and possibility to grow. The fact that we have today the Union composed of 27 countries, with intention of getting larger in the future, confirms the straight and power of the EU. There will be new problems for the EU and potential candidates in the future and therefore is very important for both to strengthen own capacities. This analysis can help to define priorities in developing process for future members, in order to make Union a better place for achieving own goals.

As above theoretical analysis shown, there are many advantages and disadvantages of regional integration. Depending on foreseen balance between benefits and costs, countries should decide whether they want to become part of the European Union or want their further economic development to be based on the pre-existing institutional frameworks. The Western Balkan countries have recognised the regional integration as optimal way to achieve their primary goal of economic prosperity. Despite that every country faces specific challenges, this analysis is intended to find the common macroeconomic, measurable indicators, that would indicate capability of accession states to successfully achieve development goals.

The subsequently conducted univariate analysis has indicated that the membership in the EU is significantly affected by the current account balance (% of GDP). The impact of GDP per capita has been confirmed as statistically significant for the EU membership. Similar results are for final consumption expenditure, the gross national expenditure and inflation. Following the univariate binary logistic analysis and separation of variables that affect the individual membership in the EU, a multivariate regression analysis was applied, including the previously excluded variables in the model. Multivariate binary logistic regression shows that final consumption has a significant impact on the EU membership. Significant impact also shows consumption expenditure. Gross capital formation has indicative effect on membership in the EU (close to statistical significance). Such results should be understood as a regularity based on past enlargements experiences, with limited guidance for perspective undertakings.

The process of obtaining a full membership in the European Union is typically lengthy, exhaustive and is not time-limited. The moment of obtaining full membership is conditioned by numerous factors, some of which are economic in nature, but the factors that are political in nature have got a huge role, as well. This primarily relates to the political will of the European Union member countries for granting additional enlargement of the Union.

However, the experience of the countries that have joined the European Union, as well as those who have given up monetary sovereignty and adopted the euro, indicates the importance of selecting the timing of accession in terms of the achieved economic development, expressed through the selected macroeconomic indicators.

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CHAPTER 27

Reference Model and Architecture for the Post-Platform Economy

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ABSTRACT

We define a post-platform economy as an economy that does not rely on intermediating platforms (or mega-platforms such as Amazon, Alibaba, and eBay) to conduct commercial transactions on the Internet. In a post-platform economy, everybody or everything connected to the Internet can act as a consumer and/or a provider of so-called complex products without requiring intermediating platforms. We define complex products as highly personalized combinations of individual products and services required to fulfill a particular consumer-defined need. Contemporary online markets work well for individual products and services or predefined combinations of them; they fall short in supporting complex products. Also, current online markets concentrate power on intermediating platforms and hence increase the "positional power" of these platforms leading towards a de-facto centralization of previously decentralized online markets. That increases transaction costs for consumers trying to find optimal product/service combinations and thus, satisfying such personalized needs. To address these issues, we propose a novel reference model for the post-platform economy and present an accompanying architecture as an example for a concrete implementation. This Decentralized Market Space Architecture (DMSA) is a strictly decentralized and highly scalable architecture to facilitate post-platform economy scenarios. It empowers consumers and providers to engage and conduct transactions of complex products in a direct, peer-to-peer manner, and without any central instance of the control. DMSA lowers transaction costs for complex products by supporting the market transactions divided into activities related to 1) formulating demand (composing and requesting arbitrary complex products), 2) negotiation (matching), 3) contracting, 4) settlement and 5) after-sales activities like reviews and dispute management.

Key words: Post-Platform Economy, Decentralized Marketplaces, Market Transactions, Complex Products

JEL classification: A10, A12, A13

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1. Introduction

In this paper, we introduce a novel reference model and architecture for the post-platform economy. We define a post-platform economy as an economy that does not rely on intermediating platforms (or mega-platforms such as *Amazon*[4], *Alibaba*[5] and *eBay*[6]) to conduct commercial transactions on the Internet. In a post-platform economy, everybody or everything connected to the Internet can act as a consumer and/or a provider of so-called complex products without requiring intermediating platforms. We define complex products as highly personalized combinations of individual products and services required to fulfill a particular consumer-defined need.

Contemporary online markets work well for individual products and services or predefined combinations of them; they fall short in supporting complex products. In addition, current online markets concentrate power on intermediating platforms and hence increase the *positional power* of these platforms leading towards a de-facto centralization of previously decentralized online markets[7]. This increases transaction costs for consumers trying to find optimal product/service combinations and thus, satisfying such personalized needs.

To address these issues, we propose a novel reference model for the post-platform economy and present an accompanying architecture as an example for a concrete implementation. This Decentralized Market Space Architecture (DMSA) is a strictly decentralized and highly scalable architecture to facilitate post-platform economy scenarios. It empowers consumers and providers (so-called peers) to engage and conduct transactions of complex products in a direct, peer-to-peer manner, and without any central instance of the control. DMSA lowers transaction costs for complex products by supporting the market transactions divided into activities related to 1) formulating demand (composing and requesting arbitrary complex products), 2) negotiation (matching), 3) contracting, 4) settlement (payment and delivery), and 5) after-sales activities like reviews and dispute management.

The remainder of this paper is structured as follows. First, Section 2 describes the context in which the proposed reference model and architecture can be applied. Following, Section 3 presents the reference model for transactions of complex products in a post-platform economy. Section 4 presents our accompanying architecture as an example for a concrete implementation. Finally, Section 5 concludes this paper with a summary and outlook.

4 http://www.amazon.com
5 http://www.alibaba.com
6 http://www.ebay.com
7 OMG (2015) Business Process Model and Notation Version 2.0.

2. Background and Motivation

In this section, we describe the context in which the proposed reference model and architecture can be applied. First, we outline main characteristics of complex products in Section 2.1 followed by the definition of primary objectives of an electronic market environment aiming to support transactions of complex products (Section 2.2).

2.1. Complex Products

Consider the simple use case of a tourist who is planning a city trip. Assume that this trip includes a flight, accommodation, guided tour, and travel insurance. From the commercial point of view, our tourist is a consumer looking for a personalized combination of services mentioned above that need to fulfill a particular context. In this case, that can be requirements, and constraints related to, e.g., schedule, budget and other personal preferences like disabled-friendly accommodation.

The use case of a tourist planning a city trip is a prototypical example for a class of real-life problems consumers face when looking for the satisfaction of a highly personalized demand. Such arbitrary combinations of individual products and services (that are required to satisfy a specific consumer's need based on a consumer-defined context) are called complex products (Schmid, Lindemann, 1998 : 193–201), (Radonjic-Simic, Pfisterer, 2017).

Thereby, the context is understood as a broader range of information to provide a richer description of a consumer's demand more specifically. Besides the desired products or services, it might encompass details about the required combination. Examples are general constraints such as price or payment and delivery modalities. Also, this includes information about contextual requirements such as time, place, reviews, and recommendations by trusted social contacts and online communities.

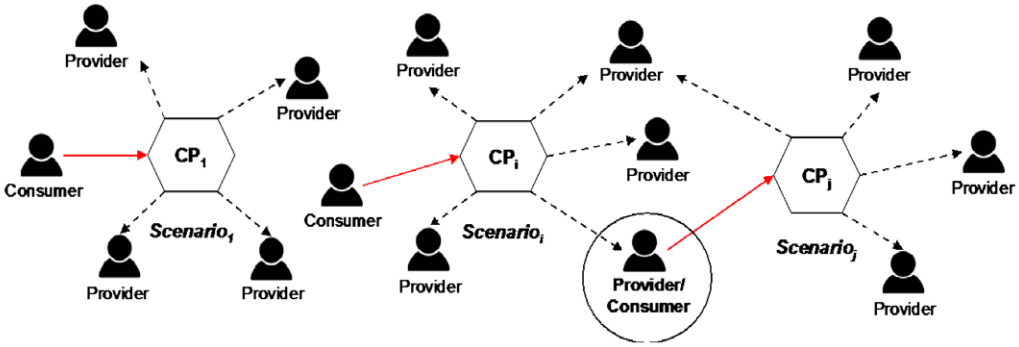

Figure 1. Visualization of complex product scenarios

A complex product scenario denotes a set of involved parties (consumers and providers) who interact to satisfy a consumer's need represented through a transaction of a particular complex product. Figure 1 visualizes such scenarios and shows consumers demanding complex products (CPs) and providers offering parts of complex products (as indicated by dotted lines). As illustrated, consumers might participate in different scenarios being consumer or provider, or both at the same time. Take for example the circled participant, who is at the same time a consumer looking for (i.e., the initiator of) and provider in .

Based on that and the scenario analysis conducted in earlier work by (Radonjic-Simic, Pfisterer, 2017), complex product scenarios can be characterized as *consumer-centric, transaction-oriented and distributed*.

A complex product scenario is considered *consumer-centric* as it is, initiated by a consumer demanding a personalized product/service combination to satisfy a particular need. In the case of our tourist, this is a combination of a flight, guided tour, accommodation, and insurance with the condition to meet several constraints such as overall budget and schedule, and disabled-friendliness.

Furthermore, such a scenario is *transaction-oriented* as the primary intention is not only to request complex products but to conduct a market transaction for such a product. Thereby, a market transaction corresponds to a finite number of interaction processes among participants (consumer and providers) with the goal to initiate, arrange, and complete the contractual agreement for the exchange of products and services in the most efficient way (Selz, Schubert, 1998 : 222–231).

Finally, the *distributed nature* of a complex product scenario refers to the different business domains a complex product might span. In our use case, it spans four different domains (flight, event, accommodation, and insurance) and requires providers from these domains to deliver distinct parts of the complex product to satisfy the consumer's need.

2.2. Overall Objectives

The identified characteristics of complex product scenarios impose a set of objectives on the electronic markets that aim to support them. Given that, and referring to our work in (Radonjic-Simic, Pfisterer, 2017, Moazed, Johnson, 2016) the primary objectives can be summarized as follows:

- *Objective 1: Enabling transactions of complex products in a trustful and reliable manner.* On the consumer-side, this increases efficiency and alleviates the effects of adverse selection (i.e., choosing good enough instead of optimal). And providers gain higher accessibility of their offerings and an increased level of personalization related to the consumer-defined context.

- *Objective 2: Facilitating integration, the simplicity of use and management.* For market participants (consumers and providers), it empowers them by providing tools and services to constitute and evolve their marketplace. An environment that enables them to initiate and participate in different context-centric, dynamic and transaction-oriented business scenarios.
- *Objective 3: Supporting scalability and allowing transactions in any business-domain.* Since complex products can be arbitrary complex combinations of individual products and services spanning different domains, the marketplace as a trading environment has to be open for any business domain and allow cross-domain transactions.

We will use the formulated objectives as a rationale for the conceptualization of our reference model and architecture in the following sections.

3. Reference Model for Transactions of Complex Products

This section describes the elements of our novel *Reference Model for Transactions of Complex Products*. Our model extends the *Reference Model for Electronic Markets* (RM-EM) by Schmid & Lindemannintroducing elements that acknowledge the specifics of complex products described in the previous section.

3.1. Related Work

The RM-EM (Selz, Schubert, 1998 : 222–231) (cf. Figure 2), is a well-recognized and widely used reference model for the design and conceptualization of electronic markets (i.e., electronic marketplaces). The term electronic marketplace refers to a market-oriented organization of commercial exchange, aiming to increase market transparency, lower transaction and coordination costs (Bakos, 1998). An e-marketplace serves three main functions: 1) to match demand and supply, 2) to facilitate market transactions, and 3) to provide the institutional infrastructure (Bakos, 1998), (N. & Gebauer, 2000).

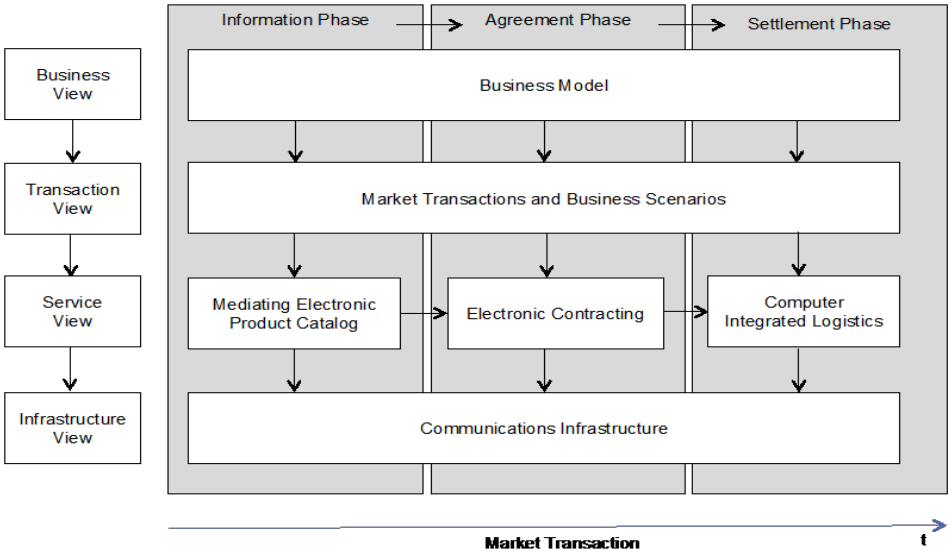

Figure 2. Reference model for electronic markets
Source: Selz,, Schubert (1998)

As shown in Figure 2, the RM-EM consists of two dimensions. The horizontal dimension represents the market transaction and the vertical dimension groups the four views.

The market transaction (see Figure 3) comprises three phases: Information, Agreement, and Settlement. During the Information Phase, market participants acquire a market overview by gathering information about goods and services and potential transaction partners. For a market participant, the phase ends with an offer. The receipt of an offer is considered to be the start of the Agreement Phase when market participants negotiate conditions of transactions and agree on a legal-binding contract. The agreed contract is fulfilled in the Settlement Phase, which involves activities related to payment, delivery, and logistics.

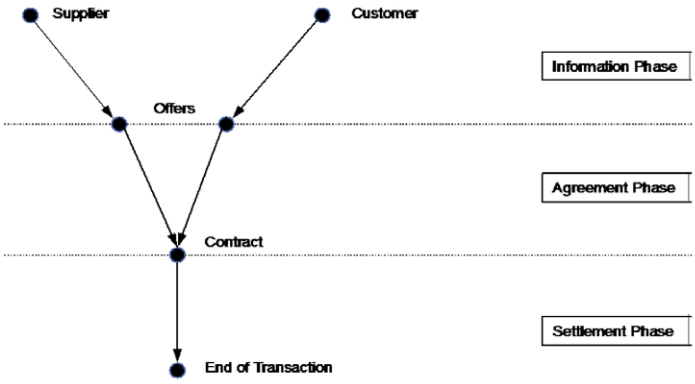

Figure 3. Phase model of market transaction
Source: Selz,, Schubert (1998)

The vertical dimension of the RM-EM refers to views organized in four layers: Business, Transaction, Services, and Infrastructure. While the upper two views focus on organizational aspects of an e-marketplace (i.e., business model, business processes, and scenarios), the lower two focus on technological aspects. The Service View specifies the market services available to the market participants. These are Electronic Product Catalog supporting the information exchange between market participants, Contracting for negotiation and contracting, as well as payment and logistics. The Infrastructure View represents the information and communication infrastructure required to support market transactions by implementing market services defined in Service View.

As to the reviewed literature, the RM-EM has been expanded and adapted to the prevailing conditions of specific market domains (i.e., business-to-business, business-to-customer, etc.). Selz & Schubert propose a new phase Communication to support interactions between market participants that happen after the Settlement phase (e.g., activities related to refund and reviews). Picot, Reichwald & Wigand (Searls, 2013), Kollmann (Radonjic-Simic, 2018) also propose an additional phase After-Sales to support activities, e.g., dispute and extended customer relationship management. But also to use the established relationships to offer additional market services like, e.g., recommendations and advertising. Additionally, an extension of the Service View is proposed by (Radonjic-Simic, 2018), introducing the e-fulfillment tool, provided by the trusted intermediary (i.e., a marketplace operator) to ensure an adequate level of trust and arbitration in a mediated marketplace.

However, these adaptations of the RM-EM reflect a reality of electronic marketplaces that are predominately supply-oriented and focused on transactions of standardized products and services. To consider the reality of consumer-oriented complex product scenarios, the initial RM-EM has to be adapted in a way to acknowledge the specifics of complex products. The adapted model forms the conceptual basis for designing electronic marketplaces suitable for transactions of complex products.

3.2. Proposed Reference Model

The proposed reference model for transactions of complex products enhances the original RM-EM in order to support the specifics of interaction processes between market participants engaged in complex product scenarios. Figure 4 shows the Reference Model highlighting the proposed extensions with bold lines.

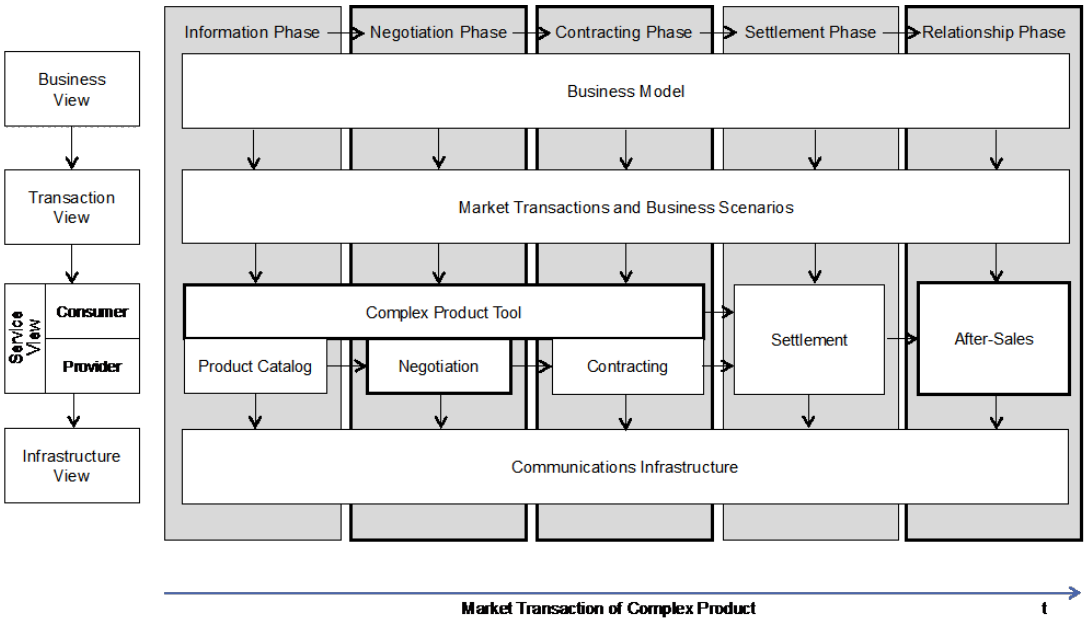

Figure 4. Proposed Reference Model for Transactions of Complex Products.

Changes refer to:

- the horizontal dimension of the RM-EM. We suggest new phases analogous to the underlying phase model of market transactions (cf. Figure 3);
- the vertical dimension: we propose additional elements of the Service View required to support each of the suggested phases.

3.3. New phases Negotiation, Contracting, and Relationship

In contrast to the phase model of market transactions (cf. Figure 3), our model encompasses five phases. As depicted in Figure 5 our model introduces two new phases after the Information phase (Negotiation and Contracting) instead of the original Agreement phase.

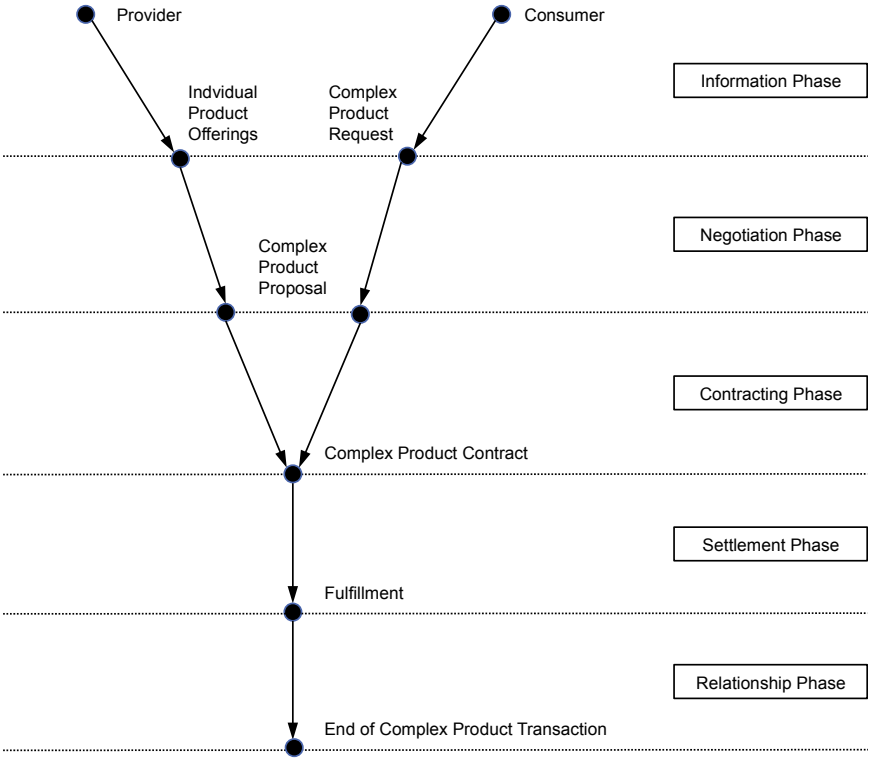

Figure 5. Phase model of market transaction of complex products.

The main reason is the necessity to support different interaction processes among market participants. In the case of standardized products and services, the Information phase supports searching and choosing offerings from existing product catalogs and ends with an offer (cf. Figure 3). But for consumers looking for a complex product (except in case of a pre-defined one), such an offering cannot be found in existing product catalogs. Instead of searching for offerings, a consumer first needs to formulate demand in the form of a complex product request. This request is used to search for potential providers that can provide parts of the required complex product. Consequently, the Information phase ends with a formulated complex product request and a list of possible transaction partners.

Following, the market participants require a phase to negotiate conditions for an agreement regarding all parts of the complex product. For the consumers it means, sending “Requests for Offer” (RfO) to providers, then aggregating all received offerings and creating complex product proposals, as well as, ranking them based on the defined requirements and constraints. A consumer might then select one complex product proposal, which best suits their requirements, which is then the starting point for the Contracting phase and serves as the basis for the contractual agreement to be made.

The Contracting phase ends with a legal-binding complex product contract, which in turn, is the starting point for the Settlement phase. After fulfilling the contract, the transaction of complex products ends with the end of the Relationship phase. The Relationship phase is the fifth phase we integrate following the suggestion by Searls (2013), (Radonjic-Simic, 2018) to support activities that might happen after sales.

3.4. Service View: Market Services for the support of market transactions of complex products

Now that we have discussed the proposed phase model for the transaction of complex products, we now suggest enhancements of the Service View by introducing the new elements *Complex Product Tool*, *Negotiation*, and *After-Sales*. As indicated in Figure 4, the Service View layer differentiates between the provider and consumer side (with new elements highlighted in bold font).

Complex Product Tool: On the consumer side, we suggest a tool, which seamlessly bundles different services in order to provide support for complex products in the Information, Negotiation and Contracting phase. The complex product tool should support processes and activities around the complex products as discussed in the previous section, and summarized in Figure 5. These are a consumer's activities related to creating complex products, sending Requests for Offers to potential transaction partners, and getting offerings, negotiation, and ranking of complex product proposals, and finally contracting.

Negotiation: On the provider side, we suggest additional services to support the part of the negotiation process that considers specifics of complex products. Hence, the supplementary services, which enable providers to create offerings, based on the contextual information of a particular product and as a part of the complex product. In case of our tourist, this could be to offer a disabled-friendly accommodation and guided tour, which in combination otherwise would not be considered.

After-Sales: As an enhancement of after-sales tools proposed by (Radonjic-Simic, 2018) such as, e.g., refund, reviews, recommendation, and dispute resolution management, we recommend further tools to facilitate sharing experiences with a community interested in an exchange of complex products. As well as, integration of advanced analytics tools to make available an up-to-date market overview, and thus, facilitate market transparency, considered one of three primary functions of a marketplace.

4. Reference Architecture for Transactions of Complex Products

Having introduced the proposed reference model for transactions of complex products, in this section, we present our Decentralized Market Space Architecture (DMSA). DMSA represents an example of a concrete implementation of the identified market services of the *Service View* as described in the previous section.

4.1. Related Work

This section reviews a set of related works and briefly discusses their suitability to support market transactions of complex products.

E-marketplaces as market-oriented organizations operate predominately as intermediated solutions focused on the supply-side of the market and individual products and services. In general, they support compositions of products/services within their boundaries (i.e., industry, domain, type of products and services) and support transactions of pre-defined product/service combination traditionally purchased together. Examples are *Opodo*[8] or *Expedia*[9] that offer combinations of flight, hotel, and rental car. However, they are limited in supporting market participants in transactions of arbitrary complex products that may span different domains and need to fulfill consumer-defined requirements and constraints.

Decentralized Peer-to-Peer and blockchain-based marketplaces refer to the concept of a disintermediated electronic marketplace that brings possible transaction partners together and enables them to engage in market transactions directly and without any intermediary (Kleedorfer, Busch, Pichler, Huemer 2014). Approaches such as, e.g., OpenBaazar (Bazaar, 2016), BitMarkets (Picot, Reichwald, Wigand, 2003), and OpenMarket (Pfisterer, Radonjic-Simic, Reichwald, 2016) propose different infrastructure solutions. They are frameworks and architectures that support the phases of the market transaction in a decentralized and peer-to-peer manner (preferably using cryptocurrency). But, as with intermediated e-marketplaces, these solutions are focused on market services necessary for the transaction of individual products and services, and thus, fail short in supporting complex products.

The Intention Economy (EI), introduced by Searls 2013, refers to an electronic market that is demand-oriented and focused on the buyer's demand as the primary driver of market transactions. The main idea of IE is to equip buyers with Vendor Relationship Management (VRM) tools (Eymann, T. (2001) that make them independent in their relationships with vendors (i.e., providers) and other participants on the supply-side of markets. The VRM tools support consumers in activities related to the Information and Negotiation phase (i.e., creating a personal request for proposal (pRFP), making them visible to vendors and identifying the best and final offers (BAFO)). But, there is no obvious evidence that VRM tools can support the contracting and settlement activities, nor the description of buyer's demands spanning different product/service domains.

Web of Needs (WoN, Kollmann, T. (2010) is a framework for a distributed and decentralized marketplace on top of the Web. Its main idea is to standardize the creation of owner-proxies as the central entity controlled by market participants (buyers and sellers). Owner-proxies describe a demand (i.e., a need) on the

8 http://www.opodo.com
9 http://www.expedia.com

buyer side, offered products/services on the provider side, and contain the information about the owner that is required to start a transaction. Once created, owner-proxies are published to the Web, where they are made aware of each other by independent matching services, which compare their descriptions and inform them about possible transaction partners. If a buyer needs a complex product, he can publish a “complex need” waiting for a suitable matching service capable of interpreting and matching with potential transaction partners. But, the WoN does not go beyond starting the conversation between market participants. It does not support activities beyond the Information phase of a market transaction for complex products.

Concluding remarks: Contemporary solutions and concepts work well for individual products and services but are limited to supporting complex products. Concepts such as IE or WoN address some of the objectives but do not represent a comprehensive solution – either they provide tools that need to be integrated, or support transaction phases only partly. Hence, considered insufficient to support market transactions of complex products.

4.2. Decentralized Market Space Architecture

Distributed Market Space Architecture (DMSA) empowers market participants (consumers and providers) to constitute a market environment where they can conduct complex product transactions in direct, peer-to-peer manner. DMSA is strictly decentralized, highly scalable, and represents a conceptual structure of a software-system required to support market transactions of complex products.

Figure 6 illustrates the proposed architecture and shows its core entities *Peer*, *Decentralized Market Space (DMS)*, and *Peer Application*.

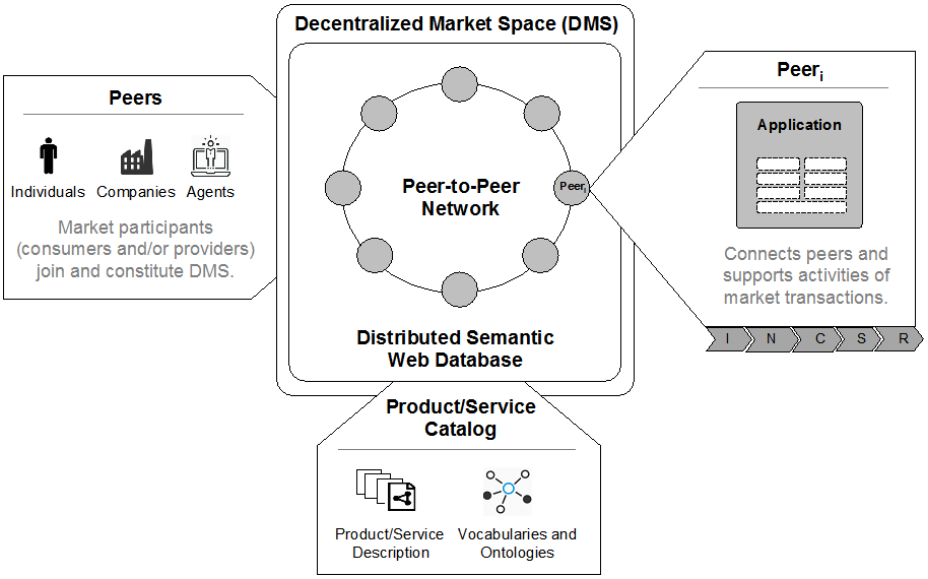

Figure 6. Conceptual structure of distributed market space

Peers represent market participants defined through their intention to consume or provide for complex products. Peers can be everyone or everything connected to the Internet (e.g., individuals, companies, institutions, or autonomous agents acting on behalf of a peer taking different roles). Peers join the peer-to-peer network and form a strictly decentralized market environment, in which they can trade complex products directly and without any central instance of the control.

Decentralized Market Space (DMS): The primary responsibility of the *DMS* is to facilitate information exchange among market participants (i.e., peers). That includes enabling direct communication among peers of interest and resolving information necessary for activities related to different phases of a market transaction. For example, this can be information essential for matching peers for a particular product/service, sending requests for offers and receiving offers from addressed peers (i.e., Information and Negotiation phase).

As illustrated on Figure 6, DMS consists of an underlying peer-to-peer network and a distributed Semantic Web database. The semantic database stores information about registered providers and their offerings (i.e., product/service descriptions), and the knowledge necessary for transactions in a particular domain (i.e., domain knowledge). This domain knowledge is described by ontologies and vocabularies, as well as terms of sales, and other domain-related conditions and requirements. To this end, the semantic database is the foundation for a product/service catalog required to supporting information exchange among market participants in a decentralized market. For detailed information about the implemented data model, examples of product/service descriptions and applied ontologies, the reader is referred to (Radonjic-Simic, Pfisterer, 2017).

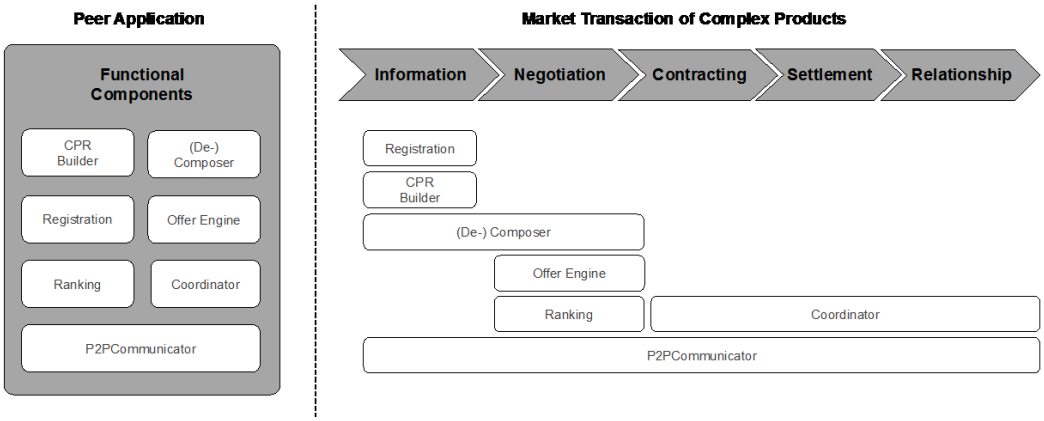

Figure 7. Functional structure of the peer application in relation to phases of a market transaction of complex products.

Peer Application: The peer application is responsible for providing communication infrastructure for market participants (i.e., peers engaged in market transactions of complex products). It represents the access point for a peer to

participate in the DMS and implements the market services identified in Services View (cf. Section 3.2). The peer application is represented by the functional structure, as summarized in Figure 7. As shown on the left, it encompasses (at least) seven components *Complex Product Request Builder (CPR Builder), (De-) Composer, Ranking, Coordinator, Registration, Offer Engine* and *P2PCommunicator* (Radonjic-Simic, Pfisterer, 2017). Each of these components is involved in a particular phase(s) but taken together they cover the whole market transaction of complex products, as illustrated on the right.

4.3. Inner Workings: Transaction of Complex Products

In this section, we provide additional details about the peer application components and how they interact to support transaction phases. Thereby we focus on the Information, Negotiation, and Contracting phase.

The process on the consumer-side starts with describing demand for a personalized combination of products and services, to satisfy a particular need. The *CPR Builder* component enables consumers to create a complex product request by composing an individual product/service combination integrating the relevant contextual information. The output of this activity is a formulated complex product request.

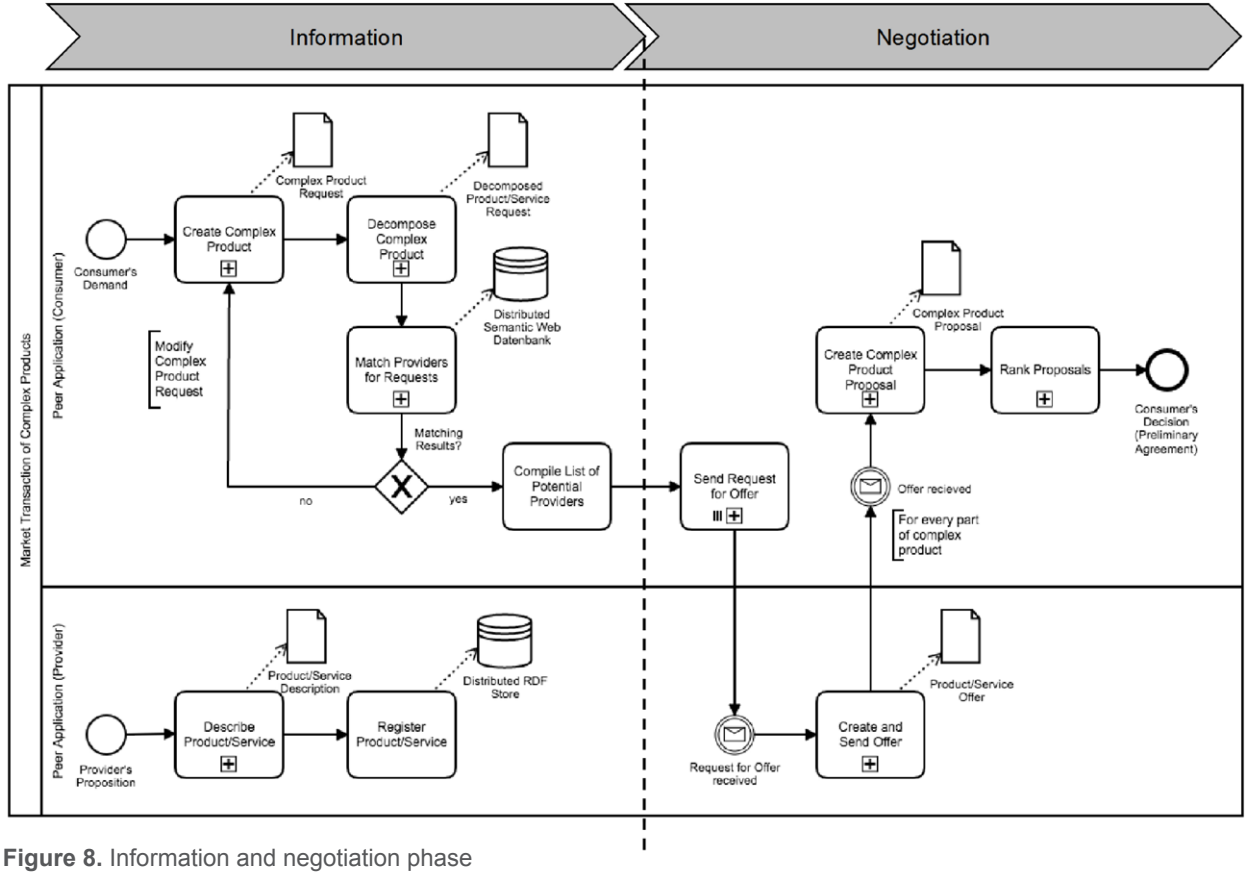

Figure 8. Information and negotiation phase

The diagram shown in Figure 8 illustrates the activities of market participants within the information and negotiation phase. The activity flows are modeled using Business Process Modeling Notation 2.0 (BPMN 2.0[10]). The upper-lane of the diagram represents the consumer-side of the peer application and the bottom-lane the provider-side.

10 OpenMarket (2016) OpenMarket. Paper, B.W. (2016) BitMarkets.

The *(de-)Composer* component decomposes complex product request into individual product/service requests, match providers for decomposed requests and compiles a list of potential providers and sends the RfO (requests for offers) to them. After receiving individual product/service offers, the composer component re-combines all offers into multiple complex product proposals and passes them to the *Ranking* component. Based on the consumer-defined requirements, the ranking component ranks all complex products proposals in a way that the best matching is on top of the list. A ranked list of proposals (hence, a consumer's decision about a preliminary agreement) is considered the end of the Negotiation phase.

While previous components are designed to support peers in the role of a consumer, the *Registration* and *Offer Engine* components support the activities of a provider regarding description and registration of offered product/services, and the negotiation process. That includes receiving the product/service requests and sending offers back to the requesting peer (i.e., consumer). The offering process can also encompass further functionalities depending on the type of the peer (e.g., individuals, companies or institutions), the type of product/service they offer and other provider-related characteristics.

