

Contemporary economic and business issues

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Contemporary Economic and Business Issues

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CONTEMPORARY ECONOMIC AND BUSINESS ISSUES

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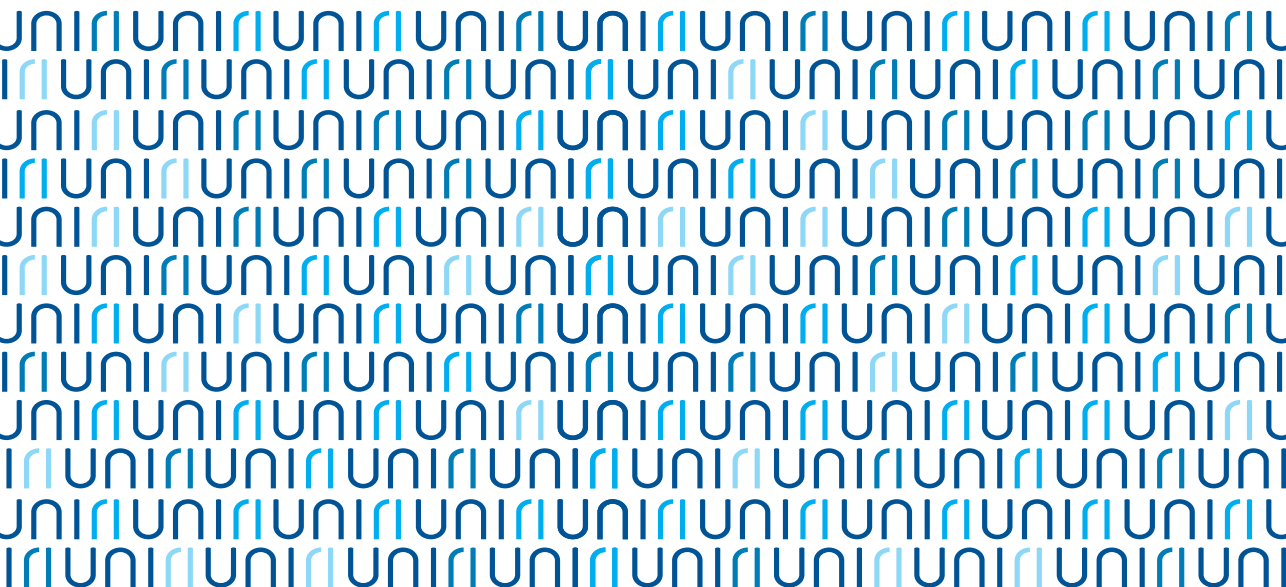
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Research monograph – First Edition



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FOREWORD

Dear authors, reviewers and readers,

With the research monograph *Contemporary Economic and Business Issues*, we present to you the third series in the context of digital transformation. We have been fortunate to enjoy presentations from more than 50 researchers, mainly from the region of Southeast Europe. From the very beginning, the main objective of the research effort has been to provide scientific evidence of the dramatic changes in the current and future economic reality caused by the increasing digitalization processes. In 2020, we have experienced unprecedented challenges related to the COVID19 pandemics, which has dramatically intensified the complexities within the economic and business spheres. Therefore, the organization of the conference has adapted to these circumstances and for the first time was held entirely online, using virtual platforms. This is a very practical manifestation of the rapid digitalization of our regular activities.

The conference was organized from 24 to 26 June 2020 (www.edt-conference.com). Since the main theme of the conference was the interplay between fiscal and monetary policy, we were honored to host the keynote speeches and panel discussion delivered by Eric Leeper (Paul Goodloe Mcintire Professor in Economics, University of Virginia, Department of Economics, Charlottesville, USA), Corrado Macchiarelli (Principal Economist at National Institute of Economic and Social Research, NIESR) and Cristian Popa (Senior Advisor to Vienna Initiative Steering Committee). There was also an amazing panel discussion on Smart Cities, introduced by a keynote address from Ben Green, Harvard School of Engineering and Applied Sciences, Cambridge, USA. The last panel sponsored by the Unger Family Foundation on "Cities, Campaigns and Civic Engagement" chaired by Andrej Kričković (Higher School of Economics (HSE), Moscow, Russia) initiated a transdisciplinary discussion on the current issues.

We are immensely grateful to all our participants, sponsors, supporting institutions, partners and all members of the program and organizing team. Our special thanks go to the President of the Republic of Croatia, Zoran Milanović, for his support and opening of the conference with his introductory speech. We are also grateful to Boris Vujčić, Governor of Croatian National Bank, for his continuous support. We also thank Nicholas C. Zingale (Maxine Goodman Levin School of Urban Affairs, Cleveland State University), whose support enabled the organization of the panel discussion on Smart Cities. Many thanks to Dorothy Baunach (DigitalC, Cleveland, Ohio, USA), Kenneth Loparo (Case Western Reserve University, Cleveland, Ohio, USA), and Brian Edward Ray (Cleveland-Marshall College of Law, Cleveland, Ohio, USA). Our special thanks goes to Andrej Kričković, who moderated the Unger Family Foundation panel, and to all panelists, Predrag Pale (University of Zagreb, Faculty of Electrical Engineering and Computer Science, Zagreb),

Vjeran Pavlaković (University of Rijeka, Faculty of Humanities and Social Sciences, Rijeka), Dražen Hoffman (GONG, Zagreb, Republic of Croatia), Kurt Bassuener (University of St. Andrews), and Velibor Mačkić (Special Advisor to the President of the Republic of Croatia for Economics).

We sincerely hope that the papers published in this monograph will be a valuable contribution to students and researchers in the field of business and economics.

Rijeka, April 2021

Editors

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INTRODUCTION

This research monograph consists of 17 papers under the framework of contemporary economic and business issues which we can structure into several main research fields. These fields relate to the regulation of economic and business activities, especially in the context of digitalization processes, fiscal and monetary issues, dealing with the impact of digitalization and COVID19 pandemics on traditional academic and business debates, as well as on innovation processes in both government and the corporate sector.

We can borrow the phrase from one of our papers and confirm that the papers presented show that the innovative market and digital society, as the new global development and technology paradigm of the modern world, together with its capabilities and standards, has changed the character of entrepreneurship and the state/government in terms of their new interactions. Thus, the contributions from the research monograph are made more urgent by the main objective of introspection of the traditional economic and business sectors and activities under the prism of digital transformation.

The researchers were particularly interested in the impact of the COVID19 pandemic on the economic and business sectors. Although the conference was held in the midst of the pandemics, researchers were able to present valuable studies showing the extent of the threat posed by COVID 19 to the public health and economic outcomes of EU citizens. Significant pressure was placed on member state spending, particularly in countries with lower fiscal capacity, resulting in a severe temporary deterioration in the fiscal deficit and public debt. It is also noted that the crisis COVID -19 will have an uneven impact on member states and could deepen their divergence. Therefore, new and creative fiscal policies to support investment in digital transformation, green transition and innovation are of utmost importance. This monograph provides some guidance.

We hope that 2021 will be less turbulent and stressful and that the papers published in the monograph will be useful to many new students and researchers as well as practitioners and a wider audience to grasp some ideas that will help in overcoming the consequences of the current health and economic crisis. With this in mind, we hope you enjoy reading our authors' contributions and that you will join us in person at the next conference in June 2021.

Rijeka, April 2021

Editors

CHAPTER 1

THE POSSIBILITIES OF E-JUSTICE DURING THE COVID-19 CRISIS: DIGITAL JUSTICE IN DIGITAL ECONOMY¹

Dejan Bodul², Pavle Jakovac³

Abstract

The innovative market and digital society, as the new global developmental and technological paradigm of the modern world, together with its capabilities and standards has changed the character of entrepreneurship and the state/government in terms of their new interrelationships. Consequently, the accumulation and acceleration of technological innovations has a decisive influence on the development of civil justice, namely e-justice. Moreover, in this day and age, and especially in the upcoming future, questions and problems in this area will increase intensively. The focus of this paper is on the existing possibilities for the digitalization of the judiciary in such a way that critically considers (all) relevant issues regarding legal protection. In this regard, the authors will analyse whether further legislative intervention is needed, which, given the relevant European and comparative law, could potentially improve the normative regulatory framework for legal protection.

Key words: e-justice, COVID-19 crisis, digital economy, possibilities

JEL classification: A10, K20, M20, O33

1. Defining the terms

The systemic and developmental changes related to the new technological paradigm require a new conception and strategy of technology-based justice development as a key lever for overall socio-economic development. Therefore, given the complexity and relevance of the problems we are addressing in this paper, and for the sake of precision and clarity, we consider it important to *ab initio* explain the concept of e-justice and the COVID 19 crisis in the judiciary system.

In 2018, the Council of Europe adopted the strategy and the draft of e-justice Action Plan for the period 2019-2023, indicating that e-justice is a tool that simplifies and improves access to the judiciary system and digitalizes cross-border

1 This paper (research) was financed by the University of Rijeka for the project ZP UNIRI 4/19.

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legal proceedings. In this context, it is important to mention that the development of the e-justice component in Croatia, either through its contribution to the development of the judicial administration, or as an essential element of the civil or non-contentious procedures, is a process which is at an advanced stage, but which is still a process *in statu nascendi*. The great potential and benefits of e-justice lies in its unique characteristics. The doctrine indicates that the term “e-justice” encompasses a wide range of initiatives, including the use of e-mail, e-bulletin boards, filing claims on-line, providing information on-line (including case law), implementing video hearings and video conferences, on-line registration monitoring and the ability of judges or other decision makers to access information electronically. In any case, a great progress has been done in the last 10 years regarding the improvement of the regulatory framework in the field of digitalization of the judiciary system. A further development strategy, whether regarding the European or national e-justice model, is (should be) based on the projection of goals and the role of the information sector in the judiciary system, taking into account the existing objective circumstances and the fact that Croatia is an EU member state and therefore has certain obligations. *Exempli causa*, some of which derive from the European Ethical Charter on the Use of Artificial Intelligence in Judicial Systems and their Environment, adopted by the Council of Europe’s Committee for the Efficiency of Justice in Strasbourg in 2018. Noting the growing impact of artificial intelligence (AI) in modern society, as well as the potential contributions of AI tools to efficiency and quality in the judicial system, the Committee adopted the afore-mentioned Charter defining therefore a total of five fundamental principles relating to the use of AI: 1) the principle of respect for fundamental rights; 2) the principle of non-discrimination; 3) the principle of quality and security; 4) the principle of transparency, impartiality and fairness; 5) the principle of “user control”.⁴ Furthermore, the obligations are also a consequence of the influence of the judicature under the Article 6 of the Convention⁵ where the right to the internet is modestly elaborated. Namely, although the European Court of Human Rights (ECHR) did not provide the definition of e-justice, since it is essentially a “qualification or legal presentation” that is constantly evolving in its jurisprudence, it is subject to the rules of access to court and the right to a fair trial under Article 6 of the Convention.