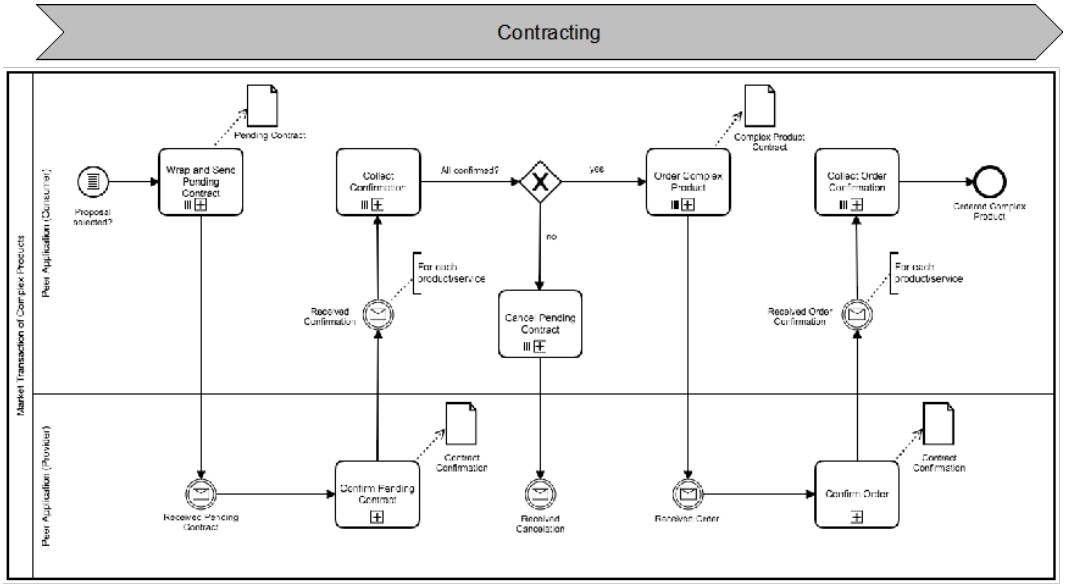

Figure 9. Contracting phase

In case the negotiation phase ended with a viable complex product proposal, which is also selected by the consumer, the contracting phase begins. Corresponding activity flows are shown in Figure 9. The component of the peer application responsible for the contracting on both sides (consumer and provider) is the *Coordinator*.

From the consumer side, a complex product contract is considered as an umbrella contract since it incorporates different arrangements for different parts of the complex product. The umbrella contract represents one-to-many contract situation and requires consumer's involvement in several contractual processes (one for each product or service). The supporting activities on the consumer side (see Figure 9, upper-lane) ranging from wrapping a pending contract, sending it to counterparts (providers), collecting confirmations and finally ordering. On the provider side, the activities covered by the Coordinator component are slightly different. That is because the contracting process is considered as a one-to-one contract situation with an additional activity regarding confirmation of a pending contract. The result of the contracting phase is an agreed legally binding contract.

Although the contracting phase ends here, the Coordinator is also responsible for the activities in the settlement and relationship phase (see Figure 7), but these two phases are considered out of the scope of this paper.

5. Conclusions and Outlook

This paper proposed a novel reference model for the post-platform economy and presented the Decentralized Market Space Architecture (DMSA), an accompanying architecture, as an example of a concrete implementation.

The proposed reference model extends the Reference Model for Electronic Markets (RM-EM) by Schmid & Lindemann and introduces elements that acknowledge the specifics of complex products. That is, introduces three new phases of the market transaction and new market services, identified as essential to supporting market participants engaging in transactions of complex products.

The introduced Decentralized Market Space Architecture enables consumers and providers to engage and conduct transactions of complex products in a direct, peer-to-peer manner and without any central instance of the control. DMSA is described by its primary building blocks and functional components, as well as their relationships and how they work together to realize transactions of complex products.

However, this paper predominately covers the technology-driven aspects of complex product scenarios and focuses on the Service and Infrastructure View of the reference model. Therefore, in our future work, we will concentrate on the organizational aspects of post-platform economy scenarios and their influence on the Business and Transaction View with rather long-term impacts.

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CHAPTER 28

Innovation expenditures efficiency in Central and Eastern European Countries

Pawel Dobrzanski[1]

ABSTRACT

The purpose of this paper is to verify if money spend on R&D are used efficiently in CEE countries. Nowadays, innovativeness is one of the most crucial factors accelerating economic growth. Increasing innovativeness is particularly important for developing countries, where policymakers are implementing various innovation strategies. The Europe 2020 strategy sets the target of 3% GDP for R&D spending. Many studies emphasize a significant effect of increasing expenditures on R&D on economic growth, but an efficiency aspect has not been covered in the literature. The article is based on critical review of the main literature of the subject and own empirical studies. The statistical data is sourced from the main international statistics. Calculations were performed using the method of DEA. DEA method allows to assess input-output efficiency. The calculations are carried out based on the program Statistica 10. and Excel spreadsheet. The paper gives a general review of the innovation level in CEE countries. The analysis shows that among CEE countries, the most innovative is Czech Republic, which is spending the most on innovation. However, hypothesis that increasing spending on innovations is not causing proportional effects has been confirmed. Main conclusion of the research is that innovation spending should be increased gradually in aim to achieve optimal results. This research may contribute to discussion on innovation policy design, and can be used by policy makers to develope national innovation strategies.

Key words: Innovation, Effectiveness, DEA Efficiency Method

JEL classification: H50, O30, O38, O57, R15

1. Introduction

Innovativeness of the economy is one of the key factors stimulating economic growth. Many countries have an increased focus on developing the innovation policy and strategy for their countries. Improving innovativeness is especially important for developing countries, which are trying to improve their competitiveness

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and stimulate economic growth. Many of the Member States of the European Union are among the most innovative and developed economies in the World. In 2004 ten post-transition countries joined the European Union from Central and Eastern Europe. Since then, a concept of two speed Europe – competitive and innovative old Members, and lower-income new Member States has become a popular topic in the literature.

Innovation policy is important for the European Union. R&D spending in Europe in 2010 was below 2% of GDP, while in the USA it was 2.6% and in Japan 3.4%. This was result of lower levels of private investment. European Commission is emphasising that there is a strong need to improve conditions for private R&D in the EU. EU policymakers even set up a goal in the Europe 2020 Strategy to ensure that 3% of GDP should be invested in R&D in all Members States. As fiscal policy is likely to remain under pressure in many Members States, public expenditures probably won't increase significantly. Therefore, to reach 2020 target business expenditure should increase by 80% (Gros, Roth,2012). "Innovation Union" was one of the initiatives created to improve conditions and access to finance for research and innovation. The Commission launched it to support regions and Member States in better defining their innovation strategies by assessing their innovative strengths and weaknesses and build on their competitive advantage (European Commission, 2013a). However, despite all those activities, it is doubtful that 3% GDP goal will be achieved. EU's spending on R&D over last years remains almost at the same level around 2% of GDP.

Another question that can arise, is whether the level of 3% of GDP spending on R&D is worthwhile and optimal for all Member Countries. Even in the Europe 2020 Strategy it is stated that the target focuses on input rather than output. For EU policy makers it is clear that analysing R&D and innovation together would get more relevant productivity drivers. Finally, the Commission proposed to keep the 3% target, while developing an indicator which would reflect R&D and innovation intensity (European Commission, 2010)

The aim of the study is to verify if money spend on R&D are used efficiently in CEE countries. Main hypothesis of the research is that increasing R&D spending is not causing proportional innovative effects.

The paper is organized as follows. Second section presents literature review regarding innovation in economic growth concept and innovation policies. Section three describes DEA methodology. Section four presents data chosen for analysis. Section five contains research findings and the last section concludes the research.

2. Literature review

According to new growth theories long-term economic growth can be achieved endogenously thanks to innovation and technological progress. The significance of innovation for economic growth has been emphasized by many economists.

Concept of innovation was introduced by Schumpeter, who stated that, innovative companies stimulate economic development and competitiveness by “creative destruction”. Innovations replace old products and technologies, having a positive impact on the turnover outcome (Schumpeter, 2003). Gartner and Drucker (1987) defined innovation as instrument of entrepreneurship, which creates new opportunities to generate wealth. Solow (1956) stated that technological change, rather than capital accumulation, is the main driver of long-run growth. Romer (1986) underlined importance of innovation and entrepreneurship in stimulating economic growth. Also, some empirical research are confirming positive impact of innovation on economic growth. (Fagerberg & Srholec, 2008; Hirooka, 2006; Taylor, Grossman & Helpman, 1993) Therefore, innovation is nowadays at the center of each competitiveness strategy, both company as well as government policies.

Literatures underline also the relationship between innovation and regulation. Companies must have the willingness, opportunity, motivation, and capability or capacity to innovate. Policy regulations can cause both positive and negative impact (Carlin and Soskice, 2006). EU regulation matters at all stages of the innovation process, from R&D to commercialization. Regulation can be a powerful incentive for innovative actions, but at times regulation can disable innovation. The impact of the regulation on innovation depends on the balance between innovation-inducing factors and compliance costs generated by legal provision. (Pelkmans, Renda, 2014)

The aim of European Union is to improve its competitiveness through innovation. The changing global landscape and the growing importance of innovation require EU to review its innovation policy, including both the scope and the governance of innovation at the EU and national level. Policymakers should take into account the whole innovation cycle, including all links in the innovation chain: industry, university, public and private financing organizations, society, politicians, policymakers etc. The innovation policy should consider both the supply and the demand for innovation. For that reason, the European Institute of Innovation and Technology (EIT) was established in 2007. The EIT is the first European initiative that aims to integrate knowledge triangle, which consists Higher Education, Research and Business-Innovation. EIT objective is to improve innovation capacity and capability of the EU. However, still there is no standard policy implemented in all Member States. Innovative goals are announced at the EU level and Member States have full flexibility in their implementation. From one hand codified policy may simplify the sharing of common technological solutions, removing trade barriers, enabling technology transfer, and boosting the creation of complementary markets. But, in some cases it can lead to undesirable results. (Anvret, Granieri, Renda, 2010)

The European Commission launched its innovation goals in the Europe 2020 Strategy, which announces seven flagship initiatives, of which at least five are closely linked with innovation (Innovation Union, Digital Agenda, Resource Efficient Europe, A New Industrial Policy for the new globalization era and an

Agenda for new skills and jobs). Main goal of this strategy is to achieve smart, sustainable and inclusive growth, improve its competitiveness and productivity and underpin a sustainable social market economy. This should be guarantee by 3% GDP spending on R&D (European Commission, 2010). The European Council agreed that progress towards the Innovation Union should be measured at EU level and only R&D indicator is not reflecting full picture of countries innovativeness. Therefore, the European Council organized high-level panel with leading business innovators and economists to identify possible indicators, which would best assess innovation intensity. New indicator should have focus on outputs and impacts and facilitate international comparability. Moreover, the European Council underlined urgent need of improving data availability and quality to measure and monitor innovation performance. The Commission also emphasized that, because innovation is a multi-faceted phenomenon, further work is needed to develop indicators on aspects such as non-technological innovation, design, service innovation, and performance at regional level. (European Commission, 2011).

Both policy makers and researchers agreed that the R&D spending indicator had certain limitations and is not correctly accessing innovative improvements of the Member States. The use of R&D spending as innovative indicator is widely criticized in the literature. Tilford and Whyte (2010) pointed out that EU should not neglect R&D, but move beyond focus on numerical R&D targets and provide the broader concept of innovation. Moreover, R&D is concentrating mainly on the manufacturing sector, omitting service sector. EU is service-dominated economy, with the highest share of service sector in GDP, which is several times bigger than that of manufacturing. Gros and Roth (2012) also emphasized that European Union should utilise the broader concept of innovation, named concept of intangible capital, which would align better with economic structure of EU. Intangible capital concept includes capital, which is not included in national accounts, such as: architectural design, new financial products, own-account and purchased organizational structure of a firm, firm-specific human capital, branding, market research and scientific R&D. Zabala-Itturiagagoitia (2008) has indicated that referring only to input indicators might result in overrating unproductive R&D investment. Most of public R&D is used not to stimulate economic growth, but to achieve public agency goals and any contribution to economic growth is thus due to indirect knowledge transfers.

In 2013, the European Commission presented a new indicator to capture innovation outputs, which can be used for measuring the EU's progress in meeting the goals of the Europe 2020 Strategy. Aim of the new indicator is to support policy-makers in establishing policies to remove barriers that prevent innovators from transforming ideas into successful products and services. The Indicator of Innovation Output combines four output sub-indicators. First is technological innovation measured by number of patents. This indicator takes into account knowledge generated by investing in R&D that can be transformed into successful technologies. Second indicator, employment in knowledge-intensive

activities as a percentage of total employment, provides an economic orientation towards the production of goods and services with innovation added value. Third indicator, competitiveness of knowledge-intensive goods and services, is based on the share of high-tech and medium-tech products trade in the total trade balance, and share of knowledge-intensive services in the total services trade. Last indicator is employment in fast-growing firms of innovative sectors. Stimulating jobs in such sectors is integral part of modern research and innovation policy. This indicator provides a measure of the dynamism of the economy, capturing relation between growth and jobs (European Commission, 2013b).

However, new innovation indicator solves only one problem. It supplements the input perspective with an output perspective, but it tends to disregard actual innovation outcomes. Enterprises can transform innovation inputs, such as R&D, human resources, research infrastructures and existing knowledge, in a first stage into intermediate outputs, such as patents, and in a second stage, into innovation outcome. Innovation outcomes are the results of the introduction of innovations, among them the economic effects of innovation outputs on firms introducing them. Patent application itself does not automatically have economic results. For adequately measuring innovation outcomes at the country level, both structural change and structural upgrading should be considered. Structural change is reallocation economic activity towards more knowledge-intensive sectors. Structural upgrading is getting closer to the frontier in sectors countries are already specialised in. This is related to differential performance of enterprises without necessarily changing the overall composition of the economic structure, e.g. by moving to more knowledge-intensive activities within the same sector (Janger et al., 2017). Unfortunally, statistics for innovative outcomes are not conducted, due to difficulty in obtaining realiable data.

Innovativeness and innovative strategies and policies are widely described in the economic literature. However, there is a lack of analysis of effectiveness of R&D spending. Current studies are focusing either on inputs defined in innovative policies or outputs achieved by countries or regions. Such an approach is caused by both problems in defining efficiency and measuring it. The relation between inputs and outputs need further investigation, which will be subject of research in this article.

3. Methodology

Method employed in the research is Data Envelopment Analysis (DEA). DEA is the nonparametric method used for efficiency measurement. The precursor of this methodology was Farell (1957) and it was further developed by Charnes et. al. (1978). DEA measures the efficiency of units with multiple outputs and multiple inputs along with objectively determining weights. Equivalences are established to ordinary linear programming models for effecting computations. (Charnes et. al. 1978). DEA is a method for measuring comparative, relative and so called technical efficiency. Efficiency is relative, as it measures effi-

ciency with reference to some set of units that are being compared with each other. In general terms, the essential idea is to assess how efficiently each decision-making unit (DMU) is handling the transformation process when compared to other DMUs engaged in the same process. To do this relation between outputs achieved and available resources it analyzed. DEA is not absolute measure of efficiency. Units which are efficient in DEA methodology may in fact be capable of improving their performance even further. The DEA model is an input-oriented model, which seeks to identify technical efficiency as a proportional reduction in input usage. (Thanassoulis, 2001) The efficient DMUs are not necessarily production frontier, but rather best-practice frontier (Cook, Tone and Zhu, 2014).

DEA can separate the efficient operating units from the inefficient on the basis of whether they lie on the efficient frontier which is spanned by the best units in a data set. The efficiency measure employed in DEA is established mathematically by the ratio of the weighted sum of outputs to the weighted sum of inputs (Wober, 2007):

$$Effectiveness = \frac{\sum_{r=1}^{R} u_r \, y_{rj}}{\sum_{N=1}^{N} v_n \, x_{nj}}$$

where: u_r–weight of output
v_n–weight of input
y_{rj} - output
x_{nj}– input

The first step in the application of DEA is to agree on relevant inputs and outputs. Inputs and outputs do not have to be measured in the same units. In DEA the resources are typically referred as inputs and the outcomes as outputs. Identification of the input-output variables used in an assessment is the most important step. The results, which will be obtained in the research depend crucially on the choice made. The input-output variables are unique to the type of efficiency being assessed. The inputs should capture all resources, which impact the outputs and the outputs should reflect all useful outcomes, on which we wish to assess the DMUs. The identification of exogenous variables is important. Exclusivity and exhaustiveness of input-output variables must guide the choice of the input-output variables subject to the exogeneity of any variables being proposed. (Thanassoulis, 2001) With DEA method the overall efficiency of a DMU is measured by its total factor productivity output-to-input ratio, which takes into account all outputs and all inputs. The main problem here is choosing the inputs and outputs to be considered and the weights to be used in order to obtain a complex overall measure (Wober, 2007).

Thanassoulis (2003) underlined that DEA method has many advantages. First of all there is no need to specify a mathematical function of the effectiveness.

Moreover, DEA method can be useful in uncovering relationships that remain hidden for other methodologies. DEA method allows analysing multiple inputs and outputs at the same time, without any input-output measurement. In addition, the sources of inefficiency can be analysed and quantified for every evaluated unit. Wober (2007) also underlined that DEA needs no a priori information regarding which inputs and outputs are the most important in the evaluation procedure. This gives possibility to use it for analysis for complex and often unknown nature of relationships between variables. The model implies that inputs and outputs are measurable, and infinitely divisible. DEA does not take into account qualitative information and some crucial factors affecting efficiency could be not included into analysis. Therefore, careful interpretation and sensitivity analysis is required. DEA can be a useful and powerful method of analysis for someone, who fully understands both its potential and its limitations (Molinero& Woracker, 1996).

Moreover, correlation coefficient method was used to remove output data, which can duplicate information. In the analysis, Pearson's linear correlation coefficient between variables was used (DeVolpi, 1991):

$$r_{ij} = \frac{cov\ (X_i\ Y_i)}{s_i s_j},$$

where:

- $cov\ (X_i\ Y_i)$ – covariance between i-variable and j-variable
- s_i – standard deviation of variable X_i
- s_j – standard deviation of variable X_j.

4. Empirical data and analysis

The aim of the study is to examine the relationship between innovation expenditure (input) and the innovation results achieved. In order to calculate this correlation study was conducted using statistical and empirical methods. Statistica 10 and Excel Spreadsheet were used for calculations. The study was limited to seven countries form CEE region and periods of research from 2008 to 2015. Main method employed was Data Envelopment Analysis (DEA). The effectiveness in DEA method is defined as the ratio of the weighted sum of the results by the weighted sum of inputs. Performance is relative, because it is created in relation to the entire group of objects.

The estimated effectiveness will indicate to what extent expenditure on innovation affected efficiency in selected CEE countries. Selection of diagnostic variables was carried out based on available statistical data. The nine output indicators chosen for analysis are as follows. Eight of them were sourced from the Eurostat database and one comes from the World Bank. First, Research

and development expenditure as a percentage of GDP (RDE), second European Union trade mark as a applications per million population (EUTM), the third one is high-technology exports as a percentage of manufactured exports, than Employment in high- and medium-high technology manufacturing sectors as a percentage of total employment, human resources in science and technology (HRST) as a percentage of active population, patent applications to the European patent office (PA) by priority year for mln inhabitants, high-tech patent applications to the European patent office (PA-HT) by priority year for mln inhabitants, graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29, employment in knowledge-intensive service sectors as a percentage of total employment, scientific and technical journal articles for mln inhabitants.

Inputs indicator are the annual public and private spending on innovation (as % GDP) represented by RDE. Source of this data is Eurostat Database. Due to the lack of available data some indicators are marked with "*", where values are calculated as average of prior and flowing period. The values of indicators are presented in the table 1.

2008	RDE	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	**0,45**	36,31	3,80*	4,20	31,40	2,48	0,51	9,60	27,20	313,45
Czech Republic	**1,24**	43,60	14,10	10,20	37,10	20,27	2,42	15,20	29,70	384,44
Croatia	**0,88**	4,87	6,70	3,80	29,00	6,70	1,90	10,70	27,10	2469,66
Hungary	**0,98**	28,67	20,20	8,60	33,30	18,04	4,55	6,10	33,20	637,95
Poland	**0,60**	42,16	4,30	5,40	33,40	6,13	0,89	14,10	28,30	613,29
Romania	**0,57**	14,30	5,40	5,00	23,80	1,62	0,66	17,90	19,00	357,05
Slovakia	**0,46**	29,20	5,20	10,20	32,00	6,86	1,58	15,20	29,60	619,88

Table 1. Diagnostic data of inputs and outputs – Innovation 2008

Note: RDE - the annual public and private spending on innovation (as % GDP); EUTM – European Union trade mark applications (per million population) ; HTE – exports of high-tech products (as% of exports); ETH-M – Employment in high- and medium-high technology manufacturing sectors (% of total employment) ; HRST - Human resources in science and technology (% of active population) ; PA – number of patent applications to the European patent office by priority year (for mln inhabitants) ; PA – HT - High-tech patent applications to the European patent office by priority year for mln inhabitants ; GTE – Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29 ; EHT-S - Employment in knowledge-intensive service sectors (% of total employment) ; ATJA - Scientific and technical journal articles (for mln inhabitants).

Source: Author's own study based on Eurostat and World Bank Data Base

Selected data was verified to remove indicators, which duplicate information with Correlation coefficient method have been used. Information replicate variables are highly correlated (correlation coefficient > 0.8, ($p< 0.05$)). To obtain the accuracy of the model three of these variables were removed (HTE, PA, HRST). This relationship is shown in the table 2.

	RDE	*EUTM*	*HTE*	*ETH-M*	*HRST*	*PA*	*PA - HT*	*GTE*	*ETH - S*	*ATJA*
RDE	1,000									
EUTM	0,090	1,000								
HTE	0,784	0,143	1,000							
ETH-M	0,400	0,459	0,554	1,000						
HRST	0,510	0,778	0,462	0,612	1,000					
PA	0,881	0,378	0,897	0,715	0,741	1,000				
PA - HT	0,691	0,009	0,949	0,538	0,435	0,834	1,000			
GTE	-0,205	0,019	-0,498	0,115	-0,283	-0,305	-0,601	1,000		
ETH - S	0,413	0,464	0,596	0,558	0,841	0,703	0,705	-0,642	1,000	
ATJA	0,205	-0,701	-0,077	-0,390	-0,199	-0,079	0,124	-0,260	0,046	1,000

Table 2. Correlation coefficients - Innovation 2008

Source: Authors' calculations

In DEA method, in oppose to the statistical methods, strong correlation is unwelcome. Another assumption in DEA model is coincidence between the inputs and outputs variable. For that reason, correlation coefficient between inputs and outputs was verified. Output variables with positive correlation with input variable can remain in the model. In analyzed case one output variables was removed (GTE). Final set of features is presented in table 3.

2008	**RDE**	EUTM	ETH-M	PA - HT	ETH - S	ATJA
Bulgaria	**0,45**	36,31	4,20	0,51	27,20	313,45
Czech Republic	**1,24**	43,60	10,20	2,42	29,70	384,44
Croatia	**0,88**	4,87	3,80	1,90	27,10	2469,66
Hungary	**0,98**	28,67	8,60	4,55	33,20	637,95
Poland	**0,60**	42,16	5,40	0,89	28,30	613,29
Romania	**0,57**	14,30	5,00	0,66	19,00	357,05
Slovakia	**0,46**	29,20	10,20	1,58	29,60	619,88

Table 3. The final set of features inputs and outputs – Innovation in 2008

Source : Authors' calculations

Based on described analysis, variables, which have fulfilled a condition of correlation have been selected to the model. The final set of inputs and outputs are presented in table 3. In next step all values were standardize by linear transformation. Goal of this process was to obtain values from 0 to 1.

$$z_{ij} = \frac{x_{ij}}{max_{i=1,2\ldots n} x_{ij}}$$

where:
z_{ij} - normalized features x_{ij}.

2008	RDE	EUTM	ETH-M	PA - HT	ETH - S	ATJA
Bulgaria	**0,36**	0,83	0,41	0,11	0,82	0,13
Czech Republic	**1,00**	1,00	1,00	0,53	0,89	0,16
Croatia	**0,71**	0,11	0,37	0,42	0,82	1,00
Hungary	**0,79**	0,66	0,84	1,00	1,00	0,26
Poland	**0,48**	0,97	0,53	0,20	0,85	0,25
Romania	**0,46**	0,33	0,49	0,15	0,57	0,14
Slovakia	**0,37**	0,67	1,00	0,35	0,89	0,25

Table 4. Standardized set of variables – Innovation in 2008
Source: Authors' calculations

Then variables were divided into stimulants and anti-stimulants. In DEA method anti-stimulants must be converted using differential formula to stimulants. In analyzed case, all the output variables are stimulants. Finally, effectiveness index was calculated with assumption that all outputs have the same weight. The obtained index reaches values from zero to one, where 1 represents exemplary efficiency. The results of these calculations have been collected in table 5.

2008	**RDE**	EUTM	ETH-M	PA - HT	ETH - S	ATJA	**Effectiveness**	**technical efficiency**
Bulgaria	**0,36**	0,83	0,41	0,11	0,82	0,13	1,27	**0,74**
Czech Republic	**1,00**	1,00	1,00	0,53	0,89	0,16	0,72	**0,42**
Croatia	**0,71**	0,11	0,37	0,42	0,82	1,00	0,77	**0,45**
Hungary	**0,79**	0,66	0,84	1,00	1,00	0,26	0,95	**0,56**
Poland	**0,48**	0,97	0,53	0,20	0,85	0,25	1,15	**0,68**
Romania	**0,46**	0,33	0,49	0,15	0,57	0,14	0,73	**0,43**
Slovakia	**0,37**	0,67	1,00	0,35	0,89	0,25	1,70	**1,00**

Table 5. The effectiveness of spending on innovation in 2008
Source: Authors' calculations

2008	technical efficiency
Slovakia	1,00
Bulgaria	0,74
Poland	0,68
Hungary	0,56
Croatia	0,45
Romania	0,43
Czech Republic	0,42
Average effectiveness	0,61

Table 6. Indication of the relative effectiveness of spending on innovation in 2008
Source: Authors' calculations

The average efficiency for the country is 0.61. The leaders of the ranking are: Slovakia, Bulgaria and Poland. In contrast, significantly below the average were countries such as the Czech Republic, Romania and Croatia (see table 6).

To expand the analysis, the author assessed the effectiveness of spending on innovation for an additional seven years (2009-2015). Diagnostic data of inputs and outputs for these years are presented below in tables.

Relative effectiveness index	2008	2009	2010	2011	2012	2013	2014	2015
Bulgaria	0,74	0,75	0,84	0,88	1,00	0,89	0,71	0,66
Czech Republic	0,42	0,41	0,56	0,47	0,52	0,48	0,38	0,44
Croatia	0,45	0,46	0,72	0,69	0,85	0,59	0,59	0,67
Hungary	0,56	0,48	0,72	0,64	0,73	0,65	0,56	0,59
Poland	0,68	0,67	0,82	0,72	0,76	0,85	0,71	0,81
Romania	0,43	0,63	0,80	0,77	0,92	1,00	1,00	1,00
Slovakia	1,00	1,00	1,00	1,00	1,00	0,88	0,70	0,62

Table 7. Effectiveness expenditure on innovation in G8 countries in 2008-2015
Source: Authors' calculations

2008-2015	Relative effectiveness index
Slovakia	0,90
Romania	0,82
Bulgaria	0,81
Poland	0,75
Croatia	0,63
Hungary	0,62
Czech Republic	0,46
Average effectiveness	0,71

Table 8. Average effectiveness index for CEE countries in 2008-2015
Source: Authors' calculations

It may be noticed that the average efficiency for the country is 0.71 (see table 8). The leaders of the ranking are: Slovakia, Romania and Bulgaria. In contrast, considerably below the average were countries such as Czech Republic, Hungary and Croatia.

5. Results and discussion

The conducted analysis allowed calculating effectiveness indicators for seven economies from CEE region: Bulgaria, Czech Republic, Croatia, Hungary, Poland, Romania and Slovakia. Research period covered eight years from 2008 to 2015. In addition, average effectiveness indicator was calculated and change in indicator between 2015 and 2008. Table 9 shows the final effectiveness index.

Relative effectiveness index	2008	2009	2010	2011	2012	2013	2014	2015	Average	2015-2008 change
Bulgaria	0,74	0,75	0,84	0,88	1,00	0,89	0,71	0,66	0,81	-0,09
Czech Republic	0,42	0,41	0,56	0,47	0,52	0,48	0,38	0,44	0,46	0,02
Croatia	0,45	0,46	0,72	0,69	0,85	0,59	0,59	0,67	0,63	0,22
Hungary	0,56	0,48	0,72	0,64	0,73	0,65	0,56	0,59	0,62	0,03
Poland	0,68	0,67	0,82	0,72	0,76	0,85	0,71	0,81	0,75	0,13
Romania	0,43	0,63	0,80	0,77	0,92	1,00	1,00	1,00	0,82	0,57
Slovakia	1,00	1,00	1,00	1,00	1,00	0,88	0,70	0,62	0,90	-0,38

Table 9. Effectiveness expenditure on innovation, average effectiveness index and change in CEE countries in 2008-2015

Source: Authors' calculations

According to obtained results money invested in innovation has been used in the most efficient way in Slovakia during period 2008-2012 and in Romania in years 2013-2015. Overall Slovakia is the most efficient according to DEA methodology. Although Slovakia is not an innovative leader in CEE region, the analysis proved that this economy is characterized by the most favorable ratio of expenditures to outputs. The second in ranking is Romania (0.82) and third Bulgaria (0.81). Poland obtained the average efficiency index with value of 0.75, which is above average for studied countries. Croatia and Hungary are below average for CEE countries, with results 0.63 and 0.62. The worst efficiency index was obtained by the Czech Republic. Position of the Czech Republic may be surprising, because it is seen as the most innovative country in the CEE region; however, it has the highest R&D spending. As demonstrated by quantitative research, huge innovation spending funds does not produce proportionally large results. In all surveyed years, the Czech Republic recorded the results of innovation spending efficiency below the average for all seven countries. In conclusion it is worth noting, that DEA method is calculating technical efficiency, which examines the degree to which R&D expenditures have been transformed into potential of innovation.

As input indicator has significantly different values for the studied countries (from 0.45 to 1.97% GDP), and it has huge impact for the efficiency indicator. Spending on R&D for studied countries is much below the EU28 average, which is approximately 2% of GDP. The highest spending during research period was noted in the Czech Republic with average value 1.63% GDP, reaching 1.9% of GDP in 2013-2015. Slovakia is spending on R&D 1.2% of GDP. The lowest R&D expenditures were noted in Romania with average for period 2008-2016 0.46% of GDP and Bulgaria with average 0.64% of GDP. Poland and Croatia are spending on average 0.8% of GDP.

Outputs indicators are presented as comparable data, e.g. divided by million inhabitants or percentage. The Czech Republic is achieving the best results for such output indicators as European Union trade mark (EUTM) applications per million population, employment in high- and medium-high technology manufacturing sectors (% of total employment), patent applications to the European patent office (EPO) by priority year for mln inhabitants. Poland has the biggest share of human resources in science and technology (HRST) in active population. The highest share of high-technology exports (% of manufactured exports) is in Hungary. Also, Hungary is leading in high-tech patent applications to the European patent office (EPO) by priority year for mln inhabitants and employment in knowledge-intensive service sectors (% of total employment). However, tt can be concluded that countries, which are achieving the best innovation results has the worst effectiveness results.

It is interesting to notice, that Romania made the most significant improvement in efficiency indicator – from the one of the less efficient country in 2008 to the most efficient in 2015. During period 2008-2015 R&D spending measured as GDP percentage didn't change much, but in the same time all outputs indicators chosen for the DEA model increased. Croatia also improved innovation efficiency, without significant change in R&D spending or even decrease, it improved efficiency indicator. Slovakia, which is efficiency leader in years 2008-2012, lost its position due to increase in R&D spending without proportional increase in output indicators.

Undoubtedly, innovation means different things depending on where a country stands in terms of development. Overall, significant national and regional disparities exist in the innovative environment in Europe. Northern and north-western European countries are performing strongly compared with a lagging southern Europe and Central and Eastern Europe. According to the European Innovation Index (European Commission, 2017) Romania and Bulgaria are classified as modest innovators, while all other studied countries are classified as moderate innovators. The Czech Republic is leader of moderate innovators group and in next years can join strong innovators group. Therefore, improvements in innovation in the Czech Republic are very different from those relevant for Romania or Bulgaria. Innovation leaders can take advantage related to commercialization of emerging technologies and spreading innovation across regional or global markets. Countries less technologically advanced

should focus on catch-up strategies. The adoption of innovative technologies and creating favourable conditions for the innovation development should be key area of innovation strategies. Competitiveness and innovativeness divide will require differentiated strategies, that take national and regional characteristics into account. Investments in knowledge-generating assets will convert into important drivers for future productivity growth.

6. Conclusions

Research on effectiveness of R&D spending expends current scientific knowledge. The results of the research confirmed hypothesis, that higher R&D spending is not causing proportional innovative effects for CEE economies. DEA provides results for technical efficiency, which examines how public and private expenditure have been converted into the effects. The efficiency indicator informs about the effectiveness of the use of funds. Countries with the highest R&D spending have the highest innovative outputs, but funds were not used efficiently. Moreover, author innovatively used DEA methodology, which is popular at the microeconomics-level research, but so far has not been implemented to macroeconomic studies. It is worth to mention, that currently international organizations are working on more sufficient innovation input statistics such as stock of current knowledge, number of innovative enterprises, R&D expenditures, human resources and research infrastructures, which can provide more actual picture of effectiveness. Also, innovative outcomes are hard to present in statistics. Launching a patent or new technology will cause additional economic profits in the future. However, they are hard to estimate and time delay should be also considering. Including such inputs and outputs into DEA model would provide better overview of effectiveness of innovative actions in the economy. However, nowadays such statistics are not yet available. Author in this research was imitated by available data, as countries comparative studies require comparable and uniform statistics. Moreover, analysis of longer period could bring more general conclusion and recommendations for innovative policies. Further research can be conducted for regions, as in each country there are huge differences between regions in terms of innovation capabilities. Even the EU is recently focusing more on regions, than countries. Competitiveness of EU is assessed at regional level in European Regional Competitiveness Index, where one of three dimensions is innovation. Area of research in this article covered only innovation factor. Analysing effectiveness of other types of country spending may acquire a general efficiency indicator, which will allow classifying countries according to their effectiveness level. Such analysis would answer the question on which state policy is the most effectively using available resources. Finally, the results of this study can be used by policymakers working on innovation policies in CEE countries. Research confirms that CEE countries are not able to achieve innovation outputs proportional to the R&D spending. For those countries where innovative capacities are still limited more reasonable seems to be step by step policy. Gradual increase in investment in innovation may produce better conditions for innovation-driven growth.

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Appendices

2008	**RDE**	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	**0,45**	36,31	3,8*	4,20	31,40	2,48	0,51	9,60	27,20	313,45
Czech Republic	**1,24**	43,60	14,10	10,20	37,10	20,27	2,42	15,20	29,70	384,44
Croatia	**0,88**	4,87	6,70	3,80	29,00	6,70	1,90	10,70	27,10	2469,66
Hungary	**0,98**	28,67	20,20	8,60	33,30	18,04	4,55	6,10	33,20	637,95
Poland	**0,60**	42,16	4,30	5,40	33,40	6,13	0,89	14,10	28,30	613,29
Romania	**0,57**	14,30	5,40	5,00	23,80	1,62	0,66	17,90	19,00	357,05
Slovakia	**0,46**	29,20	5,20	10,20	32,00	6,86	1,58	15,20	29,60	619,88

Table A1. Diagnostic data of inputs and outputs – Innovation 2008

Note: Due to the lack of available data introduced indicators marked "*", which are values in the period preceding, following or their average.

Source: Author's own study based on Eurostat and World Bank Data Base

2009	**RDE**	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	**0,49**	36,69	3,8*	3,60	31,80	2,12	0,45	10,80	28,00	341,77
Czech Republic	**1,29**	46,52	15,20	9,50	37,90	16,89	1,47	15,60	30,80	423,02
Croatia	**0,84**	7,89	7,60	3,30	30,30	5,11	0,35	13,50	28,80	2598,17
Hungary	**1,13**	28,71	22,20	7,80	33,30	18,38	3,77	7,50	34,40	601,13
Poland	**0,66**	40,59	5,70	4,80	34,90	7,65	1,15	14,30	29,50	615,45
Romania	**0,46**	16,19	8,20	4,60	24,10	1,52	0,73	24,00	19,80	467,22
Slovakia	**0,47**	38,64	5,90	8,60	32,00	5,36	0,78	17,80	31,00	587,90

Table A2. Diagnostic data of inputs and outputs – innovation 2009

Source: Author's own study based on Eurostat and World Bank Data Base

2010	**RDE**	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	**0,56**	49,31	3,8*	3,30	32,10	2,29	0,07	12,10	28,90	350,20
Czech Republic	**1,34**	61,94	16,10	9,50	37,80	18,41	1,50	16,90	31,80	422,59
Croatia	**0,74**	5,35	7,00	3,10	31,60	7,05	0,58	12,30	30,20	2945,45
Hungary	**1,14**	38,15	21,80	8,20	33,00	19,52	5,12	8,30	35,10	586,22
Poland	**0,72**	46,47	6,00	4,60	35,90	9,50	1,69	15,80	30,10	645,70
Romania	**0,45**	20,30	9,80	4,40	24,00	1,71	0,35	18,80	19,80	542,52
Slovakia	**0,62**	34,51	6,60	8,60	33,50	8,63	0,80	18,70	32,30	674,96

Table A3. Diagnostic data of inputs and outputs – innovation 2010

Source: Author's own study based on Eurostat and World Bank Data Base

2011	**RDE**	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	**0,53**	58,76	3,8*	3,40	32,70	3,58	0,31	12,40	29,40	346,56
Czech Republic	**1,56**	71,42	16,40	9,90	35,90	21,25	2,52	16,60	31,60	473,52
Croatia	**0,75**	10,96	5,80	3,80	29,80	3,96	0,16	14,9*	29,50	3157,37
Hungary	**1,19**	35,35	20,90	8,70	34,60	22,19	6,61	8,50	34,50	642,84
Poland	**0,75**	51,07	5,10	4,80	36,60	10,11	1,57	17,50	30,00	679,33
Romania	**0,49**	31,44	8,80	4,70	25,40	2,99	0,59	19,30	20,60	539,93
Slovakia	**0,66**	49,88	6,60	9,70	33,90	10,17	1,62	18,00	32,30	723,14

Table A4. Diagnostic data of inputs and outputs – innovation 2011

Source: Author's own study based on Eurostat and World Bank Data Base

2012	RDE	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	0,60	66,74	3,80	3,60	32,80	4,62	0,85	13,30	29,90	372,99
Czech Republic	1,78	87,48	16,10	10,60	36,60	22,08	1,96	16,70	32,00	458,19
Croatia	0,75	9,59	7,20	3,80	31,50	4,53	0,12	17,40	30,80	3262,15
Hungary	1,26	35,04	17,30	8,40	35,60	20,92	5,35	9,50	35,10	661,56
Poland	0,88	56,54	6,00	4,90	37,70	12,70	1,57	17,90	30,60	738,63
Romania	0,48	28,36	6,30	4,50	25,50	3,56	0,79	18,70	20,40	550,44
Slovakia	0,80	51,26	8,20	10,20	32,50	8,24	1,40	17,90	31,90	788,61

Table A5. Diagnostic data of inputs and outputs – innovation 2012

Source: Author's own study based on Eurostat and World Bank Data Base

2013	RDE	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	0,63	63,56	3,85*	3,90	34,00	5,47	0,43	14,60	30,40	377,98
Czech Republic	1,90	81,78	15,10	10,50	37,20	23,83	2,13	16,90	32,60	447,10
Croatia	0,81	29,33	7,90	3,60	34,50	4,34	0,77	15,50	32,80	3379,03
Hungary	1,39	47,43	16,30	8,50	36,00	21,76	4,30	11,20	36,10	652,75
Poland	0,87	71,86	6,70	5,00	39,00	14,38	2,31	19,2*	31,20	789,86
Romania	0,39	23,08	5,60	4,80	25,10	4,25	0,71	17,60	20,10	558,29
Slovakia	0,82	50,82	9,60	9,80	32,50	9,19	1,01	18,00	32,80	853,21

Table A6. Diagnostic data of inputs and outputs – innovation 2013

Source: Author's own study based on Eurostat and World Bank Data Base

2014	RDE	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	0,79	92,05	3,90	3,70	35,40	6,55	0,426*	14,20	30,70	378,76
Czech Republic	1,97	85,52	15,30	11,20	38,10	25,68	2,13*	16,60	32,60	425,57
Croatia	0,78	30,14	6,60	3,30	35,10	3,43	0,767*	15,70	33,50	3691,01
Hungary	1,35	53,86	14,50	8,90	36,30	22,51	4,302*	12,20	35,70	694,41
Poland	0,94	84,78	7,90	5,20	40,40	16,02	2,307*	20,50	31,40	835,91
Romania	0,38	29,58	6,40	5,30	25,60	5,11	0,711*	16,60	20,00	541,46
Slovakia	0,88	61,49	9,90	9,40	32,90	9,19	1,007*	17,20	34,00	948,29

Table A7. Diagnostic data of inputs and outputs – innovation 2014

Source: Author's own study based on Eurostat and World Bank Data Base

2015	RDE	EUTM	HTE	ETH-M	HRST	PA	PA - HT	GTE	ETH - S	ATJA
Bulgaria	0,96	90,53	4,60	3,90	36,30	6,55*	0,43*	14,60	31,20	361,74
Czech Republic	1,93	94,13	15,40	11,20	38,10	25,68*	2,13*	17,20	32,00	417,35
Croatia	0,84	31,24	7,10	3,20	36,20	3,43*	0,77*	16,80	33,50	3993,41
Hungary	1,36	57,33	15,20	9,10	36,70	22,51*	4,3*	12,20	35,90	666,25
Poland	1,00	96,38	8,50	5,30	41,60	16,02*	2,31*	21,40	31,20	862,15
Romania	0,49	32,71	7,30	5,60	27,00	5,11*	0,71*	14,90	21,80	580,12
Slovakia	1,18	66,96	9,80	10,60	33,50	9,19*	1,01*	16,60	33,80	960,22

Table A8. Diagnostic data of inputs and outputs – innovation 2015

Source: Author's own study based on Eurostat and World Bank Data Base

PART 8

DIGITAL MARKETING

CHAPTER 29

Customer Preferences towards Digital Marketing Strategies

Jelena Sormaz[1], Marija Kuzmanovic[2], Veljko Jeremic[3]

ABSTRACT

The aim of this paper is to determine customer preferences towards different strategies of Digital Marketing used to promote sale of electronic devices (laptops, tablets etc.). The interest in this type of products is expected to increase in the future, therefore it is essential for companies to find the best way to stand out from the competition. In the last decade, the development of modern technology has made Digital Marketing the most important way of interaction between companies and their customers. Digital Marketing tools give broad range of opportunities for companies to attract and retain consumers, but they need to know how their customers evaluate their marketing efforts. In order to examine which marketing strategies consumers prefer, in this paper we use Choice Based Conjoint Analysis (CBC). This method asks the respondents to choose between different combinations of marketing elements, which represents typical choice making problem they face in everyday life. Also, CBC gives us the opportunity to analyse potential interactions between given elements. Knowing which combination is seen as the most preferred one could help companies to allocate their resources and create marketing strategies that will ensure positive effects on their business performance.