4 As a member state of the EU, Croatia is already (from the second half of 2018) taking advantage of AI tools in the justice sector based on the contract concluded by the Ministry of Justice of the Republic of Croatia with the consortium of Newton Technologies Adria Ltd. and Newton Technologies Plc.

5 (European) Convention for the Protection of Human Rights and Fundamental Freedoms, (hereinafter referred to as the Convention), OJ-IT, 18/97, 6/99, 14/02, 13/03, 9/05, 1/06, 2/10. „In the determination of his civil rights and obligations or of any criminal charge against him, everyone is entitled to a fair and public hearing within a reasonable time by an independent and impartial tribunal established by law. Judgment shall be pronounced publicly but the press and public may be excluded from all or part of the trial in the interests of morals, public order or national security in a democratic society, where the interests of juveniles or the protection of the private life of the parties so require, or to the extent strictly necessary in the opinion of the court in special circumstances where publicity would prejudice the interests of justice.”

This is also pointed in the case *Lawyer Partners Llc. vs. Slovakia* (ECHR, 2009). Here, the complainant, a limited liability company (Llc), wanted to initiate more than 70,000.00 civil lawsuits for debt collection. Due to the huge number of lawsuits, the Llc. recorded them on DVD and sent them to the court together with a letter of explanation. Although domestic law allowed lawsuits to be filed in this way, the court refused to register them on the grounds that they lacked the necessary equipment. The appeal to the Constitutional Court was rejected because it was filed outside the statutory two-month deadline. The ECHR noted that, in hard copy, the Llc. lawsuits and supporting documents would fill more than 40 million pages. In those circumstances, the Llc's decision on filing the lawsuits could not be considered inappropriate. The domestic law allowed electronic filing and the applicant could not be criticized for taking advantage of this possibility. The court's refusal to register the lawsuits constituted a disproportionate restriction on the applicant's right of access to court. Furthermore, the case law of the Court of Justice of the EU also has confirmed that procedures that can be accessed solely by "electronic means" can prevent certain individuals from exercising their rights (EUR-Lex, 2010). The Court of Justice also noted that the exercise of the rights afforded by the Universal Service Directive in practice may be impossible or extremely difficult for some individuals - especially for those who do not have internet access - if the settlement process can only be accessed by electronic means.

On the other hand, the SARS-CoV-2 (COVID-19) virus infection that resulted in coronavirus disease appeared in China in late 2019 and spread through the EU in February 2020 which resulted with the disease spreading also in Croatia. On March 16th, 2020, the presidents of the courts in Croatia passed a Decision on how courts should work due to the coronavirus disease epidemic (COVID-19) to protect the parties and all participants in court proceedings as well as court employees in accordance with the rules of the Judiciary Act (Law on Courts) and the recommendations of the President of the Supreme court as well as the Minister of Justice of the Republic of Croatia from March 13th, 2020. Recommendations included, *inter alia*, the adjournment of all hearings and other non-urgent actions for a period of 14 days while the judges (taking all circumstances into account) ruled to adjourn the hearings until April 1st, 2020. At the procedural level, the Civil Procedure Act in its Article 212 (1) (7) stipulates, *inter alia*, that civil proceedings are terminated when work in court ceases due to war or other causes. In this case civil proceedings are terminated by law itself and any court decisions would have only a declaratory significance. Therefore, the Bar Association has proposed an Act on Intervention Measures in the Field of Court and Administrative Proceedings due to Coronavirus Epidemic (COVID-19). These measures relate to: suspension and interruption of deadlines, courts operation manner, possibility of participation in proceedings through audio-video devices, measures in the field of administrative procedures that would also allow cessation of deadlines thus establishing a legal basis for the limited operation of state and other governing bodies. According to available information, it appears that aforementioned and other measures (proposed by

this Act) have been adopted in other EU Member States. For example, Slovenia has implemented the Provisional Measures Act regarding judicial, administrative and other public-law matters to control the spread of the infectious disease SARS-CoV-2 (CoVID-19).

2. Literature review

There are perhaps a dozen scientific/professional papers in Croatia dealing with the extensive and complex issue regarding the digitalization of the judiciary. However, texts that analyse the issue of the digitalization of the judiciary at the time of the current COVID-19 pandemic are more important for this paper. Consideration of this issue is conceptualized, first of all, in the works of Bodul (2020) and Maganić (2020) where the authors (more or less) communicate, in a consensual sense, about the existing problem(s). Therefore, this research will present a more complete and holistic analysis of legal questions that may be raised when considering the problems of digitalization of the judiciary in times of (corona) crisis.

3. Methodological approach

Various methodological approaches are available to study this complex problematic issue. However, the often contested and infrequently dismissed methodological individualism seems appropriate for studying this particular group of problem(s). It should be understood that the computerization of the judiciary (and its modus operandi) is inevitable, making it one of the basic conditions for further overall development, regardless of the extent of the delay so far. On the other hand, it is indispensable to ask oneself what is the degree of use of specific products offered by ICT technology in the judiciary at the moment. Therefore, a comprehensive assessment/analysis for the success of any reforms, including the reforms that should occur with the digitalization of civil justice, requires a comparison of what has been achieved bearing in mind two reference points: the first (I) being the current situation and the second (II) being the target state (i.e. the intended result of the implemented regulations).

4. Current state of play

Undoubtedly, we live in an era of rapid social, economic and consequently legal changes. In such circumstances, the legal norm is often (influenced by politics and laicism) simplified, it is developing uncontrollably by obtaining unwanted features. Therefore, it is important from the standpoint of legal science and practice to provide the necessary explanations about the position/status of law, how it is interpreted, and especially how it is put into practice. In order to respond as comprehensively as possible, the structure and concept of this paper had to be adjusted. The problem of digitalization of the procedures at issue

is very specific and complex and can practically become the subject of some other paper of this or similar kind, which is why it is certainly not possible to fully present it in this particular paper.

4.1. Digitalization of civil proceedings

E-procedures are being introduced in more and more countries, while some have gone a step further, so the entire process is conducted by electronic means (European Commission, 2016). The Croatian legislator, recognizing the importance of information technology, in the Act on Amendments of the Civil Procedure Act (Official Gazette, 2013a) and in the Act on Amendments to the Land Registry Act (Official Gazette, 2013b) provided for the possibility of electronic submission, as well as the possibility of filing the claim in electronic form (Article 492 (a) of the old Civil Procedure Act - CPA) (Official Gazette, 2014a), but (at that time) only for commercial disputes. A special rulebook should have prescribed a detailed way of functioning of this type of communication, which was done by the Rulebook on electronic communication in proceedings before commercial courts (Official Gazette, 2018a) which created preconditions for the application of these provisions of the CPA in commercial courts. In addition, there is the possibility of audio-recording the hearings and the use of video-conferencing in all its variants⁶ as new process instruments and new way(s) of using evidence in electronic form.⁷ However, when referring to litigation in the context of e-justice, the doctrine indicates (Maganić, 2016) that the aforementioned implies a wider variant of the electronification of the entire proceeding (Aras Kramar, 2018). So far in Croatia, unlike some European countries, there is no example of electronification of the entire procedure from filing a lawsuit to obtaining a court decision. Experience shows that modest steps have been taken to bring about normative changes that would prescribe different aspects of electronic litigation. Therefore, the new CPA (Official Gazette, 2019a) is also making (a modest) step further by arranging delivery in line with new electronic communications capabilities and obligations. Namely, by mail delivery, the legislator implements the possibility for parties to send each other electronic letters in all types of proceedings, all in accordance with the rules by which state bodies, lawyers, notaries, court experts, court appraisers, court interpreters, bankruptcy trustees and legal entities become obliged to communicate with the court via electronic communication (Article 106 (a)). Moreover, parties that do not have attorneys can also be served electronically (Šago and Boban, 2019). In doing so, the party must give its consent that the delivery can be made

⁶ According to the Article 115 (3) (4) of the CPA, the court may order that the hearing is to be held at a distance, using appropriate audio-visual devices.

⁷ *Exempli causa*, today almost all national legislations are familiar with the concept of electronic (digital) evidence and have certain rules governing the ways in which electronic data, or documents, can be used as evidence. CPA does not provide a definition of evidence (i.e. means of evidence), but it is clear that they can be used to establish the truth of the claim (Čizmić and Boban, 2017).

electronically. According to the Article 133 (d), delivery would be made electronically to the party by e-mail or via the information system. Under the information system, the legislator most likely means the e-Citizen system. Therefore, every natural person can register for the e-Citizen system, and the courts will then send the written documents to the electronic inbox. If the delivery is made via the e-Citizen system, then the addressee has a deadline of 15 days to confirm the receipt of the letter. Failure to acknowledge the receipt within 15 days shall be deemed to have been made and such delivery shall be considered as a proper delivery. In the Article 115, the legislature also introduces the possibility of holding hearings at a distance (with audio-visual devices). In the context of the subject matter, attention should also be paid to the new model of revision. Although the original idea was to introduce a permit revision, which would at the same time be the only type of revision envisaged by the CPA, this did not happen in the end. Based on the new CPA, and as a result of a compromise, there are two types of revision. The Article 382 of the CPA prescribes a permit revision, a completely new form of revision that the Croatian legal system (in commercial and civil matters) was not familiar with until now. In the CPA, a permit revision is prescribed as a rule, that is, a form of revision that is always applied when something else is not explicitly required by the CPA in this regard. The essence of a permit revision is that the parties in dispute may file a revision against the judgment rendered in the second instance, if the Supreme Court of the Republic of Croatia allows its submission (Article 382). Exceptionally, the parties may file a review against the judgment in the second instance, without the permission of the Supreme Court, but only in the described statutory disputes (Article 382 (a)). However, a potential problem with this new revision model lies in a fact that the auditors are unable to know the decisions of the lower and higher courts. Namely, there is no legal obligation for the aforementioned courts to publish all jurisprudence on their web pages, nor to otherwise make it accessible. The new CPA states that the auditor must have knowledge of all courts' decisions in Croatia, from which non-uniformity in the application of law arises. This presupposes that the parties should have public, accessible and transparent case law databases in use, but there are currently no such databases in Croatia.