Key words: customer preferences, Digital Marketing, Choice Based Conjoint Analysis

JEL classification: C19, M31

1. Introduction

Almost twenty years ago it became clear that it is not the question whether the Internet should be used for marketing purposes, but how it should be done (Subramaniam et al., 2000). Modern consumers want the marketing process to be more interactive, and to give them the possibility to be more engaged (Ryan and Jones, 2009). The Internet brought fundamental changes, affecting the marketing flows and activities, and inducing/initiating the emergence of Digital

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Marketing (Subramaniam et al., 2000). This concept brings numerous challenges and opportunities, as well as a significant degree of uncertainty among managers considering the allocation of effort and budget to different elements of Digital Marketing. Each year the investment in Digital Marketing increase, so it is highly important to explore this field and to allocate the budget based on the research findings to ensure success and effectiveness on created strategies. There are various elements that could be included in the Digital Marketing strategy. We decided to focus on four, which we consider essential for attraction of new customers. Those are website, social media, blog and mobile marketing.

The experts, such as Gartner (2015), are forecasting the increase of demand of electronic devices, and they expect the intensification of competition in this industry. Pre-purchase information search is a critical step in the buying process (Mourali et al., 2005), especially when purchasing durable products (Malhotra, 1986), such as electronic devices. This brings the need to thoroughly examine the effect of Digital Marketing on consumers' choices of this type of products.

Another source of turbulences on modern markets are the emergence and growing influence of Generations Y and Z (Tapscott, 2009), who differ to a great extent from the previous generations. This is why the focus of this paper is on the student population, whose preferences and habits in the digital world we try to examine. Since marketing is customer-centered, the understanding of customers' needs and preferences is the key for creating successful and effective marketing strategy. It is essential to know how to approach these new generations, as well as to consider the ways they are influencing the world around them, with their attitudes, values and habits, to grab their attention and earn their trust, and answer their demands. We presume that younger generation relies on the modern technologies when deciding about their purchases. This paper tends to provide useful insight into the way they perceive and evaluate different strategies of Digital Marketing. In order to discover their preferences towards these strategies, we applied Choice Based Conjoint analysis (CBC) (Louviere and Woodworth, 1983). This method has become popular in the marketing research community over a decade ago (Struhl, 1994), and nowadays is also frequently used in healthcare, environmental, government and non-profit sectors. It helps us to understand how people make choices and what they value the most in the tested concepts (in this case, marketing strategy). When answering to the CBC questions, the respondent is asked to choose the most preferred alternative of all the offered (Helme and Kallio, 2011), simulating that way the real-life purchase decisions (choices), which represents realistic and relatively simple task for them (Desarbo et al., 1995). Our respondents will be asked to choose between several strategies the one that they consider to be the most helpful to them when making a purchasing decision. Results of CBC analysis will help us discover the most important element of digital strategy, as well as the most preferred combination of elements that can be further shaped and implemented as a part of marketing mix.

The paper is organized as follows. Section 2 provides the literature review of key points of the paper. Section 3 presents the CBC analysis. Section 4 gives an insight into the design of the conducted survey and the obtained results. Section 5 offers the discussion on practical implications of the main findings. Section 6 provides some concluding remarks, points out several limitations of this paper and offers recommendations for further research.

2. Literature Review

The Digital Marketing Institute gave the following definition of Digital Marketing: "it is the use of digital technologies to create an integrated, targeted and measurable communication which helps to acquire and retain customers while building deeper relationships with them" (Smith, 2007, in Wymbs, 2011, p. 94). It includes promotion and education of consumers about product, services, and brands using a variety of online media (Williams et al., 2012). The focus of marketing has been moved from company to the customer, and now Digital Marketing is customer-centric, user-generated, interactive and dynamic, encouraging community participation (Singh et al., 2008). Marketing in the digital age has been transformed and now the interaction between companies and consumers mostly happens in form of dialogue, moving the emphasis from telling to listening (Ryan and Jones, 2009). Customers nowadays represent proactive audience, they are more in control of their exposition to marketing efforts (Singh et al., 2008), they have the possibility to choose, as well as to create marketing content (Iosub et al, 2016). The features of virtual environment, such as extended reach, enhanced interactivity, increased speed, and higher flexibility, enabled two-way communication, richer interaction and enlarged size and scope of the audience (Subramaniam et al., 2000; Stewart and Pavlou 2002; Sawhney et al., 2005). Digital Thanks to its capacity to to both broaden the scope of the marketing reach and narrow its focus at the same time (Ryan and Jones, 2009), Digital Marketing enables marketers to target smaller segments of consumers with specified interests or purchase behavior. Digital Marketing is based on more innovative and cost-effective communication channels, providing customers with high interactivity and individualisation, which were not possible with traditional communication platforms (Joshi, 2013; Leeflang et al., 2014).

Website is one of the key elements of Digital Marketing strategy. Its main purpose is to provide information to its users (Angehrn, 1997). Companies should base its design and content on business goals and the needs of target market, with the emphasis on its usability and accessibility, in order to ensure its effectiveness (Ryan and Jones, 2009). They need to choose wisely verbal and nonverbal elements and the way to present them, since they are influencing the extent of attention that customers will pay to the message company tries to transmit via its website.

Social media is one of the key factors in the process of transformation of consumer behaviour (Kaplan and Haenlein, 2010). It now represents one of the

main sources of information for customers who and turning more frequently to various types of social media to conduct their information searches and to make their purchasing decisions (Lempert, 2006; Vollmer and Precourt, 2008). They perceive it as a more trustworthy source of information, compared to the corporate-sponsored communications transmitted via the traditional elements of the promotion mix (Foux, 2006). By using social media, companies can approach their customers in a more natural and informal manner, presenting them real information (Christodoulides, 2009; Weinberg and Pehlivan, 2011), and authentic stories about their brand (Fournier and Avery, 2011). In addition, social media activities help companies to avoid misunderstandings and prejudices (Kim and Ko, 2012). Social media has become an important part of an organization's marketing communications (Bruhn et al., 2012), as a successful tool for engaging customers and building unique customer relationships (Taiminenet and Karjaluoto, 2015). It facilitates the interaction with customers, information search, interactivity, promotion and enhancement of customers buying behaviours (Zeng and Gerritsen, 2014). *2017 Social Media Marketing Industry Report* provided an important insight into the social media usage in marketing purposes. The research has shown that Facebook, Twitter, LinkedIn, and Instagram were the top four platforms used by marketers, who confirmed that social media is important to their businesses. They perceived increasing exposure and increasing traffic as the top two benefits of social media marketing.

Many companies use blogging as it represents a good relationship tool for both marketing and PR (Ahuja and Medury, 2010; Cho and Huh, 2010), and provides a real time insight on customers' opinions about company's products, as well as on the opinions about competition. The interactivity that is characteristic for blogs enables building closer relations with the customer, which facilitates managing those relations, and helps improving media relations, and testing new ideas for products and services (Singh et al., 2008).

Within digital, mobile is the fastest growing medium (Smith, 2017), whose development is causing a second Internet revolution, which is even more intensive than the first one (Husson et al., 2013). The widespread adoption of mobile phones represents a great marketing opportunity for companies to reach and serve consumers anytime, anywhere (Grant and O'Donohoe, 2007; Roach, 2009; Barutçu, 2007). The potential of smartphones in the shopping is on its growing trajectory, and it is the key element for a personalised shopping experience, which is one of the most significant trends in retail. Smartphones and mobile devices are facilitating real-time, location-based communications, and quick access to information on the consumer's timetable (Smith, 2017).

When building a Digital Marketing strategy, it is crucial to understand people, the way they are using modern technology, and how the companies can use it to engage with them more effectively. The essence is how the marketing can enhance their shopping experience and help them to make more informed decisions (Ryan and Jones, 2009). It is important to have in mind that Digital Marketing is not just a faster or newer channel within traditional marketing, but rather

a new approach to marketing, that brings fundamental changes of the concept of marketing (Wind and Mahajan, 2002). One of the tasks of Digital Marketing is finding the best way to communicate with customers, to meet their changing needs, and to build sustainable relationships and loyalty (Wymbs, 2011). However, when using modern technologies in marketing purposes, companies can be perceived as intruders, especially if they do not respect the norms assumed by its users (Fournier and Avery, 2011; Persaud and Azhar, 2012). Companies should make an effort to determine and understand their consumers' preferences, why and how consumers may want to participate in Digital Marketing and to adapt their strategies to their customers' wishes and needs.

Growing purchasing power (Wolburg and Pokrywczynski, 2001), along with the influence on other's buying decisions (Horovitz, 2002) makes members of generations Y and Z important players in the modern markets. Generation Y, or "the Millennials" (Kultalahtii and Viitala, 2015), was born between early 1980s and approximately 1995 (Parry and Urwin, 2011; Lyon et al., 2010; Hays, 2013), while Generation Z, "digital natives" (Prensky, 2001; Friedrich et al., 2010) was born after 1995 (Seemiller and Grace, 2016; Koulopoulos and Keldsen, 2016). What makes the key difference between them is the way they relate to technology (Easton, 2016). While members of Generation Y are known as tech savvy (Bannon et al., 2011; Beekman, 2011; Cekada, 2012), the members of Generation Z are true digital natives (Friedrich et al., 2010). Characteristics such as visual sophistication (Williams et al., 2012), short attention span (Elmore, 2014), and the ability of multitasking (Kilber et al., 2014), are inherent to both generations. However, since most of these features have emerged as a consequence of rapid and intensive technology development (Smith, 2017; Bannon et al., 2011), they are more emphasised in the Generation Z. Moreover, the research has shown other differences related to buying behavior in the digital world. Bannon et al. (2011) suggest that Generation Y is more liberal with sharing private information online and it is more comfortable building relationships online, while members of Generation Z value more their privacy online. Also, Generation Z is considered to be more pragmatic, more money conscious, less focused compared to Generation Y (Williams, 2015; McGorry and McGorry, 2017).

Nevertheless, to both generations, digital tools are indispensable, utterly integrated elements of their lives (Ryan and Jones, 2009). They always consult the Internet before making a purchase, they scrutinize a product, its features, and its price, before going to a store. For these generations, especially the generation Z, it is a social norm to be constantly connected with not only their friends and family but also brands and businesses (Fromm, 2016). As consumers, they want to be "prosumers", i.e. to co-innovate products and services with producers. They are not just passive observers, they want to participate (Tapscott, 2009). According to Elmore (2010), these two generations differ to a great extent from previous generations especially when it comes to the use of cell phones. The smartphone is not just a tool, but also a source of social

connection, entertainment, and information. A recent survey conducted among Generation Y showed that 83% of them were keeping their mobile phones close at all times (Bannon, et al., 2011). Moreover, the majority of Digital Natives use their phones to conduct online shopping (MarketingCharts, 2017), to search for product information and for suggestions on what products they might like (Smith, 2017). Therefore, marketers should design campaigns that take advantage of young peoples' constant connectivity to technology, their multi-tasking behaviors, and the fluidity of their media experiences (Montgomery and Chester, 2009). Having constant access to technology, they are more visually literate than previous generations (Stanford and Reeves, 2007), and, therefore, more comfortable with images and graphics than with text (Palfrey and Gasser, 2008). They often even refuse to read a lot of text (Cekada, 2012). Consequently, video might be the crucial format for this audience. SnapChat and Instagram are good examples with their brief videos, showing that companies have to communicate the most important information directed to these consumers in a short period of time (McGorry and McGorry, 2017).

It is hard to impress consumers who belong to these two generations, since they have been constantly exposed to various marketing campaigns on a daily basis. That could be one of the reasons why they appreciate a more engaging and subtle approach (Misonzhnik, 2009), done in a way that they do not feel as the obvious targets of marketing efforts (Castronovo and Huang, 2012). They prefer those forms of marketing that gives them the freedom and resources to encounter the brand by themselves, instead of being dictated to. Marketing efforts should be aimed at creating subtle, but effective approach that would make them curious about a product or service that they intend to purchase in the future (Yi, 2014).

3. Methodology

The key part of the research is the application of Choice Based Conjoint analysis (CBC), with the aim to determine students' preferences towards different strategies of Digital Marketing. Wickliffe and Psyarchik (2001) claim that consumers choose products based on their attributes that they find valuable and that provide them certain benefits. Each attribute has a different importance for the consumer, but when observing a certain product, he perceives the sum of their interaction. Puth et al. (1999) have shown that customers use the attributes to compare the products and make their purchasing decisions. Meghani et al. (2013) confirm this point of view claiming that the utility or desirability of any entity can be described based on the value of its separate, yet, conjoined parts. The base of conjoint analysis is breaking a product or service down into its components (attributes and levels) and then testing combinations of these components in order to find out what customers prefer. Rather than directly asking respondents what they like in a product (service, or any tested concept), or what features they find most important, conjoint analysis faces the respond-

ents with the more realistic task. They are asked to choose one of the alternatives from the choice set. Each alternative represents different combination of levels of multiple attributes. The respondent repeats this task for a limited number of choice sets, providing repeated choice data. Then, these choices are converted to utilities (attribute importance scores, level values, or partworths) for each of the levels of the individual attributes (Louviere et al., 2000; Louviere and Woodworth, 1983). Partworth utilities are numerical scores that measure how much each attribute influences the customer's choice, i.e. they represent the value of each component of the tested concept in terms of its effect on customer decisions. Apart from attribute partworths, it is also possible to calculate level partworths, which enables deeper understanding of the effect of specific features within an attribute on customers' choice.

A choice-based conjoint analysis questionnaire consists of Q questions, generated using some efficient design principle such as fractional factorial design. When a choice-based conjoint question includes A profiles, defined by attribute levels, and the respondent chooses the most preferred one, we know that the chosen alternative is preferred to each non-chosen alternative. For each respondent our information on the utilities employed for estimation consists of preference inequalities, the number of which is $n = Q (A – 1)$. For each pair-wise comparison the utility margin is the utility difference between the chosen and the not-chosen alternative. Such a margin is non-negative for a consistent utility function (Halme and Kallio, 2011).

Conjoint.ly estimates a hierarchical bayesian (HB) multinomial logit model of choice using valid responses. The value (partworth) of each level reflects how strongly that level affects the respondent's purchasing decision. Attribute importance and level value scores (partworth utilities) are calculated by taking coefficients from the estimated model and linearly transforming them so that:

- in each attribute, the sum of absolute values of positive partworths equals the sum of absolute values of the negative ones, and
- in each attribute, the sum of the spreads (maximum minus minimum) of parthworths equals 100%.

CBC analysis enables us to track changes of consumers' choices, which represent their reactions to a series of changes in attribute levels of an observed (Meghani et al., 2013). The main advantage of CBC is that it provides full-profile in the questions, i.e., all the attributes are presented to the respondent at one time, allowing respondents to make trade-offs between attribute levels, as they do when making decisions in the real life (Orme, 2010). Also, this method allows us to discover the possible interactions between certain levels of different attributes. These interactions represent the case when the net utility effect of levels from two separate attributes is significantly higher or lower than what would be predicted by summing their main effect parts. Knowing the effect that certain combinations have on consumers' choice could be crucial for understanding the process of making their purchase decisions.

4. Empirical Data and Analysis

The research was based on the survey that was conducted in February 2018 among students of second year of Faculty of Organizational Sciences, University of Belgrade. The survey had three parts – first two questions referred to their demographic characteristics, after which followed the set of ten CBC questions, and the third part provided information on their experiences, preferences and habits in the digital world. Each Conjoint question consisted of three profiles (alternatives) – combinations of attribute levels, and the ''none of the above'' option. The attributes and their levels were the following:

1. Information provided on website
   a. Detailed specification and photos of products
   b. Basic information on the offer and the way of purchase
   c. No website
2. Presence on social media
   a. Present
   b. Not present
3. Existence of blog
   a. Exists
   b. Does not exist
4. Mobile application
   a. Possibility to order
   b. Information on current offer
   c. No application

The experimental design, which consisted of the process of assembly of levels into concepts and then into choice sets, was automated by Conjoint.ly, optimising balance and overlap. When the data had been collected, CBC analysis was performed by Conjoint.ly. Apart from CBC, come classical statistical analysis was conducted. Descriptive analysis and statistical testing were performed using SPSS (IBM SPSS Statistics 20).

In the survey participated 572 respondents, 61% of them were female, and 39% male. The average age of respondents was 20.78 years, with youngest respondent having 19, and the oldest 26 years. The majority of our respondents are the members of Generation Z, and only 7.5% of them belong to the Generation Y. Almost all of them possess a mobile phone (99.5%) and a majority has a laptop (63.5%), while PC is more popular with male students – 74.4% males

compared to 56.5% females have a PC. Tablets are somewhat less popular, 30.9% of students possess one. When it comes to the brand of mobile phone, students prefer Samsung (37.2%), followed by Apple (26.9%) and Huawei (18.4%). The importance of mobile phones in young people everyday life confirms the fact that 80.8% of respondents claim that they access Internet mostly via this device, and more than 84% of students are always online, while 15.6% of them use Internet only when they have the possibility to use Wi-Fi. This is not surprising, having in mind similar research (Chaffey, 2016; Villanti et al., 2017).

When it comes to the popularity of social networks, it is not unexpected to see that only 3.3% of respondents do not use any social network. Facebook is still the most popular among students, (86.7% of them use it actively – visit and post content at least two to three times a week), followed by Instagram (81.6% are active users). Popularity of other social networks can be seen in the following graph (Figure 1).

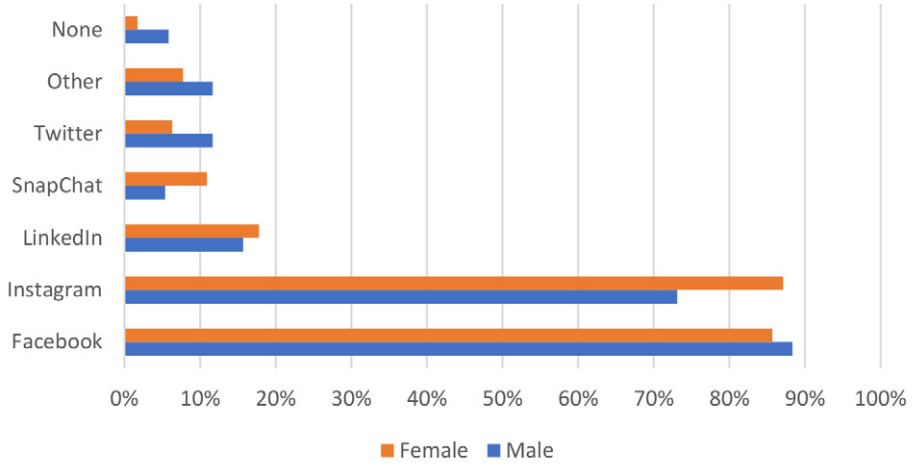

Figure 1. Popularity of social networks between male and female students

Students use social networks mostly to communicate with their friends (85.5%) and search for information (72.2%). Slightly less they tend to use them for entertainment (58.2%), and this approach to social media is somewhat more characteristic for male students, although this difference was not proven to be statistically significant ($p>0.05$).

When it comes to purchasing goods online, students mostly buy clothes and shoes, and technical and electronic devices. However, almost 24% of respondents do not perform Internet purchase. When deciding about purchase of an electronic device (laptop, tablet etc.), students rely mostly on their previous experiences. The next source of information for making this decision is the Internet, which is slightly more important for male students. Female students are more prone to relying on the friend's advice than male students are. The

least significant help was expected from the shop assistant in the store. Results show that students consider performance and price as the most important features of electronic devices, having the strongest influence on their purchase. Mann-Whitney test has shown that the brand and design are more important to female students, and Kruskal-Wallis test has proven that students who were ready to pay more for their current mobile phone also pay more attention to these characteristics ($p<0.05$). Also, the frequency of buying a new mobile phone has shown to have somewhat significant positive correlation ($r_s=0.087$, $p<0.05$) with the perception of brand as significant for making a purchasing decision.

The CBC analysis has shown that the website is the most important element of Digital Marketing strategy for our respondents, while blog has the least importance (Figure 2). The level partworths are presented in the Figure 3. Levels that are strongly preferred by customers are assigned higher scores, while levels that perform poorly (in comparison) are assigned lower scores. The chart is scaled so that, for each attribute, the sum of all positive values equals the sum of all negative values. The results suggest that the respondents showed the strongest negative preference in case when the company did not have a website, while the website with detailed specification and photos of products was perceived as a most preferred feature of Digital Marketing strategy. Presence on social media and existence of mobile application are also considered useful, but not to the extent expected when looking into previous research (Powers et al., 2012; Hamilton et al., 2016). The possibility to order a product using mobile application is seen as a useful, but not the key element. Moreover, although previous research suggested that the customers thought more positively about companies that had blogs (Kim and Ko, 2010), our respondents were rather indifferent towards its existence.

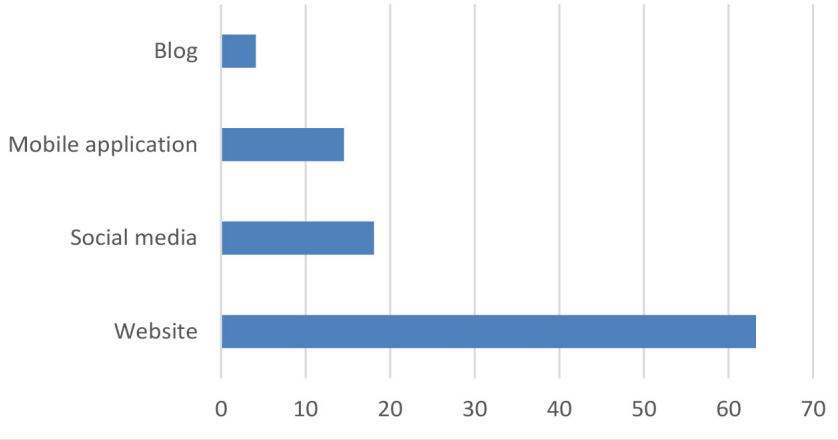

Figure 2. Relative importance score

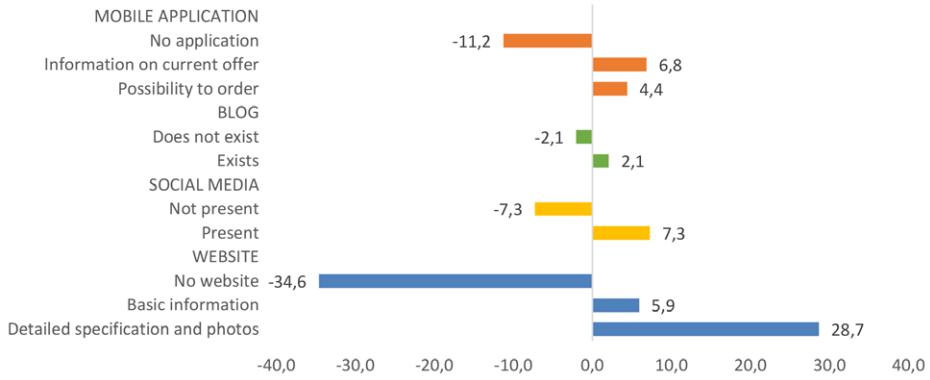

Figure 3. Relative value score

Conjoint.ly also provided a rank list of all possible level combinations based on respondents' preference (Table 1). For each concept was calculated the sum of partworth utility scores of all attribute levels that comprise the concept, representing the value each concept has to customers. The rank was determined based on these sums.

Rank	Website	Social Media	Blog	Mobile application
1	Detailed specification and photos of products	Present	Exists	Information on current offer
2	Detailed specification and photos of products	Present	Exists	Possibility to order
3	Detailed specification and photos of products	Present	Does not exist	Information on current offer
…				
34	No website	Present	Does not exist	No application
35	No website	Not present	Exists	No application
36	No website	Not present	Does not exist	No application

Table 1. Top 3 and bottom 3 digital marketing strategies based on respondents' preferences

The best ranked is the strategy that assures the presence on all named channels and provides the most detailed information. As expected, the least preferred strategy is the one without any of suggested elements of Digital Marketing.

5. Results and Discussion

The results of this paper confirm that Digital Marketing is highly important to the young generations. Companies that are not present on the Internet might lose a significant number of potential customers, who rely mostly on the information they can find online when deciding about their purchase. Although they do not tend to purchase goods online frequently, students use Internet as an important source of information. After their own previous experiences, the Internet is the next thing they rely on. CBC results suggest that when choosing an electronic device, students start their online research with the company's website. They expect to find there all the relevant information, as well as the pictures of the offered products. Since the results suggest that website is the inevitable part of pre-purchasing process, companies need to work on its design and content in order to attract and retain customers' attention. Wind and Mahajan (2002) claim that captivating and engaging design, along with relevant content, ensure that customers spend time on the site and develop relationships with the company. Furthermore, since social networks represent important part of everyday life, companies should try to use them to approach their customers. This confirms the findings of previous research (Gangadharbatla, 2008; Jones et al., 2009; Weigand, 2009). The results show that students use Facebook and Instagram the most, so these are the networks companies should pay the most attention to. Mobile application is another element that should be included into the strategy. Marchetti (2016) claims that mobile advertising is nowadays imperative for reaching the younger generation. When creating the application, special care should be taken to ensure its functionality (Smith, 2017). Customers expect its use to be fast and unobstructed, that it is easy to navigate, and that it gives them the possibility to control the content they want to access, as well as the time when they want to do it. On the other hand, we could see that one of the best ranked strategies does not include blog. Considering the indifference respondents expressed towards this element, it might not be worth investing in.

Our respondents appreciate the presence of company on different channels, which confirms the results of previous research. Lella and Lipsman (2016) claim that the majority of consumers are ‘‘multi-screening’’, i.e. using multiple devices to access the Internet. Furthermore, Smith (2017) suggests that companies need to create multi-channel marketing strategies that can be viewed on different types of devices.

Although there have not been detected significant differences between male and female students, Digital Marketing enables companies to mold their strategies, to adapt them the slightest differences between consumers. In that sense, the strategies that would suite better to male students could be directed towards creation of mobile application with entertaining content, providing all the necessary information of products' features. Also, since they are more prone to purchasing electronic devices online, the application should enable them to make an order. Female students could, however, be more in favor of the

strategies that rely on word-of-mouth concept, since they appreciate more their friends' advice, and predominantly use social networks to communicate and search for information.

6. Conclusions

Bearing in mind the increasing importance of Digital Marketing and the influence of young generations on the market of electronic devices, this paper was dedicated to the exploration of students' preferences towards different strategies that companies in this industry could create. The CBC analysis has shown to be appropriate for this purpose. The results of this survey have practical implications for the companies from this industry. As expected, our respondents have assessed the Internet as a valuable source of information when making a purchasing decision. They appreciate being able to find all the necessary information online, especially on the company's website. Once again has been proven the students' constant connectivity has important influence on their purchasing behavior.

This is very vast and developing field that demands further research. The main of our study was the homogeneity of the sample. There could have been more meaningful information discovered if the respondents had differed more in their demographic characteristics. It could have been made clearer distinction between the two observed generations, so that the significant differences could be determined.

After proving useful for our research, similar approach could be applied on other industries. Also, there are other elements of Digital Marketing that could be subjected to research, such as e-mail marketing. Furthermore, more extensive analysis of certain elements, for example, appearance on different social media, website design, mobile application content etc. could give significant results. This paper was focusing on the pre-purchase phase. Future research could be directed towards post-purchase interaction, that includes tasks as retaining customers, assuring their loyalty, and developing customer relations.

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CHAPTER 30

The Online Marketing Activities of Travel Agencies in Slovakia

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ABSTRACT

Since we live in a modern and constantly changing society, it is important to be interested in information communication technologies, as presently move the world. And online marketing and social media are part of these technologies. Our article is focusing on the issue of present online marketing activities of travel agencies in Slovakia. In our article we will mention the main and the most used online marketing activities. According to Inbound marketing, what is online marketing methodology focused on the needs of customers is said about these important steps in getting new customers: attract, convert, close and delight. So, by following them we know the buyers journey of our customers. In the next part of article, we will analyse the situation in this field of the biggest travel agencies in Slovakia. How Slovak travel agencies are using online marketing activities and how they act and interact with users and their potential customers on social media. What kind of content they share on their web pages and what kind of content they share on each type of social media they use for marketing purpose. In the last part of our article, we will discuss about possible changes or improvements which we recommend doing in future for travel agencies and in general for companies which want to be successful in their marketing and online marketing activities.

Key words: marketing, online marketing, inbound marketing, travel agencies, Slovakia

JEL classification: M31_Marketing, M37_Advertising

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1. Introduction

When any organization (profit or non-profit) operates in any business in current internet age, it is important to be informed about effective marketing and online marketing activities to promote its business, products and services. The second thing is that we are in very competitive environment, so companies need to fight for customers with their competitors in their business sector. This is the reason to show to companies' actual marketing and online marketing activities and to recommend them most effective activities to make them original in their business.

2. Literature review

2.1. Marketing

Today, marketing management represents a responsibility for the fact that all business activities performed in the market environment are oriented on business objectives and aimed at achieving an agreement in the issue of satisfying the needs of target markets, which implies a responsiveness to market needs, understood in an effective and profit-oriented manner. An integral part of marketing activities is marketing communication as an instrument organisations use to achieve a relatively large amount of defined objectives. Marketing communication applied as a combination of currently used communication mix instruments plays an important role in the processes of affecting purchase decisions of the consuming public. One of the characteristic features of contemporary marketing communication is the fact that it notably encourages the consumption of ultimate customers and participates in the creation of unsustainable patterns of consumer behaviour on the one hand, while it (respectively its instruments) can be decisive in the process of spreading the ideas of sustainable lifestyle on the other.

Marketing communication (respectively communication mix or integrated marketing communication) creates a substantial element in the marketing strategy of an organisation. Marketing communication instruments are used in order to achieve different objectives, for which responsibility is shared by both marketing managers and managers at other management levels, taking into account the time and place viewpoints: to develop the awareness of a product; to educate or provide information on products, a brand and/or an organisation; to draw attention (remind) or reassure customers of a brand; to convince a potential customer to try the given product; to reward those customers who have purchased a product; to improve the image of a brand or an organisation; to strengthen or maintain employee morale.

Notwithstanding the given wide range of objectives which can be achieved applying individual marketing communication instruments, marketing communication is a significant subject of social criticism in marketing, even despite legislative regulation of many of its elements in a number of cases. These (negative) aspects of marketing communication, respectively their perception and evaluation by ultimate customers.

2.2. Online marketing

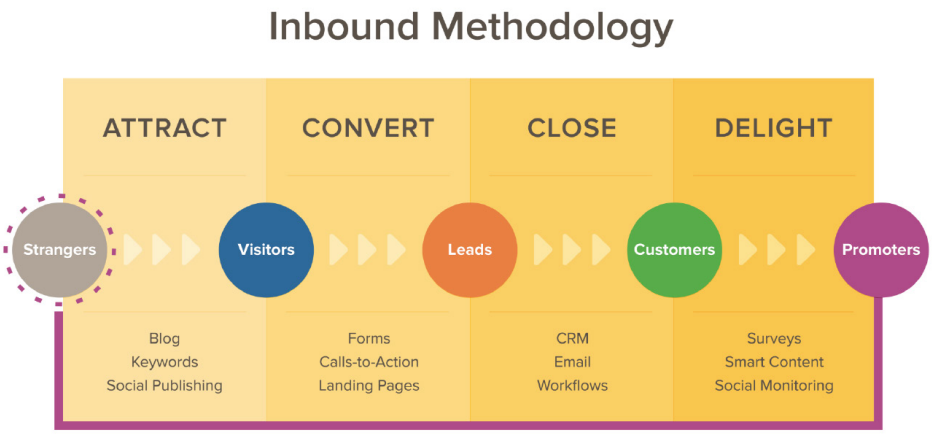
In traditional marketing, companies focus on finding customers and use techniques that are interruptive. Customers are interrupt in their activity, such as calls to customers or potential customers, by telephone, product offerings, print ads, TV ads, or spam. Traditional marketing is marketer-centric because it pushes the product or brand in front of the customer's eyes, whether they are, or they are not interested. From a practice perspective, these techniques have become less effective.

Inbound marketing is the exact opposite of traditional marketing:

- According to it, it is more appropriate to upload a video on the chosen theme that your customers will be interested in, rather than disturbing them by advertising about your product.
- It is more effective to write a business blog, instead of buying ads in print. You should present yourself with your expertise in the field, which would inspire people to find your company.

Inbound marketing is customer focused. It educates and helps customers find solutions and answers to their questions.

Inbound methodology presents four stages of inbound marketing and sales process. These stages are Attract, Convert, Close, and Delight.



Source: HubSpot

The first stage of the methodology is to attract strangers, people who do not yet know your company, to visit your website. Using tools such as blogging, optimizing your website for search engines and social media will engage the attention of aliens and create visitors from them. Visitors will become interested in finding interesting content, so they will want to return to you in the future.

The next step is to turn some visitors into leads (potential customers). Lead is the person who, in some way or in some form, has expressed interest in the product or service of your company. This conversion is based on an offer of interesting and valuable content to visitors for a certain amount. In this case, the counter value is information about the visitors. As the company needs to generate new contacts, it will offer for example eBook, as a counter value in the form of the name and email of the site visitor. If he / she has an interest in offered content, he / she will be willing to provide the requested consideration. By providing personal information, the visitor becomes the lead.

The conversion tools are forms, for example, subscribing to a newsletter (e-mail about company information). The second tool is Call-to-Action, a push-to-action button, for example, subscribe to a newsletter or download a new eBook. These will then take you to a landing page where you will be asked to fill in the contact form to get the content.

In the third step, the company already has contact with leads who have expressed interest in their content. Now, the company has the opportunity to reach out to them with tools such as email and CRM (lead customer relationship management) for leads and sell the product to the right lead at the right time.

Inbound is about delivering exceptional content to your users, whether they are visitors, leaders or existing customers. Inbound marketing companies do not even forget about their customers and try to continue to enjoy and engage in conversations. This creates from them happy promoters of the products and services, which they love.

2.3. Web 2.0 and Social Media

The term Web 2.0 describes trends and ways in which the web will probably take. However, someone argue that Web 2.0 is just a bubble - marketing term created how to amaze and gain customers with something that does not exist. The second on the other hand see new quality and others say that Web 2.0 = social media.

Social media have revolutionized the use of Internet as a tool to propagate products and promote their sale. Opens the possibility of less expensive and more effective online marketing and also offer new approaches to direct contact with potential customers, inspire in developing business and communication strategy.

Every day millions of users publish their articles, photos and videos with the help of services such as YouTube, Flickr, Wordpress and share them with others. The phenomenon of user-generated content got into the center stage approximately in 2005 with the arrival of so-called waves of Web 2.0. Many experts led by Tim O'Reilly pointed to the rising trend of involving the user directly to the creation of the site. Thus, formed web has become more targeted and more useful. As best seen on sites that are now symbols of social media: Facebook (* 2004), YouTube (* 2005) and Twitter (* 2006). Probably with

the best definition came Andreas Kaplan and Michael Haenlein who identified social media as “a group of Internet applications built on the ideological and technological foundations of Web 2.0 that allow the creation and exchange of user-generated content.”

Social media allow people to exchange ideas and opinions, discuss together the content of pages and make contacts online. Social media is different from traditional mainstream media in that their content can create everybody as well contribute into it or comment on it. They may have a text format, may be an audio, video or photographs and other visual forms that bring together communities, and assist people who want to associate together.

To make it easier to understand them, it is important to note that there are two terms that sound similar, and many people are confused about them, they are: social media and social networks. The term social media is superior to the social networks and includes various media that people use for online communication and collaboration and also to develop social interaction (sociability). Social media include blogs, wikis, video or photo sharing sites and more other things.

Creating social networks belongs under the social media and the term is used when it is some way of people interaction, such as Facebook, LinkedIn, MySpace and so on. We are talking about creating social networks when people create personal profiles and interact with the aim of becoming part of a community of friends and people who have “the same blood type,” that are interested to communicate and exchange information.

3. Travel agencies in Slovakia

We can say that in Slovakia there are 90 bigger or smaller travel agencies, which offer different services. Some of them are offering just summer holidays, some just winter, some local and some of them foreign. There is big variety of vacation they offer.

Act no. 281/2001 Coll. The Act on Tours, the Terms of Business of Travel Offices and Travel Agencies and on Amendments to the Civil Code as amended (as amended by Act No. 95/2002 Coll., 747/2004 Coll., 186/2006 Coll. 186/2006 Coll., 136/2010 Coll.) defines:

Travel office is an entrepreneur, 1a) who, based on a trade license, 2) organizes, offers and sells tours and concludes a contract for the provision of a tour 3) (hereinafter referred to as the “tour contract”).

3.1. Travel office

within the trade license under paragraph 1 below

a) organizes combinations of services, offers and sells to another travel agency for the purpose of its further business,

b) offers and sells individual services or combinations thereof on the basis of an individual order,

c) mediates the sale of individual services to another travel agency, travel agency or other legal entities and natural persons (carriers, operators of accommodation facilities, organizers of cultural, sporting and other social events);

d) arranges sales of tours for another travel agency; The travel contract must, in these cases, be entered into on behalf of the travel agency for which the tour is arranged and the tour operator is responsible for the performance of the tour contract,

e) sells things related to tourism, in particular tickets, maps, plans, brochures, timetables, printed guides and commemorative articles,

f) organizes, offers and sells individual services or combinations thereof which are not provided for longer than 24 hours and do not include accommodation overnight,

g) provides tour guide services.

3.2. Travel Agency

(1) A travel agency is an entrepreneur, 1a) who, on the basis of a trade license 2) performs services pursuant to § 3 par. 2nd

(2) In addition to the obligations under a special regulation4), the travel agency is obliged to mark the establishment and promotional and other materials designated for the ordering party by the words “travel agency” if this name does not already contain its business name.

(3) The travel agency may not arrange the sale of a tour for a person who is not a travel agency [§ 3 par. Article 2 d)].

(4) An operator, a member of a statutory body or a representative of a travel agency may not be a natural person who has been revoked during the last five years 2) for the operation of a travel office or travel agency due to violation of the obligations imposed by law or due to bankruptcy.5)

Here are some statistics about tourism of Slovak citizens. Organized tourist travels of Slovak citizens’ abroad (passive tourism) of the Slovak Republic in 2016:

No.	Country	Gateways	Stay days	Average duration stay
1.	Bulgaria[5]	120 514	923 324	7,7
2.	Croatia	102 753	1 468 731	14,3
3.	Italy	69 791	504 572	7,2
4.	Greece	68 570	580 666	8,5
5.	Turkey	40 356	356 285	8,8
6.	Spain	22 728	168 158	7,4
7.	Austria	22 724	49 459	2,2
8.	Cyprus	13 643	118 604	8,7
9.	Hungary	12 169	24 543	2,0
10.	Egypt	11 988	106 353	8,9
	Together	**573 393**	**5 137 090**	**8.9**

Source: Statistical office of the Slovak Republic, 2017

4. Methodology

For data analysis and article processing, we used the data from the statistical office of the Slovak Republic, data from social media analytics social bakers and web pages and social media accounts of travel agencies in Slovakia. We also used our own online marketing experience that focuses on customer needs. Based on this data and information, we have created recommendations for the effective use of online marketing activities.

5. Empirical data and analysis

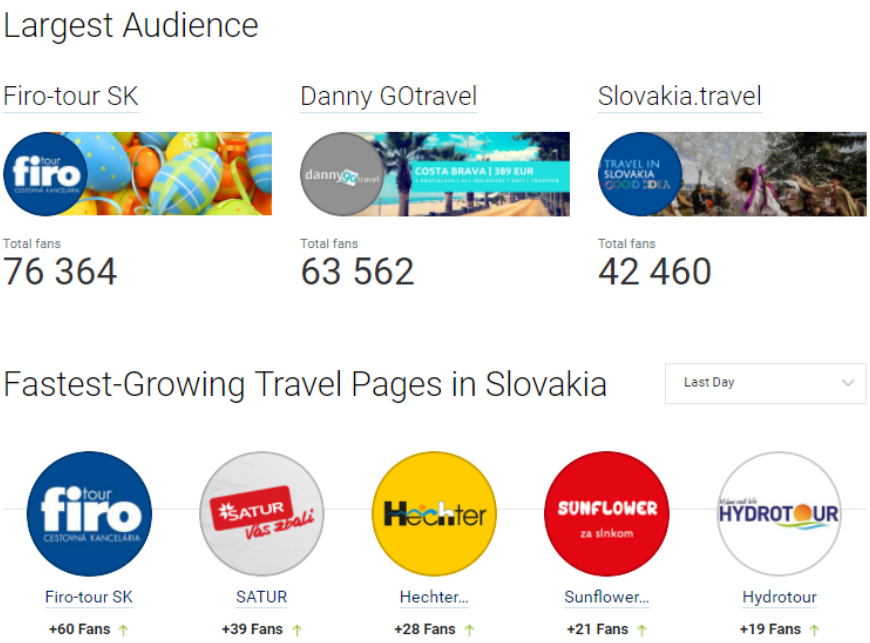
In this part of article, we will discuss about practical online marketing activities of Slovak travel agencies.

5.1. Online marketing activities

As we can see from picture below, according to social media analytics social bakers, in area of travel agencies in Slovakia the largest audience have these three travel agencies: Firo tour, Danny GOtravel and Slovakia travel. The fastest-growing travel pages in Slovakia are Firo tour fun page, Satur travel agency fun page and Hechter travel agency fun page.

In this part of article, we will focus on online (inbound) marketing activities of Firo tour travel agency, as one of the biggest travel agencies in Slovakia. This travel agency has 76 364 fans on social network Facebook.

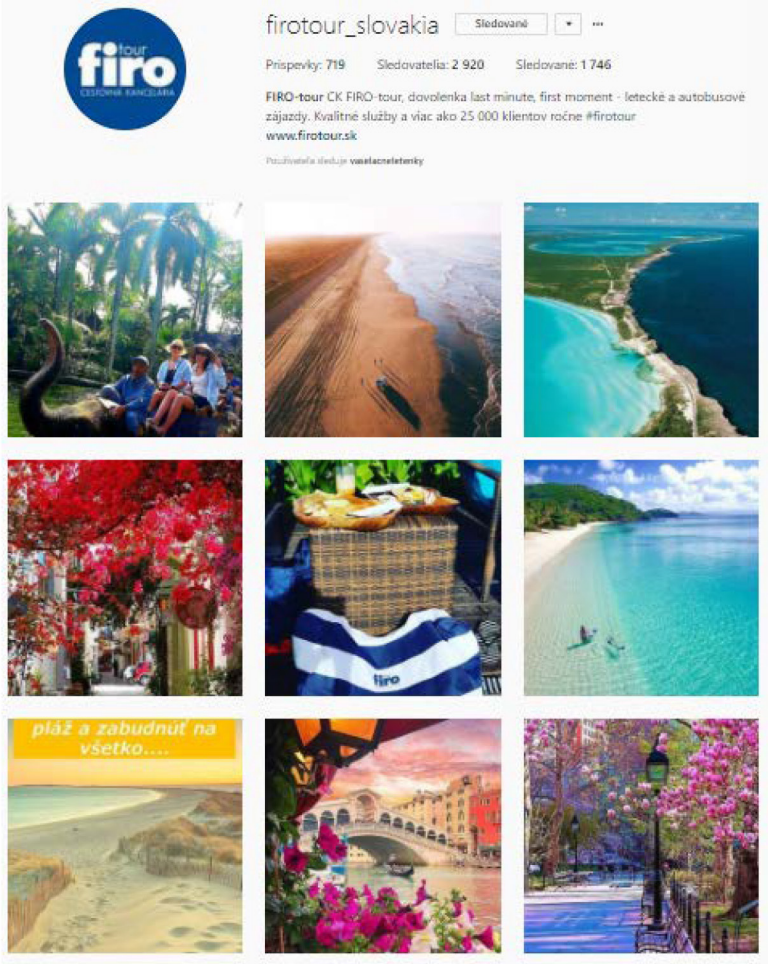
5 Data published by the Statistical Office of the Slovak Republic. According to the records of the airports, Bulgaria visited 46,608 visitors.



Source: Social Bakers

Besides social network Facebook, they act on other as on Instagram, YouTube, Google+ and Twitter. However, the main concentration is on Facebook, as it is the most used social media in Slovakia. On Facebook, they share all kinds of content, from offers of vacation, through pictures, official videos and life videos from destinations, to blog posts about destinations. In advance, they create contests for their customers or funs.

On other social media channels, they act mainly on daily basis but the conversation with users is not natural. For example, on Instagram, they share pictures and short videos, of course about that is this social media. Nevertheless, main part of pictures and videos are not authentic from destinations (see picture below). The same situation is with videos shared on social media YouTube. Videos, which they share here, are official videos of hotels, which are often not showing reality.



Source: firotour_slovakia Instagram, 2018

Regarding to account on social network Google+, actually they do not use it. Last post on Google + was published in March 2016. Even before, they did not use this social network very often. The reason is that this social network is not very used in Slovakia and all over the world. The company has there just 58 followers.

Microblog Twitter is used for sharing posts from Facebook. In addition, company has here 135 followers, what is not enough to interact with users.

To conclude online marketing practices of this travel agency and others in Slovakia, we can say that these companies are using many of effective activities for attract their prospects and to engage their customers but every time there is a space for improvements. In the next part of our article, we will offer for them recommendations for them, the important activities that they should do to be successful in their marketing and online marketing.

6. Results and discussion

In spite of an increasing number of market driving forces and the fact that market environment has become hypercompetitive, marketing is overlooked and marginalized in many cases. One of the causes can be the fact that “side effects” of marketing have defeated the defined key effects. Can this situation be improved? Several variables in the customer – organization – society relationship need to be rethought in order to compensate. Marketing used to be declared a representative of customers in organizations, however, in fact, it represented (also using unfair practices in many cases) an organization of customers by means of endless innovations, aggressive marketing communication, etc. Marketing does not work in its traditional concepts any more, which is why it is necessary to identify with a new view of it. According to Kotler (Kotler, 2007), the contributions of marketing include the facts that it has improved the quality of life, played an important role upon creating markets and products, increasing comfort and general enriching of life. The boundary between a healthy, rational, responsible and sustainable approach to marketing and a moment when such an approach becomes harmful is questionable.

Where many current marketing strategies are channel-specific and weak, customer experience strategy from the marketing communication point of view is holistic and integrated. Where the majority of current advertising is loud and fleeting, rich customer experiences and interactions are personal and immersive. Where brand communication is designed today to speak about the benefits of a product or service, customer experience design improves the offering itself. Customer experience management in marketing communication is about considering the customers’ perspective in everything companies do and every decision they make in order to ensure a mutually beneficial relationship and provide customers with valuable experiences.

According to inbound marketing, we recommend to companies these activities:

- at first start with optimization of your web page, incorporate to your content on web page right key words, do not forget to optimize for mobile devices,
- create your buyer personas (your ideal customers) to concentrate on right content for right people,
- create educative content for your prospects and customers, there are many kinds of content you can create, e.g. blog posts, infographics from your business or sector, eBooks, guides how to do something or how to use your products, educative videos, videos from your stone shops, life videos from destinations, webinars, podcasts etc.
- post all of your created content on your web page and do not forget to apply appropriate key words for your content,
- post content shared on your web page on your accounts on social media,

- do not offer all content for free, your exchange value from interested prospects can be information about them, e. g. their name and their e-mail and this information you can get thanks to call-to-action buttons and landing pages,
- when you already have information about your prospects then you know that they are interested about your products or services, then you can contact them by right and interesting e-mail, e. g. to inform them about other content which can interest them and on the end you can offer them products or services from your portfolio which can be appropriate for them,
- all these activities are very important for improving your position in results of search engines, so don't forget on any of them.

Other recommendations for social media and content creation:

- Optimize for five seconds because people do not study profiles. They spend a few seconds looking and make a snap decision. Your profile should be likeable, trustworthy, and competent. Do not forget enter to your profile these important information: avatar (profile picture or logo of your company), cover or header picture which tells your story, biographical text and links (to you web page, blog or other social media accounts).
- Have same avatar or logo of your company on all social media accounts, to help people to recognize you and not confuse them.
- Create your own mantra with message why your company exists.
- Plan your marketing and online marketing activities and sharing of your created content.
- If you want to create your own content and share it with your prospects and customers you should love to write be creative and to publish, because you are publisher.

It is important to be yourself so to know you and your company, to get your brand story voice. Then it is important to know your customers, to know what they need and what their objectives are.

- In creation of your content focus on your objective, because your content should be created with intent, for someone, to get something.
- Speak in customers' language to clearly communicate your values and mission. Do not use special terminology of your industry; communicate in simple language with simple terms for everyone.
- Good content does not try to sell, so do not try to sell your products in your content. Content should educate and add value to your customers. Your content should solve problems, share resources and help your customers do their jobs or other things better and more effective. On the other hand, it helps your company to position you as a reliable and valuable source of information so you are getting more competitive.

- Do not forget that you should tell true stories to your customers by offering them case studies or client narratives to show them how your real customers use your products or services and how it adds value to them.
- Here is not important to do everything and be everywhere. You do not need to create huge spectrum of content, try some of them and decide which work for you and concentrate on these type of content. The same is with publishing of your content, chose some social media that are appropriate for your business and share your content there where you know that your customers are.

7. Conclusions

In this high competitive environment, it is not easy for companies to attract prospects to their businesses. Because of that, it is important for them to follow trends in online marketing to know how offer and present their business. In our article, we presented actual situation of marketing and online marketing practices and offered recommendations for travel agencies for effective marketing and online marketing activities.

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CHAPTER 31

Preferences for Carsharing Service Attributes: A Survey of University Students in Belgrade

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ABSTRACT

Carsharing is a mobility service and a specific business model launched in many cities worldwide. The research investigates the prospects to bring carsharing to the market where it is not yet developed. In doing so, an extensive survey was conducted among university students in the city of Belgrade. This specific target group is recognized as promising, because students are more receptive to new services, have intensive mobility needs and operators are partnering with universities for mutual benefits. Preferences for particular service attributes were explored using a choice-based conjoint analysis. Further market segmentation was obtained using the Partitioning Around Medoids (PAM) method. The study finds two principal clusters - users whose participation in carsharing is heavily dependent upon purchasing costs and those who express an equal interest in price and other service attributes. To match the requirements of both target segments, carsharing operators should consider more than one service package.

Key words: carsharing service, university students, stated preferences, choice-based conjoint, market segmentation

JEL classification: C44, R40

1. Introduction

Carsharing (CS) is a mobility option and a specific business process in which operators provide customers with an access to passenger cars. This on-demand and membership-based mobility service is typically foreseen for short-term rental but allows a long one as well. As for daily mobility, carsharing offers flexibility and autonomy for the driver, without having financial burden of car ownership.

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From the perspective of individual users, sharing vehicle enhances mobility options for carless population and potentially saves (or reduces) personal transportation costs (Boyaci et al., 2015). Being able to accommodate occasional car usage, carsharing fulfils mobility needs of those who cannot afford or do not wish to buy a car.

From the sustainable mobility perspective, sharing schemes tend to optimise car usage, both by increasing time utilization (Csonka and Csiszár, 2015) and by the 'pay-as-you-drive' principle (Dotter, 2015). It is one of the solutions to cope with common urban problems like congestion, parking and inefficient use of limited public space. Previous research reported that people (households) sell cars or forgo their purchase after joining the carsharing programme and shift towards public transportation and active modes (e.g. Martin and Shaheen, 2011; Giuliano and Hanson, 2017; Zavaglia, 2016).The long-run effects of carsharing are widely investigated. Reduction in car ownership and vehicle kilometers are the most notable benefits. The exact number of private vehicles that can be or are replaced by a carsharing vehicle as well as the effects on total vehicle kilometres traveled (VKT) are difficult to determine precisely. The figures vary according to local specificities, calculation methodologies but also according to carsharing business models (for more discussion see Ferrero et al., 2015 and De Barros, 2015). By reducing the total VKT, carsharing delivers a positive environmental effect in terms of energy savings and CO_2 emission reductions. This is associated with the composition of the fleet as well - the carsharing vehicles are generally newer, smaller and more energy efficient. Moreover, it is expected that electric vehicles will play a primary role in service provision.

Although the idea of carsharing dates back to 1940s, this transportation option has experienced its growth much later. A considerable impetus for wider implementation gave the development of information and communication technologies (ICT). CS operators use ICT to manage the fleet in terms of distribution, utilization and maintaince, while users benefit from improved reservation system. Another stimulus was the integration and joint organization of urban transportation system, where CS is perceived as complementary to public transport. This has enabled institutional support and partnership between carsharing operators and local governments (Terrien et al., 2016) and public institutions like universities. Not of less importance for greater success of CS is a societal transition where car would be no longer a symbol of status, and access to the assets would be valued more than ownership. Along with the creation of favorable environment, CS itself evolved into more flexible business models. In the traditional, *round-trip* model, vehicles should be returned to the same location from which they were picked-up. In *one-way* model, users are allowed to make one-way trips and return a vehicle to a different location from where it was accessed. There are two types of *one-way* CS: station-based and free-floating. Station-based concept requires customers to leave a vehicle at fixed stations. Free-floating is the most flexible service since a vehicle can be accessed and

left at any public parking lot within a designated zone (the so-called operating or business area). The common features of all models are the constant availability of service (24/7) and rates which include fuel, parking, maintenance and insurance costs (Shaheen et al., 2015).

As regard industry growth, the projections from 90's appear to have been too optimistic, but the global trend is promising (Shaheen and Cohen, 2016). This is particularly true over the past few years, with the launch of new forms of service. More flexible one-way and especially free-floating concept is a chance for CS to expand from niche market into the mainstream.

Measured by service per capita, Europe is currently the largest market, followed by the North American one. In terms of the total number of users, Asia-Pacific region stands out, due to large customer base. Along with Japan, with the longest CS tradition, Australia, China, New Zealand, Singapore, South Korea, and Malaysia are currently among prominent markets of this region (Bert et al., 2016). Generally, less developed countries are newcomers in CS practice. Due to limited history, there is a lack of knowledge about the business viability. As pointed out in WRI (World Resource Institute) report (Lane et al., 2016), many questions have yet to be investigated, among which are barriers and opportunities for implementation, potential market, service design and finally societal and environmental impacts.

At this moment the worldwide development is rather uneven/highly concentrated. Even in Europe, which is the cradle of CS, there are countries having a well-established service (especially Switzerland and Germany) but also those where it's not even known how carsharing works. The main motivation of this paper is to shed light on potentials of the industry in Belgrade, specifically among university students, which is a population of intense daily movements. The aim is to investigate their preferences for particular service attributes, which is the basis for appropriate service design to be developed.

The rest of the paper proceeds as follows. The next section presents previous work on the topic. It is organized in two parts. The first refers to ongoing practice with students' participation in carsharing programs, while the second highlights commonly used methodologies for preference investigation. Section 3 brings relevant information related to Belgrade as the study area, and the description of survey. Research results are presented and discussed in Section 4, followed by concluding remarks.

2. Related work

2.1. University students as a carsharing market segment

University students are becoming increasingly recognizable as one of the target audience for CS operators. Important characteristic in favour of this customer group is that they are more open to new services and more familiar with ICT than the older generations. Besides, it is easier to break through this market

since students just start making their travel decisions and, as discussed in Davison et al. (2015), their commuting habits have not yet been formed. At the same time, owning a car may be uneconomical for this customer group. This is because their need for car is generally sporadic, especially for long journeys, as well as because they still need to strengthen financially.

High rates and the insurance restrictions for young population below 21 years of age are major barriers to penetrate into this market. Nevertheless, some of the leading CS companies (like Zipcar, The Enterprise CarShare and Car2go) are already partnering with universities around the world. They have tailored their service to grow customer base in different manners - various discounts are put in place (reduced fees and/or membership), age requirement is lowered to 18 and vehicles are located close to campuses or at dedicated lots within the campuses. Universities benefit from the agreement with CS operators in different ways. First, CS provides greater accessibility for students, teaching and other staff. According to an extensive survey among students at universities across the U.S and Canada[5], CS is especially important for improving the quality of life for students staying in more isolated campuses. Second, maybe the most important benefit from partnership with CS operators is reducing parking demand. Third, with the cs adoption, universities demonstrate their environmental awareness and commitment (Zheng et al., 2009). A considerable number of academic papers have been devoted to university student travel patterns (see for example Zhou 2012a, 2014, dell'Olio et al. 2014, Danaf et al. 2014, Davison et al. 2015, Rotaris and Danielis 2015), however carsharing university market is less investigated. Several field research that have brought the answers on some aspects of interest are cited below.

Stasko et al. (2013) conducted a survey among student members of CS operator in Ithaca to reveal the impact of carsharing on vehicle ownership, parking demand and travel behaviour. Using collected information on service-related user preferences, Zheng et al. (2009) developed models to predict the willingness to join carsharing program at the University of Wisconsin–Madison. Pricing and vehicle access distance were selected as membership package features that mostly affect the potential CS market share. It was also pointed that student status (undergraduate, graduate, foreign-exchange or visiting scholar) may have stronger influence on CS acceptance than socioeconomic status, which is a specificity of university community. Le Vine et al. (2014) found an increase tendency to use one-way service type among full-time students. A study by Zhou and Kockelman (2011) reports that without prior experience with CS and without special programs for universities students will be less likely to join. These findings are based on a survey which was carried out in Austin (Texas) at the time of the launch of the first CS service. The authors assume that the shuttle and free of charge bus service for University of Texas students are more attractive than costly carsharing. Breitner and Klein (2014) have searched for

5 https://www.universityofcalifornia.edu/news/car-sharing-campuses-improves-quality-life-takes-cars-road

an optimal pricing model that would provide maximum revenue for CS operator. Students from Leibniz University Hannover were asked to name the amount that they would be willing to pay for different trip scenarios. This research has demonstrated that there are specific trips, where car sharing is far more convenient than public transportation. Hence, students are ready to pay even if they have free travel tickets for wider urban area. Danielis et al. (2015) investigated the potential demand for CS at the University of Trieste. It was found that more than half of the students had very little knowledge of what CS was. On the other hand, higher level of knowledge as well as higher level of environmental consciousness is reported to be of importance for probability of use. The sensitivity to service design was also examined. The CS price and less time to vehicle access, as well as more time for car parking, would significantly affect the probability to opt for CS.

A specific study was done by Puandra et al. (2017) where decision for carsharing was investigated from the perspective of "psychological ownership" i.e. individual's affection towards an object. The respondents (undergraduate students) were asked to state their intention to select carsharing, described by three attributes - price, parking convenience and car type. While parking convenience was found not to be affected by the level of the psychological ownership, other two parameters were with effects. The price of a service was important for respondents with low psychological ownership, while it was less decisive for those with high psychological ownership. Also, only respondents who scored low on psychological ownership were willing to pay more for an electric shared car service.

2.2. Methodological background

To investigate the demand characteristics of carsharing market that is not yet established, a stated preference approach is exploited. This is considered a suitable tool to illuminate the behaviour of people who had no or had little prior experience with car sharing (Efthymiou et al., 2013; Jorge and Coreira 2013). In this respect SP have been used both to explore preferences of car sharing early adopters (e.g. Zheng, 2009) as well to analyse the willingness to join car sharing schemes (e.g. Efthymiou et al., 2013).

Stated preferences discrete choice modelling (SPDCM) approach helps the researchers to uncover how the users value different car sharing service attributes or different transport alternatives by asking them to rank or rate set of alternatives (so called contingent ranking) or to choose the most preferred option from a choice set (referred as 'discrete choice experiments' - DCEs or 'choice-based conjoint analysis'-CBC). In discrete choice experiments sets of alternative profiles are provided to the user (in a form of choice questions) and each profile is described by different mix of the attribute levels. The important feature of choice experiments is that they address hypothetical service attributes with reduced cognitive load and integration of a non-purchase option - respondents are not compulsory to select unacceptable alternatives (Hildebrandt et al., 2015).

It is also worth noting that some studies exploit SP surveys with hybrid choice model i.e. include latent variables to address mid-term (Kim et al., 2017a; Efthymiou and Antoniou, 2016) and short-term (Kim et al., 2017b) car-sharing decisions, or combine them with agent based simulations (e.g.; Ciari and Axhausen, 2012; Martínez et al., 2017).

A stream of research exploited SPDCM for investigating modal selection – choosing carharing over other modes like bus, para-transit or private car (Fukuda et al., 2005); carpooling, private car, public transport (Catalano, 2008); car as driver, car as passenger, car-pool and bus (De Luca and Di Pace, 2014, 2015).

Among first attempts to elicit preferences for car sharing on the basis of SP and CBC was done by Johnson et al. (1998) who analysed a proposed car-sharing concept at Daimler-Benz. They were able to track the differences in users' preferences depending on different characteristics like car-ownership, level of urbanization, etc. Abraham (2000) investigated car sharing non users with SP technique and INVIEW conjoint software (Hunt et al., 1995) with the aim to evaluate the impact of hypothetical service attributes on the overall attractiveness of car sharing in Calgary, Canada. The hypothetical car sharing organizations were described with 11 different attributes which were further randomly computer generated. The choice data were analysed with *logit model.* The resulting utility function revealed that respondents are more interested in lower prices than membership deposit, while the preference for shorter walking distance was initially found to be quite low. Yoon et al. (2017) modelled preferences for one-way and round-trip CS in Bejing on the basis of hypothetical choice sets around actual trips. They included several attributes (weather, car type, price, etc.) and found that the difference between cost for carshare and original mode is the most influential on both CS variants, while car ownership was with diverse impact (positive in one-way and negative for round trips).

Several SPDCM studies focused on a particular carsharing attribute or aspect like information systems (Hildebrandt et al., 2015) or electric vehicles (Kramer et al., 2015; Zoepf and Keith, 2016; Carteni et al., 2016; Yoon et al., 2017). Hildebrandt et al. (2015) relied on choice-based conjoint analysis to explore and evaluate the role of information systems for car sharing attractiveness. They found that convince of car sharing is dependent on IS uptake, having that users prefer mobility services independent of the engaged operator and of their location. Reservation was found to be the most valuable attribute. Kramer et al. (2015) utilized conjoint to investigate users' preferences about integrating electric car sharing system into public transport system in Berlin. Zoepf and Keith (2016) exploited conjoint experiment to explore the potential of electric vehicles (EVs) within ZipCar. For attributes were considered: distance to the location of vehicles, the availability of vehicles at the desired time, and rental price of vehicle rental. Results showed that carsharing users prefer driving a hybrid vehicle over a plug-in electric vehicle. Also, the utility of hybrid and electric vehicle decreases with increasing reservation distance. Utilizing SPDCM,

Cartenì et al. (2016) investigated the EVs and carsharing, in terms of 'pure preferences' for EVs (i.e. excluding other factors) in the city centre of Salerno (Italy). They found that user decision is very much influenced by travel cost, whereas this was not the case with variations in total travel time.

3. Conception of analysis and empirical data

3.1. Study area

The city of Belgrade with a population of around 1.700.000 inhabitants is the fourth largest in Southeast Europe. Belgrade is the leading city of higher education in Serbia. Students account for about 7% of the total number of Belgrade population [6].

There are 11 student residences scattered throughout the city's urban neighbourhoods, providing accommodation for more than 11000 students. The largest dormitory (with more than 6000 students living in it) „Studentski grad", is situated in Belgrade's municipality of Novi Beograd, and is about 6 km away from the city centre. Faculties are located at different Belgrade's municipalities, but the majority are in or close to the downtown district.

Public transport (PT) system as the most affordable is the dominant mode of student travel in Belgrade. According to research on the professional status of PT users, students account for 16,42% which is a considerable share in total number of trips (2,5 million per day). The students' monthly travel ticket is subsidized and costs about 12 Euros. With a monthly travel ticket, students can realize an unlimited number of trips on the entire network of lines in the city area. The system is well developed with 150 lines running daily from 4.00 am until 12.00 pm, and 25 night lines. The network density is high-5,256 km/km^2 and nearly 75 % of citizens live within a five-minute walking distance to the nearest transit stop (stop catchment area), or 400 metres in diameter (Tica et al., 2015). Some of the recent improvements are electronic fair collection and real time management system.

Bearing in mind that Belgrade has not yet introduced the higher capacity transport options, like metro or light rail system, it is not surprising that current PT is operating under increased pressure. Due to budget constraints, the fleet is only partially renewed and is still outdated, especially the buses which are the backbone of the system. Vehicles are often overcrowded, let alone that some operate without air-condition system. Interference with a car traffic and limited number of night lines also affect the level of service. According to the latest in-depth research about users' satisfaction the average rate for level of service has dropped. The average PT satisfaction grade was 2,81 (on 1-5 scale) in 2017, while it was 3,4 in 2007. Reaction to the weaknesses of PT was most extremely expressed by students who rated the system lower than the other user groups.

6 Statistical Office of the Republic of Serbia

As reported by the latest survey, punctuality and regularity, frequency of service and travel time are the most important attributes for students. This suggests that for particular trips, especially those where public transport would have taken too long, a more flexible service might be a desired option. Apart from private car, taxi is the only flexible mobility option that is currently put in place. It is however not only expensive to be regularly used, but also with limited capacities especially during the disrupted functioning of the urban transport system caused by traffic congestion.

3.2. Survey

Before developing a conjoint-based survey, a preliminary test was performed on 170 respondents. Having that the typical conjoint study involve limited number of attributes (up to six, Orme, 2002), the aim was to reveal the most important aspects of service delivery. They were selected on the basis of how the leading companies (DriveNow, Car2go, Autolib, Zipcar) operate on the market. The focus was on one-way service, as more flexible and likely more receptive renting concept.

At the beginning of the questionnaire, students were informed of the basic principles of one-way carsharing functioning. The questionnaire contained 15 items. They were related to the vehicle fleet (size, age, brand, cleaning), reservation and payment system, accessibility of vehicles, parking spots and user benefits issues (see Table 1). Respondents were asked to specify four attributes that they perceive as the most important. At this point of the research, the price of the service was not explicitly included, because its significance was presumed to be unquestionable.

Based on this preliminary test, we have generated the most important stimuli for cs on the basis of frequency of attribute selection (Table 1).

Attribute	Percentage of respondents	Rank
Distance to getting a vehicle	59,57	1
Vehicle cleanness	58,16	2
The number of spots to park the vehicle during or after use	55,32	3
Pricing scheme (by-the-minute rate or hourly rate only)	53,52	4
Information about the current availability of parking spaces (e.g. via mobile phone application)	51,77	5
Annual membership fee	48,59	6
Possibility to book a vehicle in advance (e.g. for more hours or for more days)	46,48	7
Possibility of cancellation of reservation of the vehicle free of charge	43,97	8
Payment options (mobile phone, payment card, etc.)	39,72	9
The size of the operating zone (where vehicle can be accessed and left)	37,59	10
Benefits for regular users (reward points, booking priority and the like ...)	34,04	11
Age of the fleet	30,28	12
Vehicle size	17,61	13
Obligation to define the renting period in advance	12,77	14
Vehicle brand	12,68	15

Table 1. Ranking of attributes within preliminary test

These are the following attributes: distance to vehicle, pricing scheme, parking spots and vehicle cleanness. Together with the renting rate, they form the input for a choice-based survey/conjoint experiment. Each attribute is made up of levels, specified to correspond to the existing CS services (Table 2). For example, walking distance for getting to a vehicle is set to be up to 800m which is, according to the empirical evidence, considered acceptable (Schmöller et al., 2015; Csonka and Csiszár, 2015).

Attribute		Levels
A.	Pricing scheme	A1. By-the-minute rate A2. Hourly rate only
B.	Cleanness	B1. Vehicles are cleaned and washed daily B2. vehicles are cleaned and washed twice a week
C.	Distance to getting a vehicle	C1. Up to 400m C2. Up to 800m
D.	Renting rate	D1. 1200 RSD D2. 1400 RSD D3. 1600 RSD
E.	Parking spots	E1. Free of charge in any approved legal spot E2. Free of charge in any approved legal spot plus in the reserved/dedicated locations of the company.

Table 2. Attributes and levels

The research was carried out using the choice-based conjoint online platform Conjoint.ly (Samoylov & Kayande, 2017). A sample comprised students from different faculties of Belgrade University (Faculty of Organisational Sciences, Faculty of Economics and Faculty of Transport and Traffic Engineering)

After initial page where more details about the carshare service was provided, a set of questions where respondents were asked to choose one of the three CS options (encompassing previously stated attributes) have been presented. Finally, several socio-demographic questions have been included to shed additional light on research questions. The peak period of data collection occurred in the week October 15th – Oct 22nd, where students of undergraduate studies were asked to fill up the survey with their participation being awarded with additional course credits.

We applied the choice-based conjoint analysis in order to explore user preferences. Obtained results were furthered scrutinized using the descriptive and multivariate statistical methods. In particular, users have been segmented using the Partitioning Around Medoids (PAM) method. Prior the PAM method, outliers were removed from the analysis using the multivariate outlier detection based on the Mahalanobis distance.

4. Research results

In total, 954 fully answered responses were collected. Out of that number, 36 respondents were excluded from the analysis since CBC determined inconsistency in their responses. Since the pre-processing of data should be done

before conducting any analysis, we analysed our dataset (attribute importance scores on the individual level) for the outliers.

Outliers could be defined as observations, which deviate significantly from the rest of the data so that it seems they are created by another process (Hawkins, 1980). Outlier detection proves to be of high importance for the results of the CBC analysis (Ku et al., 2017). Therefore, it is recommended to identify the outliers before conducting any data mining analysis (Rehm et al., 2007). One of the commonly cited approaches to multivariate outlier detection is the Mahalanobis distance (Ben-Gal, 2005; Tabachnick and Fidell, 2007; Jayakumar and Thomas, 2013). Mahalanobis distance assumes that the data is multivariate normally distributed and it follows a Chi-Square distribution with d degrees of freedom, where d is the number of the observed variables. After the Mahalanobis distance was computed, the probability that the Mahalanobis distance is greater than the Chi-Square distribution with d degrees of freedom was obtained. A maximum Mahalanobis distance larger than the critical Chi-square value for df = d at a critical alpha value of .001 indicates the presence of one multivariate outlier (Tabachnick & Fidell, 2007). After conduction this analysis, 11 additional responses were excluded leading to the final dataset of 907 respondents which were further scrutinized.

The sample consisted of 41,9% of males, the majority of the respondents (52%) graduated from the high-school in the capital (Belgrade). Nearly half of respondents (49,6%) live with their parents and 49,7% switch couple of PT lines on their way to faculty. Our respondents don't tend to use taxi services (83,4% use them rarely or never), nor the specialized bus (e-lines) services (96,5% rarely or never use the e-lines). Only 31,1% are familiar with the carshare services, solely 1% actually used carshare, while 7,4% have a friend/acquaintance who has used a carshare service before.

With the principle idea of the paper to determine user preferences towards the carsharing services, we further analysed the attribute importance scores by clustering the sample of 907 respondents in several market segments. Herein we suggest the implementation of non-hierarchical cluster analysis, Partitioning Around Medoids (PAM) method. PAM is an implementation of the K-medoids algorithm. The algorithm partitions the observations in clusters and minimizes the distance between the observations assigned to a cluster and its centre (Kaufman and Rousseeuw, 1990). PAM has several favourable properties: performs clustering with respect to any specified distance metric, identifying clusters by the medoids. Thus, each element is considered as a potential medoid while holding the other K-1 medoids fixed (Van der Laan et al., 2003). Namely, one of the advantages of the PAM method is the silhouette plot that shows how well cluster members are positioned within their respective clusters. Besides, the calculation of the predefined number of clusters, it is possible to use the silhouette average widths for assessing the best number of clusters. In our research, both silhouette score and Calinski-Harabasz index (Caliński and Harabasz, 1974) proposed three clusters as depicted in Figure 1.

First cluster (*StudentsOnTheBudget*), with 25,69% of respondents, is depicted with the highest score for the attribute Renting rate (60,627) meaning that this is the crucial aspect of carshare service that they seek. On the other hand, third cluster (*CleannessComesFirst*), with 26,35% of respondents, is characterized with the highest score for the attribute Cleanness (41,023). Second cluster, not only because of its size (47,96% of sample) but also because it exhibited variety of individual' preferences, lead to further clustering approach. Both silhouette score and Calinski-Harabasz index determined three clusters with the Cluster2.1 and Cluster2.2 being more cost oriented (attributes Pricing scheme and Renting rate), while Cluster2.3 encompasses both cost and comfort oriented attributes.

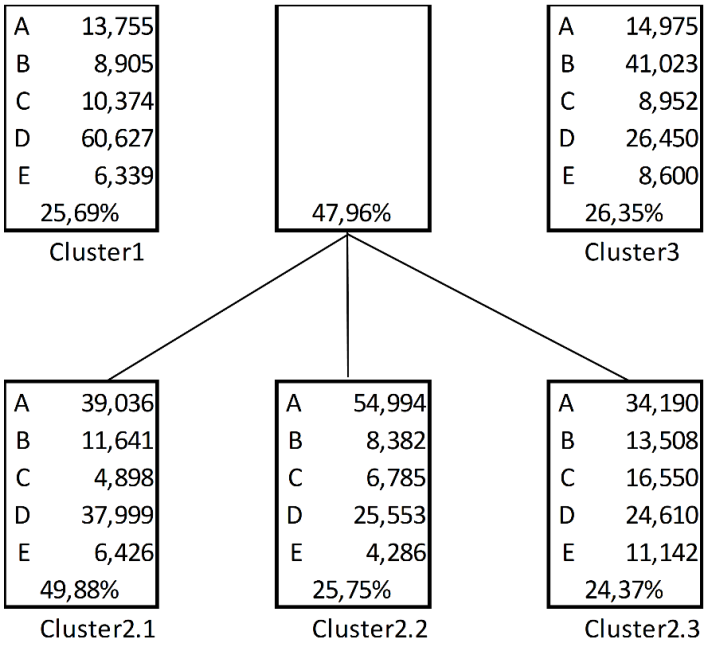

Figure 1. Segmentation of the respondents based on their carsharing preferences

As we can see from the Table 3, cost oriented attributes dominate our sample with only Cluster3 being the representative of students which prefer comfort over cost in the carsharing service.

Group of attributes	Cluster1	Cluster2.1	Cluster2.2	Cluster2.3	Cluster3
Cost oriented (A+D)	74,382	77,035	80,547	58,800	41,425
Comfort oriented (B+C+E)	25,618	22,965	19,453	41,200	58,575

Table 3. Cost *vs.* Comfort clusters

5. Conclusions

With all its potential benefits and flexibility, carsharing still appears to be a luxury service in less developed countries. Nevertheless, there are certain markets where it is reasonable to believe that carsharing might have a prospective future. One of them is the student population, mostly because they are more open to new, ICT-based services and increasingly adoptive of sharing economy. As regard university students in Belgrade, their intensive need for mobility and the decline in satisfaction with public transport indicate the potential success of carsharing.