4.2. Digitalization of land registry procedure

It should be noted that by the time this paper was written, there was modest practical experience regarding the electronification of land registry procedure, so we were not able to analyse the legal novelties in question from their practical perspective. Namely, land registry and land cadastre reform began with the adoption of the Land Registration Act (LRA) which came into force on January 1st, 1997. This created the prerequisites for keeping the real estate information in electronic form. The new Land Registration Act was published in the Official Gazette (2019b) and entered into force on July 6th, 2019. It introduces further rules for fully electronic handling of land registries. Regarding the topic of this paper,

it is important to mention that the land registry is publicly accessible, which means that anyone can request an access and it is available in electronic form. An electronically accessible land registry is prescribed within the harmonization of the provisions of the LRA with the provisions of the Act on Implementation of General Data Protection Regulation (Official Gazette, 2018b). As far back as from the (old) LRA/97, the land registry was defined as an electronic land ledger, while the (new) LRA further prescribes the concept of a common information system (CIS) and a land register database (LRD) with a clear separation of jurisdiction between the court and the registry authority in the LRD. Although some courts have not yet completed the process of transcribing and verifying land registry folios, the new LRA prescribes the obligation of transferring the folios into electronic form and storing them in the CIS (Article 14 (1)). The process of scanning hand-held land registries has begun, and documents from the hand-held collection are upon request, for further use, transmitted electronically and stored in an electronic document collection. For documents transmitted electronically authorized users of the information system guarantee to be identical with those in the paper form, while the Minister of Justice will decide when the individual court will entirely start keeping an electronic collection of documents (Article 30). The obligation to submit proposals electronically is specifically prescribed for the competent public prosecutor's office as an authorized user of the information system (Article 105 (6)). As soon as the technical conditions are fulfilled, mail dispatch will be done electronically, namely via e-mail delivery for all individuals who will be able to programmatically accept it. Electronic submission is specifically prescribed for legal entities (Article 139 (4)), as well as for all cases where the proposal is submitted electronically (Article 137 (7)). Thus, the court bulletin board is kept only electronically (Article 137 (8)), while only one type of decision will be submitted exclusively in writing. Namely, it is a matter of notification the priority order for the intended alienation or encumbrance of the property, which is prescribed by Articles 77-82 of the new LRA. All other land registry decisions (whether issued by an authorized clerk, advisor or judge) must be digitally signed, since a collection of land registry solutions is being organized which will be kept exclusively in an electronic form (Article 31). On the practical and empirical level, we see that all the above amendments of the LRA certainly contribute to the reform of land registries. However, we should bear in mind that land registries (whether handled manually or electronically) will not fully fulfil their role in the real estate transactions if the process of harmonization of land registry and cadastral status (and the entry of harmonized data) is not accelerated (Matuško Antonić, 2019; Čizmić et al., 2018). However, today's development process of land registry is certainly not yet complete and this does not preclude a blockchain-based land registry (Verheye, 2017). Moreover, in 2018, the European Parliament issued resolutions recognizing distributed ledger technologies (DLT) and blockchains (as one of DLT technologies) as a tool that reduces intermediation costs in a trusted environment between the transacting parties and allows peer-to-peer exchange of value that can empower citizens, disrupt legacy models, improve services and reduce costs throughout

value chains (European Parliament, 2018). In those resolutions, the European Parliament calls on the Commission to investigate the improvement of traditional public services, including, *inter alia*, the further digitalization of the land registry (Wudarski and Josipović, 2015).

4.3. Digitalization of enforcement proceedings

Since the first Enforcement Act of 1996 entered into force, through the second Enforcement Act of 2010 and until the third Enforcement Act of 2012, the regulation of the enforcement system/proceedings in Croatia has undergone about 25 changes. Due to the perceived difficulties in the implementation of the existing Enforcement Act, the legislator has submitted a new Enforcement Act aimed at digitalizing part(s) of the enforcement procedure. For example, electronic communication is introduced with the aim of simplifying and modernizing the enforcement proceedings. Therefore, the notary will submit the draft decision electronically to the court in machine-readable form. In addition, electronic forms are being introduced to make the enforcement proceedings clearer. Therefore, the aim is to speed up the proceedings by returning the enforcement proceedings on the basis of a credible document under the supervision of the court together with the digitalization of the proceedings and electronic filing of the motion for enforcement.

The prevailing national particularism in the field of civil enforcement has begun to give way to ideas on the harmonization of enforcement procedures in the European context, so comparisons have become a necessary condition for mutual dialogue and harmonization of national enforcement systems. *Exempli gratia*, in Slovenia the entire procedure on the basis of a credible document remained in the jurisdiction of the courts but its implementation was digitalized way back in 2008 (i.e. 12 years ago)! Today, in whole of Slovenia, 5 judges (with the help of about 60 employees) work on issuing over 200,000 enforcement orders based on a credible document and decide on about 20,000 complaints against issued decisions annually (Uzelac and Bratković, 2015). Therefore, Slovenian experience shows that such a digitalized system can be designed while maintaining the formal framework of jurisdiction in court proceedings. However, in order for the digitalization to have the desired effect, we believe that a comprehensive digitalization is needed. In other words, a digitalization of each stage of the procedure.

Furthermore, the Enforcement Act of 2012 together with the Act on Execution of Enforcement over Monetary Assets (Official Gazette, 2018c) constitutes the legislative framework for the implementation of extrajudicial enforcement which is largely operated by the Financial Agency (hereinafter: FINA). It is important to mention that FINA conducts the sale of real estate and movable property by electronic auction in bankruptcy and insolvency proceedings and also in insurance procedures pursuant to the Act on Amendments to the Enforcement Act

(which entered into force on January 1st, 2015) and the Bankruptcy Act (which entered into force on September 1st, 2015). Consequently, FINA has developed a system of electronic public auction regulated solely in accordance with the provisions of the Enforcement Act and the related by-laws. More important are the Rules on the manner and procedure for the sale of real estate and movable property in enforcement proceedings (Official Gazette, 2019c) which for the time being have left a number of unanswered questions. (Kontrec, 2015; Mihelčić, 2015). Given the fact that difficulties have been encountered in the implementation of the e-public real estate auction, the aforementioned proposal of the Enforcement Act seeks to improve and facilitate the sale of real estate.

4.4. Digitalization of bankruptcy proceedings

Bankruptcy proceedings are inherently restrictive, rigid and/or difficult to enforce. Therefore, the question of the expediency and the need to improve bankruptcy solutions, in the context of modernizing *de lege lata* solutions, is extremely current topic. In this segment, the use of digital technologies in the conduct of bankruptcy proceedings, in principle, contributes to its efficiency and transparency while at the same time facilitates subjects' access to the justice system. The previous Bankruptcy Act (Article 8) regulated the delivery of court documents during the bankruptcy proceedings (Official Gazette, 2013c). Therefore, all the letters addressed to a wider circle of individuals were submitted by placing them on a special notice board of the court. The court documents, which were to be publicly published, were published in the Official Gazette and on the notice board of the court (in whole or just an excerpt). Since bankruptcy is an out-of-court procedure, *in extremis*, in which time is one of the most important elements, such delivery rules had to be significantly changed as they have provided the parties and other participants with a variety of options to avoid receiving letters and to eventually delay the proceedings. The new Bankruptcy Act solutions seek the legitimate aim of ensuring that bankruptcy proceedings are prompt and effective (Official Gazette, 2017a). The reason for abandoning the previous delivery model lies in the fact that this type of procedure can involve a large number of creditors, so delivery as determined by the old bankruptcy rules would increase the costs and, consequently, complicate the course of the proceedings. Therefore, the new Bankruptcy Act (BA) explicitly states that all court documents are submitted (or delivered) via publication on the court's electronic bulletin board while the delivery itself is considered to be complete on the eighth day from the day of the public announcement on the court's e-Bulletin board (Article 12 (1)).⁸ Thus, in our case, the publication of a written notice on the court's e-Bulletin board is considered as proof that the delivery was made to all participants, even those for whom special delivery was

⁸ Proper delivery in the pre-bankruptcy and bankruptcy proceedings is of utmost importance, since the legal consequences of these proceedings occur when the notice is displayed on the court's e-Bulletin board (Article 65 (1)).

prescribed (Article 12 (2)).⁹ In any case, the records of the e-Bulletin boards shall be kept for each debtor (electronically and in the order of publication). The register is public and must be accessible to interested parties during court's working hours while its content is prescribed by the BA and the Court Rule Book (Official Gazette, 2017b). Such solutions in corporate bankruptcy may be problematic, since procedures that can be accessed solely by "electronic means" can potentially prevent some parties from having a "fair opportunity" to attend the hearings. Thus, in the case *Zavodnik vs. Slovenia* (ECHR, 2015a) the problem of inadequate notification during bankruptcy proceedings was problematized. Specifically, the applicant complained that his right of access to court had been jeopardized with regard to the bankruptcy proceedings against his former employer, a company in which he was a creditor. The applicant did not see the notice of the hearing, which was announced in advance on the notice board, nor did he read the notice in the Official Gazette. In addition, the applicant could not appeal against the decision because he had missed the deadline for appeal. The ECHR examined the applicant's complaint regarding his inability to attend the bankruptcy hearing as well as filing an appeal in a timely manner. Recognizing that Article 6 (1) does not prescribe a specific way of submitting the documents, the ECHR weighed the interests of the judiciary's efficiency on the one hand and the interests of the applicants on the other. The ECHR found that the applicant had no "fair opportunity" to find out about the hearing and that there was a violation of Article 6 (1) of the Convention. The judgment is interesting in that it provides indications as to the measures which a Member State should take in certain situations to ensure that a party to bankruptcy proceedings has a "fair opportunity" to participate in the hearings, bearing in mind that this applicant's case should be analysed in the light of his factual situation. Specifically, the applicant was assured that he would be informed and the number of creditors was relatively small. It is also interesting to note that the ECHR took into account the fact that the applicant was an elderly person, did not know how to use a computer and did not have internet access (ECHR, 2015b).

Furthermore, it is important to emphasize that the announcements on the e-Bulletin board are determined by the court, while the technical search capability is not within the jurisdiction of the court. Namely, the Ministry of Justice has the management and supervisory functions of the e-Bulletin board, while the courts post the decisions on the e-Bulletin board. The problem has arisen since the delivery between the Financial Agency (FINA) and the court is done electronically (Article 12 (5) of the BA), which is complicated because this legal provision has not yet been technically implemented. Commercial courts do not have a link that allows the filing of decisions and submissions between FINA and the court, thus questioning the implementation of the entire pre-bankruptcy proceedings. This is certainly reflected in the inability of the court to control the work of FINA, which is its legal obligation (Article 22 (1) (3) of the BA). Namely, even though FINA is no longer a part of the proceedings,

⁹ Therefore, creditors will have to follow the announcements on the e-Bulletin board for all decisions so as not to miss the deadlines for application or appeal.

not mentioning FINA is merely a formality. However, without FINA the proceedings cannot be conducted because FINA has clearly defined competences and the court has an obligation to give instructions to FINA (which is not the constitutional role of the court because the court makes decisions and does not apply the law through instructions).

In authors' opinion, a potential problem also arises in the consumer bankruptcy procedure, which is defined by the *lex specialis* - the Consumer Bankruptcy Act (CBA) that also determines delivery via the e-Bulletin board (Official Gazette, 2018d). Specifically, in consumer bankruptcy proceedings, the written notices are published via the courts' e-Bulletin board and this is considered as proof that the delivery was made to all interest parties including those for whom the CBA requires special delivery. The delivery itself is considered to be complete on the eighth day from the day of the publication on the court's e-Bulletin board. Although the participants of the proceedings process may request the delivery of their letters to their home address, e-mail address or personal mailbox, the delivery mode has no legal effect on the deadlines prescribed by the CBA. In any case, for each participant in each court, and in accordance with the order of publication, a logbook of the documents submitted via courts' e-Bulletin board shall be kept separately. The logbook is public and must be available to interested parties during court working hours. The logbook contains data which can be used to determine the identity of the participant, case number, the type of court document and the letter publication date on the courts' e-Bulletin board. Therefore, by standardizing the letters delivery mode (in the consumer bankruptcy proceedings) via the e-Bulletin board (i.e. without any personal submission of the letter to the party involved in the proceedings) ultimately makes the party objectively unable to get acquainted with the content of the letter. Also, the exercise of the right to a fair trial, to equal protection of rights and to a legal remedy is called into question which is however guaranteed by the provisions of Article 29 (1) of the Croatian Constitution and Article (6) (1) of the Convention.

Furthermore, after the BA entered into force in 2015, electronic public auctioning through FINA was applied as a method of sale also in bankruptcy proceedings in accordance with the competent court's decision. The parties involved in the proceedings as well as the interested public can follow the course of the bankruptcy proceeding through the Public Announcement (Javna objava) application. Data on real estate and movable property which are being sold in the bankruptcy proceedings (and which were previously submitted to FINA by the competent authorities) are available in the Register of real estate and movables sold in enforcement and bankruptcy proceedings application.¹⁰

Also (from August 1st, 2015), a rule has been introduced that the selection of a bankruptcy trustee/administrator is done through the e-File (e-Spis) system using the method of random selection from the A list of bankruptcy trustees within the jurisdiction of the competent court (Official Gazette, 2018e).

¹⁰ According to the BA, the Register is kept for all real estate sold in the enforcement and bankruptcy proceedings and for movables if their estimated value is more than 50,000.00 kn.

This was designed to enhance the transparency of the bankruptcy proceedings. The Minister of Justice passed the Rulebook on Conditions and Method of Random Selection of Bankruptcy Trustees (Official Gazette, 2015) which stipulates that the process of (automatic) random selection is based on the defined weight of each type of procedure (determined by the code list of the type of bankruptcy procedure in the e-File system) and the total weight of all procedures in which the trustee is appointed. However, the doctrine and the judicature cannot grasp exactly what the problem is except that there are problems in the system. One part of the problem lies in the spontaneous assignment of cases. The other set of problems is found in extremely large difference regarding the weight/load of each type of case/procedure. Although some trustees have an extremely different number of cases in which they are appointed, the system recognizes them as equally burdened. The Data on the exact workload and number of cases assigned to an individual bankruptcy administrator are not available through the e-Bulletin board, although they should be. According to other available data, it was found that, *exempli gratia*, 1154 cases were assigned to one bankruptcy trustee while some are administrating only a few cases (Čuveljak, 2015).

Another novelty is the rule on the obligatory use of the prescribed forms in the pre-bankruptcy and bankruptcy proceedings, which will also be available on the courts' e-Bulletin board. In this way, in addition to the instructional role, the forms should contribute to the greater efficiency of the courts in dealing with a large number of bankruptcy cases. If the submission/statement is not submitted on the prescribed form, the court will reject it as inadmissible (Article 13 (4) of the BA). The tendency is for simple actions that do not require the involvement of a procedural representative. To the authors' knowledge, however, the practice has not yet shown such effects. Specifically, the forms to be filled in by the parties and submitted to the court's reception offices did not allow for (such an) efficiency in the proceedings. For example, the doctrine indicates that the court does not receive the submission in e-form and is therefore unable to transmit the content into a (formal) decision without rewriting it, which is a great waste of time. The Personal Identification Number (OIB) together with the name and address becomes a necessary part of the information needed for submitting a valid proposal, and since the judges do not have an insight into the OIB, they are not able to verify the received proposal.

5. In Lieu of a Conclusion Or Target State

In the article entitled "What computers can do: analysis and prediction of judicial decisions", published in the American Bar Association Journal, Lawlore (1963) argues that, in the future, judicial decisions will be analysed and also predicted (with a high percentage of probability) based on digital analysis of legal regulations and facts of each case. In the paper "Predicting judicial decisions of the ECHR: a natural language processing perspective", Aletras et al. (2016) argue that through digital language processing by binary classification,

the outcome of ECHR decisions can be predicted with a probability of 79%. So, even though the idea and the standard that supports e-justice exists in national legislation for over 20 years, we can see that in comparative legislation the concept of e-justice is much older. Therefore, further accumulation and acceleration of scientific breakthroughs and technological innovations will undoubtedly influence further development of the judiciary system. It is necessary not only to establish the “rules of the game” by adopting individual laws and completing the regulatory framework. This is just the initial step. The development of digital technology depends entirely on the level of individual’s information literacy that is currently at an unsatisfactory level, even with regard to judicial staff. It is therefore necessary for the concept of future development of digital technology to be laid down to a practical and empirical level of the judiciary system. More specifically, it is necessary to transform adopted documents and strategies into concrete projects that will and can be applicable. For example, the regulation of individuals obliged to communicate with the court via electronic communication should have been addressed in the new Civil Procedure Act (CPA) by an ordinance. Although it is stipulated that the Minister of Justice will adopt the ordinance within 30 days of CPA’s entry into force (October 1st, 2019; based on Article 120 of the CPA), this has not yet been achieved. The same situation is with the ordinance for tone recording of a hearing that should have been enacted but was not. This would not be the first time that the legislature had not foreseen the effects and consequences that the legislative changes would produce nor did not prepare the (judicial) system to welcome them. This resulted in a fact that significant remarks could not have been formally pointed out in the field of normative civil law and that the absence of strategy is the reason why reform(s) could not have been acted upon. Thus, there is a need for a practical revival of the norm, since this creates the conditions for the development, education and increase of individuals’ level of information literacy, which will (ultimately) lead to an increase of the level of information literacy of a whole society. For example, the ECHR’s practice of Article 6 has no specific conditions that have been established in relation to the concept of e-justice. However, the current decision on delivery in consumer bankruptcy proceedings (Article 25 of the Consumer Bankruptcy Act) may result in the fact that certain individuals will be potentially prevented from exercising their right of access to justice if they do not have Internet access. In the authors’ view, for any dispute before the court to be publicly discussed, it is a constitutional requirement for the court to ensure the presence and possibility of the active participation of subjects whose rights and obligations are being discussed before the court in terms of the possibility of taking appropriate action(s) in court proceedings. This constitutional guarantee, therefore, excludes the possibility of deciding by a decision published and delivered via an electronic bulletin board without the presence and participation of, for example, an insolvent consumer, whose rights and obligations are discussed and decided upon. Thus, the purpose of the constitutional guarantee (Article 29 (1) of the Croatian Constitution) is to ensure that every person to whom a certain decision applies (concerning his/her rights,

obligations and/or interests), provides an objective opportunity to use a prescribed, effective legal remedy against such a decision.

Furthermore, whatever positive regulations have been adopted, which as a whole can be considered a step forward, many issues remain unresolved such as identity verification, confidentiality and integrity of all transactions. However, it is more a matter of choosing the right technological background/platform than the adequate legislation. This situation requires adapting new information and technology trends (such as blockchain technology), as well as creating the legal basis for making long-term development plans of such an area. Finally, we believe that the new regulations, based on a different concept, also contain a lot of acceptable novelties especially those that are designed to increase the efficiency of proceedings, but their benefits have not yet been fully realized due to the overload of courts and other factual factors. Therefore, overcoming the normative and factual obstacles to order to achieve the necessary speed of action was (always) the main objective of all civil procedure reforms. After the initial difficulties that are inevitable in these situations, we believe that over time the situation will get better and that the true value of these laws (and especially when the case-law answers many controversial issues) will come to the fullest extent. Therefore, the judiciary based on new technologies (i.e. digital judiciary or e-justice) requires a new concept and strategy that should be created for the forthcoming developmental phase. This new step forward, in the context of globalization processes, should be looked upon as a key factor for comprehensive national judicial development taking into consideration issues regarding technology base, availability of electronic services and human resources for using this (new) technology.

If we stop for a moment and take a look from a broader perspective (in a macroeconomic fashion), we can see that the start of the new decade is potentially representing a crucial moment for the future of globalisation and all integration processes worldwide. The COVID-19 outbreak and the associated urgent economic measures taken by countries worldwide will have huge effects on trade, transport, employment and economic growth (as well on judiciary). It seems that the role of the State is crucial to handle this crisis. But, can the State (especially in the case of small, open, globalized economies) handle with this new reality alone? Almost every thread of human action is interwoven with the effects of the globalization process, within the borders of one country and on the global level. Techno-globalism, global civil society, global pollution, global crises (with both economic and non-economic origins like the recent COVID-19 pandemic) are just some of the examples of global problems facing all residents of the so-called global village - a world where constant changes and processes of restructuring political and economic reality result in the emergence of a new social system. In neoliberal capitalism, citizens are often left to the whims of the (global) free market and the arbitrariness of the holders of capital (while there are no or little social, democratic and humanitarian values). Therefore, a logical projection of our (near) future comes in a form of recession(s), crises

and eventually (or ultimately) self-destruction of humankind. The contemporary macroeconomic science is inadequate to confront the challenges imposed by globalization (and crises that follow) and has no answer(s) for a number of problems and issues which globalization creates for both every nation-state and the entire world economy. The neoclassical economic theory (and its offspring economic schools) will become (if not already) increasingly irrelevant and even counterproductive. It seems that the COVID-19 pandemic will lead to a new way of economic (and legal) thinking.