The findings from this study revealed that we can basically distinguish two user groups among Belgrade students. The first, and not surprisingly the dominant group, are those whose participation in carsharing program is heavily dependent upon purchasing costs. However, this research has outlined the second group of about a quarter of the respondents, who expressed an approximately equal interest in the price and comfort oriented attributes. This finding is encouraging meaning that the introduction of CS program for students in Belgrade should not necessarily be on hold. Apparently, it is unlikely that a single type of service will match the requirements of both target segments. Hence, the carsharing providers should consider more than one service package.

It is worth to note that there is a noticeable lack of research about travel behaviour in Belgrade. Beside that this study illuminated students' preference for carsharing, it can also give impetus for similar research among other user groups.

Insufficient knowledge and lack of prior experience with carsharing are the main limitation of the research. The results would be more reliable if prior to the survey the students were given the opportunity to try carsharing service (using for example gift cards for students like in the study of Zhou, 2012b). Our future research will include the in-depth analysis of user demographics, in order to improve understanding of motivation factors and to design appropriate service packages.

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CHAPTER 32

The Role of Personal Relationship and Information Technology in Business Markets

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ABSTRACT

In this paper we investigate the role of personal relationships in business markets in the information technology era. In particular we were interested in how the spreading of usage of information technology affects the importance of personal relationships, trust, commitment or loyalty in the business to business relationships. The results from our combined qualitative and quantitative research program indicate that while information technology transforms the methods of interaction in business relationships, personal relationships still keep their importance. The social embeddedness of economy still seems to exist in our post-modern, technology driven world. The interpersonal relationships and networks of these relationships still seem to play an important role in business life. Based on our results we believe that both (face-to-face and information technology mediated) types of encounters can be effective.

Key words: relationship marketing, information technology, customer relationship, personal relationship, relationship management

JEL classification: M30

1. What makes relationships successful?

In the literature one can find a lot of research dealing with the successfulness of business relationships (Dyer 1997), where success is mainly characterized by implicit meanings such as the efficiency, the prior expectations and realized goals, or the sustainability. However the reason why a business relationship or the participation in a network is considered to be successful is largely diverse. The success of the relationship cannot be measured only in numbers. There are a lot of other factors that can influence its judgement. There can be a significant difference between the business success and the relationship success. Whilst the business success can be measured by revenues, profit, or market share (Ellram 1995, Chikán & Czakó 2009), the relationship success can be evaluated from other aspects. Often factors such as the management of the relationship, conflict management, fairness, trust, commitment, loyalty between

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business partners can make the relationship successful. All these dimensions of relationships can hardly work without personal contacts, personal encounters and sympathy, human and psychological factors.

One of the leading concepts of the B2B relationship marketing is the commitment-trust theory by Morgan and Hunt (1994). The authors consider these two factors as the most important ones in the relationship marketing. Another aspect of the success of the business relationship is the theory that examines the effect of the customer satisfaction and the relationship quality in the context of the customer behaviour (that is loyalty) (Hennig-Thuaru & Klee 1997). This model suggests that the perceived relative quality, the satisfaction, the perception of the quality of the relationship, the commitment and trust alone or altogether can not describe exactly the nature of the loyal customer behaviour, since other factors such as inner psychological or contextual characteristics can also affect the decision of the customer.

As shown above, studies refer the following characteristics of a stable, long term relationship: perceived quality, satisfaction, commitment, trust, cooperation and loyalty. In most of these dimensions personal relationship plays an important part "…business relationships are established between companies, and operated by people, or a group of people, so the social and psychological aspect have great influence on the business relationships" (Gelei & Mandják 2011. 22. p.)

2. The role of personal relationship in business marketing

Besides the above mentioned ones several studies investigate the role of the personal relationship during business to business relationships. Many consider it as the most important binding force of business relationships. According to the ARA model, published by the IMP Group, there are three basic forms of the bonds between business partners: the activity links, the resources ties and the social bonds, that refer to the personal relationships (Hakansson & Snehota 1995, Gelei et al. 2011). Also, studies in economic psychology analyse the role of the personal relationship, as one aspect of embeddedness. Economic transactions cannot be described only in the aspect of economic motivation, but it must be analysed as embedded in social relationships (Granovetter 1985, Zukin & DiMaggio 1990). Personal relationship plays a significant part in strengthening the relationship, as well as in factors like trust, commitment, and loyalty. "…probably the most important role of the personal relationship is that in long term relationships it almost chains together the participants during encounters (exchanges)…"(Gelei & Mandják 2011, 28.p). The social bond developed in a relationship can reduce or even terminate the feat of self-interest behaviour, which can raise the loyalty of the parties (Sommerfeld & Paulssen 2006). Several others draw the attention to the fact that business relationship is often tied to a person, and not to the organization.

Interpersonal relationships can be so tight, that if a key staff member leaves the organization it can lead to the loss of a part of the market share (Lindgreen et al. 2000, Palmatier et al. 2007, Reynolds & Beatty 1999, Zolkiewski 2014). The findings of Andersen and Kumar (2006) draw the attention to the fact, that the absence of a positive personal relationship can block the development, or even the maintenance of the relationship. Other authors' findings show that personal relationships can play a significant role in solving conflict situations (Gedeon et al. 2009). Weitz and Bradford (1999) studying sales management, especially the role of the personal selling, also come to the conclusion that at companies that are seeking to establish a long term relationship, personal sales, namely the face to face personal meetings play a significant role in solving conflict situations.

As we have seen above, there is a growing body of research that draw the attention to the significance of the social embeddedness of business relationships and interpersonal relationships and networks. In parallel to this the development of information technology also affects the way business functions are being organised. Information technology provides, among other things, new ways and methods for business and personal communication, and relationship management.

3. The role of information technology in business relationships

According to Zuboff (1985) companies might decide on using information technology in the pursuit of one of three goals: automation, information creation and the transformation of business performance. In the early days of the spread of information technology developments, the basic motivation was *automation*. Companies expected financial and time benefits from the introduction of new technology. The application of technology also greatly enhances the practice of *information creation*. The information provided by the technology makes it possible to gain deeper knowledge of the processes; thereby the changes aimed at increasing efficiency are able to reinforce the company's competitive position. Insofar as the information necessary for decision making and operation is available, the company's aim can be to *transform* the activities and *the business performance* and to take the opportunities becoming available by the usage of information technology (Brady et al. 2002).

With the help of the increasingly more efficient and more user-friendly database and information management (Holland & Naudé 2004) and the modern communication methods, several subfields of organizational management have become more efficient. Companies now can easily track their consumers' ordering and purchasing behaviour and preferences in the long term, as well as the extent of profit deriving from serving each customer, in order to perfect their supply, formulate personalised offers to solve their customers' problems or deliver the product more efficiently to the customers based on this information. Tong et al. (2008) studied the effect of information technology on inter-organizational relationships, since the technology-based buyer-seller interface has

also emerged in organizational markets. Their research results have pointed out that the intensive use of information technology can serve both transactional and relationship approach. Therefore, in each situation it is important to understand the application of the technology, because automation supports transactional approach, while customer database and personalization supports the use of relationship approach.

The results of information technology development have closely interwoven with the evolution of marketing theory, thus today the terms of marketing activities supported by different information technologies signify both technology and marketing approach itself. Both in the business press and among scientific sources we can find approaches according to which IT solutions rather than support marketing and, at the same time, business activity, they fundamentally change it, “raise it to a new level”.

4. Can IT enabled communication result a personal relationship

The research projects of the IMP Group completed in the past three decades have led to the conclusion that one of the most important keys of business relationship success is the relation of the participating organizations and the development of interactions between these actors. According to the interaction approach (Turnbull et al 2002), companies do not think in individual transactions, but in most cases these transactions form a long-term relation, and each transaction is only an episode of this relationship. However, in the course of the episodes, relationships develop not only between organizations but between involved persons as well, which has a significant role in ensuring the long-term maintenance of the relationship. But business relationships do not exist by themselves. The parties involved in the relationship have several relations towards other actors and these relationships also can have serious effect on the relation in question. Thus the dyadic relationship is none other than a slice of the network of relations connected to and dependent on each other (Leek et al 2000).

According to Hakansson (1982), market actors use both impersonal and personal communication methods for information exchange. They use impersonal communication methods to convey basic technological or commercial data and personal communication methods to convey ‘soft data’ and information (e.g. in connection with product use, developing cooperation). However, this also seems to be changing with the spread of information technology solutions. For instance, Naudé and Holland (1996) assume that a new kind of strategic relationship can be formed with the help of IT-based technologies, since the application of technological solutions enables a more rational decision making.

Information technology plays an important role in the buyer-supplier interaction as well. What’s more researchers argue that these technology enabled interactions are among the key factors of long term success (Meuter et al. 2000, Coviello et al. 2001, Brady et al. 2002, Ryssel et al. 2004). The new IT enabled

communication and sales methodologies support the involvement of customers in the value creation process as well. Owing to this, the traditional toolbox of information exchange completed in the course of the business process has also changed. In their research, Leek et al. (2003) found that although according to about half of the respondents, the use of information technology for communication decreases the significance of personal meetings and makes communication faster and more accurate, a similar proportion of the participants talked about the alienation, impersonation of relationships, thus becoming task-oriented at the same time. All this in turn can result in developing trust between partners with more difficulty and managing uncertainties more slowly, moreover, in a lower level of satisfaction.

We can see from the above summary that the results of the research approaches measuring the effect of information technology usage are diverse. More research is needed to understand the impact of information technology on long term relationships.

5. Primary research

During the past years (between 2010-2016) we conducted 5 research projects to analyse the change in the importance of information technology enabled and “face-to-face” interactions in business relationships.

Based on the results of our quantitative and qualitative research projects between 2010 and 2013, we decided to examine separately how the communication method influences the judgement of the quality of the relationships. In this part we summarise the most important results and conclusions of the qualitative research that was conducted between 2014 and 2016.

Research objectives

We formulated the following objectives in the course of our *qualitative research*:

- to analyse the role of IT enabled and personal meetings in business markets;
- to analyse the effect of the communication and interaction methods on the level of trust, commitment and loyalty;

Research methodology

In the course of this explanatory research 22 in-depth interviews have been completed, where the representatives of large multinational and small- and medium sized enterprises provided answers. The interviews were made between the autumn of 2014 and the spring of 2016. The respondents include the representatives of manufacturing and service providing companies. From the many aspects we examined during our research we focus on two in our present paper: the effect of the form of communication method on trust, commitment and loyalty, the characteristics of the usage of the communicational channels.

Results of primary research

The role of IT enabled communication and personal meetings in business markets - Channels of communication

Respondents still seem to be uncertain about the role of information technology in business relationships. The responses indicate that several aspects have an effect on the method of communication being used.

Relationship lifecycle

> *"… My colleagues use e-mails especially frequently. Everyone uses smart phone now. I always tell them that these technology based methods are not enough, especially in the beginning phase, while trust is being built. In a new relationship I am insistent on having at least one personal meeting with the partner because it strengthens trust." (Manager, business service provider)*

Profile

> *"The first thing is to organise a personal meeting with a new partner even if he approached us via e-mail. No offer is made until that. For the everyday interactions we use phone that is the fastest. We do not use social media or videoconferences to interact with our customers, we don't need these, it is not that industry." (Representative, production equipment distributor)*

Rules of procedure

> *"We have to interact with the partners in a controllable and verifiable way. We have very strict regulations about customer interactions. There is no place for being personal in these. Having a personal relationship with a partner is considered to be a suspicious business in this company, but if you keep all the regulations, you cannot get into personal relationship with the representative of the partner organization." (Representative, multinational manufacturer)*

Seller or buyer position

> *"As I see, sellers are more open to information technology while buyers consider personal meetings more important." (Representative, industrial manufacturer)*

Conflict situation

> *"Face-to-face communication is needed when there is a problem. I talk the least to the person whom I am satisfied with. Because there is nothing to talk about, no need to give directions, to tell him off, or ask for help. With these good partners less personal channels, like e-mail come to the front." (Manager, wholesaler)*

But an intuition might also have an influence on what method is being used.

"The mean of communication is defined by the situation in most cases. You have to feel when you need a personal meeting. Many times a phone call or email is enough if it is not that urgent or important." (Representative, IT service provider)

Based on these opinions we can conclude that combined usage of these communication methods is the most frequent. Companies seem to be open to the new technologies and communication channels, but personal meetings are considered to be crucial. One can see from the above responses that the way and channel of communication is largly affected by the situation.

Trust, commitment, loyalty

"… it is not always beneficial for the company to choose an unknown supplier because they offer a few percent lower price. We had a problem with that once. By the end it cost more because they did not deliver the way they promised. The company vanished in about a year and we had to handle the complains of the end users. After this we decided to cooperate only with trustworthy, steady partners who offer good quality of products, services and relationship." (Representative, IT service provider)

"Having a personal relationship means that the partners know each other. In this case communication involves what makes it personal regardless of the channel of communication. But only the personal, face-to-face communication can establish the trust. But on the other hand, the new IT technologies might nearly be ready for this." (Representative, business service provider)

"The basis of the "success" of the relationship is the mutual satisfaction. It is the basis of a long term relationship, and the trust that develops during that time. Since we talk about companies, not the individuals are the essentials, but good personal relationship can only spring up between individuals, so that is why it is important too." (Representative, business service provider)

Expectations for the future

The picture hasn't changed compared to what we found earlier. The organisations know that the usage of information and communication technology is necessary for the competitive advantage, but they don't see a chance that these technics would substitute personal meetings.

"..Although I am not a futurologist, but I am sure, that the changes happened so far, and the established trend wouldn't change in the future. The technology developed, the communication method, the channel, the customer and supplier behaviour also changed. I don't know, what brings the future, but we try to keep up. Slowly such independent communication and economical

trends and sciences develop, which we can use to make profit. If we miss our chances there will be no more profit that brings us further." (Representative, IT service provider)

"…in the last few years the personal relationship, and the personal contact has subsided, which is not good. I believe in personal relationships and that a personal meeting brings much more than a super IT system. Within the company there are a lot of communicational channels, but nothing can replace that if you go over to the next door office and solve a problem personally" (Representative, industrial manufacturer)

"… the real business relationships doesn't go anywhere, they will be direct contacts between individuals for a long time" (Manger, retailer)

6. Quantitative research

6.1. Model development – constructions- definitions personal relationship, personal encounter, IT communication

During the development of the research model on one hand we declare, what we consider as important categories form the research's point of view, on the other hand we formulate the hypotheses.

The development of the information technology resulted in a number of new tools and communication channels for interpersonal and business interactions (Coviello et al. 2001). In this study we consider the IT based communication as internet based, or other information and communication technology based interaction between two person or corporation. While the personal encounters (face to face actions: discussions, trainings, team meetings etc.) can be easily defined the definition of personal relationship is more difficult since the digital communication technology can also help maintaining personal relationships. Because of the lack of consensus in the literature about the understanding of personal relationship, we experienced difficulties in securing the validity of the research model.

In our research, we concentrated on the personal relationships. Personal relationship is more than the personal encounter. It means regular and continual communication between business partners. The channel of communication in a personal relationship therefore may also be telephone or e-mail too. The main point is that these communication acts should be interpersonal (representing long lasting relationship between individuals).

Satisfaction

Satisfaction is considered as cognitive response (Bolton – Drew, 1991, Howard – Sheth, 1969, Tse – Wilton, 1988), and emotional response (Cadotte et al., 1987, Westbrook – Reilly, 1983) to expectations, in the literature. Since B2B interactions form long lasting relationship in the most cases, satisfaction is not single act either. It is a development procedure, where numerous other factors play part in shaping the overall satisfaction, or dissatisfaction feeling (Westbrook, 1987, Fornell, 1992). During the episodes however relationship evolve not only between the organisations, but also between the people taking part in it, which plays an important role in securing the maintenance of a long lasting relationship. According to research results of others, personal relationship can play an important role in solving conflict situations too (Gedeon et al., 2009).

H1. Relationship satisfaction is affected positively by personal relationship.

The more and more efficient and user friendly database and information management (Holland – Naudé, 2004) together with the help of the modern communication methods resulted in higher efficiency in a number of areas of the organisation's operation. Tong et al. (2008) studied the effect of the information technology on the inter-organizational relationships, since the technology based seller-buyer interface appear on the business market too. Their research showed that the intensive usage of information technology serves not only the transactional but also the relational approach. It is important therefore to get to know the application of the technology. While the automation represents the transactional approach, customer databases and customization supports the relational approach.

H2. The information technology based communication has a positive influence on relationship satisfaction.

Turst

Walter and Ritter (2000) describe trust as the belief in the trustworthiness and competence of the partner. Trust therefore is such a dimension of the evaluation of the relationship, which contribute to a stable, reliable cooperation in the inter-organizational relationship. The first stage of trust is the preliminary trust based on the perceived elements. The personal relationship usually strengthen trust and so the relationship, so when the customers don't err in trust, they are longing for building a long term relationship (Singh - Sirdeshmukh, 2000, Vollmer et al., 2000).

H3a. The personal relationships have a positive effect on trust.

According to Hakansson (1982) the market actors use both the personal and the impersonal communication methods for information exchange. For expressing basic technical or commercial information the impersonal, and for passing "soft" data and information (e.g. product usage, forming of cooperation) the personal communication methods are used. However with the spreading of the information technology these methods seem to change also. Customers

become ever more part of the value creation process, through the new communication and sales methods. The information technology plays an important part in the business-customer interaction too, moreover some authors consider these technology based interactions as the key factors of the long term success (Brady et al., 2002)..

H3b. IT used for communication purposes has a positive impact on trust through the satisfaction.

Commitment

Commitment can be defined as "permanent desire for maintaining an important relationship", and this can be considered as the antecedent of loyalty (Costabile, 2000). Gundlach et al. (1995) discuss the three dimensions of commitment: emotional commitment, which is a positive attitude for maintaining a future relationship; instrumental commitment, which means a kind of investment during the relationship (time, resources); and the third dimension is the dimension of time, which means the confidence in the future existence of a relationship. In the B2B relationships, commitment means a kind of psychological attachment. One aspect of this is maintaining the personal relationships.

H4. Personal relationships have positive impact on the commitment.

The information ensured by technology enables the better understanding of the processes, so the changes related to the enhancement of efficiency are able to strengthen the company's position in the competition (Brady et al., 2002). Leek et al. (2003) in their research found that according to about half of the respondents think that the usage of information technology for communication decreases the importance of the personal encounter, and IT makes the communication quicker and more accurate. The other half of the respondents report about the drawing-away of the relationships, impersonalization, and thereby becoming task oriented. Consequently, the development of trust between partners could become more difficult and the handling of the uncertainty become slower. The research results shown above are not convincing regarding the connection between IT and commitment so, in our model we assume that:

H5. The impact of IT used for communication purposes on commitment is not measureable directly.

Loyalty

In our model we take loyalty as a result factor. We take it as the final link indicating that partners are willing to repurchase and cross-purchase, they are not price sensitive, and they recommend the partner for others wholeheartedly (Grönholdt et al., 2000). Social bonds in relationships can decrease, or even release the fear from self interest following behaviour, which increases the partner's loyalty (Sommerfeld – Paulssen, 2006). Several authors also draw the attention to that business relationships are often connected to persons and not to companies. The interpersonal relationship can be so strong, that an important

employee leaving the company can mean the loss of a market share (Lindgreen et al., 2000, Palmatier et al., 2007, Reynolds-Beatty, 1999, Zolkiewski, 2014).

H6. Personal relationship has a positive impact on loyalty.

We found a number of research results in the literature showing that the satisfaction strengthens trust, trust has a positive impact on commitment, and that trust and commitment has a positive impact on loyalty, so we assume that:

H7a. Satisfaction has a positive impact on trust.

H7b. Trust has a positive impact on loyalty and commitment.

H7c. Commitment has a positive impact on loyalty.

6.2. Measurement, methodology

In the course of operationalizing the concepts included in the study, we relied on the literature review and qualitative research conducted earlier. We also applied scales already validated other studies (Čater- Čater, 2010, Révész 2011). Defining concepts and their items was done by principal component analysis. The following concepts are included in our final model: personal relationship, IT relationship, satisfaction (with items considering the satisfactin with the relationship and with the product also), trust, commitment, loyalty. (We planned to separate the items of personal meeting and personal relations; however, the items are not separable based on the results of principal component analysis. Therefore, personal relationship consits of items of personal meeting and items of personal relations too.)

Our research was conducted between 1st of August and 30th of September in 2015 among social enterprises employing more than 2 employees. Sampling and sending out the questionnaires carried out by the Hungarian Central Statistical Office. Results of 312 respondents were collected, which means a response rate of 30%. The sample is considered to be representative from the point of view of size of enterprises and regional distribution.

Testing the hypotheses requires the examination of the relations between latent variables, for which PLS path analysis can be applied (Hair et al,, 2014), as the variables (indicators) cannot be considered normally distributed (also in the case of Kolmogorov-Smirnov and Shapiro-Wilk tests, $p<0.01$ for each variable). We applied SmartPLS 3 (Ringle et al, 2015) software for PLS path analysis.

6.3. Results

With regard to the results of the *outer (measurement) model*, we examined the reliability of the constructions with Cronbach's Alpha (>0.7) indicator and CR indicator (composite reliability>0.7), concerning which we find that criteria (Hair et al, 2014) are fulfilled in the case of all constructions. For checking convergent validity, we considered standardized factor loadings (>0.5), AVE (average

variance extracted, >0.5) indicators. Comparing minimal criterion values (Hair et al, 2014) to the indicators, the existence of the six constructions can be verified. For checking discriminant validity, HTMT ratio of correlations can be applied (Henseler et al, 2015), which is lower for each variable pair compared to the criterion value of 0.9. Based on the results of the outer model, the existence of latent variables can be proven; furthermore, the indicators related to the given latent variables represent the same phenomenon.

In terms of the results of the *inner (structural) model*, the effects of IT relationship on trust, on commitment, on loyalty are not significant; and personal relationship has non-significant effect on trust either. After eliminating non-significant effect from the model, all of the paths represent significant effects (Table 1).

Path	Path coefficient (original sample)	Mean of path coefficients (bootsrap samples)	Standard error of the mean	t-value	p-value
IT_rel -> Satisfaction	0.130	0.156	0.047	2.760	0.006
Trust -> Commitment.	0.553	0.556	0.059	9.456	$1{,}25*10^{-19}$
Trust -> Loyalty.	0.418	0.424	0.085	4.894	$1{,}34*10^{-6}$
Commitment. -> Loyalt.	0.201	0.198	0.095	2.118	0.035
Satisfaction -> Trust	0.581	0.582	0.054	10.820	$1{,}18*10^{-24}$
Personal_rel -> Commitment	0.269	0.266	0.063	4.295	$2{,}1*10^{-5}$
Personal_rel -> Satisfaction	0.239	0.234	0.078	3.089	0.002
Personal_rel -> Loyalty	0.137	0.132	0.060	2.258	0.024

Table 1. Testing significance path coefficients

Source: own calculation

In the final model developed by taking account of the significant effects, in terms of direct effects it can be established on the basis of the standardized path coefficients in Figure 1 – on each arrow – that there is a positive effect between the latent variables in the case of every pairing. The following statement can be formulated regarding standardized path coefficients (β):

- Personal relationship has stronger effect (β=0,239) on satisfaction compared to the effect of IT relationship (β=0,130).
- Trust has stonger effect (β=0,553) on commitment compared to the effect of personal relationship (β=0,269).
- Trust has the strongest effect on loyalty (β=0,418), followed by the effects of commitment (β=201) and personal relationships (β=0,137).

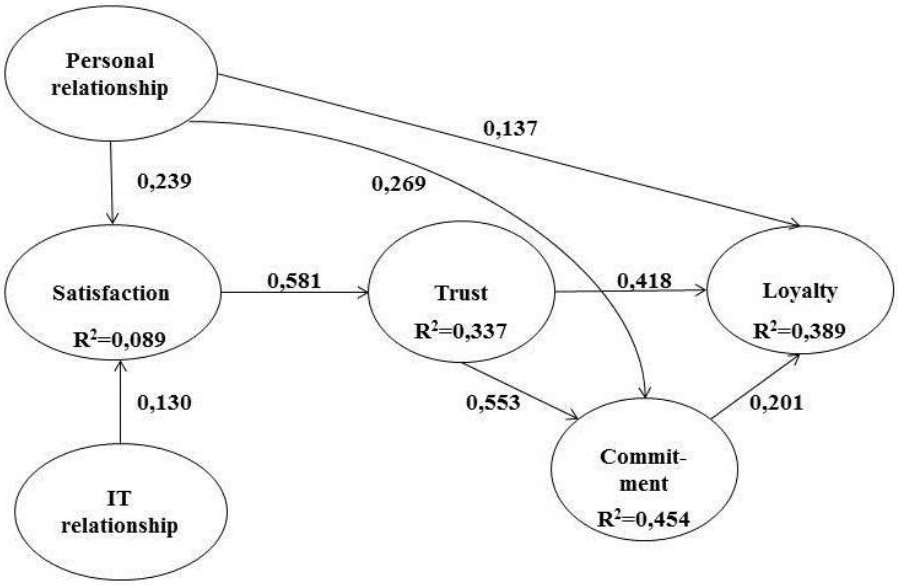

Figure 1. Effects of communication types on relationship success
Source: own construction

Based on the values in the ellipses in Figure 1, the total variances explained in the model can be regarded as low in the case of satisfaction; but R^2 in the case of trust, commitment and loyalty are regarded as medium.

However, in the model it is worth mentioning the effect sizes between the variables based on the f^2 indicator, which examines the change in the coefficient of determination of an endogenous variable by omitting a given exogenous variable (Hair et al, 2014). The effect of satisfaction on trust (f^2=0.508), and the effect of trust on commitment (f^2=0.525) can be considered strong. Furthermore, in the case of the effect of trust on loyalty (f^2=0.175), and the effect of personal relation on commitment (f^2=0.124) can be considered medium. Thus based on the f^2 indicators, a satisfaction – trust – loyalty, and a satisfaction – trust – commitment path can be highlighted. Finally, decisions about the hypotheseses can be seen in table 2.

Hypothesis	Decision
H1. Personal relationhip has a positive effect on satisfaction	Accepted
H2. IT relationship has a positive effect on satisfaction	Accepted
H3a. Personal relationship has a positive effect on trust	Rejected
H3b. IT relationship has a positive effect on trust through satisfaction	Rejected
H4. Personal relationship has a positive effect on commitment	Accepted
H5. IT relationship has no direct effect on commitment	Accepted
H6. Personal relationsip has positive effect on loyalty	Accepted
H7a. Satisfaction has positive effec on trust	Accepted
H7b. Trust has positive effect on loyalty and on commitment	Accepted
H7c. Commitment has positive effect on loyalty	Accepted

Table 2. Decisions about the hypotheses
Source: own construction

7. Summary, limitations of the study

Based on the results of data analysis we did not manage to prove the impact of personal and the IT based relationship on the relationship success. Although the way of the communication influences the judgement of the success, the results are confusing. It can be seen that the analysed factors have only partly effect on satisfaction, trust, commitment and loyalty. IT based relationship influences significantly only satisfaction, and the personal relationship influences only satisfaction, commitment and loyalty significantly. Based on the f2 indicators from our model the "satisfaction-trust-commitment", and the "satisfaction-trust-loyalty" path can be highlighted. It is also important to mention the personal relationships effect on loyalty and its significant effect on commitment.

In the same time the research result also show, that in the research model it is necessary to clarify the differences between the personal relationship and the personal encounter, in order to secure the validity. We also have to clear how big influence the information technology has on interpersonal encounter during interactions. Another limitation of the research seems to be the domestic sampling: in an international comparison most probably we would find even more striking/surprising results than that above, due to the cultural defences and the differences in the level of used modern technology.

8. Summary, conclusions

The results of the empirical research show two, seemingly inconsistent, but in the everyday practice existing forms of handling relationships. We can conclude that the advantages of the information technology have their effect on the business to business relationships. Moreover, based on the interviews it seems

that the role of the IT is significant, especially during the interactions with the customers, at least considering the frequency of the interaction. In nowadays business world it is necessary for the companies that they quickly and efficiently exchange information, they continuously interact, and instantly react. At the same time it can be seen, that the personal interactions, the personal contacts will still be essential in the future, especially at new project, or at conflict situations. In most cases our results show that personal meetings and IT enabled communication does have its role in business relationships. Companies seem to combine these ways of communication. A number of characteristics have been identified in our research that has an effect on the choice of communication channel. The stage of the relationship lifecycle, the industry the companies are involved in, the company rules and procedures, the seller or buyer role itself and the presence of conflict seem to be the factors that are considered by the actors in a relationship.

Important result of our research is that personal relationships have outstanding role in strengthening trust, so the personal relationships still can be considered as a pledge of long term relationships. Based on our findings we think that both ways of handling relationships have their effect on the relationships between businesses: the acceptance and usage of IT is necessary, but it cannot substitute the milieu, that can be felt during a personal encounter. It seems that in relationship between businesses IT and the personal encounter serve together the efficiency of the relationship.

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PART 9

MONETARY POLICY IN ERA OF DIGITAL CURRENCIES

CHAPTER 33

Asymmetric price transmission in Croatia within the real estate market

Zdravko Šergo[1], Jasmina Gržinić[2]

ABSTRACT

Croatia has experienced a huge volatility, expressed in rapid growth, fall, stagnation and revival of the real estate market in recent decade. The City of Zagreb has the most transactions in real estate business and the Adriatic Coast participate as second in market share. This study is an attempt to test the relationship between the price indices of real estate, in those two regions, over the 2006M6–-2016M3 period. For this purpose, we have chosen the threshold cointegration and an asymmetric error correction model approaches. Some of these regions have been the price leader of the market and its price has been evolving more independently. Whether it is due to swelling demand for dwelling, stimulated by thriving tourism industry that priority gives to Adriatic or accession of Croatia to the European Union that gives advantage to capital city will be tested by Granger-causality test. In this paper it is assumed that the transmission between the prices of those regions has been asymmetric in both the long term and short term.

Key words: Price, Real estate, Threshold cointegration, Asymmetric ECM, Croatia

JEL classification: E31, E37, R31, R32, C32

1. Introduction

For some reason, in the late 1990s and early 2000s the idea that homes and apartments were spectacular investments gained a strong-hold on the public imagination, in the United States and in many countries as well. Not only did prices go up, but there was palpable excitement about real estate investments (Akerlof & Shiller, 2009). There are two reasons for that excitement in Croatia in the last decade. First, the convergence of accession of Croatia to the European Union, the rising liberalization of EU market, the right of EU residents to

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acquire real estate in EU member states, the well-development of a mortgage supply capital provided by mainly Austrian, German and Italian banks, all that were impacted in boosting prices. Second, substantial cohort of baby boomers non-residents nearing retirement age have haste to invest their savings in rental property assets in Croatia that appear to provide more secure cash flow. They are thought, the house can be rented or if things go wrong sold for speculative reason. Namely, real estate may bring, greater benefit than investment in a motor home, for example. The trend towards living in capital city apartments, caused by inter country migration, has boosted construction activity in Zagreb, whereas the growing attractiveness of coastal property has increased costal property values in Adriatic region, in the meanwhile

The prices of commercial real estate and of homes and condominiums have prior 2007 (in Zagreb) and 2009 (in Adriatic region) had inflated and become bubble-like. Prior to the burst of the bubble in Zagreb city region and the resulting real estate crash that began in earnest in 2007, historical housing price data from the *Burza Nekretnina* seemed to support the theory of endlessly rising prices in capital city of Croatia. Although, real estate prices in Croatia in last decade are as volatile as overall economic performance in the country. The same had been true for Adriatic, the well know tourist destination. By 2008, real estate prices in Adriatic region data showed just a slight increase. Unfortunately for native homeowner sellers in Adriatic region, 2009 was the last year of healthy growth before the market collapsed. After that, the prices experienced an unprecedented decline (about 27% within 2007-2015). Consequently, real estate price deflation has become a serious threat to the domestic construction industry and aroused wide concerns among entrepreneurs in the Croatia. Before the economic crisis (2005 – 2008) the average is built 10545 buildings per year and 23 273 flats, but in times of crisis (2009 – 2015) these numbers dropped to 6300 buildings with 11978 flats with simultaneous the fall of the surface of the building for 44.1% and the area of the flats for 44.7% (HGK, 2016).

As real estate price de-accelerates, the recession has changed considerably Croatia's market over the last decade. Yet, by mid-2016, housing prices in Adriatic region had risen back to 2009 last year peak level. From 2015 on, the real estate market for the first time noticed slightly recovery, signalled by 0.3% increase in house prices and expanded construction activity measured by issued licenses at national level.

Up to now it has been hinted that the prices of a real estate in two main statistical regions of Croatia had specific dynamics and trajectory path per se. Yet, their paths are not independent one from another, and in this paper we will show it. Real estate prices in the Adriatic region until the year 2002 were lower than the prices in Zagreb and the rest of Croatia. After 2007, the position is completely opposite: real estate in the Adriatic become costlier than that in Zagreb and in the rest of Croatia. Such a development is a consequence of the intensive growth of real estate prices on the coast where they had grew up in the period of 1997 - 2008 in cumulative by 167 percent (or indeed an

impressive 14 percent a year) that would have reached an average price from 1,925 euros per m2 during 2008. At the same time, in Zagreb in the same period, property prices recorded a growth of 78 percent (two times less than of coastal side of Croatia), and in the rest of Croatia, only 50 per cent. An intensive growth of prices was a result of the strong domestic and foreign demand for real estate on the coast, the limited supply of real estate items, but also speculation related to the further strengthening of the demand side once Croatia after access to the European Union, enable their nationals the purchase of real estate (Vizek, 2010). Land-price bubbles were often justified by the logic that an ever-growing population (in case of Adriatic augmented by inflow of foreigners combined with a limited supply of land is sure to make land scarce and houses that lay into that land parcels precious and expensive.

Croatian real estate sector has experienced significant structural changes in recent decade. Such changes have influenced price dynamics and transmitted shocks to the real estate markets, especially on the two main markets of the regions within the country.

Exposed information, so far, give us the right to emphasize our main hypothesis, that the Adriatic region is a price leader in transmitting those shocks on Zagreb real estate market. But, what is the relationship between these two market prices is really unknown without deep statistical analysis. Which market is the leading one to reflect information into the market prices, will be tested by Granger causality test?

This paper investigates price transmission mechanism in the real estate business between two markets especially on the two main markets of the regions within the country (Adriatic & Zagreb) using monthly price data for the period 2006.03 to 2016.5. Price transmissions, market integration and price leadership in real estate have been missing in relevant literature to help understand price interaction and dynamics in case of Croatia. Asymmetric Price Transmission (APT) has received considerable attention in the literature because price transmission may differ according to whether prices are increasing or decreasing in two regions. Given the evolution of the real estate markets in both Croatia's regions and the current status of empirical analyses of price transmission, the objective of this study is to examine the dynamics between the real estate prices of from Zagreb and Adriatic. The latest error correction model with threshold cointegration is employed for the price analysis. At the beginning, linear cointegration analyses, including Johansen and Engle-Granger two-step approaches, are applied to evaluate the cointegration relationship. The latter analysis would provide intuition about the price leadership of one of these two markets. Then the analysis is extended to nonlinear threshold cointegration. At the end, an asymmetric error correction model with threshold cointegration is utilized to analyze the short-term relationship.

The rest of the article is organized as follows. In the second section, a review of the literature is presented. The emphasis is on housing price transmission

paper contributions in the last decade. In the third section, the methodology employed is presented, including the linear and threshold cointegration approaches and the asymmetric error correction model. Following that, the data used and the empirical analysis are presented. The next chapter will address results with short discussion. Finally, the section concludes with closing remarks.

2. Literature preview

Past studies have shown that changes in the house price of a region may transmit to its neighboring regions. The transmission mechanism may follow spatial and temporal diffusion processes (Nanda and Yeh, 2014). In theory, we do know that the relationship between the local population and holiday home owners exhibits secondary elements of conflict, since the two groups share an implicit social pact (Bimonte and Punzo 2007); however, a trade-off between tourists and local residents may arise when the high demand for holiday homes by the former inflates real estate prices at the disadvantage of some of the latter. In paper dealing with residents' perceptions of the socio-cultural impacts of tourism at Lake Balaton, Hungary: negative impacts embodied in costs of land and housing is perceived to be very high, overtopping other negative perception of tourism externalities (like, residents' concern for material gain, congestion, crime, prostitution, gambling, vandalism, drug abuse, alcoholism, sexual permissiveness etc. (Ratz, 2000).

The study of Tsai et al (2016) investigates the determinants of tourism real estate prices, with an emphasis on the impact of theme parks. A hedonic pricing model was built using a sample of 294 real estate transactions in the Overseas Chinese Town area of Shenzhen, China. Findings indicated that while distance to metro and the architectural features of the property itself had significant positive effects on tourism real estate value, distance to theme parks was found to have a negative effect on price. Itzhak (2011) investigating the case of Illinois (in 2005-2008) during the housing boom, state that financially constrained home buyers artificially inflated transaction prices in order to draw larger mortgages. Property prices in areas with a high rate of past price inflation exhibited momentum and high volatility. Because of the dual motives to purchase a home, most economists do agree that housing demand is best measured as home price rather than home size. The recent housing boom in the United States, however, dramatically inflated home price and widely increased housing costs (Di, 2010).

Reviewing more recent literature about price transmissions, market integration and price leadership in regional real estate market, we do see rare, but inspiring positive contributions of others' work.

The work of Yang et al (2013) examine dynamic relationships among housing prices from four first-tier cities in China from December 2000 to May 2010 and present an equilibrium model of housing price in multi-markets with long-run equilibrium relationships and important short-run dynamics and price structures such as price leadership, price transmission lag and asymmetric price responses.

They conclude that the revealed effective price transmission and high correlation among these different markets in China is not a good thing for a stable financial system and for the defense against price bubbles in the housing market.

Another papers explored the relationship between housing prices and transmission mechanism in broader range with different topics. Yuksel (2016) based research on the relationship between stock and real estate prices focuses on two transmission mechanisms, namely the wealth and credit-price effects. The paper uses the 2007 global financial crisis as a natural experiment and examines whether the relationship between real estate prices and stock prices has changed after the outbreak of the crisis by using data from the Turkish market. The results based on a threshold cointegration framework indicate that while both effects exist during the pre-crisis period, only a credit-price effect is observed during the crisis period.

In similar venue, using the non-parametric rank tests proposed by Breitung (2001), authors in their paper (Su et al, 2013) try to determine whether non-linear long-run equilibrium relationship exists between the stock and real estate markets of China. They also adopted the threshold error-correction model (TECM) and find the existence of a long-run non-linear relationship between the Shenzhen composite index and the real estate price index. They conclude that a bi-directional feedback causal relationship among the wealth and credit-price effect exist within those markets.

The paper written by Blake & Gharleghi (2018) investigate the Ripple Effect of house prices at an inter-suburban level of analysis in the Sydney metropolitan area and price transmission in order to improve residential real estate purchasing decisions of market participants. In this paper Granger-causal pathways were subsequently mapped for each suburb string identifying price transmission pathways and confirming support that while the standard Ripple Effect does not exist at an inter-suburban level, it is still possible to predict price movements by considering the price behavior of surrounding suburbs.

From an econometric perspective, authors (Marquez et al, 2014) estimate the asymmetries in the consumption response within the momentum threshold autoregressive model (M-TAR) proposed by Enders and Siklos (2001). The same advanced technique is used in this paper. They find the existence of an asymmetric behavior in the US aggregate consumption spending responses to real estate wealth and credit market shocks, which is only significant when a negative shock takes place.

3. Methodology

3.1. Linear cointegration analysis

The focus variables in this study are monthly real estate prices for two main regions in Croatia — Adriatic costal region and Zagreb. As usual, their properties of nonstationarity and order of integration can be assessed using the

Augmented Dickey–Fuller (ADF) Test (Dickey and Fuller, 1979). If both the price series appear to have a unit root, then it is appropriate to conduct cointegration analysis to evaluate their interaction. Econometric literature proposes different methodological alternatives to empirically analyze the long-run relationships and dynamics interactions between two or more time-series variables. The most widely used methods include the two-step procedure of Engle and Granger (1987) hand the full information maximum likelihood-based approach due to Johansen (1988) and Johansen and Juselius (1990). The Johansen approach is a multivariate generalization of the Dickey–Fuller test (Johansen, 1988; Johansen and Juselius, 1990). It concentrates on the relationship between the rank of a matrix and its characteristic roots in a vector autoregression. The Johansen approach starts with a vector autoregressive model and then reformulates it into a vector error correction model as follows:

$$X_t = \pi_1 X_{t-1} + \pi_k X_{t-k} + \varepsilon_t \qquad (1a)$$

$$\Delta X_t = \sum_{i=1}^{K-1} \Gamma_i \Delta X_{t-1} + \Pi X_{t-K} + \varepsilon_t \qquad (1b)$$

where X_t is a vector of the real estate price at month t for Zagreb (Z_t) and for Adriatic region (A_t), K is the number of lags, and ε_t is the error term. The relationship among the coefficients for the two equations is Γ_i = -I + $\Sigma_{j=1}^{i} \pi_j$ and Π = -I + $\Sigma_{h=1}^{K} \pi_h$, where I is an identity matrix. Two types of tests, i.e., the trace and maximum eigenvalue statistics, can be used to detect the number of cointegrating vectors, *r*, among the variables in X_t.

The Engle-Granger two-stage approach focuses on the time series property of the residuals from the long-term equilibrium relationship (Engle and Granger, 1987). For this study, it can be expressed as:

$$Z_t = \alpha_0 + \alpha_1 A_t + \xi_t \qquad (2a)$$

$$\Delta\hat{\xi_t} = \rho\, \hat{\xi_{t-1}} + \sum_{i=1}^{p} \phi_i \Delta\hat{\xi_{t-1}} + \mu_t \qquad (3a)$$

where α_0, α_1, ρ and ϕ_i are coefficients, ξ_t is the error term, $\hat{\xi_{t-1}}$ is the estimated residuals, Δ indicates the first difference, μ_t is a white noise disturbance term, and *P* is the number of lags. In the first stage of estimating the long-term relationship among the price variables Z_t and A_t, the price of Adriatic is chosen to be placed on the right side and assumed to be the driving force. This considers the fact that Adriatic has been the leading region in the stimulating real estate price (and that due to strong demand for touristic apartment) for most years over the study period from 2006 to 2016**.** In the second stage, the estimated residuals $\hat{\xi_t}$ are used to conduct a unit root test (Engle and Granger, 1987). The number of lags is chosen so there is no serial correlation in the regression residuals. It can be selected using the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC),

or Ljung–Box Q test. If the null hypothesis of ρ= 0 is rejected, then the residual series from the long-term equilibrium is stationary and the focal variables of Z_t and A_t are cointegrated. But if the null hypothesis of ρ= 0 is accepted we should try to proceed with the same procedure analysis based on modified equation expressed as:

$$A_t = \alpha_0 + \alpha_1 Z_t + \xi_t \,, \qquad (2b)$$

which will hint that Zagreb market is the leading one to reflect information into the market prices of Adriatic market.

Our choice of dependent and explanatory variable should ideally be determined by the theory underlying regression given by Eq.2, which says that Adriatic market is a price leader. But this assumption is based on economic intuition and not on statistical rigorous test. In this case it may not be clear-cut or there may be bi-directional causality, eventually. Based on statistical results we allow that region of Zagreb could be price leader.

3.2. Threshold cointegration analysis

Suppose that Z_t and A_t are unit root processes. To examine whether they have an asymmetric cointegrating relationship, Enders and Siklos (2012) propose the following two-step method. First, the linear cointegration model (2a) and/or (2b) is estimated. Second, a two-regime threshold model is estimated for the estimated residual $\hat{\xi_t}$, given by

$$\Delta\hat{\xi_t} = \rho_1 I_t \hat{\xi}_{t-1} + \rho_2 (1 - I_t)\hat{\xi}_{t-1} + \sum_{i=1}^{p} \varphi_i \Delta\hat{\xi}_{t-1} + \quad \mu_t \qquad (4)$$

where ρ_1, ρ_2 and φ_i are coefficients; *p* is the number of lags; μ_t is assumed to be white noise and *It* is an Heaviside indicator function defined as

$$I_t = \begin{cases} 1, & z_{t-1} \geq \tau, \qquad (5a) \\ 0, & \Delta z_{t-1} < \tau. \qquad (5b) \end{cases}$$

Variable z_{t-1} is the so-called threshold variable with two alternative definitions considered. For the first case, the threshold variable is defined as the level of lagged residuals, that is, $z_{t-1} = \hat{\xi}_{t-1}$, and the model is called the threshold autoregressive (TAR) cointegration model; in the second case, the threshold variable is defined as the change in lagged residuals, that is, $\Delta z_{t-1} = \Delta\hat{\xi}_{t-1}$,, and the model is called the momentum threshold autoregressive (MTAR) cointegration model, in which the $\{\hat{\xi}_{t-1}\}$ series exhibits more 'momentum' in one direction than the other. The TAR model is designed to capture potential asymmetric deep movements in the residuals (Enders and Granger, 1998; Enders and Siklos, 2001), while the MTAR model is powerful to deal with steep variations in the residuals, so it is especially valuable when the adjustment is believed to

exhibit more momentum in one direction than the other, according to several studies (Chen and Zhu, 2015; Sun, 2011). Negative deepness (i.e., $|\rho_1| \leq |\rho_2|$) of the residuals implies that increases tend to persist, whereas decreases tend to revert quickly towards to equilibrium (Enders and Granger, 1998).

The threshold value τ can be specified as zero, given the regression deals with the residual series. In addition, it is endogenously set by following Chan's search (1993) method for obtaining a consistent estimate of the threshold value.

Given these considerations, a total of four models are entertained in this paper. They are TAR — Eq. (5a) with τ=0; consistent TAR — Eq. (5a) with τestimated; MTAR — Eq. (5b) with τ=0; and consistent MTAR — Eq. (5b) with τestimated. Since there is generally no presumption on which specification is used, it is recommended to choose the appropriate adjustment mechanism via model selection criteria of AIC and BIC (Enders and Siklos, 2001). A model with the lowest AIC and BIC will be used for further analysis.

Based on Equation (2a) and/or (2b), we examine the asymmetric cointegrating relationship by testing ($H_0: \rho_1 = \rho_2 = 0$). Theoretically, if the null hypothesis is rejected, one could conclude that there exists a cointegration of either symmetric ($H_0: \rho_1 = \rho_2 \neq 0$) or asymmetric form ($H_0: \rho_1 \neq \rho_2$) (Cai, et al, 2011). In the first test an F-test is employed to examine the null hypothesis. The test statistic is represented by Φ. This test does not follow a standard distribution and the critical values in Enders and Siklos (2001) should be used. If the null hypothesis of no cointegration is rejected, a standard *F*-test can be employed to evaluate the null hypothesis of symmetric adjustment in the long-run equilibrium, with the null hypothesis given as ($H_0: \rho_1 = \rho_2$)

Rejection of this null hypothesis indicates the existence of an asymmetric adjustment mechanism.

It is well known that, if all considered variables are cointegrated, and then there will be a corresponding ECM, for the Granger representation theorem (see Engle and Granger, 1987). The result could be extended to threshold cointegration. The specification assumes that the adjustment process due to disequilibrium among the variables is symmetric. Two extensions on the standard specification in the error correction model have been made for analyzing asymmetric price transmission. Granger and Lee (1989) first extend the specification to the case of asymmetric adjustments. Error correction terms and first differences on the variables are decomposed into positive and negative components. This allows detailed examinations on whether positive and negative price differences have asymmetric effects on the dynamic behavior of real estate prices. The second extension follows the development of threshold cointegration (Balke and Fomby, 1997; Enders and Granger, 1998). When the presence of threshold cointegration is validated, the error correction terms are modified further.

That is to say, if *Zt* and *At* are threshold cointegrated, then we could construct the following asymmetric ECM:

(6a)

$$\Delta A_t = \theta_A + \delta_A^+ E_{t-1}^+ + \delta_A^- E_{t-1}^- + \sum_{j=1}^{J} \alpha_{Aj}^+ \Delta A_{t-j}^+ + \sum_{j=1}^{J} \alpha_{Aj}^- \Delta A_{t-j}^- + \sum_{j=1}^{J} \beta_{Aj}^+ \Delta Z_{t-j}^+ + \sum_{j=1}^{J} \beta_{Aj}^- \Delta Z_{t-j}^- + \vartheta_{At}$$

(6b)

$$\Delta Z_t = \theta_z + \delta_z^+ E_{t-1}^+ + \delta_z^- E_{t-1}^- + \sum_{j=1}^{J} \alpha_{zj}^+ \Delta A_{t-j}^+ + \sum_{j=1}^{J} \alpha_{zj}^- \Delta A_{t-j}^- + \sum_{j=1}^{J} \beta_{zj}^+ \Delta Z_{t-j}^+ + \sum_{j=1}^{J} \beta_{zj}^- \Delta Z_{t-j}^- + \vartheta_{zt}$$

where ΔA and ΔZ are the real estate prices of Adriatic and Zagreb region in first difference, θ, δ, α and β are coefficients, and ϑ is error terms. The subscripts A and z differentiate the coefficients by region, t denotes time, and j represents lags. All the lagged price variables in first difference (i.e., ΔZ_{t-j} and ΔA_{t-j}) are split into positive and negative components, as indicated by the superscripts + and –. For instance, ΔZ_{t-j}^+ is equal to $(Z_{t-1} - Z_{t-2})$ if $Z_{t-1} > Z_{t-2}$ and equal to 0 otherwise; ΔZ_{t-j}^- is equal to $(Z_{t-1} - Z_{t-2})$ if $Z_{t-1} < Z_{t-2}$ and equal to 0 otherwise. The maximum lag J is chosen with the AIC statistic and Ljung–Box Q test so the residuals have no serial correlation. The error correction terms E, defined as $E_{t-1}^+ = I_t \hat{\xi}_{t-1}$ and $E_{t-1}^- = (1 - I_t) \hat{\xi}_{t-1}$, are constructed from the threshold cointegration regressions in Eqs. (4), (5a), and (5b). The former definition of the error correction terms, according to Sun (2011) not only considers the possible asymmetric price in response to positive and negative shocks to the deviations from long-term equilibrium, but also incorporates the impact of threshold cointegration through the construction of Heaviside indicator in Eq. (5a) and (5b).

Based on the results of the ECMs, we conduct some hypothesis testing. Note that the real estate price of Adriatic region is assumed to be the driving force and the long-term disequilibrium is measured as the real estate price spread between Zagreb and Adriatic. Thus, the expected signs for the error correction terms should be positive for Adriatic (i.e.,$\delta_A^+ > 0$, $\delta_A^- > 0$) and negative for Zagreb (i.e., $\delta_A^+ > 0$, $\delta_A^- > 0$).

The hypothesis that the Adriatic retail price Granger-cause its own price or the Zagreb retail price can be tested, by imposing the following restriction on the parameters of Equation 1, and then employing a F-test ($H_{01}: \alpha_i^+ = \alpha_i^- = 0$ for all lags *i* simultaneously). Similarly, the test can be applied to the Zagreb retail price ($H_{02}: \beta_i^+ = \beta_i^- = 0$ for all lags). The second type of hypothesis is concerned with the distributed lag asymmetric effect. At the first lag, for instance, the null hypothesis is that the Adriatic price has symmetric effect on its own price or the Zagreb price ($H_{03}: \alpha_1^+ = \alpha_1^-$). This can be repeated for each lag and both regions (i.e., $H_{04}: \beta_4^+ = \beta_4^-$). The third type of hypothesis is cumulative

asymmetric effect. The null hypothesis of cumulative symmetric effect can be expressed as $H_{05}: \sum_{i=1}^{J} \alpha_i^+ = \sum_{j=1}^{J} \alpha_i^-$ for Adriatic region and $H_{06}: \sum_{i=1}^{J} \beta_i^+ = \sum_{j=1}^{J} \beta_i^-$ for Zagreb region. As last, the equilibrium adjustment path asymmetry can be examined with the null hypothesis of $H_{07}: \delta^+ = \delta^-$ for each equation estimated.

4. Empirical data and analysis

4.1. Data

The data for this study comes from Croatia Real Estate Price Index developed by the *Burza Nekretnina* (real estate on-line portal), which is the first housing index system in Croatia. It is the most authoritative databank with the most comprehensive and detailed information on the Croatia property market covering Zagreb, Adriatic and rest of the Croatia. The CREPI real estate price index reflects price movements on a monthly basis of repeating sales on housing market. This article uses the real estate price index from May 2006 to March 2016 for two regions (Adriatic and Zagreb) for a total of 119 observations. Namely, the starting and the end period reflect state of data availability when the data are collected.

4.2. Descriptive statistics and unit root test

The descriptive statistics for the real estate prices of Zagreb and Adriatic are reported in Table 1.

Item	Zagreb level	Zagreb diff	Adriatic level	Adriatic diff.
Mean	102.188		122.470	
St.dev	8.904		7.281	
Min	88.3		100.0	
Max	116.603		137.030	
Obs.no	119		119	
ADF with trend	-1.982[1]	-6.254[1]***	-3.081[1]	-6.554[1]***
ADF with drift	-0.508[1]	-6.28[1]***	-2.256[1]	-6.654[1]***

Table 1. Descriptive statistics and unit root test results for the CREPI price index of Zagreb and Adriatic region

Notes: The critical values are−3.99, -3.43, and−3.13 for ADF test with trend, and−3.46, -3.14, -2.57 for ADF test with a drift at the 1%, 5%, and 10% level, respectively (Enders, 2004). The numbers in the bracket are lags used in the test.

*** Denotes significance at the 1% level.

Figure 1 displays the time series plots for the two CREPI indices. We can make three observations: (1) Jad- and Zag-real estate price indexes have an evident comovement in general, which reveals a high possibility of cointegration between these two series. (2) Although two indices move together most of the

time during our sample period, they also display divergent movement indicating possible nonlinear cointegration. (3). At the same time, the real estate prices value from Adriatic has grown steadily and has passed that from Zagreb since December 2006 (Fig. 1). Notice that for Adriatic real estate market, prices continued to rise until the year of 2009 and reach a peak in September of 2009, which was affected by great financial crisis and prevailing pessimism of potential apartment buyers afterward. In case of Zagreb the prices begin to deteriorate, much earlier, since free fall begin from Jun of 2007. Some summary statistics about these two indices are reported in Table 1. We find that the average price of the Adriatic real estate price index (122.470) is substantially higher than that of the Zagreb index (102.188), confirming what we saw in Figure 1. The average values of the both indexes coincide approximately with the value occurring in December 2010 (see Figure A1 & A2 in Apendices). The standard deviation of the prices of the Zagreb real estate price index is higher than that of the Adriatic, indicating a higher volatility in the Zagreb real estate market. The correlation coefficient is 0.44 between the two prices over the whole study period. The nonstationary properties of these two series are examined using the augmented Dickey– Fuller (ADF) test (Dickey; Fuller, 1979). Using that test, two different cases are considered: the case with drift, as well as the case with trend. The optimal lags are determined by Akaike Information Criterion (AIC). As reported in Table 1, the statistics reveal that unit roots cannot be rejected at the 1% level for the level forms of both the price variables but rejected for the first difference form. Thus, it is concluded that both the real estate prices for Zagreb and Adriatic are integrated of order one.

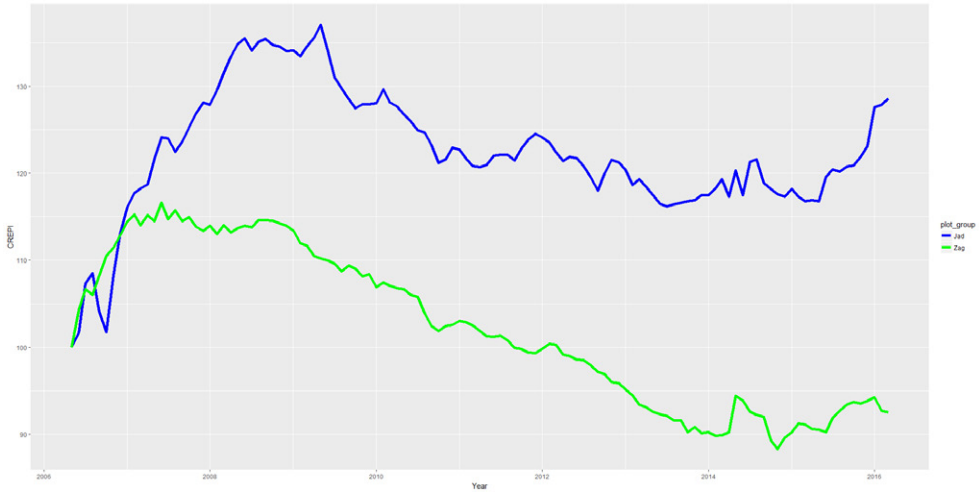

Figure 1. Monthly real estate prices indices from Zagreb and Adriatic (May. 2006–March. 2016)
Source: Author's computation

4.3. The linear cointegration analysis

Linear cointegration analyses are conducted using both the Johansen and Engle-Granger approach. Such traditional approaches require the same order of integration for finding a long-run relationship among the variables. Based on the lowest AIC and BIC, five lags are used in the regression when implementing Johansen approach. Without prior information, three model specifications with trend, constant, or no intercept are entailed (Table 2). For instance, with only a constant included, the Johansen maximum eigenvalue statistic (λmax) is 17.066 for the null hypothesis of no cointegrating vector between the prices of Zagreb and Adriatic. This is significant at the 5% level (our rule-of-the-thumb threshold) so the null hypothesis is rejected. However, for the null hypothesis of one cointegrating vector, the λmax statistic decreases to 6.23, which is not significant at all. Thus, the maximum eigenvalue statistic concludes that there is one cointegrating vector. Similarly, the Johansen trace statistic also supports the conclusion that the prices of Zagreb and Adriatic are cointegrated.

				Critical value		
Test	Specification	Lag	Statistic	10%	5%	1%
Johansen λ_{max}						
r=1	trend	5	11.39*	10.49	12.25	16.26
r=0	trend	5	24.914***	16.85	18.96	23.65
r=1	const	5	6.23	7.52	9.24	12.97
r=0	const	5	17.066**	13.75	15.67	20.2
r=1	none	5	1.538	6.5	8.18	11.65
r=0	none	5	14.755*	12.91	14.9	19.19
Johansen λ_{trace}						
r=1	trend	5	11.39*	10.49	12.25	16.26
r=0	trend	5	36.303***	22.76	25.32	30.45
r=1	const	5	6.23	7.52	9.24	12.97
r=0	const	5	23.297**	17.85	19.96	24.6
r=1	none	5	1.538	6.5	8.18	11.65
r=0	none	5	16.293*	15.66	17.95	23.52

Table 2. Results of the Johansen cointegration tests on the CREPI price index of Zagreb and Adriatic region

Notes: r is the number of cointegrating vectors. The critical values are from Enders (2004).

* Denotes significance at the 10% level.

** Denotes significance at the 5% level.

*** Denotes significance at the 1% level.

Engle and Granger suggested the following simple two-step estimator. In the first step, the long-term relationship between the real estate prices of Adriatic and Zagreb is estimated, as specified in Eq. (2). The statistic from the unit root test is -3.25 and it is significant at the 10% level. Yet, which alerts that the significance is weak. We cannot conclude that the Engle-Granger approach also confirms that the real estate prices of Adriatic and Zagreb are cointegrated (according to Eq.2), because the weak integration among those variables. In other words, assuming uni-directional causality, the Engle-Granger two step methodologies requires that the residual from the regression in levels (first step) be stationary - otherwise the second step is meaningless. Since cointegration according Engle and Granger was not proven in regard to the Eq. (2) we continue to test an Eq. (3) by reversed sides of two variables. The estimate for the coefficient on the Zagreb real estate price (i.e.,α1) is 0.391with a p-value of 0.000. In the second step, the residual is used to conduct a unit root test with the specification in Eq. (3). As reported in Table 3, the AIC and Ljung–Box Q statistics indicate that one lag is sufficient to address the serial correlation. Now, the statistic from the unit root test is -0.088 and it is significant at 5%. This step of the analysis proves that the Zagreb is the leader that reflects prices on the Adriatic market, although contrary to our theoretical considerations.

4.4. The error correction model analysis

The nonlinear cointegration analysis is conducted using the threshold autoregression models. Four models (i.e., TAR, MTAR and their consistent counterparts) are examined and the results are reported in Table 3. In selecting an appropriate lag to address possible serial correction in the residual series, a maximum lag of 12 is specified and tried at the beginning. Diagnostic analyses on the residuals through AIC, BIC and Ljung–Box Q statistics all reveal that a lag of three is sufficient.

Item	Engle-Granger	TAR	Consistent TAR	MTAR	Consistent MTAR
Estimate					
Lag		3	3	3	3
Treshold †		0	3.177	0	0.654
ρ_1	0.088** (-3.41)	-0.002 (-0.061)	0.005 (0.119)	-0.026 (-0.795)	0.02 (0.63)
ρ_2		-0.1* * * (-3.073)	-0.101* * * (-3.183)	-0.11* * * (-2.789)	-0.124* * * (-3.495)
Diagnostics					
AIC	437.975	426.372	425.759	427.238	423.767
BIC	446.313	442.841	442.229	443.708	440.236
QLB test(4)	0.284	0.826	0.813	0.89	0.845
QLB test(8)	0.263	0.929	0.922	0.913	0.922
QLB test(12)	0.135	0.844	0.868	0.721	0.742
Hypotheses					
$\Phi(H_0: \rho_1 = \rho_2 = 0)$		4.746	5.065*	4.297	6.114*
$F(H_0: \rho_1 = \rho_2)$		3.443* [0.066]	4.049** [0.047]	2.591 [0.121]	6.042** [0.016]

Table 3. Results of the Engle-Granger and threshold cointegration tests

Notes: † For the Engle-Granger cointegration test, ρ1 refers to ρ in Eq. (3). For the Engle-Granger cointegration test, the critical value is −3.067, -3.368, and −3.964 at the 10%, 5%, and 1% level, respectively (Enders, 2004). TAR refers to the threshold autoregressive model and MTAR is the momentum threshold autoregressive model. QLB (p) denotes the significance level for the Ljung-Box Q statistic; it tests serial correlation based on p autocorrelation coefficients (p=4, 8, 12). Φ is the threshold cointegration test with the critical values from Enders and Siklos (2001). F is a standard F-test on the asymmetry of the price transmission and the numbers in the brackets are p-values.

* Denotes significance at the 10% level.

** Denotes significance at the 5% level.

*** Denotes significance at the 1% level.

In estimating the threshold values for consistent TAR and MTAR, the method by Chan (1993) is followed. It turns out that different lag specifications in the models have little impact of the final threshold values selected. The variation of the sum of squared errors by threshold value for consistent MTAR with a lag of three is presented in Fig. 3. The whole range of Δ is from -1.063 to 1.411. Around the values of 0.51 zero and 0.63, the sum of squared errors is relatively low. The lowest sum of squared errors for the consistent MTAR model is 241.685 at the threshold value of 0.654. Similarly, the best threshold value with the lowest sum of squared errors is estimated to be 3.177 for the consistent TAR model. Finally, while the four nonlinear threshold cointegration models have similar results (Table 3), the consistent MTAR model has the lowest AIC statistic of 423.767 and BIC statistic of 440.236, and therefore, is deemed to be the best.

Focusing on the results from the consistent MTAR model, the F-test for the null hypothesis of no cointegration has a statistic of 6.114, it is weakly significant at the 10% level. Thus, the real estate prices of Adriatic and Zagreb are cointegrated with threshold adjustment. Furthermore, the F statistic for the null hypothesis of symmetric price transmission has a value of 6.042 and it is also significant at the 5% level. Therefore, the adjustment process is asymmetric when the prices of Adriatic and Zagreb adjust to achieve the long-term equilibrium. The point estimate for the price adjustment is 0.02 for positive shocks and -0.124 for negative shocks. Positive deviations from the long-term equilibrium resulting from increases in the Adriatic price or decreases in the Zagreb price ($\Delta\hat{\xi}_{t-1} \geq -0.654$) are eliminated at 2% per month. Negative deviations from the long-term equilibrium resulting from decrease in the Adriatic price or increases in the Zagreb price ($\Delta\hat{\xi}_{t-1} \leq -0.654$) are eliminated at a rate of 12.4% per month. In other words, positive deviations take about 4.16 years (1/0.02=50 months) to be fully digested while negative deviations take 0.8 months only. Therefore, there is substantially slower convergence for positive (above threshold) deviations from long-term equilibrium than negative (below threshold) deviations.

4.5. The threshold cointegration analysis

Given the consistent MTAR model is the best among these from the threshold cointegration analyses, the error correction terms are constructed using Eqs. (4) and (5b). The asymmetric error correction model with threshold cointegration is estimated and the results are reported in Table 4.

Item	Zagreb		Adriatic	
	Estimate	t-value	Estimate	t-value
(Intercept)	-0.205	-0.88	0.593*	1.779
α_1^+	0.062	0.332	-0.58* *	-2.171
α_2^+	-0.033	-0.166	0.764* * *	2.909
α_3^+	0.079	0.429	0.144	0.545
α_4^+	0.255.	1.538	-0.373.	-1.563
α_1^-	-0.126	-0.643	0.519*	1.845
α_2^-	0.369*	1.785	-0.166	-0.56
α_3^-	-0.297.	-1.482	-0.136	-0.475
α_4^-	-0.138	-0.73	0.626* *	2.316
β_1^+	0.096	0.881	0.32* *	2.056
β_2^+	-0.018	-0.163	0.161	1
β_3^+	0.042	0.388	-0.386* *	-2.507
β_4^+	-0.129	-1.275	0.172	1.189
β_1^-	-0.012	-0.093	0.212	1.12
β_2^-	0.135	0.909	-0.194	-0.916
β_3^-	-0.155	-1.003	0.279	1.261
β_4^-	0.242*	1.758	-0.05	-0.256
δ^+	-0.028	-0.987	-0.051	-1.237
δ^-	-0.039	-1.402	-0.164* * *	-4.14
R^2	0.205	-	0.429	-

Item	Zagreb		Adriatic	
	Estimate	t-value	Estimate	t-value
AIC	316.449	-	398.333	-
BIC	371.173	-	453.057	-
QLB test(4)	0.924	-	0.705	-
QLB test(8)	0.417	-	0.261	-
$H_{01}: \alpha_i^+ = \alpha_i^- = 0$	1.213	[0.3]	2.988* * *	[0]
$H_{02}: \beta_i^+ = \beta_i^- = 0$	0.92	[0.5]	2.773* * *	[0.01]
$H_{03}: \alpha_1^+ = \alpha_1^-$	1.475	[0.23]	3.895*	[0.05]
$H_{04}: \beta_4^+ = \beta_4^-$	3.283*	[0.07]	0.577	[0.45]
$H_{06}: \sum_{i=1}^{4} \beta_i^+ = \sum_{j=1}^{4} \beta_i^-$	0.791	[0.38]	0.97	[0.33]
$H_{07}: \delta^+ = \delta^-$	0.477	[0.49]	0.002	[0.96]
=	0.08	[0.78]	4.733* *	[0.03]

Table 4. Results of the asymmetric error correction model with threshold cointegration

Notes: Numbers in brackets are p-values. See Table 3 for QLB. For the hypotheses, H01 and H02 are Granger causality tests, H03 and H04 evaluate distributed lag asymmetric effect, H05 and H06 assess the cumulative asymmetric effect, and H07 is about equilibrium adjustment path asymmetric effect.

* Denotes significance at the 10% level.

** Denotes significance at the 5% level.

*** Denotes significance at the 1% level.

Diagnostic analyses on the residuals with AIC, BIC and Ljung–Box Q statistics select a lag of four for the model. In the equation for Zagreb, there are two coefficients significant at the 5% level (i.e.,α_{Z2}^-,β_{Z4}^+) and two coefficients significant at the 10% (i.e., α_{Z4}^+,α_{Z3}^-). In equation for Adriatic, there are ninth significant coefficients at least 5% (i.e. θ_A,α_{A1}^+, α_{A2}^+, α_{A4}^+, α_{A1}^-, α_{A4}^-, β_{A1}^+,β_{A3}^+, δ_A^-). There are two additional coefficients significant at the 15% level in each of the equations. The R2 statistic is 0.205 for Zagreb and 0.429 for Adriatic. The AIC statistic is 316.45 for Zagreb and 398.333 for Adriatic. Overall, the model specification has a better fit on Zagreb than on Adriatic. The hypotheses of Granger causality between the prices are assessed with F-tests. The F-statistic of 2.988 and the

p-value of 0.000 reveal that the price of Zagreb does Granger cause the price of Adriatic. However, the F-statistic of 1.213 indicates that the price of Adriatic does not Grange cause the price of Zagreb. Similarly, the F-statistics of 2.773 for Adriatic disclose that the lagged price series have significant impacts on its own price. Thus, in the short term, the price of Zagreb has been evolving more independently while the price of Adriatic has been dependent on the price of Zagreb in the previous periods and its own price.

Several types of hypotheses are examined for asymmetric price transmission. The first one is the distributed lag asymmetric effect. In each price equation, the equality of the corresponding positive and negative coefficients for each of the four lags is tested; in total, there are eight F-tests for this hypothesis. It turns out that two of them are significant at the 5% level. Distributed lag asymmetric effect is found for Zagreb for Adriatic price at lag four and for Adriatic for Zagreb price at lag one.

Furthermore, the cumulative asymmetric effects are also examined. The largest F-statistic is 0.97 but none of the four statistics are significant at the conventional level. Thus, there have been some distributed lag asymmetric effect but cumulative effects are symmetric.

The final type of asymmetry examined is the momentum equilibrium adjustment path asymmetries. For Zagreb, the F-statistic is insignificant. In contrast, for Adriatic, the F-statistic is 4.733 with a p-value of 0.03. Thus, there is momentum equilibrium adjustment asymmetry. The point estimates of the coefficients for the error correction terms are −0.051 for positive error correction term and - 0.164 for the negative one. While the sign is wrong for the first term, only second of them are significant at the conventional level (the corresponding p-value for -0.164 is 0.000). The magnitude suggests that in the short term the price of Adriatic responds to the positive deviations by 5.1% in a month but by 16.4% to negative deviations. Measured in response time, positive deviations take about 19 months to be fully digested while negative deviations take six months only. Therefore, it seems that in the short term the price of Adriatic has some different responding speed to positive and negative deviations. Namely, the price of Adriatic has a much slower reaction to positive deviations from long-term equilibrium than negative deviations.

5. Discussion of results

This section of the paper open discussion about price transmission mechanism in the real estate business between two main markets within the Croatia founded on our empirical results. The main aim of this paper was to study whether the Adriatic region is a price leader in transmitting shocks on Zagreb real estate market. We assumed that one of these regions has been the real estate price leader of the market and its price has been evolving more independently.

Recent empirical literature did not provide great help. So far, unknown is if any study that dealing with our hypothesis or same data processed with similar statistical technique, exist. Outlining similarities with other authors' models to compare our results in regard to economic significance with them is quite impossible. In the general panorama of past-to-present literature about real estate prices in Croatia and asymmetry transmission, early on, we did not find similar research. Thus, using the opinions and results of others, in an economic sense, to justify the efforts of this research are absent from the discussion.

The linear cointegrating relationship between two real estate markets has been used to pinpoint price leadership rule to one of them, by principle of exclude one in this set of two. Zagreb bears the reputation of the price leader because the statistic from the unit root test in Engle-Granger cointegration test is assessed with better significant value (at 5% and not at 10%). In our case, Zagreb's real estate prices as the driving force was found to have a long-run equilibrium relationship with the Adriatic real estate prices. This empirical result doesn't fit into the stylized story of real estate buyers travelling from abroad (and not only they) to buy condominium and therefore affecting demand conditions in neighboring's region. Zagreb has been the price leader of the market and its price has been evolving more independently. That result is not consistent with the trade pattern in real estate business of the two regions over the study period. Adriatic region on average outperformed Zagreb in traded construction unit volume and real estate prices as well. The price of Zagreb has been fluctuated between 88.3 and 117 according to CREPI, which is lower than the price of Adriatic (ranging from 100 to 137).

The transmission between the prices of Zagreb and Adriatic has been asymmetric in both the long term and short term. The threshold cointegration analysis (CMTAR) reveals that in the long term positive deviations of the price spread between the two regions take about 500 months to be fully digested, while negative deviations take less than one month. Similarly, in the short term, the error correction model reveals that Adriatic real estate buyers need 19 months to fully digest positive price shocks but about six months only for negative shocks. Therefore, it seems that in the short term the price of Adriatic has some different responding speed to positive and negative deviations. Namely, the price of Adriatic has a much slower reaction to positive deviations from long-term equilibrium than negative deviations. Overall, these firms, that where dealing with real estate (developers, real estate agency, individual investors, home owners) are more sensitive and act more promptly (with price menu correction), when price fluctuations reduce their excepted profits. The prices where easily pushed up with such a transmission mechanism and it helps to explain parallel price downturn after bursting the bubble. The coexistence of bubble ended while it burst first in Zagreb (around starting of 2007) and Adriatic (in last quarter of 2009).

There are some interesting findings revealed in Granger causality relationships that need to be discussed regardless hidden paradox in reveled prices direction. Firstly, although prices in Adriatic cities and other coastal sites may have influences on some of the same region along the Croatia's long coast, prices in capital Zagreb region, lead to house price changes in the Adriatic. The finding refutes the assumption that past house price movements in Adriatic may predict current Zagreb housing markets.

Furthermore, from the point of view of asymmetric price transmission in real estate business, our results suggest that at least some of the claims of the presence of nonlinearities in price transmission and associated price dynamics direction raised in the existing literature should be re-visited in a multiregional framework to account for the complexity of inter-country price interactions, especially in those country where tourism sector plays important role and is concentrated in some geographically homogenous region. Our paper aims to contribute to the literature on the issue of interregional (within unique country) price transmission, threshold behavior and asymmetric adjustments in the real estate market.

6. Conclusions

Thriving construction business in before financial crisis was stimulated by housing credit, for credit achieves many goals at same time. It pushes up house prices, making households feel wealthier. It creates more profits and jobs in the financial sector as well as in real estate brokerage and housing construction. In this paper we were focused on price dynamics prior and after financial crises in Croatia. We formed hypothesis that swelling demand for dwelling, stimulated by thriving tourism industry gives priority to Adriatic as price leader whereas accession of Croatia to the European Union that gives advantage to capital city plays not so important rule in getting former title. Several conclusions can be drawn from the analyses that can be presented as a new contribution. Findings confirm the asymmetric price transmission and threshold behavior in the real estate market in these regions but refute our hypothesis that Adriatic region as a strong tourist destination that attracts substantial buyers of the house units is a price leader. Zagreb has been the price leader of the market and its price has been evolving more independently. This is revealed by the resulted Granger causality test, uni-directional price causality exists where Zagreb's price cause Adriatic's price and not in vice versa. The research limitations emerged from short time span, but our whish was to catch-up just this time-snapshot with price time series in and around economic recession. Free fall of real estate prices in Zagreb in a larger part of the observed period caused a price to decline on the Adriatic coastal-side region. Adriatic price deflation was also in a while stimulated to decrease by its own force. It certainly favors a relatively fast convergence when negative deviation around the short and long-term equilibrium, of the prices occurred. Zagreb, comes to focus as a truly price leader, is

a capital city where housing prices have to begin fallen dramatically even two years earlier than in Adriatic as an overture in construction recession. Despite its vibrant economy otherwise, it is a city where it is relatively hard to build new dwellings (hence, it mirrors heaviness of prices decline), but where synergies and spillovers abound, especially on Adriatic real estate price aspect. The economic policy should mitigate intensity of negative asymmetric price transmission effect to spillover along Adriatic. The action plan should encourage investors to build more houses and offices in other continental part of Croatia, not exclusively in Adriatic, promoting other business by easing regulatory barriers to make new business and building, from zoning rules to legal acts, stimulating along this young population to stay in Croatia, in land with greater possibility than now. Because, when the price of housing rises in that part of Croatia, and the wealthy, who are more likely to own this kind of prime real estate now or new generations, will get wealthier, asymmetric transmission effect from Zagreb to Adriatic prices will become less stressful.