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CHAPTER 2

THE PUBLIC PERSPECTIVE IN REGULATING BIG DATA. BIG DATA AS A NEW COMMONS

Francesco Gaspari¹

Abstract

The paper aims at identifying the legal nature of big data and the different views concerning data “ownership”.

In particular, in its first part, after having clarified that currently no specific law grants ownership to big data as such, the work points out that within the EU legal system, three different legal regimes concerning the “ownership” of data can be identified: private, for personal data; public, for public data; and no-one “ownership”, for non-personal data.

The paper then focuses on the main views concerning big data.

In its second part, the work puts other regulatory and interpretative options forward, and specifically the one that may be defined as the “public view” of big data. This “public view” is based, *inter alia*, on the consideration that big amount of data should be designed to serve mankind. Within such a view, it may be possible to consider big data as a new commons.

The paper concludes upholding that big data requires a multilevel regulatory framework, within which competition-related matters should be given due considerations, in order to ensure different needs stemming from both private and public sides.

Key words: big data, personal data, public data, new commons, data ownership, big data regulation

JEL classification: K10, K21, K23, K29, K38

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1. Introduction

Within the EU legal order, we can identify three different legal regimes concerning the “ownership” of data: private, for personal data; *public*, for public data; and *no-one* “ownership”, for non-personal data.²

With regards to non-personal data – that include raw machine-generated data, aggregate and anonymised datasets used for big data analytics, data on precision farming that can help to monitor and optimise the use of pesticides and water, or data on maintenance needs for industrial machines³ –, Regulation (EU) 2018/1807 has affirmed their free flow, on the assumption that, as non-personal (and namely, not referred to a specific person) data, they belong to no-one.

However, no specific law grants ownership to big data as such.⁴

2. The legal nature of big data and the different views concerning data “ownership”

As has been noted by the EU Commission, “[r]aw machine-generated data are not protected by existing intellectual property rights since they are deemed not to be the result of an intellectual effort and/or have any degree of originality” (EU Commission, 2017a: par. 3.2, 10; EU Commission, 2017b: Part 3, point 3).

According to a scholar (Tjong Tjin Tai, 2018), we should distinguish between data as information and data as data files, concluding that ownership should only apply to data files, not to information.

2 With regards to personal data, see Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (on the protection of natural persons with regard to the processing of personal data and on the free movement of such data), and Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 (on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data), as well as Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 (on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data). As for public data, see Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information. This directive will be repealed with effect from 17 July 2021, pursuant to Article 19 of Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information. With regards to non-personal data, see Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union.

3 Regulation (EU) 2018/1807, whereas 9.

4 For a definition of “data ownership” see EU Commission, *Study on emerging issues of data ownership, interoperability, (re-)usability and access to data, and liability*, prepared for the European Commission DG Communications Networks, Content & Technology by Deloitte, Final Report, Luxembourg, 2018, 75-76, in which “data ownership” is understood as “an alienable legal construct permitting one or more persons (the ‘owners’) to control access to or use of a single piece or set of data elements to the exclusion of others”.

Other scholars (Rubinfeld and Gal, 2017: 362) argue that, legal systems generally differentiate between *raw* data and *databases* (or processed data). Raw data refer to basic, unprocessed data, such as internet traffic. Generally, raw data, including private data, are not seen as owned by anyone. According to this view, there is no market that requires generic big data, as such (Rubinfeld and Gal, 2017: 346).

According to a recent study (Posner and Weyl, 2018), if – within the so-called “zero price market” (OECD, 2018; Gal and Rubinfeld, 2016: 526-527; Stucke and Grunes, 2015: 2; Kup and Mikeš, 2018: 393)⁵ – we look at the free services users not as consumers but rather as producers, as “data workers”, it would be possible to identify an exploitation scenario, in which the work of data providers, like the one of housewives, is taken for granted and not remunerated. The aim of this study is to show that there is a need to more equally distribute the benefits stemming from the digital economy, by attributing a *quid* also to whom data produce. Such an approach, in principle fully sharable for its aim, assumes that data have an economic value and are owned (*recte*: produced) by private persons. As a consequence, the “worker” who transfers her/his data shall be remunerated. Alternatively, and within such perspective, we may add that the “data worker” could sell his/her data directly to the buyer (for instance, advertising agencies), cutting one of the middlemen in the transaction (the ‘free’ service provider that collects his/her data), or to companies that are interested in advertising their products to him/her directly without any intermediary intervention in the transaction.⁶

Otherwise, the figures of producer and consumer will merge into a “prosumer” (Toffler, 1980), letting online sites exploiting data and datasets thereby created. Many online sites (especially social networks) are based on prosumers, given that they gain value as more people join them and interact with each other and create communities (Duncum, 2011).

Within the debate on data producer’s right for non-personal or anonymised data (EU Commission, 2017b: Part 3, point 7.2c), other scholars propose another possible solution consisting of creating a new data producer right, with the objective of enhancing the tradability of non-personal or anonymised machine-generated data as an economic good (Zech, 2016). This solution raises a number of questions (EU Commission, 2017b: Part 3, point 7.2c), starting with

5 Within the *zero price market* logic, a whole range of products and services are provided free of direct charge in exchange for the ability to harvest users’ data.

6 The commodification of personal data raises many questions, among which ethical and digital divide issues. From one side, allowing individuals to sell or license their data means giving a monetary value to fundamental rights. The commodification of personal data can be viewed as the commodification of a human being and its identity. From the other side, the commodification at stake implies that individuals have gained a significant level of digital literacy, that is not (yet) the case in the EU, according to recent data published by the European Commission. According to the Digital Economy and Society Index (DESI), report 2019, *Human Capital. Digital Inclusion and Skills*, 5, in 2017, 43% of the EU population had an insufficient level of digital skills, while 17% of the EU population had no digital skills at all, the main reason being that they did not use the internet or barely did so.

the scope of the right. In this respect, someone believes that such a right could be envisaged as a right *in rem*, assigning the exclusive right to utilise certain data, including the right to license its usage. As has been properly outlined, such right would not be conceivable with regard to personal data as the protection of the latter is a fundamental right in itself under which natural persons should have control of their own personal data (EU Commission, 2017b: Part 3, point 7.2c(i), 33). Alternatively, instead of creating the data producer right as a right *in rem*, it could be conceived of as a set of purely defensive rights (Kerber, 2016a: 989). This approach aims at enhancing the sharing of data by giving at least the defensive elements of an *in rem* right (for instance, the capacity for the *de facto* data holder to sue third parties in case of illicit misappropriation of data, as explained by the EU Commission, 2017b: Part 3, point 7.2c(i), 33-34), and therefore it equates to a protection of a *de facto* “possession”, rather than to the concept of “ownership” (Zech, 2016: 63).

Others are of the opinion that the answer to the question concerning big data ownership is multi-faceted, and three different perspectives – traditional property, intellectual property, contract – are identified (Zeno-Zencovich, and Giannone Codiglione, 2016: 32). According to this view, these perspectives are not mutually exclusive and can be used in different contexts, according to which situation is considered prevailing.

According to the EU Commission, given that a comprehensive policy framework does not currently exist at national or Union level in relation to raw machine-generated data which does not qualify as personal data, or to the conditions of their economic exploitation and tradability, the issue “*is largely left to contractual solutions*”, being the use of existing general contract law and competition law instruments available in the Union deemed by the Commission as “*a sufficient response*” (EU Commission, 2017a: par. 3.2, 10). This conclusion conceives big data as a private matter, to be regulated between parties of a contract.

3. The “public view” of big data

However, other regulatory and interpretative options may be put forward.

One may uphold that big data – such as internet traffic, “first party data” (Autorité de la concurrence and Bundeskartellamt, 2016: 12), non-personal data and, more in general, raw data – cannot be owned individually, and they are public goods owned by the State/public administration or they can be seen as a commons, belonging to all, i.e., the Community or the *Human Community* (Rodotà, 2012: 123; Cerulli Irelli and De Lucia, 2015: par. 4).

The “public view” of big data is based, inter alia, on the consideration that the big amount of data should be designed to serve mankind.⁷ Big data have social functions, and should be used by governments for public policy purposes (European Parliament, 2017: whereas “H”; Delmastro and Nicita, 2019: 141 ff.), such as, inter alia, prevention of corruption, conflicts of interest, tax fraud and money laundering, and also to promote competition within the social market economy (on which the European Union is based: Libertini, 2011: 491 ff.), as well as to identify and monitoring differences in access healthcare and diseases caused (also) by environmental pollution by geographic area⁸. and – more in general – to increase the well-being of all people (Delmastro and Nicita, 2019: 27; Munné, 2016: 195).

Also for commercially-held information, the EU Commission has pointed out that in a number of scenarios, public sector bodies could significantly improve their decision making using such information, notably for reasons of public health policy, spatial and urban planning, natural and technological risk management, managing energy supply grids or protecting the environment (EU Commission, 2017a: par. 3, 8; EU Commission, 2017b: Part 3, point 7.2b, 32).

But, as known, companies are not willing to share “their” big data, even in case of a pandemic.⁹ Therefore, governments can (*recte*: should) solicit such data to private firms to carry out their tasks.

It is clear that this request cannot fall within the essential facility doctrine (EFD) logic, in case the company refuses to provide the relevant big data, as in these situations there is no market, but public functions to carry out.

A possible solution to make the release of the required big data possible and lawful would be legislative measures. A similar solution has been adopted in France, where the open data legislation has put in place the possibility for the Government to request commercial players to give access to data they hold for the purpose of establishing public statistics (EU Commission, 2017b: Part 3, point 7.2b, 32).¹⁰

7 A similar principle is laid down in Regulation (EU) 2016/679, according to which “[t]he processing of personal data should be designed to serve mankind” (whereas 4).

8 In this regards, see the Italian Law 22 March 2019, No. 29, establishing the *National Network of cancers’ registers and of oversight systems and of epidemiological report for the health control of population* (O.J. 5 April 2019, No. 81).

9 On 19 March 2020 Mr Zuckerberg – CEO of Facebook – announced that it would not be available to share users’ data with governments and public authorities to fight against the coronavirus: see https://www.corriere.it/tecnologia/20_marzo_19/coronavirus-zuckerberg-governi-non-mi-hanno-chiesto-dati-utenti-66f9d658-69b6-11ea-a8a1-df48c20e9d2e.shtml.

10 Article 19, Loi No. 2016-1321 du 7 octobre 2016 pour une République numérique, JO République Française No. 0235 of 7 October 2016.

The notion of “public interest data” introduced in the French legislation could be developed at European level, so as to give access to all relevant data to public sector bodies.¹¹

Another possible interpretative option consists of considering non-personal data as something that nonetheless derive, inter alia, from persons or (mainly) from human activities and therefore are indirectly personal.