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Appendices

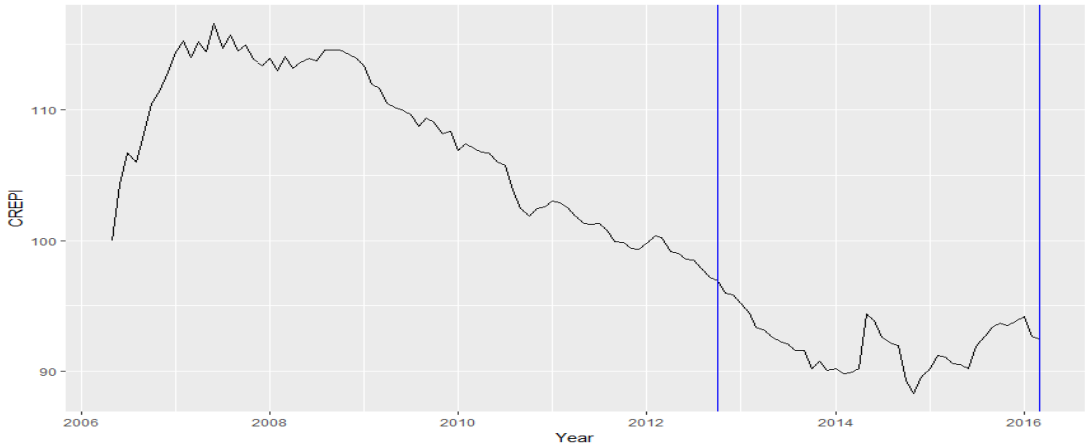

Figure A1. Monthly real estate price and mean in Zagreb
Note: First vertical line from the left shows mean value
Source: Author's computation

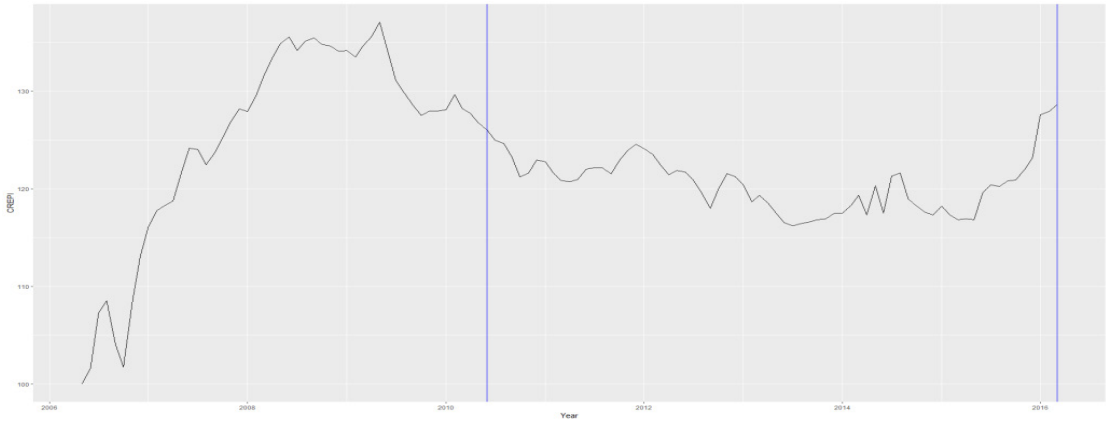

Figure A2. Monthly real estate price and mean in Adriatic
Note: First vertical line from the left shows mean value
Source: Author's computation

CHAPTER 34

EU Benchmark Regulation after LIBOR manipulation

Sanja Gongeta[1]

ABSTRACT

This paper examines legal and economic implications of manipulation of reference interest rate. In June 2012, the manipulation of the most significant reference interest rate - LIBOR in which participated some of the largest banks was confirmed. This, as many call it the biggest banking scandal undermined the confidence in the financial markets and investor protection, but also pointed to the lack of legal regulation of such fraudulent activities in the market. The main aim of this paper is to assess if the strengthening of the legal regulation can prevent possible further manipulation. The European Parliament's proposal for imposing penalties for trading based on inside information and market manipulation is analyzed. The findings suggest the importance of adequate regulatory framework, not only in the national but also in the broader context. Therefore, the paper compares financial regulation in the United States and the United Kingdom and analyses the latest Regulation for Benchmark – Setting in the European Union after the LIBOR Scandal.

Key words: LIBOR manipulation, interest rates, benchmark setting, Dodd Frank Act

JEL classification: G1, K2

1. Introduction

The London Interbank Offered Rate ("LIBOR") is the benchmark reference rate[2], established in 1986, most commonly used in international finance markets to interest rates paid between market counterparties and end users. (Walker, 2012:352) As an average interest rate for interbank loans, LIBOR represents the end product of a calculation based upon submissions of lending rates by leading banks. (Bainbridge, 2013.; Weldon, 2013: 202; Konchar, 2014)

Libor rates are produced daily for five major currencies: Pound Sterling (GBP), European euro (EUR), Japanese yen (JPY), Swiss Franc (CHF), and US

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2 A benchmark is an index or indicator calculated from a representative set of data or information that is used to price a financial instrument or financial contract, or to measure the performance of an investment fund.

Dollar (USD), with seven maturities quoted for each – ranging from overnight to 12 months, producing 35 rates each business day.

Latest data show that approximately $500 to $800 trillion worth of global financial instruments, including corporate debt, mortgages, student loans, interest rate swaps, and other derivatives, are tied to LIBOR, so there's no wonder that LIBOR is often called the "world's most important number". (Braml, 2016; Yeoh, 2016; Kohn, 2014:456; Snider & Youle, 2012; Bainbridge, 2013; Yeung, 2013; Konchar, 2014)

In August 2007, the LIBOR began to diverge from some of its historic relationships (Snider & Youle, 2012) that caused some doubts in its proper functioning and suspicion on manipulation by panel banks. The conduct of a number of banks involved in setting the rates between 2005 and 2008 was investigated by authorities in the United Kingdom, United States and elsewhere. (Walker, 2012:352) Investigations by regulators culminated in July of 2012 with admissions of manipulation by Barclay's, UBS, and the Royal Bank of Scotland. UBS admitted to manipulating the Yen LIBOR, while Barclay's has admitted to manipulating the Dollar LIBOR.[3]Admissions of manipulating LIBOR on a widespread and routine basis over the years have shocked both the regulators and market participants alike.[3] (Tabb & Groundfest, 2013)

In order to prevent market abuse, the LIBOR-setting process has been the subject of considerable examination in many jurisdictions. It was clear that adequate regulatory framework and improved structure and professionalism embedded in the rate-setting process, is needed, not only for prevention, but also for sanctioning such misconducts in financial world. (LIBOR Code of Conduct, 2014)

Significant changes in, at that time existing regulatory frameworks, started when Martin Wheatley[4] conducted an investigation of possible reforms in LIBOR calculating method. (Weldon, 2013) The Wheatley Review of LIBOR in September 2012 set out a plan for the reform of LIBOR which included regulation of LIBOR, institutional reform, the rules governing LIBOR, immediate improvements to LIBOR and International co-ordination. (Wheatley Review, 2012) One of the reforms in Wheatley's ten-point plan included transferring responsibility for LIBOR administration from the British Bankers' Association ("BBA") to a new administrator.[5]

The European Parliament also has adopted new rules to trading based on inside information and market manipulation and unlawful disclosure of information defined as a serious offense and as such prescribes imprisonment for a minimum term of four years. This is the first time across the European Union to

3 In the newspapers the scandal has been referred to as "epic in scale", and „presumably the biggest financial scandal ever".

4 At the time LIBOR Scandal came to light Mr. Martin Wheatley was Managing Director of the Financial Services Authority (FSA) and CEO-designate of the Financial Conduct Authority (FCA), and is now CEO of the FCA.

5 The new administrator took over the LIBOR administration in February 2014.

impose penalties for market abuse, all in order to restore confidence of citizens in the financial markets.

In addition, the aim of this article is to point out the importance of strengthening legal regulation in order to prevent possible further manipulation. Therefore, available data and scientific literature are analysed and compared.

The conclusion of this article is that adequate regulatory framework is crucial for preventing manipulations in benchmarks settings which affects the health of financial markets and eventually financial stability.

This article is organized as follows. Section 2 summarizes the extant literature of history and significance of LIBOR, definition of manipulation, with special emphasis on LIBOR manipulation, Section 3 presents the methodology analysing the latest reforms in benchmark Regulations, and Section 4 the data. Section 5 presents and discusses the results and avenues for further research, while Section 6 concludes the paper.

2. Literature review

There is a wide literature on one of the most popular interest–rate models. This article relates to two main streams of the literature – the one that defines and explains the importance of Libor, and the recent one that studies on Libor manipulation and its consequences.

As noted before, the London Interbank Offered Rate is a set of indices that represent the prevailing interest rates in London money markets denominated in various currencies and for various durations and represents the cost of funds for major banks lending to each other. (Brady, 2012:2)

Similar rates exist in other markets, like the Hibor in Hong Kong, but some previously existing rates like Pibor in Paris, the Fibor in Frankfurt and the Ribor in Rome, merged into the EURIBOR (Euro Interbank Offer Rate), which is the benchmark interbank rate offered in the Euro zone for unsecured funds in Euro. (van Gestel & Baestens, 2009)

The LIBOR Market Model was introduced by Miltersen, Sandmann and Sondermann (1997) and Brace, Gatarek and Musiela (1997). As Goetsch (2006:13) clarifies, the model is called BGM from the names of the authors of one of the first papers where it was introduced.

Rebonato (2002) reviews a historical development of LIBOR market model, lays out its mathematical and modelling framework and shows the types of product that can be handled by the modern pricing approach.

With their numerical illustrations Gaterek, Bachert and Maksymiuk (2006) provide the starting point to master market model skills. Theoretical and practical issues of the LIBOR market model are presented in Goetsch (2006).

Regulatory investigations connected to the LIBOR scandal are on-going story and, in accordance to that, the story is interesting for many researchers.

The first doubts in LIBOR manipulation where presented in different newspapers[6] written by columnists of market practitioners at the beginning of 2008 followed by the first papers written and published within academia. (Kohn, 2014; Fouquau and Spiser, 2015:634; Yu, 2013)

In 2008 Abrantes-Metz et al. extended the Wall Street Journal Study and compared of LIBOR with other rates of short-term borrowing costs, evaluated the individual bank quotes submitted to the British Banker's Association and made a comparison of these individual quotes to individual CDS spreads and market cap data.[7] (Fouquau & Spieser, 2015:634)

Christopher Hall presents the three issues in his research: a problem with the people involved in setting LIBOR, a problem with the publicity that banks face when they submit their rates to LIBOR and a problem with the way LIBOR is calculated that allows it to diverge too far from market realities. Hall also compares Banking Regulations in the United Kingdom and in the United States and explains how the Wheatley Review "embodies the hybrid approach" of these two systems.

Allen Kohn defines LIBOR and answers the question "what went wrong" by explaining early warnings signs and responses to LIBOR being manipulated.

Abrantes-Metz, Rauterberg and Verstein (2013) bring relevant review of manipulation in the United States after the Dodd-Frank Act. For resolving a lack of trust in rate setting process, Rebecca Tabb and Joseph Grundfest (2013) research adequate substitutes and alternatives for LIBOR.

3. Methodology/Method/Model/Conception of analysis

Money market, where banks lend each other cash or borrow it from the central bank, is one particularly important market in the financial world. Banks always negotiate individually over the rate at which they enter into a loan and that rate changes arbitrarily over time, there is the concept of an average rate which is fixed once on a daily basis. (Kenyon & Stamm, 2012:1)

In the EUR market, that Interbank Offer Rate is called EURIBOR and for all currencies that are traded on the money market in London is called LIBOR. (Kenyon & Stamm, 2012:2)

6 Mackenzie and Tett, as well as Mollenkamp and Whitehouse in 2008 questioned the honesty of LIBOR in different newspapers (The Wall Street Journal, Global Financial Stability Review, Financial Times) in an attempt to estimate heuristically the normal level of LIBOR from an intuitive point of view.

7 The authors made their research with different analyses during the three periods crucial for LIBOR manipulating suspicions. Period 1 included: 1/1/07 through 8/8/07, Period 2: 8/9/07 through 4/16/08, and Period 3: 4/17/08 through 5/30/08.

As earlier said, the object of this article is to point out the importance of adequate legal regulation in preventing possible further manipulation in benchmark setting, so the emphasis on the recent literature of LIBOR manipulation and its economic and legal impact is taken.

The methodology used in this article is consistent with those that are usually used to point out the potential anticompetitive behaviour by market participants.

Following the Yeoh (2016), Hall (2013), Kohn (2014) and Abrantes-Metz, Rauterberg and Verstein (2013) research, this article makes an overview from the history of LIBOR and its significance to the research of LIBOR manipulation and latest legal reforms.

Also, like Abrantes-Metz, Rauterberg and Verstein's research from 2013, this article analyses the definitions and common types of manipulation, regarding on LIBOR manipulation.

In order to prove the importance of adequate regulatory framework, not only in national legislation, but also in wider context, the European Parliament's regulation for imposing penalties for trading based on inside information and market manipulation is analysed.

4. Empirical data (documentation background) and analysis

In addition to explain the importance of stronger and adequate regulatory framework, not only in the national but also in the broader context, this section contains the theoretical analyses of recent researches.

4.1. History and Significance of LIBOR

Back in the 1969 the London branch of Manufacturers Hanover Bank organized an $80 million syndicated loan for the Shah of Iran pegged to an interbank offered interest rate based in London. According to Yu (2013:1277) that's the one of the first uses of LIBOR. In his article, Yu also explains that "the boom of the global loan market and the creation of the Eurodollar paved the way for Libor's broad use as a benchmark rate based in London".

In the mid-1980's the British Banker's Association sought to standardize rate terms on interest rate swaps between London based banks and in 1986 introduced London Interbank Offered Rate (LIBOR) to standardize rate terms on a wider variety of securities, including syndicated loans, futures contracts, and forward rate agreements. (Abrantes-Metz et al. 2008:4; Hou, Skeie, 2014:1) At that time LIBOR fixings were calculated for the U.S.dollar, the British pound, and the Japanese yen.

In modern markets LIBOR serves two primary purposes: as a reference rate - a rate that financial instruments can contract upon to establish the terms of agreement and as benchmark rate, which reflects a relative performance

measure, often times for investment returns or funding costs. LIBOR serves as the primary reference rate for short-term floating rate financial contracts like swaps and futures. (Hou, Skeie, 2014:1)

In their research Hou and Skeie "LIBOR: Origins, Economics, Crisis, Scandal, and Reform" seek for the rationale for the wide usage of LIBOR. They conclude it stems from its construction "Because LIBOR represents the terms at which the world's largest and most financially sound institutions are able to obtain funding on a short-term basis, it serves as the lower bound for the borrowing rate of other less creditworthy institutions and individuals". (2014:3)

From its beginning until the early 2014,[8] LIBOR was administrated by British Banker's Association (BBA) which main role included lobbying efforts on the behalf of more than 200 banks from nearly 60 countries doing business in the United Kingdom, and promoting the banking industry reputation. (Konchar, 2014:3)

From the 1st February 2014, the new administrator, ICE Benchmark Administration (IBA) took over the responsibility on administrating LIBOR. From that date "the world's most important number", formerly known as BBA LIBOR became ICE LIBOR.

(ICE) LIBOR is designed to reflect the short term funding costs of major banks active in London. (Yu, 2013) Like other financial benchmarks, LIBOR is a "polled" rate which means that a panel of representative banks submits rates which are then combined to give the LIBOR rate. LIBOR is a benchmark rate produced for five currencies with seven maturities quoted for each - ranging from overnight to 12 months, producing 35 rates each business day.[9]

As earlier said, ICE Benchmark Administration maintains a reference panel of contributor banks for each currency calculated. IBA currently fixes in the following five currencies: CHF (Swiss Franc), EUR (Euro), GBP (Pound Sterling), JPY (Japanese Yen) and USD (US Dollar).

Panel banks are required to submit a rate in answer to the LIBOR question: "At what rate could you borrow funds, were you to do so by asking for and then accepting inter-bank offers in a reasonable market size just prior to 11 am London time?" Submissions are based upon the lowest perceived rate at which a bank could go into the London interbank money market and obtain funding in reasonable market size, for a given maturity and currency.[10]

8 In section three, Reform in Banking Regulation we'll explain why did a new administrator take over LIBOR.

9 https://www.theice.com/iba/libor (October 3, 2017)

10 https://www.theice.com/iba/libor (October 3, 2017)

NUMBER OF CONTRIBUTORS	METHODOLOGY	NUMBER OF CONTRIBUTOR RATES AVERAGED
16	Top 4 highest rates, tail 4 lowest rates	8
15	Top 4 highest rates, tail 4 lowest rates	7
14	Top 3 highest rates, tail 3 lowest rates	8
13	Top 3 highest rates, tail 3 lowest rates	7
12	Top 3 highest rates, tail 3 lowest rates	6
11	Top 3 highest rates, tail 3 lowest rates	5

Table 1. Calculating LIBOR

Source: https://www.theice.com/iba/libor

As explained in Table 1, every ICE LIBOR rate is calculated using a trimmed arithmetic mean.[11] Once each submission is received, they are ranked in descending order and then the highest and lowest 25% of submissions are excluded. This trimming of the top and bottom quartiles allows for the exclusion of outliers from the final calculation.

The remaining contributions are then arithmetically averaged and the result is rounded to five decimal places to create an ICE LIBOR rate. This is repeated for every currency and maturity, producing 35 rates every business day

4.2. Manipulation of LIBOR

In 2007 Libor appeared artificially low, signalling that banks might be understating borrowing costs to hide their financial problems. (Konchar, 2014:5; Mollenkamp, Whitehouse, 2008) and during the sub-prime mortgage crisis of 2008, there was worry about the health of individual banks and their ability to withstand the crisis. (Hall, 2014:160)

The first doubts in LIBOR manipulation where presented in different newspapers[12] written by columnists of market practitioners at the beginning of 2008 followed by the first papers written and published within academia. (Kohn, 2014; Fouquau and Spiser, 2015:634; Yu, 2013)

11 The methodology is reviewed by the ICE LIBOR Oversight Committee as documented in its Terms of Reference. The frequency of reviews is set by the Oversight Committee through its Calendar of Agenda Items.

12 Mackenzie and Tett, as well as Mollenkamp and Whitehouse in 2008 questioned the honesty of LIBOR in different newspapers (The Wall Street Journal, Global Financial Stability Review, Financial Times) in an attempt to estimate heuristically the normal level of LIBOR from an intuitive point of view.

The Wall Street Journal's analysis indicated "that several banks—Citigroup, JP Morgan Chase, and UBS—were reporting significantly lower borrowing costs for the Libor than other market measures suggested"…. and knowing that "Libor is supposed to reflect the average rate at which banks lend to each other, the effect was that it appeared that the banking system was doing better than it actually was". (Konchar, 2014:7; Mollenkamp, Whitehouse, 2008)

In the meantime, facts regarding LIBOR manipulation were coming to light showing that both internal and external manipulation requests were numerous and made verbally and in writing.

In late June 2012 the United Kingdom's Financial Services Authority and Barclays Bank PLS announced a settlement agreement in which Barclays agreed to pay a fine of $92.8 million U.S. dollars and acknowledged its role in manipulating the LIBOR.

Hall (2014:158) explains "Financial Services Authority found that "Barclay's acted inappropriately on numerous occasions between January 2005 and July 2008 by making US dollar submissions . . . that took into account requests made by its (own) interest rate derivatives traders." Barclays's LIBOR submissions also considered requests from derivatives traders from other banks. Furthermore, the Financial Services Authority found that Barclay's had manipulated LIBOR submissions by "taking into account concerns over the negative media perception of Barclays's LIBOR submissions." LIBOR submissions are supposed to be formed only as a response to the prompt question. Consideration of either of these factors was therefore inappropriate because neither factor was directly related to the cost of borrowing money. The CFTC's charges and findings in the United States echoed those of the FSA"."

As noted before, Barclay's manipulation requests where both internal and external. External manipulations of LIBOR were at the request of traders[13], and internal requests of LIBOR manipulations were of Barclay's Management.

13 As Hall (2014:159) notices, E-mail correspondence was informal: "Your annoying colleague again . . . Would love to get a high 1m Also if poss a low 3m . . . if poss . . . thanks" (February 3, 2006, Trader in London to Submitter). "Hi Guys, We got a big position in 3m libor for the next 3 days. Can we please keep the libor fixing at 5.39 for the next few days. It would really help. We do not want to fix any higher than that. Tks a lot." (13 September, 2006; Senior Trader in New York to Submitter).

After Barclay's settlement, in early 2013, similar settlements were announced with both the Royal Bank of Scotland and UBS. (Hall, 2014:154,155)[14] The cumulative fines for LIBOR manipulation reaching amount to $8 billion dollars is larger than any of the previous fines imposed on financial institutions.

Regulatory investigations connected to the LIBOR scandal are on-going story and, in accordance to that, the story is still interesting for many researchers.

4.3. Reforms in Banking Regulation

As noted before, the LIBOR scandal undermined the confidence in the financial markets and investor protection, but also pointed to the lack of legal regulation of such fraudulent activities in the market.

Gandhi et al. (2015:1) and Coffee (2007) notice that LIBOR manipulation appeared in banks incorporated outside the United States, where enforcement was "historically weaker". [15]

As Hall (2015:170) concludes, it is because banking regulation in the United States "represents a set of accumulated responses to a long history of financial crises, scandals, happenstance, personalities, and compromises among a broad and competing array of industry and government units."[16]

The main financial regulator in the United Kingdom is the Financial Services Authority, created by the Parliament after passing the Financial Services and Markets Act of 2000 (FSMA). With its operationally independence from the government of the United Kingdom, the Financial Services Authority measures financial firms according to guiding principles[17]: "maintain confidence in the U.K. financial system, contributing to the protection and enhancement of the stability of the U.K. financial system, securing the appropriate degree of protection for

14 At last, UBS fessed up first and cooperated with a DOJ investigation in order to avoid criminal charges in connection with currency rigging. Total fines: $545 million $203 million criminal fine to the DOJ in connection to LIBOR rate rigging; $342 to the Federal Reserve in connection with its forex investigation (no criminal charges); Barclays: Total fines: $2.4 billion, Eight additional employees fired for their roles in forex manipulation; Fine breakdown: $650 million criminal fine to the DOJ, plus an additional $60 million fine for violating a non-prosecution agreement. So $710 million to the DOJ total; $342 million to the Federal Reserve in connection with its forex investigation; £284 million (about $443 million) to the UK's Financial Conduct Authority $485 million to the New York State Department of Financial Services; $400 million to the CFTC;
Citi: Fines: $925 million criminal fine to the DOJ; $342 million to the Federal Reserve in connection with its forex investigation; *JPMorgan* Fines: $550 million criminal fine to the DOJ; $342 million to the Federal Reserve in connection with its forex investigation; *Royal Bank of Scotland* :Fines:$395 million criminal fine to the DOJ; $274 million to the Federal Reserve in connection with its forex investigation; *Bank of America*: Fines: $205 million civil monetary penalty to the Federal Reserve; Deutsche Bank $2.5 billion, Societe Generale $605 million.

15 In order to explain the US tradition of securing the free financial market, it is important to point out The Sherman Antitrust Act, enacted in 1890, as the leading federal statute on competition law that is designed to deter activities that reduce competition in the marketplace.

16 Hall also brings a detailed description of federal regulatory agencies relevant to the LIBOR scandal: The Commodities Futures Trading Commission and The Department of Justice.

17 These "Principles of Businesses" Barclay's violated in the LIBOR scandal.

consumers and reducing the extent to which it is possible for a business carried on. To be used for a purpose connected with financial crime." (Hall (2015:163)

After the LIBOR manipulation became public, the Chancellor of the Exchequer requested a review and report on the reforms to LIBOR. This review, later named Wheatley's review, after Martin Wheatley, identified several key weaknesses in then-current U.K. regulatory model as it related to LIBOR and the final report made a number of recommendations to address the problems identified with LIBOR. (Hall, 2015:166)

The recommendations included "introducing statutory regulation of administration of, and submission to, LIBOR and "the creation of new criminal offenses under the FSMA". (The Wheatley Report, 2012)

After regulators launched formal investigations and soon after the first allegation of LIBOR manipulation, the first change (following Wheatley Report recommendations) was made in 2013 when the administration of LIBOR was transferred from British Banking Association to the ICE Benchmark Administration.

Comparing the United States and the United Kingdom banking regulation in light of the LIBOR scandal, it is evident that adoption of the Review's recommendations represents a move towards the U.S. model which includes more invasive regulation and sanctions. Hall (2015:180) concludes that the United Kingdom move forward to the better model of financial regulation, especially enacting the recommendations of the Review.

LIBOR manipulation scandal also made its effect on European Union's legal framework.

At the European Union level, in July 2012 the European Commission put forward proposal to amend its proposals for a Regulation on market abuse and for a Directive on criminal sanctions for market abuse to ensure that any manipulation of benchmarks is clearly illegal. (ESMA-ESBA Principles on Benchmark-Setting Process in the EU:6)

On 6 June 2013 European Securities and Markets Authority (ESMA) and European Banking Authority (EBA) published Principles on Benchmark-Setting Process in the EU to address the problems in the area of benchmarks as a transition path toward potential future legal obligations. The Principles didn't replace any EU or national regulation in that area but were crucial for the period until a formal regulatory and supervisory framework for benchmarks has been devised. In order to instil confidence in financial markets and market participants as well as guarantee the integrity of the Benchmark formation process, a framework for any Benchmark setting process was obliged to include that Principles.

The Principles covered every stage of the Benchmark process starting with Benchmark Data Submission, Benchmark Administration, Benchmark Calculation, Benchmark Publication the use of Benchmarks, and the continuity of Benchmarks.

On September 2013, the European Commission published Proposal for a Regulation on indices used as benchmarks in financial instruments and financial contracts explaining some crucial changes that should be made.

The main objective of the Proposal was to ensure that benchmarks produced and used in EU are robust, reliable, and representative and fit for purpose and that they are no longer subject to manipulation. (MEMO:3)

Proposal suggested crucial changes that included: regulation and supervision of benchmark providers and contributors who already were regulated (financial institutions); Managing conflicts of interest; ensuring appropriate governance and controls over the benchmark-setting process made by the providers of benchmarks and contributors to benchmarks; transparent and robust methodologies that need to ensure the use of sufficient, accurate and representative underlying data; improved transparency of the benchmark-setting process; and suitability of assessments of benchmarks for retail contracts. (MEMO:3)

On 17 May 2016, the European Council adopted this new rules aimed at ensuring greater accuracy and integrity of benchmarks in financial instruments.

It is important to note that before the latest Regulation on indices used as benchmarks in financial instruments,[18] Union consumer protection rules did not cover the particular issue of adequate information on benchmarks in financial contracts.

5. Results and discussion

Manipulations are quite different from traditional price-fixing cartels so the different approaches to detect manipulation are needed. As Abrantes-Metz at al. (2008:7) research explains, “Screening processes for manipulations are very similar to those for conspiracies, but they are difficult to develop and implement because of the variety of forms that are utilized by manipulators”.

LIBOR manipulation is being described as “a cartel of banks manipulating interest rates that affect hundreds of trillions of dollars in financial products, including adjustable rate mortgages, credit cards, interest rate swaps, and interest rates on government bailout funds”. (Foster, 2015:292)

Knowing that LIBOR rates are a benchmark for interest rates on a global scale, and knowing that LIBOR is an indicator of the financial stability of the major banks in the world, it is clear that it has to be predictable, stable, and reflect market fundamentals.

Following and analysing some recent papers on LIBOR scandal (Fouquau, Spieser, 2015:633; Walker, 2012, Konchar, 2014, Abrantes-Metz at al. 2008, Gotsch, 2006, Foster, 2015) this article shows that the integrity of benchmark

18 Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds and amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014 OJL of the European Union, L 171.

reference rates is of fundamental importance to all financial markets, in that LIBOR is supposed to be an overall and reliable assessment of the health of the financial system. LIBOR manipulation was initially stronger for banks incorporated outside the United States “Where enforcement is historically weaker, and that is disappeared in the aftermath of LIBOR investigations” (Gandhi et Al, 2015)

The most complete study was made by Abrantes-Metz et al. (2011) who compared many different analyses during period affected by different and significant economic events (01.01.2007.-05.03.2008). They made a comparison of LIBOR with other rates of short-term borrowing costs, an evaluation of individual bank quotes and a comparison of these individual quotes to individual CDS spreads and market cap data. (Fouquau, Spieser, 2015:634)

Ghandi et al. (2015:4) found that the evidence for manipulation is initially strong but disappears after 2010 and they connect it with the regulators investigation of banks in their probe of LIBOR manipulation.

In order to prevent market abuse, The United Kingdom, as well as The European Parliament, have adopted new rules to trading based on inside information and market manipulation and unlawful disclosure of information defined as a serious offense and as such prescribes imprisonment for a minimum term of four years.

The EU has taken a further step towards restoring public trust in financial benchmarks in the wake of recent scandals over the manipulation of the LIBOR and EURIBOR benchmarks. In a move welcomed by the European Commission, the Council has given its backing to new proposed rules to enhance the robustness and reliability of benchmarks, which are used in financial instruments (e.g. bonds, shares, futures or swaps) and financial contracts (e.g. mortgages or consumer contracts) in the EU.

The Commission proposed new standards in September 2013 after it emerged that some benchmarks had been manipulated, resulting in multi-million euro fines on several banks in Europe and in the US, and these new rules were adopted in 2016.

6. Conclusions

The LIBOR manipulation scandal is the last banking scandal brought to the light since the financial crisis of 2008. The pricing of many financial instruments and financial contracts depends on the accuracy and integrity of benchmarks and the free financial market must be competitive and transparent. Knowing that LIBOR rates are a benchmark for interest rates on a global scale, and knowing that LIBOR is an indicator of the financial stability of the major banks in the world, it is clear that it has to be predictable, stable, and reflect market fundamentals.

After LIBOR manipulation became public, a number of initiatives to reform reference rate-setting mechanisms have been launched across wide parts of the regulatory communities and the financial markets. In order to prevent market abuse, the European Parliament adopted new regulation on indices used as benchmarks in financial instruments and financial contracts. This is the first time across the European Union to impose penalties for market abuse, all in order to restore confidence of citizens in the financial markets.

The new regulation aims to enhance the robustness and reliability of benchmarks, thereby strengthening confidence in financial markets but also aims to restore trust in indices used as financial benchmarks, following manipulation scandals in recent years.

Whether they succeeded, it remains to be seen in the upcoming time

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CHAPTER 35

Monetary and absorption approach to explain croatian current account

Milan Bošnjak, Ivan Novak, Ante Krišto

ABSTRACT

The paper brings the determinants of Croatian current account dynamcs under monetary and absorption approach. The research employed newly developed Non-linear Autoregression Distributed Lag (NARDL) approach that takes into account nonlinear and asymmetric nature of the relitationship between Croatian current account and its determinants. Estimated results on a quartarly data sample from the first quarter of 2000 to the second quarter of 2017 reveals that that Croatian current account can be expalined using monteray and absorption approach. Domestic demand, real exchange rate index, loans to private sector and monetary aggregates M4 are tested as the determinants of Croatian current account. Monetary aggregates M4 are found to hold the highest explanatory power among tested monetary variables.

Key words: asymmetric cointegration, current account, monetary approach, absorbtion approach, Croatia.

JEL Classification: C22, C51, F14, F43.

1. Introduction

Croatia experienced trade and financial liberalization in a last two and half decades and eventually joined the European Uninon (EU). The current account deficit in Croatia and other similar countries persisted until recently. One stand of litarature expain the current account deficit of European transition countries by growth in domestic demand financed by the inflow of foreign loans and real appreciation of domestic currencies (Aristovnik, 2008; Zakharova, 2008; Bakker and Gulde, 2010; Obadić et al., 2014). Bilas and Bošnjak (2015) examined of international trade between Croatia and the rest of the EU member countries and found that trade patter as suggested by Heckscher-Ohlin trade theorem while Croatia appeared as the labour abundant country. This paper examines the Croatian current account in lights of monetary and absorption approach. The main idea of absorption approach is that current account will improve if its output of goods and services increases by more than its absorption (Harberger, 1950).

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The monetary approach pointed on demand and supply of money and its relationship as the one that determines current account balance (Polak, 1957). It is reasonable to assume that the former as well as the later approach contributes to explain the dynamics in the Croatian current account.

The remainder of this paper is organized as follows: Section 2 briefly summarizes existing literature related to the topic under consideration. Section 3 presents methodology and research data, while Section 4 empirical analysis. The final section provides an overview of the main findings of the research.

2. Brief related literature overview

Ozgur and Memis (2017) examined the trade deficits of the eleven eurozone - countries and explained the tradede deficit of sample countries by credit expansion and asset prices while no significant effects was reported for countries with trade surpluses. Shahid Hassan et al (2017) employed ARDL bound testing to examine the determinants of trade deficit in Pakistan, India and Bangladesh and found real effective exchange rate, per capita income and money supply as the significant determinant of trade flows for the considered countries. Davis et al. (2016) pointed that combination of credit growth and external deficits increases the probability of a banking crisis. Ekinci et al. (2015) suggest that at the early stages of financial development, acceleration in the credit growth might cause deterioration in the current account. Elhaddadi and Karim (2017) examined the Moroccan case under monetary approach (Polak, 1957) and reported the theoreticaly consistent adjustment. Khalid Yousif and Attahir Musa (2017) employed VECM approach in its linear specification form to examine the determinants of Sudan balance of payments and reported the significant role of foreign debt, inflation, gross domestic product and exchange rate. Meniago and Hinaunye Eita (2017) reported the significant role of exchange rate changes for imports, exports and trade balance in Sub-Saharan Africa but the response is found to be extremely low. Chukuet al.(2017) examined the long-run and short-run determinants of current account balances in West Africa and reported different short-run and long-run determinants. Unger(2017) pointed that bank loans to the non-financial private sector were a significant determinant of the current account in the countries with current account deficit. Folloeing the extensive overview of empirical literature Kauko (2014) pointed that during a typical build-up phase, domestic banks borrow internationally to finance domestic lending and consequently boosting the current account deficit. Some recent papers reported nonliner and regime dependent dynamics in trade flows (Khadaroo, 2016; Topalli and Dogan, 2016). Conclusively, this paper contributes to the existing literature with Croatian case while taking into account the posible nonlinear and asymmetric relationship between Croatian current account and its determinants.

3. Research data and methodology

The research is based on the quartarly data on imports, exports, domestic demand, real effective exchange rate index, loans to private sector and montetary aggregates M4 from the first quarter of 2000 to the second quarter of 2017. The imports, exports and domestic demand series are obtained from Croatian Bureau of statistics while real effective exchange rate index, loans to private sector and montetary aggregates M4 series are obtained from Croatian National Bank. The observed series that represent current account in this paper is given by the equation (1):

$$\mathrm{CA} = \frac{\mathrm{EXP}}{\mathrm{IMP}} \tag{1}$$

where IMP represents the level of import and EXP the level of exports.

Domestic demand over Gross Domestic product (GDP) is represented by the variable Loans to private sector over GDP and montetary aggregates M4 over GDP are represented by the variables LTPS and M4, respectivelly. Real effective exchange rate index is denoted by the variable REER All of the variables under consideration are X-13 ARIMA seasonally adjusted and taken in (natural) log values. Firstly, using standard unit root test (ADF, PP, KPSS) the variables are tested for existence of unit root and insigts into property of stationarity are provided for the observed series. Here needs to be stated that the Non-linear Autoregression Distributed Lag (NARDL) approach we follow in this paper requires that all of the observed variables are stationary I(0) or integrated of order one I(1). NARDL approach developed by Shin et al. (2011) is employed in this paper in order to take into account the nonlinear relationship between the Croatian current account and variables under consideration. In the NARD approach we follow in this paper the short – run and long-run nonlinearities are introduced through positive and negative partial sum decompositions of the explanatory variables. As already stated and contrary to standard linear cointegration approach, this model specification does not depend on the degree of the integration of the variables.

So, the increase (X_{it}^{+}) and decrease (X_{it}^{-}) of of the independent variables (X_{it}) can be defined with the application of partial sum process as given by the equations (2) and (3).

$$\mathrm{X}_{it}^{+} = \sum_{j=1}^{t} \Delta \mathrm{X}_{ij}^{+} = \sum_{j=1}^{t} \max(\Delta \mathrm{X}_{ij}, 0) \tag{2}$$

$$\mathrm{X}_{it}^{-} = \sum_{j=1}^{t} \Delta \mathrm{X}_{ij}^{-} = \sum_{j=1}^{t} \min(\Delta \mathrm{X}_{ij}, 0) \tag{3}$$

Firsly, NARDL model is employed to obtiane the estimates for the absorption approach only and the model specification is given by the equation (4):

$$\Delta \mathrm{CA}_{\mathrm{t}} = \alpha_0 + \beta_1 \mathrm{CA}_{\mathrm{t-1}} + \beta_2 D_{t-1}^{+} + \beta_3 D_{t-1}^{-} + \sum_{i=1}^{p-1} \gamma_i \Delta \mathrm{CA}_{\mathrm{t-i}} + \sum_{i=1}^{q} \delta_i^{+} \mathrm{D}_{t-i}^{+} + \sum_{i=1}^{q} \delta_i^{-} \mathrm{D}_{t-i}^{-} + \varepsilon_t \tag{4}$$

Similarily, the model specification is extended using various variables representing the monetary sector (real effective exchange rate index, loans to private sector and montetary aggregates M4). After the NARD model estimates are obtained, following Pesaran et al. (2001) the long run and short run asymmetric effects are tested. Eventualy, using ARCH Test, Breusch-Godfrey Serial Correlation LM Test and Jarque-Bera Test diagnostic test are performed for each od the estimated model.

4. Empirical results and discussion

Following the procedure described in the section Research data and methodology, unit root testsresults are summarized in Table 1.

Variable and test	Levels		First difference	
	Constant	Constant and trend	Constant	Constant and trend
ADF test	**t-stat.**			
	-1.373234	-3.690647	-10.72338	-10.83391
	-3.068337	0.006005	-2.933066	-5.304565
	-1.542579	-3.499165	-12.20777	-12.31657
	-2.625039	-1.548152	-5.970161	-6.712613
	-3.907154	-4.066662	-7.884917	-8.673237
PP test	**Adj. t-stat.**			
	-1.373234	-3.593835	-11.51255	-11.60163
	-3.363331	0.829803	-2.795244	-5.304565
	-1.056061	-3.279851	-12.80947	-13.55647
	-2.393210	-1.561448	-6.000232	-6.729829
	-3.915366	-3.882794	-8.118709	-8.730287
KPSS test	**LM-stat.**			
	0.844207	0.192239	0.307608	0.117893
	0.848064	0.278239	0.873644	0.097589
	0.808705	0.199456	0.226863	0.103752
	0.385172	0.270029	0.604160	0.084551
	1.058882	0.172734	0.444075	0.107207

Table 1. Standard unit root test results

Source: Authors

The unit root tests results in Table 1 show that non of the variables under consideration is integrated of order two I(2). Since all of the observed variables are stationary I(0) or integrated of order one I(1), we firstly examine the Croatian

current account under absorption approch. Therefore, The dependent variable in equttion (4) is current account (CA) and independent one is domestic demand in Croatia (D). The estimates are provided in Table 2.

Variable	Estimate	t - value	p - value
Intercept	-0.12970 (0.03598)	-3.605	0.000630
$\log(\mathrm{CA})_{t-1}$	-1.00902 (0.24236)	-4.163	0.000100
$\log(\mathrm{D})^{+}_{t-1}$	-2.13721 (0.58859)	-3.631	0.000579
$\log(\mathrm{D})^{-}_{t-1}$	-2.32241 (0.60172)	-3.860	0.000277
$\Delta\log(\mathrm{D})^{-}_{t-1}$	1.26568 (0.42549)	2.975	0.004198
$\Delta\log(\mathrm{D})^{-}_{t-2}$	0.63846 (0.36738)	1.738	0.087282
Residual standard error: 0.03338	Adjusted R-squared: 0.2984	F-statistic: 6.615	p-value: 5.589e-05
Asymmetric Cointegration test (Bounds Test):			
Critical values	I(0)	I(1)	F statistic
10%	3.17	4.14	6.614633
5%	3.79	4.85	
2.5%	4.41	5.52	
1%	5.15	6.36	
Asymmetry statistics			
Wald F-statistic: 4.836384		p - value: 0.03166624	

Table 2. NARDL estimates of the croatian current account under absorbtion approach.
Source: Authors

Following the estimates in Table 2, domestic demand in Croatia and Croatian current account are asimmetricaly cointegrated. The influence out of domestic demand is significant at usually accepted siginificance level in short–run as well as in long-run. Furthermore, the influence from domestic demand to current account in short–run as well as in long-run is more prominent in case of decline in domestic demand comparing to influence out of increase in domestic demand. But nonetheless, there might be an influence from monetary sector to Croatian curren account. In this paper three variables representing monetary sector are examined. However, the estimated model exibited multicolinearity in independent variables. Therefore, three model specifications are provied. The each model takes into account one monetary variable (Loans to private sector, montetary aggregates M4 and Real effective exchange rate index) while holding domestic demand as the second independent variable in each model.

So, the first model specification aims to explain the dynamics in Croatian current account with domestic demand and loans to private sector and the estimates are summarized in Table 3.

Variable	Estimate	t - value	p - value
Intercept	-0.13146 (0.03616)	-3.635	0.000598
$\log(\mathrm{CA})_{t-1}$	-1.09948 (0.24826)	-4.429	4.35e-05
$\log(\mathrm{D})^{+}_{t-1}$	-2.60230 (0.64460)	-4.037	0.000163
$\log(\mathrm{LTPS})^{+}_{t-2}$	0.11653 (0.07184)	1.622	0.110293
$\log(\mathrm{D})^{-}_{t-1}$	-2.38685 (0.66716)	-3.578	0.000716
$\log(\mathrm{LTPS})^{-}_{t-2}$	-0.04518 (0.14608)	-0.309	0.758232
$\Delta\log(\mathrm{D})^{-}_{t-1}$	1.38489 (0.46450)	2.981	0.004214
$\Delta\log(\mathrm{LTPS})^{-}_{t-2}$	0.04820 (0.95368)	0.051	0.959867
$\Delta\log(\mathrm{D})^{-}_{t-3}$	0.46291 (0.38789)	1.193	0.237646
$\Delta\log(\mathrm{LTPS})^{-}_{t-4}$	0.35051 (1.01903)	0.344	0.732140
Residual standard error: 0.03342	Adjusted R-squared: 0.2968	F-statistic: 4.096	p-value: 0.0004259
Asymmetric Cointegration test (Bounds Test):			
Critical values	I(0)	I(1)	F statistic
10%	3.17	4.14	4.095545
5%	3.79	4.85	
2.5%	4.41	5.52	
1%	5.15	6.36	
Asymmetry statistics			
Wald F-statistic: 16.80451		p - value: 0.0001328319	

Table 3. NARDL estimates of the relationship between croatian current account, domestc demand and loans to private sector.
Source: Authors

Following the estimates reported in Table 3, asimmetric cointegration is still established and confirmed but the effects from loans to private sector is not found to be significant. The other monetary variable considered in this paper is the variable representing montetary aggregates M4. Table 4 provides the estimates for the model specification where the Croatian current account is the dependent variable while montetary aggregates M4 and domestic demand represent the independent variables.

Variable	Estimate	t - value	p - value
Intercept	-0.12867 (0.03938)	-3.267	0.001927
$\log(\mathrm{CA})_{t-1}$	-1.15701 (0.32452)	-3.565	0.000790
$\log(\mathrm{D})^{+}_{t-1}$	-2.58122 (0.83995)	-3.073	0.003370
$\log(\mathrm{M4})^{+}_{t-2}$	0.06275 (0.16358)	0.384	0.702820
$\log(\mathrm{D})^{-}_{t-1}$	-2.37867 (0.83747)	-2.840	0.006419
$\log(\mathrm{M4})^{-}_{t-2}$	-0.69209 (0.39518)	-1.751	0.085789
$\Delta\log(\mathrm{CA})_{t-1}$	0.38414 (0.21133)	1.818	0.074878
$\Delta\log(\mathrm{D})^{+}_{t-1}$	2.68355 (0.83743)	3.205	0.002313
$\Delta\log(\mathrm{M4})^{+}_{t-2}$	-0.91793 (0.26997)	-3.400	0.001301
$\Delta\log(\mathrm{D})^{+}_{t-3}$	-1.12742 (0.46879)	-2.405	0.019769
$\Delta\log(\mathrm{M4})^{+}_{t-4}$	0.43012 (0.26461)	1.626	0.110102
$\Delta\log(\mathrm{D})^{-}_{t-1}$	1.61103 (0.76161)	2.115	0.039214
$\Delta\log(\mathrm{M4})^{-}_{t-2}$	2.08280 (0.58964)	3.532	0.000873

$\Delta\log(\mathrm{D})^{-}_{t-3}$	1.49200 (0.71286)	2.093	0.041249
$\Delta\log(\mathrm{M4})^{-}_{t-4}$	0.13298 (0.79972)	0.166	0.868581
Residual standard error: 0.02613	Adjusted R-squared: 0.5702	F-statistic: 7.254	p-value: 5.062e-08
Asymmetric Cointegration test (Bounds Test):			
Critical values	I(0)	I(1)	F statistic
10%	3.17	4.14	7.253781
5%	3.79	4.85	
2.5%	4.41	5.52	
1%	5.15	6.36	
Asymmetry statistics			
Wald F-statistic: 8.755591		p - value: 0.004637665	

Table 4. NARDL estimates of the relationship between croatian current account, domestc demand and monetary aggregate (m4).
Source: Authors

The results in Table 4 point that taking into account montetary aggregates M4 the model improved. The asymmetric cointegration is established and confirmed. Compering to estimates in Table 2, explanatory power of the model presented in Table 4 is almost doubled. Adjusted R-squared for the specification presented in Table 2 amounts 29.84 while the reported Adjusted R-squared for model specification reported in Table 4 amounts 57.02. As expected the influence out of monetary sector is more prominent in a short –run. The third variable representing monetary sector is real effective exchange rate. Threrefore, the model specification where the Croatian current account is the dependent variable while real effective exchange rate index and domestic demand represent the independent variables is reported in Table 5.

Variable	Estimate	t - value	p - value
Intercept	-0.1272303 (0.0355545)	-3.578	0.000714
$\log(\mathrm{CA})_{t-1}$	-1.0598627 (0.2468084)	-4.294	6.89e-05
$\log(\mathrm{D})^{+}_{t-1}$	-2.4781623 (0.6837282)	-3.624	0.000618
$\log(\mathrm{REER})^{+}_{t-2}$	-0.0001731 (0.3170656)	-0.001	0.999566
$\log(\mathrm{D})^{-}_{t-1}$	-2.2143498 (0.7841212)	-2.824	0.006524
$\log(\mathrm{REER})^{-}_{t-2}$	-0.4278856 (0.2174958)	-1.967	0.054019
$\Delta\log(\mathrm{D})^{-}_{t-1}$	1.5322131 (0.5839569)	2.624	0.011137
$\Delta\log(\mathrm{REER})^{-}_{t-2}$	1.0916777 (0.8306321)	1.314	0.194019
$\Delta\log(\mathrm{D})^{-}_{t-3}$	0.5833632 (0.3914168)	1.490	0.141635
$\Delta\log(\mathrm{REER})^{-}_{t-4}$	-0.8749961 (0.7955349)	-1.100	0.276006
Residual standard error: 0.0321	Adjusted R-squared: 0.3513	F-statistic: 4.97	p-value: 6.155e-05
Asymmetric Cointegration test (Bounds Test):			
Critical values	I(0)	I(1)	F statistic
10%	3.17	4.14	4.970462
5%	3.79	4.85	
2.5%	4.41	5.52	
1%	5.15	6.36	
Asymmetry statistics			
Wald F-statistic: 15.5693		p - value: 0.0002205716	

Table 5. NARDL estimates of the relationship between croatian current account, domestc demand and real effective exchange rate index.
Source: Authors

Following the results in Table 5, the real effective exchange rate helps to explaine Croatian current account dynamics. However, the explanatory power of model specification in Table 5 is not as much improved as in case reported in Table 4. Similarily, effects of real effective exchange rate is more prominent in a short-run. All of the estimated model specification passed he diagnostic tests.[1]

1 Results available upon request.

Conclusively, Croatian current account is quite well explained under monetary and absorption approach. The influence aout of monetary sector is more prominent in a short-run. However, the absorbtion approach seems to be the one that dominates. Unexpectedly, the best monetary variable to explain Croatian current account is the one representing montetary aggregates M4 over GDP since the real effective exchange rate index is a direct measure of relative prices. Here needs to be stated that this paper employed the index real effective exchange rate and results might be better when real effective exchange rate in levels are observed. This is the limitation of this research. Eventually, there might be the following conclusion. If the level of montetary aggregates M4 contributes more to current account than real effective exchanange rate then there might be liquidity constraints. Therefore, relaxing more liquidity could help to improve Croatian current account. However, this remains to be empiricaly confirmed by another research.

5. Concluding remarks

There are several conclusions that can be drawn out of the research presented in this paper. Firstly, as suggested by the results of the research presented in this paper Croatian current account is well explained under monetary and absorption approach. Secondly, the research results revealed significantly different responses of Croatian curren account to postive and negative change in its determinants. NARDL approach employed in this paper revealed nonlinear and asymetric long-run and short-run relationship between Croatian current account and its determinant. Eventually, Croatian current account is the most responsive to change in montetary aggregates M4, among tested variables. Besides montetary aggregates M4, the variable tested in this research are real effective exchange rate index and loans to private sector. The paper points on the potential existence of liquidity constraints in Croatia and calls for further research to prove that empiricaly.

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CHAPTER 36

Cryptocurrencies: A critical review of concepts and definitions

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ABSTRACT

Blockchain technology enabled the development of BitCoin and other cryptocurrencies that created the potential for further economic decentralization. Most of the cryptocurrencies are created by individuals, organizations, and companies, which implies that there is still no clearly defined regulator and regulation in this area. This is precisely the basic characteristic of the cryptocurrencies and refers to the absence of central authority for the emission and management of these currencies. There are currently more than 1300 cryptocurrencies in the world, with a clear tendency for their growth. This is happening regardless of their volatility and possibility of collapse for some cryptocurrencies. These trends are present globally and are slowly starting to develop in the Western Balkan countries. In this paper, cryptocurrencies represent the central research topic. Through the critical analysis of this concept, the aim is to clarify the different interpretations of the same, along with the blockchain technology on which cryptocurrencies are based. In addition, the paper presents the main features of the cryptocurrencies, with the potential of their growth, and the challenges that accompany them. Paper also offers analysis of the potential of blockchain technology. In the end, an appropriate conclusion will be made, with recommendations for improvement in this area.

Key words: Cryptocurrencies, blockchain technology, BitCoin

JEL classification: O3, O32, E49

1. Introduction

Today's world is marked by the development and intensive use of the blockchain technology, which maximizes the potential of existing technologies in order to improve global business. This is the next level of globalization, which involves decentralizing power and further reducing the impact of time and space on global transactions. The flagship of these new trends is BitCoin, the pioneering and most famous cryptocurrency. Right now, this is the only true mainstream cryptocurrency that attracted even the biggest sceptics among its investors in 2017 with its growing market value. BitCoin but also the other cryptocurrencies, whose number exceeds a thousand, are the voices of new tendencies, primarily in business, but certainly also in technology. This trend will change the world as we know it and enable better integration of the rest of the world into the current economic trends. It is therefore essential to understand the main characteristics

of these new trends, but also their future perspective. The paper will present the trend of decentralization, and the way blocking technology works, as well as the future of the application of this technology, together with the cryptocurrencies that are the direct result of blockchain technology.

2. Decentralization trend

Blockchain technology, bitcoin and other cryptocurrencies are an integral part of a wider trend of decentralization that has been going on since the early years of the Internet, but for the past two decades at an extraordinary pace. According to Frank Holmes (2018), a contributor to Forbes magazine, this has been called a number of things: The sharing economy, or "shareconomy." Peer-to-peer economy. Collaborative consumption. What all of these terms have in common is the idea of decentralization — and blockchain applications, including bitcoin and other cryptocurrencies, are just the latest in a trend toward this new economic paradigm. The basis of the new economic paradigm is decentralization, which means the reduction of the power of the one single centre, was opposed to creating more around the world. All this is possible thanks to new technologies, primarily the Internet (Sharma, 2014), which summarize space and time, as Harvey points out (Harvi, 2014). Decentralization is the process of distributing or disseminating functions, powers, people or things away from a central location or authority (The Economist, 2009).

In addition to economics, this also happens in politics, so "the future now depends on the continued commitment to the ethos of decentralization, the idea that even in politics, the customer is always right" (Kibbe, 2012: 332). These trends are generally viewed positively as decentralization leads to greater freedom of business and the individual (Hayek, 2013: 32), which ultimately leads to prosperity and economic democracy (Algar, 2006; Buczynski, 2013). This trend is often referred to as the sharing economy, which implies greater participation (Sajter, 2014) on both sides - supply and demand, with the maximum utilization of available resources.

The sharing economy is defined as an umbrella concept that includes several information and communication technologies and technologies, among others, collaborative consumption, which encourages the sharing and consumption of goods and services through the Internet platform (Juho et al., 2016). Collaborative consumption can be defined as "a form of consumption that promotes co-operation between individuals and develops a sense of community and encourages a sense of commitment" (Vaquero and Calle, 2013). Bitcoin as such is considered as part of the sharing economy (Oxyang, 2014; Frodesjak et al., 2011), or as a technology that will revolutionize the entire sharing economy, making the missing puzzle. Although sharing has always existed as such, these phenomena have emerged in the era of the Internet (Belk, 2014) and are linked to the greater consumerism of Internet technologies (Sundararajan, 2011). The Internet is a medium of unseen opportunities (Huseynefendić, 2011) and regulation, in this case, is not, nor can it be a solution (Malhotra, 2014).

3. Blockchain and bitcoin

According to Thomas Kuhn's theories, it is clear that the research of blockchain technology is still in the pre-paradigm phase characterized by a number of incomplete, competitive theories that compete in the scientific community for primacy, for the position of the new paradigm (Letica, 2010). As with the sharing economy, blockchain technology seeks to give power to individuals by creating no need for intermediaries. Again, paraphrasing Drucker, the consumer becomes the one who determines what the company is (Drucker, 2008). Blockchain technology implies the existence of information blocks that record transactions. Records are kept by members of the network, who are rewarded through the process of "mining" (cryptocurrency mining). Unlike the classic transaction that requires a bookkeeper to register in the ledger, blockchain technology rests on a mathematical algorithm that cannot be influenced. Blockchain ensures the transparency and integrity of transactions purely through mathematics, and not trust. The type of transaction varies depending on the application of blockchain technology. For bitcoin, as an example, each transaction is a transfer of a certain value of bitcoin between two or more participants, and each transaction is recorded on the bitcoin blockchain (Vairaprakash et al., 2018).

The history of cryptography actually begins in the 80s, but only blockchain technology will really solve the issue of double spending. BitCoin's history is marked by links to crime (Silk Road, CrptoLocker and others) (Bonneau et al, 2015). For the first time, the word bitcoin appears in a paper published on October 31, 2008, by Satoshi Nakamoto. The first block that was made is called genesis block. Currently, it counts as block 0. The message on the block has listed the following: The Times 03 / Jan / 2009 Chancellor on the brink of the second bailout for the banks. This is the title of The Times magazine that came out on January 3, 2009. The title refers to the global financial crisis that hit the banking sector and caused government rescue of banks. This appeared to be a trigger for the rise of cryptocurrencies.

There are two basic reasons for the emergence of bitcoin in the context of the global financial system. Satoshi Nakamoto, who is considered the founder of bitcoin in his scientific work in which he presents this cryptocurrency, states that the global system of financial transactions has two deficiencies - high transaction costs and distrust, that is, the possibility of fraud (Nacamoto, 2008). In essence, Bitcoin, but also other cryptocurrencies try to eject third parties in electronic transactions. So there is a system of electronic transactions that do not rely on trust. This is unique for bitcoin, which still falls within the domain of the sharing economy. Because of that, the biggest potential of bitcoin is that it solves the problem of double spending. It is because of that, that bitcoin today is a worldwide payment system and a first decentralized currency. The whole system operates without a central bank or any other kind of centre administrator. Bitcoin is a collection of concepts and technologies that form the basis for digital money ecosystem (Antonuopoulos, 2014: 1). Bitcoin is used to store

and transfer values among bitcoin market participants. At the same time, user interaction takes place using special bitcoin protocols, which most often work on the Internet. Bitcoin can be used in any other currency. Antonupoulos (2014) states that with bitcoin, an individual can buy and sell goods, send money to people or organizations, or extend credit. Bitcoins can be purchased, sold, and exchanged for other currencies at specialized currency exchanges. Bitcoin in a sense is the perfect form of money for the Internet because it is fast, secure, and borderless (Bonneau et al., 2015).

Several factors determine bitcoin: (1) the price of electricity; (2) state of global and local economies; and (3) other socioeconomic factors (Mehta, 2018). Bitcoin network requires exceptional power levels, which even causes BitCoin miners to migrate to sources of cheaper energy, such as e.g. Oregon in the United States. Electricity also affects transaction costs when it comes to Bitcoin. At the end of 2017, the global bitcoin mining activity was estimated to consume between 1 and 4 gigawatts of electricity (between 9 and 35 TWh a year), with 1.2 GW as the theoretical lower bound assuming that everyone uses the most energy-efficient mining hardware available (Mooney and Mufson, 2017). Another aspect of the impact is the situation of global and local economies. Major events, such as the global economic crisis, have a significant impact on the demand for bitcoin and other cryptocurrencies. In addition, any other uncertainty about conventional world currencies increases the demand for alternatives like bitcoin. The effect is also the opposite, ie. in case of economic stability. In crisis situations, bitcoin serves as value storage, although this is still questionable and problematic due to the very nature of this cryptocurrency. In addition, there are many other options for storing value on the market.

Another impact on bitcoin is that of local economies. In particular, the fact that the local government can issue a regulation against bitcoin can affect its value. So, for example, some governments have threatened or otherwise discussed crypto-regulation. For example, in September 2017, China threatened to close crypto exchanges. The legal status of bitcoin varies considerably from country to country and is still undefined or changing in many of them. While some countries have explicitly allowed its use and trade, others have banned or restricted it. Regulations and bans that apply to bitcoin probably extend to similar cryptocurrency systems also (Tasca, 2015).

Bitcoin carries a series of social consequences and affects the behaviour of an individual, non-governmental organizations and the state. The economic aspect of bitcoin is in line with Milton Friedman's theories about a certain annual increase in money in circulation. When it comes to environmental aspects, bitcoin supports eco-innovation, while on the other hand, it consumes a lot of electricity that indirectly threatens the environment.

4. Future of blockhain

Although we are at an early stage of the new paradigm, much is expected from blockchain technology (Holmes, 2018). What is likely to happen is that blockchain technology will further empower the sharing economy and make it more efficient. It will reduce the cost of resources and the need for individual ownership over it. This will affect the increase in the discretionary budget and the time available to consumers, which will allow capital and time for new innovations, leisure, and other needs (Killeen, 2016). A particular problem will be related to the issue of taxation (Buntinx, 2015). With the rise of numbers of this kind of transactions, governments will have a stronger interest in putting it into legal frameworks and taxing to preserve fiscal stability. Blockchain technology will be used more significantly by the government also. Right now there are countries in the world that embarked on a project to implement blockchain technology in the evolution of ownership rights (Shin, 2017).

There are several possible applications of blockchain technology in the future: (New Gen Apps, 2018): (1) Dropping a third party for trust - this applies to any kind of public records also; (2) increasing security by using blockchain technology; (3) greater capital investment in this technology, Deloitte predicts that blockchain projects will overcome those in the field of cloud computing and IoT in venture capital investments. (4) The most important feature of blockchain is that it provides unsurpassed security in an unsecured Internet where phishing, malware, DDOS, spam and hacks put in danger the way business is done globally; (5) Application of blockchain for greater transparency of digital advertising; (6) change of payment method, e.g. Micro contracts, smart pay; (7) new ways of employing and changing the labour market. When it comes to the sharing economy, blockchain will further empower it, helping a develop of confidence for larger markets and more participants (Bradbury, 2014). Larger sharing economy requires an autonomous, decentralized system that will provide a component of trust. Predictions are that almost all business will be conducted on a radically decentralized peer-to-peer level (Clifford, 2014).

It is interesting that the first major players and investors started to appear when it came to these technologies, which the Forbes magazine regularly monitors (Shin, 2018, Novack, 2018; Kauflin, 20189. Some of the other potentials of blockchain technology include the integration of billions of people in global financial markets, only by using their smartphones, as well as the elimination of mediators in the form of bureaucracy when it comes to foreign aid (Tapscott et al, 2016). Cryptocurrencies could become part of everyday life. Several people will be enriched in this process, but not excessively much or more in comparison with the pioneers of some other computer technology (Hern, 2018). Blockchain technologies are in the initial two stages, as stated by some authors (blockchain 1.0 and 2.0). These stages are oriented on cryptocurrencies mostly. Now it is expected that blockchain 3.0, which implies the creation of real applications that will be practical and act on the basis of blocking technology (Inc., 2018).

5. Conclusion

The paper analysed the phenomenon of blockchain technology and bitcoin as the most famous product of the same and presented the basic characteristics of these concepts. A general trend of decentralization in society and politics is happening, especially in economics and technology. Blochain technology is in a natural symbiosis with the sharing economy, which in the long run will have remarkable effects on the fiscal system. Governments will have to find new modalities to integrate these trends into their economies. When it comes to bitcoin, the question is what is the future of this cryptocurrencies. This will remain unclear in the future, and many investors are already asking what will happen to bitcoin in 2018. What is shown in the paper, is that blockchain technology is changing our world and economy? It is for this reason that for the less developed countries of the world it is crucial to adapt to these new trends because they can achieve higher rates of economic growth by their application. The limitation of this paper is reflected in the fact that it can not, in the largest capacity, encompass the essence of new technologies, as they are changing and developing as the paper is being created. Therefore, continuous research and monitoring of these development trends are recommended.

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CHAPTER 37

The bail-in principle – responsible banks for a sound financial system

Jovan Zafiroski

ABSTRACT

Since January 2016 the Single Resolution Mechanism became fully operational. As a second pillar of the European banking union it should provide equal treatment of the credit institutions when they are facing problems and when a bank failure is probable or occurs. Also, the Single Resolution Mechanism contributes to broader objectives of the banking union for achievement of deeper market integration and breaking the link between the sovereigns and banks. The financial crisis from 2008 has shown that even failures of the big international banks are possible. It is difficult to justify the situation when the bank's profits are always private and are distributed between the shareholders and the management while loses are covered by taxpayers. This dilemma goes beyond the problems of morality and has direct effects of the countries' public finances and the level of public debt. It is hard to justify the bank bail-outs. The negative consequences of the problems facing credit institutions were more emphasized on the EU financial market. The newly created Single Resolution Mechanism includes a solution to this problem which puts the responsibility and consequences of the bank difficulties to the bank itself. Thus, the newly created bail-in principle gives power to the resolution authorities to cancel shares and to write down or to convert liabilities of a bank. The text explains the bail-in principle and discusses the possible effects that it might have on the stability of the financial sector in the Eurozone. Also, the effects of the digitalization of money and the reduction of cash in the transactions are examined.

Key words: digital money, bail-in principle, bank failure, Eurozone, bail-out

JEL classification: G21, K39

1. Introduction

The financial crisis from 2008 has brought profound changes in the financial infrastructure in the developed countries while provoking series of reforms in the legal framework regulating the financial and monetary institutions. Unprecedented in its scale and scope in the recent decades the crisis has pushed the markets and the regulators to their limits, menacing to endanger the existence of the international financial order as we all know it. The bankruptcy of the *Lehman Brothers* (See: Williams M., 2010, 165-178) was a clear signal that even

the big banks might face difficulties and fail. In other words, there are no “stars” in the financial systems and every single financial institution, no matter how big and systemically important it is, may face the “Chapter 11”.

Also, the crisis has clearly shown that nowadays, in times when financial markets are highly integrated, the national response to problems is not enough when the threat to the financial system is global. This is even more accented in the EU before the crisis. The banks have had cross border activities while the authorities for regulation and supervision were national. In other words, the crisis was an unambiguous warning sign that either the EU will commence profound reforms in the field of the financial services infrastructure or it will face a collapse of the entire integration project. Thus, a broader reform of the European financial system and the establishment of the Banking union including the Single Supervisory Mechanism (hereinafter SSM), the Single Resolution Mechanism (hereinafter SRM) and the Common Deposit Insurance Schemes (hereinafter CDIS) has taken place.

While SSM provides a coherent supervision at the EU level the SRM should ensure equal rules and procedures when a bank is facing difficulties and is likely to fail. Different treatment of a failing bank might undermine the competition and put in danger the functioning of the internal market with the four freedoms as its core element.

As far as bank failure is concerned two questions are the most important. Who is responsible for conducting the process of resolution and who carries the costs of the bank failure? Before the crisis national authorities were responsible for bank resolution while a common response to a systemic banking crisis was a bail-out of the banking sector which involves public finances. The bail-out might consist of different instruments and procedures for intervention including government takeovers, purchases of bad assets, mergers of financial institutions etc. However, the cost of the banking crises goes far beyond the simple numbers of the bank bail-out. It includes the costs of the overall economic downturn in both the financial and real sector which is difficult to be measured in its entirety. The history teaches us that along with the direct cost for bank bail-out the negative impact of the bank crisis on the public revenues is considerable (See: Reinhart C., Rogoff K., 2009, 163-171).

With different interventions on the financial markets, primarily by capital injections to problematic banks and by guarantees on the deposits to prevent bank runs, the recent crisis has put enormous pressure on the public finances in the EU Member States. The indirect costs are difficult to be measured while the numbers are saying that the EU Member States have intervened with large amounts of money. This raises a series of questions about the moral aspects

of spending public money for saving private institutions which in normal times were making huge profits for shareholders and premiums for the management[1].

The financial crisis had significant impact on the financial institutions in the EU. To reduce the negative effects of the crisis and to restore confidence, EU governments provided State aid to financial institutions through different instruments such as recapitalizations, impaired asset measures, guarantees on liabilities liquidity measures other than guarantees on liabilities etc. The data relating to the State aid to financial institutions in the years 2008-2015 shows that the overall amount of state aid approved was above 5 trillion Euros while amounts of state aid used was around 2 trillion euro (European Commission, 2016). Considering the financial costs of the bailing out and financial aid for the troubled financial institutions for the public finances and ultimately for the taxpayer's money the need for a new model dealing with a failing institution was undisputable. Banks could no longer be permitted to be *European in life but national in death* (Boccuzzi G., 2016, pg.15).

The text will present the newly established bail-in principle (2) as a pillar on the foundations of the SRM (1) while also discussing some important legal questions deriving from the implementation of bail-in principle as the principle of protection of property (3). Also, the last part (4) will consider the effects on the dematerialization of money on the implementation on the bail-in principle. The paper does not go into details about the rules and procedures of the bail-in as a resolution tool but gives an overview of this instrument which is somehow a revolution in the resolution process of a failing financial institution.

2. The foundations on the new resolution mechanism

The newly created SRM should provide a unique treatment of institutions which are facing bad times. Different rules and procedures for bank resolution could bring differences in treatment of the failing bank depending on the member state where resolution is taken. Therefore, in some cases, the decision on the establishment or on certain business activities might be taken on the grounds of facts determining which Member State provides better conditions for a failing credit institution. This will undoubtedly undermine the competition and the principle of equal treatment of the European financial operators. The SRM is a unique mechanism that includes supranational bodies and national resolution authorities. The legal framework regulation the SRM consists the

1 Also, the state intervention in the banking sector for bailing out systemic important banks is problematic from legal point of view in terms of competition policy and state aid rules. The fear from disaster in the financial sector was too great that even the EU did not take serious measures to limit the state aid in the financial institutions and to make profound analysis on the mergers in the financial sector (See: Marsden P., Kokkoris I., 2012, 331-336)

Recovery and resolution Directive[2] (hereinafter: the Directive) and the Regulation establishing uniform procedures for resolution on the credit institution[3] (hereinafter: the Regulation).

The Directive sets the resolution objectives which requires that the resolution process ensures the continuity of the critical functions of the financial institution, protection of public funds by minimizing reliance on public financial support, protection of depositors, protection of client funds and assets[4]. The conditions for resolution are laid in the Directive's provisions demanding certain conditions to be met before resolution process might be undertaken. Thus, the determination if the credit institution is failing or is likely to fail has been made by competent authority, there is no private sector solution for the credit institution and if the resolution action is necessary in the public interest[5] and there is a replacement of the management body and senior management of the institution under resolution which should provide all necessary assistance for achievement of the resolution objectives[6]. General principles governing resolution requires that the shareholders of the institution bear first loses, creditors of the same class are treated equally, and they bear loses after shareholders, while covered deposits are fully protected. At the end of the resolution process no creditor shall incur greater loses than he would have under normal insolvency proceedings. The resolution procedure is defined in the Directive where there are three different phases. The first stage is the *preparatory phase*; the second phase is the *early intervention* while the third stage is the *resolution stage*. The resolution tools include: the sale of the business tool, the bridge of the institution tool, the asset separation tool and the bail-in tool[7]. The novelty in the resolution tools deemed as a "revolution" in the resolution process which will make the credit institutions more responsible and will protect the public finances from excessive debt created by bail outs of the banks is the bail-in tool and it will be elaborated in the next part of this article.

2 Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0059&from=EN

3 Regulation (EU) No 806/2014 of the European Parliament and of the Council of 15 July 2014 establishing uniform rules and a uniform procedure for the resolution of credit institutions and certain investment firms in the framework of a Single Resolution Mechanism and a Single Resolution Fund and amending Regulation (EU) No 1093/2010, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0806&from=EN

4 Article 31 of the Directive

5 Article 32 of the Directive

6 Article 34 of the Directive

7 Article 37 of the Directive

3. The bail – in principle

As in every other business, banks may face difficulties and go into default. That means that there will be more room for other credit institutions that are working better. They are more efficient, innovative and that is why they will continue and expand their activities (See: Nouy D., 2017). To be out of the business is a normal phenomenon. A failure of a bank is a signal for well functioning of the financial system. If the financial infrastructure is well designed a failure of one bank should not pose a problem to the entire financial system. However, a problem arises, as in 2008, when a failure of one bank might undermine the well-functioning of the entire financial system. The trust in the system and the institutions for control and supervision is eroded while panic is spread. Usually, the state is faced to difficult choices. To let the bank fail with risk to endanger the functioning of the system or to save the bank with public money and to continue the work as usual. In fact, the theory offers two different concepts for dealing with a failing bank. The opposing theoretical concepts*: liberal vs. interventionist*. The former states that the bank should be left to the forces of market and let to fail while the position of the latter is that the authorities should intervene and protect the stability of the overall financial system. In times when the problems of one banks are spreading to other financial institution the common choice is intervention. As explained before, the intervention means huge cost for the public finances and poses moral dilemmas about the different treatment of the banks in good and in bed times. When they have profits they are private institution but when it comes for loses they are covered by the state.

The first attempt to solve this problem and to limit the government intervention with public money to save private banks was in the case of Cyprus. In 2012, the banking sector in Cyprus or the country's two largest banks were facing difficult times and was clear that they need financial aid to continue with their work and to avoid failure which might provoke collapse of the entire financial and economic system considering the fact that country's banking sector is much bigger than its GDP. The financial assistance for troubling banks in Europe was offered before though different mechanisms. It was the case with banks in Island, Ireland, Spain, Greece etc. However, in order to preserve its macroeconomic stability and to keep the public finances in good condition the Cypriot authorities together with the EU institutions proposed unusual measure at that time i.e. use of funds from uninsured bank depositors for helping the troubled institutions. It was very different situation from what we have previously seen and has rarely occurred in the financial history. The solution has been deemed as a form of taxation or as a modern "nationalization" of the bank deposits (See: Zafiroski J., 2013). At that time, strange and unusual but this mechanism become one of the core elements in the further reform process and the creation of the SRM.

The most important novelty brought by the bail-in principle is that when a bank fails it is the banks' shareholders and creditors that bear the costs. The main purpose of the bail in principle is to break the link between sovereigns and financial institutions in trouble putting pressure on the bank's management and

shareholders to be more responsible for their own decisions. Thus, the management and shareholders cannot be sure that the bank will be rescued with public money when things go wrong while earning big returns when things go well. This mechanism will also reduce the risk that the banks are ready to take when taking decisions.

At the essence of the bail-in objectives is the reshaping the bank balance sheet provided that the financial institution under resolution has a positive net value. To achieve this the competent authority might decide that equity holders or existing shares or other instruments of ownership are cancelled or transferred to bailed-in creditors or, as far as the debt holders are concerned, the competent authorities might convert liabilities[8], bonds for instance (Spiegeleer De J. and al.,2014), into shares or other instruments of ownership[9].

4. Challenges to the traditional legal principles and the fundamental right to property

The role of the State in the financial sector is to protect the soundness and well-functioning of the system as well as to promote competition. The recent financial crisis has shown that the public finances could suffer by excessive use of the taxpayer's money that are used to save the systemic important institutions in order a collapse of the entire financial and economic system to be avoided. The bail-in is a useful tool in this respect. However, it opens series of questions about the justification of these measures in view of the basic legal principles as the protection of right to property. Measures such as bail-in decision which include cancelation or transfer of shares, suspension or conversion of liabilities into shares are often contested by concerned individuals or companies on the ground on Article17 of the EU Charter of fundamental rights relating to the right to property[10]. The Charter is applicable when EU institutions, bodies and agencies are deciding and thus implementing EU law and national authorities when are implementing the EU law. In the Case law of the European Court of Human Rights it is established that company shares[11] and debt instruments

8 All liabilities of a bank in resolution are eligible to the bail-in tool if they are not explicitly excluded by the provisions of the directive (such as covered deposits, for example), see Article 44(2) of the Directive

9 Articles 47 (1)(b) and 63 (1)(f) of the Directive

10 Article 17(1) of the Charter provides that: everyone has the right to own, use, dispose of and bequeath his or her lawfully acquired possessions. No one may be deprived of his or her possessions, except in the public interest and in the cases and under conditions provided for by the law, subject to fair compensation being paid in good time for their loss. The use of property may be regulated by law in so far as is necessary for the general interest. Also, Article 1 of Protocol No 1 to the European Convention on Human Rights states that: Every natural or legal person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by law and by the general principles of international law.

11 See: ECtHR, Sovtransavto Holding v. Ukraine, Appl. No 48553/99, paragraphs 90-93, available at: http://hudoc.echr.coe.int/eng?i=001-60634

and liabilities deriving from them are falling in the category or in the scope of the article 1 of the Protocol relating to the property rights.

From the legal point of view the limitations to the right to property should be examined through proportionality test regularly used in the process of expropriation. However, the bail-in ban not be qualifying for expropriation or "deprivation of possession" simply because the process of writing down or canceling of shares or of a liability is not a transfer of property from shareholder or creditor to another person. The financial stability and fiscal protection is the public interest on which grounds the limitation of the right to property is justified in the case of using bail-in tool (Wojcik K-P., 2016).

Moreover, in its recent judgement[12] concerning State aid rules to support measures in favour of banks in the context of the Slovenian banks the Court found that the right to property must be interpreted as not precluding the Banking communication (European commission, 2013) in respect to the points 40-41 stating that "state support can create moral hazard and undermine market discipline. To reduce moral hazard, aid should only be granted on terms which involve adequate burden-sharing by existing investor". Therefore, "since shareholders are liable for the debts of a bank up to the amount of its share capital, the fact that the Banking Communication requires that, in order to overcome the capital shortfall of the bank, prior to the grant of State aid, those shareholders should contribute to the absorption of the losses suffered by that bank to the same extent as if there were no State aid, cannot be regarded as adversely affecting their right to property"[13]. This judgment is a clear confirmation that the bail-in as a resolution tool cannot be perceived an instrument undermining the right to property.

5. New technology, dematerialization of money and the bail-in principle

In the last period there are certain trends in the monetary field that are in favor or against the bail-in principle and have influence on its efficiency in delivering expected results. Those trends are related to the use of the new technologies in the payment systems and to the process of dematerialization of money. Also, the effects form the crisis are present in some of the developed countries while the measures taken in that period are still in place which has certain effects on the possible success of implementation of the bail-in principle in the bank resolution process. Thus, there is a general trend of dematerialization of money. Some authors even consider cash as redundant in the economy (Rogoff K. S., 2016).

12 Case C526/14, JUDGMENT OF THE COURT (Grand Chamber) of 19 July 2016, REQUEST for a preliminary ruling under Article 267 TFEU from the Ustavno sodišče (Constitutional Court, Slovenia), made by decision of 6 November 2014, received at the Court on 20 November 2014, available at: http://curia.europa.eu/juris/document/document.jsf?text=&docid=181842&pageIndex=0&doclang=EN&mode=req&dir=&occ=first&part=1&cid=95988

13 Court of Justice of the European Union, PRESS RELEASE No 80/16 Luxembourg, 19 July 2016, pg. 2, available at: https://curia.europa.eu/jcms/upload/docs/application/pdf/2016-07/cp160080en.pdf

According to this position all the transactions should be made through electronic payments while the cash might be used in transactions on very small amounts. There are many arguments for this: combat against tax evasion, money laundering, financing of terrorism etc. This process creates a situation in which all the money in the economy are “visible” in the banking system. The money is on current accounts, deposit accounts etc. which makes a possible use of the bail-in principle efficient. This trend of dematerialization of money goes in favor of the bail-in principle. However, there are two other trends that are making the success of the implementation of the bail-in principle less likely. The use of technology and the launch of cryptocurrencies as means of payment makes the use of the bail-in principle inefficient. The cryptocurrencies are outside the traditional payment system and are not part of the system of bank deposits. They are not “visible” for the authorities while the transactions and owners of the funds are anonymous. Also, another factor which a result of the current monetary policy, most notably in the Eurozone, could jeopardize the success of the possible use of the bail-in principle. Namely, the real interest rates on bank deposits in certain economies are negative which makes cash more attractive than bank deposits. Banknotes have 0% return while certain deposits have negative return which is unprecedented in the monetary and banking history, but we are witnessing today. When one will also consider the fact that deposits might be subject to bail-in in case of bank failure the cash is even more attractive.

6. Conclusions

In the aftermath of the financial crisis profound reforms in the financial infrastructure in the EU has been undertaken. The result is more competences on European level for many important issues relating to the financial system. From institutional point of view the creation of the European banking union implies transfer of powers to the supranational institution and cooperation with the national authorities responsible for supervision and resolution of the credit institutions.

The crisis from 2008 had significant impact on the public finances in the Member States. Vast amounts of money were spent by Governments and EU institutions on bailing out the systemically important banks in in Island, Ireland, Spain Greece etc. The authorities were forced to save this institutions with public money in order to preserve the stability of the overall financial system. The bail-out opened a series of debates about the moral hazard problem with saving the big banks. The current mode of the global financial system can not let banks to be private when making profits while public good and bailed out when facing loses.

The most important novelty in the resolution process on European level is the bail-in principle that gives powers to the resolution authorities to cancel shares and to write down or to convert liabilities of a bank. Thus, if a bank fails it is the banks' shareholders and creditors that bear the costs.

The main goal of the bail-in tool is to reduce the risk that the management of the bank is ready to take. By putting more pressure on the bank's management and shareholders will be more responsible for their own decisions. Thus, the management and shareholders cannot be sure that the will be saved with taxpayer's money when things go wrong. Similar resolution tool was successfully used during the crisis in the banking sector in Cyprus in 2012.

However, even if the bail-in principle may look like a revolution in the resolution process that will break the vicious cycle between the governments and the systemically important banks it has been challenged by the core legal principles as the fundamental right to property.

Also, there are certain trends in the monetary field that go in favor of the successful use of the bail in principle as is the case with the process of dematerialization of money. However, there are also some developments as it is the case with the use of the cryptocurrencies and the negative interest rates that are making the possible implementation of the bail-in principle much more difficult task.

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