This conclusion stems from the interpretation concerning the precise scope of Article 20 of Regulation (EU) 2016/679¹² in terms of the personal data which is eligible to be ported. Literally, the provision makes provision for a right to port any data which the data subject has “provided” to the controller. The question remains what is to be considered as “provided” by the data subject in any given situation (EU Commission, 2017b: Part 5, point 2, 46). The Article 29 Working Party¹³ issued guidelines on this specific point and applied a broad definition. According to these guidelines, the categories that can be qualified as “*provided by the data subject*” are not only “[d]ata actively and knowingly provided by the data subject”, for example, mailing address, user name, age, etc., but also “[o]bserved data provided by the data subject by virtue of the use of the service or the device”, such as a person’s search history, traffic data and location data. It may also include other raw data such as the heartbeat tracked by a wearable device (Article 29 Data Protection Working Party, 2017, 10).

11 Specific obligations to licence provisions are foreseen in Regulation (EC) 715/2007 of the European Parliament and of the Council of 20 June 2007 *on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information* (Articles 6-9). As specified in its whereas 8, “[u]nrestricted access to vehicle repair information, via a standardised format which can be used to retrieve the technical information, and effective competition on the market for vehicle repair and maintenance information services are necessary to improve the functioning of the internal market, particularly as regards the free movement of goods, freedom of establishment and freedom to provide services”. Another obligation to licence is laid down in 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* (Articles 35 and 36), in which access is to be given, respectively, to “payment systems” and to “credit institutions’ payment accounts services”. Another example is given by Regulation (EC) 1907/2006 of 18 December 2006 concerning the *Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)* (Title III, concerning *Data Sharing and Avoidance of Unnecessary Testing*, Articles 25 ff.). In this context, sharing of information on substances should be provided for in order to, inter alia, reduce testing on vertebrate animals (whereas 33, 49, 50, 51). See also Commission implementing Regulation (EU) 2016/9 of 5 January 2016 *on joint submission of data and data-sharing in accordance with Regulation (EC) No. 1907/2006 establishes detailed rules on the conditions under which data have to be shared*.

12 According to this Article, “[t]he data subject shall have the right to receive the personal data concerning him or her, which he or she has provided to a controller, in a structured, commonly used and machine-readable format and have the right to transmit those data to another controller without hindrance from the controller to which the personal data have been provided”.

13 The Article 29 Working Party (Article 29 WP) was the independent European working party that dealt with issues relating to the protection of privacy and personal data until 25 May 2018 (entry into application of the GDPR), when was succeeded by the European Data Protection Board (EDPB): see https://edpb.europa.eu/news/news/2018/europes-new-data-protection-rules-and-edpb-giving-individuals-greater-control_en.

By contrast, data created by the data controller on the basis of data provided by the data subject would fall outside the scope of the right to data portability. This is the case for “inferred data” and “derived data” that are created by the data controller on the basis of the data “provided by the data subject”. For example, personal data created by a service provider through algorithmic results, or the outcome of an assessment regarding the health of a user or the profile created in the context of risk management and financial regulations (e.g. to assign a credit score or comply with anti-money laundering rules) cannot in themselves be considered as “provided by” the data subject (Article 29 Data Protection Working Party, 2017, 10).

According to this interpretation of the right to portability, also raw data are deemed as personal data, as long as they are “provided by” the data subject.

However, if we think that big data are generated by different sources, taken together all pieces of information may allow to “build” an *identity*, which cannot but have public relevance. This *identity* does not necessarily concern a specific natural person, but aggregate and anonymised datasets (for instance, data concerning a specific urban area with regards to energy consumptions, road traffic, healthcare, etc.). Notwithstanding, they derive, inter alia, from persons that, if deemed as a whole, may be identified in the State-community.

In this respect, the German Constitutional Court has significantly stated that the idea of “man” (*Menschenbild*) does not coincide with that of “sovereign individual”, as the German Constitution has determined the tension “individual-community”, namely the “relativity-to-the-community” (*Gemeinschaftsbezogenheit*) and the “bindingness-to-the-community” (*Gemeinschaftsgebundenheit*) of a person. The Court has consistently affirmed that individual fundamental rights belong to a man as a member of the community and therefore in the public interest and those rights are conditioned in their effective exercise and, hence, they are mediated by particular common values, especially by the liberal-democratic fundamental order. This view is reflected in Article 2 of the Italian Constitution (which makes reference to “social groups”), even if Italian scholars and academic writers follow a different view that, starting from a strictly individualistic concept of a person, seen as a single/individual, considers the reference made in Article 2 to “social groups” as an additional guarantee as compared with individual inviolable rights (Baldassarre, 1989: 16).

In conclusion, data generated from the State-community cannot but belong to the same community.

4. Big data as a “new commons”

Within that we have called the “public view” of big data, it may be possible to consider big data as a commons.

The term “commons” is full of ambiguity and rarely defined. However, its definition varies with the type of resource at hand (Hess, 2008: 33 ff.).

As has been pointed out (Foster and Iaione, 2016: 285), the term “commons” has a long historical and intellectual lineage ranging from the enclosure movement in England (Linebaugh, 2008; De Moor, 2015), to Garret Hardin’s article “*The Tragedy of the Commons*” (1968), and to Elinor Ostrom’s Nobel work on governing common pool resources (1990). More recently, scholars across an array of specialties have conceptualized and articulated “new commons”, beyond those recognized in the traditional fields of property and environmental law (Hess, 2008). Such new commons include, inter alia, scientific knowledge, voluntary associations, climate change, community gardens, wikipe-dias, cultural treasures, plant seeds, and the electromagnetic spectrum.

Since 1990’s, the legal community has increasingly invoked the “commons” as an argument against the expansion of intellectual property rights and increasing legal ambiguities in the advent of the online digital environment (Hess, 2008: 2-3; Cerulli Irelli and De Lucia, 2014: 3 ff.). Like for other new commons, also big data may be seen as a reaction to increasing commodification, privatization, and corporatization, untamed globalization, and unresponsive governments (Hess, 2008: 3; Lucarelli, 2007: 87 ff.; Barcellona, 2013: 123 ff.).

There are many different ways that new commons evolve or come into being. Some – like big data – evolve from new technologies (e.g. digital commons) that have enabled the capture of previously uncapturable public goods, such as, inter alia, the Internet (Hess, 2008: 4, 38). As for big data, they are generated *for free* (mainly) by network users, and they are captured by collectors through new technologies. In the Hess’s Map of new commons, big data would be included within the “Knowledge Commons” category, as big data should be deemed, first of all, as a peer production/mass collaboration good (Benkler, 2002; Benkler, 2006; Benkler and Nissenbaum, 2006)¹⁴, and they may also fall within the Internet access and infrastructure subcategories (Hess, 2008: 13, 20 ff.).

The Commons-based peer production (CBPP) represents the “*third mode of production in the digitally networked environment*”, beyond the property and contract-based modes of firms and markets (Benkler, 2002: 394 ff.).

In the light of the peer production theory/model, large numbers of people work cooperatively to produce big data, without being necessarily financially compensated for their activity. All the principles (or structural attributes) governing such a model theory seem to be met with regards to big data: first, the potential goals of peer production are modular; second, the granularity of the modules; and third, the low-cost integration (Benkler and Nissenbaum, 2006: 400-401).

14 The expression “*Commons-based peer production (CBPP)*” is a term coined by Harvard Professor Yochai Benkler and describes a new model of socioeconomic production in which large numbers of people work cooperatively (usually over the Internet). Commons-based projects generally have less rigid hierarchical structures than those under more traditional business models. Often—but not always—commons-based projects are designed without a need for financial compensation for contributors.

These are the main reasons why we believe that big data can be conceptualized as a new (digital) commons.

Within this perspective, at the international level, the OECD has undertaken extensive analysis to assess to what extent enhanced access to data can maximise the social and economic value of data (OECD, 2015: 2; OECD, 2019). It is interesting to note that in this debate the OECD refers to a “data commons” as a way to describe non-discriminatory access to certain data for at least a wider group of players, specifying that this should neither be confused with an “open data” or “open access” approach (access for the public at large), nor should it mean that access is given at no costs. The defining element of a “commons” is that non-discriminatory access is to be given, i.e. any member of a certain group (e.g. users of an industrial data platform) can use the data for purposes defined by the party making the data accessible (EU Commission, 2017b: Part 3, point 7.2d, 37).

5. Big data as an instrumental resource to exercise fundamental rights and freedoms

The free movement of data (and of big data) does not hinder their qualification as a commons. In fact, regardless of their mobility, commons are characterized for being functional or instrumental to satisfy the rights and the fundamental freedoms recognized to natural and legal persons by the multilevel legal order (Rodotà, 2011: 238-239; Lucarelli, 2007; Lucarelli, 2016).

In this respect, it is worth recalling Article 1, par. 3c of the Bill by the “Commissione Rodotà”¹⁵, in which the codification of the legal category of “commons” is set out. There, commons are “*things expressing functional utility to the exercise of fundamental rights as well as to the free development of persons*”. It also clarifies that commons can be held by natural and legal persons. The provision at stake adds that “*In any case it must be ensured their collective enjoyment, subject to the limits and the conditions fixed by law*”.¹⁶

The most important element stemming from the work carried out by the Commission consists of having included such new legal category of commons without bringing it onto the category of public goods, as the former are characterized by a widespread ownership and not by a public ownership (Ciolli, 2016: 462).

Such an approach seems to be followed by the Italian case-law. In particular, the Joint Divisions of the Supreme Court¹⁷ stated that from Articles 2, 9, 42 of the Italian Constitution it is possible to deduce the protection of the human personality principle, whose proper application concerns not only public/State

15 The Commission was appointed with decree of the Italian Ministry of Justice of 14 June 2007 and tasked with drafting a bill for the reform of regulation concerning public goods, as regulated by the domestic Civil Code of 1942.

16 Our translation.

17 Supreme Court, Joint Divisions, judgment 14 February 2011, No. 3665.

property, but also “goods that, regardless of a prior identification by the legislator, for their inherent nature or end result, on the basis of a systematic interpretation of the whole legal order, functional to pursuing community interests”.¹⁸

Another part of the 2011 Supreme Court judgment is very relevant for our ends, in particular when it – stressing that any immovable good is a commons if it helps to meet society’s goals – affirms that for a good to be public, “more than to State-body, as public legal person individually taken, reference must be made to the State-community, deemed as a representative body of citizenship (community) interests, and as a body entrusted with the effective implementation of those interests”.¹⁹

According to the Supreme Court, the inclusion of commons on the State deemed as State–community “is not an aim in itself and it is not relevant on an ownership level but implies for it burdens of a governance that make the different forms of enjoyment and of public use of such goods effective”.²⁰ In this respect, one shall point out that the (Italian) Republic, pursuant to Article 2 of the Italian Constitution, not only recognizes and ensures human inviolable rights, but also requires the fulfillment of mandatory duties of political, economic and social solidarity (Lombardi, 1967; Cerri, 1989; Barbera, 1975: 84 ff.).

The concept of solidarity (Lombardi, 1967: 45 ff.), which represents the rationale of such duties (Rossi, 2006: 54-55), is for its nature not-exclusive and calls for the necessity to ensure all the essential conditions that allow the effectiveness of fundamental rights for the development of personality (Lieto, 2011: 349-350). The fulfillment of solidarity duties as set out in Article 2 of the Italian Constitution – duties that, like freedoms laid down in the same provision, have an open character (Barbera, 1975: 97) – concerns both citizens and institutions that have the task to foster cohesion processes (Lieto, 2011: 349-350).

The Italian legal (constitutional) order recognizes the solidarity principle as a supreme constitutional value, one of the founding values of the legal order (Italian Constitutional Court, judgment 28 February 1992, No. 75). Hence, solidarity is not seen exclusively as a synthesis of duties requested to persons, but includes also all behaviours that each subject, both individual or associated, performs for the fulfillment of general interests and therefore of commons, beyond obligations set out by the legal order and, hence, based on the bond of solidarity (Rossi, 2006: 54-57; Cerri, 1989: 1; Italian Constitutional Court, judgment 31 December 1993, No. 500).

Solidarity must not be conceived as depending upon the willingness of those who satisfy it, but rather it must be seen as a “right” of its recipients

¹⁸ Our translation. Non-italics character added.

¹⁹ Our translation. As known, it does exist two different meaning of the word State: “State-community” (“*Stato-collettività*”) and “State-body” (“*Stato-apparato*”). In the former, the word “State” takes a wide meaning, indicating the people, territorially located and politically organized, while in the latter, that word assumes a narrower significance, as it refers to a government apparatus, which exercises the powers conferred on it, within the State-community (see Zagrebelsky et al., 2019: 58)

²⁰ Our translation.

and therefore – conversely – as a duty that imposes to individuals to take others in due account (Grossi, 2014: 49). Such concept is clearly expressed in the EU Charter of fundamental rights (also known as “Charter of Nice”), whose Preamble affirms that enjoyment of the Charter rights “*entails responsibilities and duties with regards to other persons, to the human community and to future generations*”.

The free flow of data implies that those data are (*recte*: shall be) *available for all*. A possible argument supporting this view can be found in the *Schrems* case²¹, in which the European Court of Justice (ECJ) indicates that collecting data using one’s own algorithms does not automatically make the collected data the property of the collector (for instance, Facebook, Amazon, Google, etc.). There, the EU High Court determined that the collector of data cannot transfer data collected in Europe and protected under EU laws to entities outside of Europe (Rubinfeld and Gal, 2017: 362).

However, it is the market economy itself, on which the European Union is based, that endorses such view. Indeed, seen as a commons, big data not only allow to safeguard the equality principle *in* the market and *for* the market, but they are also instrumental to exercise fundamental rights and freedoms (Micciché, 2018: 94 ff.; Italian Supreme Court, Joint Divisions, judgment 14 February 2011, No. 3665), such as the freedom to conduct a business regulated at EU level (Article 16 of the Charter of Nice) and the freedom to exercise economic initiative regulated in many EU Member States (in Italy by Article 41 of the Constitution).

Article 16 of the Charter of Nice has been widely interpreted. However, the recognition of the freedom to conduct a business is not unconditional and may be subject to limits (Alpa, 2004: 91 ff.; Lucarelli, 2010: 102 ff.; Daniele, 1998: 69; Blanke, 2006: 429; Everson and Correa Gonçalves, 2014: 458). Like the freedom to exercise economic initiative (Italian Const. Court., judgment 23 April 1965, No. 30; Pace, 1990: 461 ff.), also the freedom to conduct a business embraces each phase of business activity, among which the right to take an activity up (Malberti, 2017: 322; Bezemek, 2014: 223 ff.; Blanke, 2006: 426 ff.), as well as the right to enter the market and to organize its business (Malberti, 2017: 322; Zinzani and Santarelli, 2013: 1210 ff.).

The freedom to conduct a business includes the right to exercise an economic or entrepreneurial activity, not only individually, but also in an associated form, or through other ways (Malberti, 2017: 311). The European Court of Justice (judgment 22 January 2013, C-283-11, *Sky Österreich*: par. 42) has clarified that the protection afforded by Article 16 of the Charter “*covers the freedom to exercise an economic or commercial activity, the freedom of contract and free competition*”. The scope of Article 16 of the Charter is however wider than the freedom to exercise economic initiative as recognized in the constitutional traditions of different Member States (Malberti, 2017: 314). The draftsmen of the

²¹ Judgment 6 October 2015, C-362/14, *Schrems*.

Charter consider the freedom of Article 16 as the expression to adhere to a precise economic system (Malberti, 2017: 314). In fact, in the Explanations to the Charter reference is made to Article 119 of the Treaty on the Functioning of the European Union (TFEU), whose first two paragraphs refer to an “*open market economy with free competition*”. As has been significantly pointed out, it exists, in the EU legal order, a functional link between business activity and protection of competition (Lucarelli, 2010: 131-132; Capriglione, 2008: 293-294). As a result, EU law aims at not only safeguarding the freedom to conduct a business, but also benefits having social nature that may derive from the market economy (Lucarelli, 2010: 133). And it is also for this reason that in the Hess’s Map of new commons, the market itself is deemed as a commons (Hess, 2008: 13).

Moreover, Article 16 of the Charter of Nice should be read together with Article 3, par. 3 of the Treaty on the European Union (TEU), according to which the Union “*shall establish an internal market*” and “*shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress [...]*” (Everson and Correa Gonçalves, 2014: 439). Moreover, the precise scope of Article 16 of the Charter is set out in Protocol No. 27 of the TFEU on the internal market and competition, which clarifies that “*the internal market as set out in Article 3 of the Treaty on European Union includes a system ensuring that competition is not distorted*” (Oliver, 2013: 287).

Big data can therefore be seen as instrumental resources having essential character²², and as raw materials necessary to exercise other fundamental freedoms, as recognized in the EU legal order, the exercise of which aims at attaining the objectives set out in the Treaties, as recalled above.

6. Big data and the duty to protect market needs

Thanks to big data, companies can enter the market, as they can design new goods, new processes and new business strategies by guessing consumers’ preferences and rivals’ strategies (Brynjolfsson et al., 2011; Kup and Mikeš, 2018: 394; Pitruzzella, 2016: 18). Big data represent a valuable resource that companies are not willing to share (Stucke and Grunes, 2015: 3; Richter and Slowinski, 2019: 5 ff.; EU Commission, 2018a: point 6.1.1; EU Commission, 2018b), thereby jeopardizing the market and the objectives set out in the EU Treaties.

As a matter of fact, by collecting as many data as possible, companies are able to obtain a competitive advantage over rivals that do not have access to the same big data (Mayer-Schonberger and Cukier, 2013; Stucke and Grunes,

²²From a competition law point of view, big data can be seen as essential resources, and where collector refuses to make them available the Essential Facility Doctrine (EFD) may find application.

2015: 1 ff.; McAfee, 2012; Mahnke, 2015; Autorité de la concurrence and Bundeskartellamt, 2016: 11 ff.). The *same* data are the *raw* data (or “first party data” or “non-personal data” or “anonymised data” or data that have not been processed or changed since its recording) (EU Commission, 2017a: par. 3, 8) and not the *processed* data.

Big data competition-related issues therefore primarily concern the first stage (and possibly the second one) of the four-step chain described by the OECD (2013: 10)²³ and by some scholars (Rubinfeld and Gal, 2017: 349), as data collected (and stored) by the collector are not often substitutable (Graef, 2015: 496; Pitruzzella, 2016: 20)²⁴, and they should be available and accessible to all for the next stages²⁵ (namely, analysis and distribution, as well as usage), in which data often acquire commercial value (Di Porto, 2017: 154; Italian Administrative Regional Court of Lazio, Division I, judgement 10 January 2020, No. 260; Italian Antitrust Authority (AGCM), 2018)²⁶, for instance as a commodity product (Sivinski et al., 2017: 208)²⁷ or because they are used for generating profit via online advertising (Kup and Mikeš, 2018: 394; AGCM, 2018: 18)²⁸, or

23 The four steps of the chain are: (i) collection and access, (ii) storage and aggregation, (iii) analysis and distribution and (iv) usage of personal datasets.

24 As far as the market definition for big data is concerned, the most relevant statements can be found in the EU Commission Decision of 4 September 2012, declaring a concentration to be compatible with the internal market and the functioning of the EEA Agreement, Case No. COMP/M.6314, *Telefónica UK/Vodafone UK/Everything Everywhere/ JV*, C(2012) 6063 final, in O.J. 7 March 2013 (C 66). While the Commission left the precise product market definition open, it argued that there were possibly separate relevant markets for online and mobile data analytics (para. 109-203).

25 Where Data analytics will search for patterns (*recte*: correlations) in data.

26 In a recent Italian case-law (Administrative Regional Court of Lazio, Division I, judgement 10 January 2020, No. 260) it has been clearly stated that data have a commercial value. The case concerns data gathered by Facebook and then traded by the company to third parties, especially with regards to online marketing activities and users profiling aims. The Court rejected the claim lodged by Facebook Inc. and Facebook Ireland Ltd. against whom the Italian Antitrust Authority (Autorità Garante della Concorrenza e del Mercato, also known as AGCM) in 2018 issued an administrative measure (including economic sanctions) for having adopted anticompetitive and abusive practices in managing data of Facebook users: AGCM, *Facebook-Condivisione dati con terzi*, Provvedimento No. 27432 adopted on 29 November 2018.

27 For example, data brokers collect, package and sell databases filled with personal information about consumers – name, address, age, income, job history, online site visit history, buying habits and similar data that possess commercial value for retailers and other businesses.

28 In the Italian AGCM measure issued in 2018 against Facebook, above cited, the Authority ascertained (see point 18) that the business model of the Facebook Group consists of gathering and subsequent exploitation of data users for commercial purposes. Such data – as pointed out by the AGCM – represent a consideration for the service provided by Facebook, given that users data have a commercial value. In addition to that, the Authority observes that the revenues generated by online advertising, based on users profiling from their own (users) data, constitutes the entire aggregate turnover of Facebook Ireland Ltd. and 98% of the Facebook Inc. revenues. It is also interesting to note that the data at stake were transferred to third parties in exchange for consideration without a valid consent given by the data subject (AGCM, point 5), while the same company (Facebook) refuses to share with public authorities users' data in case of a pandemic (like coronavirus), as “*it would [not] make sense to share people's data in a way where they didn't have the opportunity to opt in to do that*” (namely, without a consent by the same people!). This is what Mr Zuckerberg – CEO of Facebook – declared on 18 March 2020: see <https://www.businessinsider.com/zuckerberg-facebook-not-sharing-location-data-government-track-coronavirus-2020-3?IR=T>.

as results of data integration, analytics (EU Commission, 2017b: Part 3, point 3).²⁹ A low (or outright absent) availability of such a resource/commons (big data) has a negative impact on production of goods and on provision of services and, ultimately, on the market (Micciché, 2018: 95).

From a combined reading of Article 3 of TEU and of Article 2 of the Italian Constitution, an economic and social duty imposed on natural and legal persons can be identified; such a duty represents “*a barrier to the exaggerated individualism*” (Alpa, 1994: 365) and entails, in our case, that big data, deemed as commons, are freely accessible to all (Giannini, 1963: 39), without any charges, precisely because they are instrumental to the exercise of other fundamental freedoms (Lucarelli, 2016: 490-491), similarly to data and information held by public administrations (Directive 2003/98/EC and Directive (EU) 2019/1024). Writers have been bringing forward arguments in favour of wider re-usability of data, including privately-held data by other economic players (Drexl et al., 2016), and also the OECD has stressed the importance of identifying avenues to make more commercially-held data available for re-use. A recent OECD report (2019) – which examines 205 policy initiatives across 37 countries – shows that few countries have policy initiatives (almost 15% of all initiatives) to facilitate data sharing within the private sector (around 55% of the policy initiatives are based on voluntary schemes) and between government and private sector, even though sharing and re-use of data held by the private sector is the most frequently cited emerging challenge.

Ensuring market access through the payment of a raw material so essential like big data is like – by resorting to a metaphor – giving to market operators an access key that opens an empty room (similarly Rodotà, 2011: 240).

It can therefore be identified a duty of protection – imposed on all persons of the multilevel legal order – of the good “market” and of the good “competition” (Predieri, 1992: 6-7; Niccolai, 1991: 3680 ff.; Miccù, 2011: 142 ff.; Ferrarese, 1992: 291 ff.), that does not allow using in an egoistic way a factor of the production process (such as data and big data), which is essential to attain the objectives set out in the Treaties (EU Commission, 2020: point 2B, 7; Capriglione, 2008: 293 ff. Similar arguments have been used by Fracchia, 2013: 113, with regards to environmental law; and by Micciché, 2018: 96, with regards to the commons).³⁰

Therefore, such goods (data and big data) are commons since they are socially useful pursuant to Article 41 of the Italian Constitution (Italian Const. Court., judgment 26 January 1957, n. 29), and as they safeguard general interests of a democratically oriented community (Italian Const. Court., judgment 19 December 1986, n. 269: point 6).

²⁹In these cases, data can be protected, as a result of a protection given to the intellectual effort made into the design of the data integration process or the analytics algorithm (software).

³⁰The commons conceptual category aims at overcoming ownership forms typical of bourgeois ideology, based on appropriation and individual and excluding exploitation of goods (Cerulli Irelli and De Lucia, 2014: 3 ff.; Rodotà, 2013; Lucarelli, 2013).

All data are competitively useful, and most of them are unique and without reasonable substitutes. In this respect, it has been pointed out that “[n]on-personal, i.e. industrial, data often remain single-source data” and “[i]n most cases it will not be possible to replace industrial data from a specific sensor with data from another sensor”, with the consequence that “the entity or person who has actual control over the sensor and its data can de facto exclude others from its use” (Richter and Slowinski, 2019: 19). Amassing large amounts of data raises entry barriers by favoring market concentration and dominance (Stucke and Grunes, 2015: 7; Kup and Mikeš, 2018: 395; Newman, 2014: 401 ff.; Autorité de la concurrence and Bundeskartellamt, 2016: 11). In this respect, one should point out that the German Competition Act was amended in 2017, affirming that “access to relevant data is a potential source of market power” (Kerber, 2016b: 639 ff.).

The full and, in principle, unconditional accessibility to the goods at stake concerns raw data, as “[a]ll data in existence are potentially useful for developing, or use in, one model or another” (Sivinski et al., 2017: 203; EU Commission, 2017b: Part 3, point 6.2a, 25).³¹ And it is clear that firms “need to acquire infrastructures, technologies, competences and specific analytical techniques to infer information from data” (Colangelo and Maggiolino, 2017: 251), but this relates to a later stage, which requires/implies the availability of the raw data upstream.

This conclusion seems to find a base in several EU documents, such as on a recent Parliament recommendation, on Commission documents, as well as on the ECJ case law.

More specifically, the EU Parliament states that the development of massive, ever-growing data sets provides unprecedented insight into human behaviour, private life and our societies only “through advanced processing techniques and analytics” (European Parliament, 2017: whereas “C”).

The EU Commission points out that “in a data-driven economy industrial competitiveness depends on the widespread use of data services, enabled by technologies, such as cloud computing” (EU Commission, 2017b: Part 2, point 1). Moreover, the Commission affirms that “[t]he issues of access and transfer in relation to the raw data [...] generated by [...] machines or processes are [...] central to the emergence of a data economy and require careful assessment” (EU Commission, 2017a: par. 3, 8).

Furthermore, in a recent study published by the EU Commission, access to and (re-)use of data is deemed as a key barrier (EU Commission, 2018b: 72 ff. But also previously in EU Commission, 2017a: par. 3.2, 9).

³¹ An example is the “in-vehicle data”, the access to which could allow independent service providers to provide a wide range of services to the car owners and drivers (Kerber, 2018).

7. Conclusions

The fact that big data are regarded as a barrier to entry in (digital) markets implies a new approach, that takes into considerations not only data collector private needs, but also and above all market public and common needs, as established in the EU Treaties (EU Commission, 2020: point 2B, 9).

Such a new approach implies that private firms should be forced to share their big data (which are not otherwise publicly available). This aim can be achieved through different regulatory options. Firstly, it can be attained through legislative provisions. In this respect, the Italian Constitutional Court (Judgment 13 January 2004, No. 14: point 4) stated that the protection of competition by the legislator does not consist exclusively of repressive regulatory interventions, but requires, *inter alia*, public measures apt to reduce unbalances and to foster conditions for sufficient market development. According to the Court, the protection of competition cannot be viewed as “static” only, but also as “dynamic” (this latter well-known to the EU law), given that it concerns one of the State economic policy elements (Cassetti, 2004; Figorilli, 2019: 551). In this perspective, the protection of competition is deemed as a “tool” for the realisation of social utility (Luciani, 2019: 67-70), having competition a twofold purpose: one at individual level (the freedom to exercise an economic activity), and one at social level (directed towards the protection of community interests) (Italian Const. Court, judgments 16 December 1982, No. 223; 15 May 1990, No. 241; 9 December 1991, No. 439; Ferri, 1961: 532 ff.; Libertini, 2005, 1429 ff.; Corso, 2006: 4 ff.). The principle of social utility has to be seen as *internal* and not as *external* to the freedom of competition (Luciani, 2019: 67-68).³²

With regards to data, a dynamic approach seems to be adopted in France, where the above mentioned open data legislation (2016) puts in place provisions that oblige commercial companies to open up data they hold for re-use, namely data generated in the context of procurement (Article 17), commercial data for the establishment of official statistics (Article 19), certain electricity and gas production and consumption data held by transmission and distribution systems operators for re-use by any other party (Article 23), and certain data relating to changes in real estate ownership for re-use by certain third parties (Article 24). Such data are defined as “*données d'intérêt général*” (public interest data) (EU Commission, 2017b: Part 3, point 4, 22).

Secondly, the above-mentioned new approach can be achieved through the Essential Facility Doctrine (EFD), when the data holder (i.e., the collector) refuses to provide big data (similarly Kup and Mikeš, 2018: 396; Zeno-Zencovich and Giannone Codiglione, 2016: 37), seen as an (essential) infrastructural resource (OECD, 2015: 2).

The EU Commission has recently answered affirmatively to the question if and, possibly, to what extent general competition law can be applicable in the

³² Pursuant to Article 41, par. 2, It. Const., the freedom to exercise economic initiative cannot be conducted in conflict with social usefulness.

context of data-driven business models and, therefore, it may be invoked to claim wider access to data held by one economic operator (EU Commission, 2017b: Part 3, point 3, 21; EU Commission, 2017a: par. 3.3, 10).

The EFD is applicable in the fields of data and big data as long as the requirements set by the ECJ case law (judgment 26 November 1998, C-7/97, *Bronner*, esp. para. 44-45) and by the EU Commission are met (Hoffmann, and Johannsen, 2019: 59-60). In some cases, the EU Commission has excluded that big data can be qualified as an “essential facility”.³³

Thirdly, some economists (Prüfer and Schottmuller, 2017) have proposed remedial measures, that consist of imposing on online platforms a mandatory data sharing, a regulatory duty of sharing data with their competitors (Delmastro and Nicita, 2019: 131). In this perspective, organizational and institutional issues would arise. Among those issues, Prüfer and Schottmuller (2017: 32) wonder what type of data should be shared, in which market, by whom, and at which intervals. Moreover, they wonder whether competitors should be asked to share data bilaterally or should there be a third party, for instance a centralized public authority, that collects and distributes the data from and among competitors. Or perhaps such an authority should be a private industry association that is run by and on behalf competitors.

Fourthly, another regulatory option through which the new approach can be implemented consists in the qualification of big data as a commons, them being instrumental to exercise fundamental rights and freedoms.

Reasoning otherwise means that the opening up of markets (and the relative degree of competition, beyond the possibility to generate benefits across society) depends on the goodwill of the data holder, “*who ultimately becomes the gatekeeper for downstream markets*” (Richter, P. R. Slowinski, 2019: 21).

A possible alternative regulatory option *de iure condendo* may consist of granting, by Member States, special or exclusive rights to undertakings that, on a monopolistic basis (also taking into account the rival nature of big data), collect big data.

In this view, the concerned Member States would not act as administrators of big data (and therefore they could not dispose of them), but rather they would act as an authority tasked with ensuring their conservation and a proper collective enjoyment (Giannini, 1963: 39; Lucarelli, 2007: 89).

The recipient undertakings (of special or exclusive rights) would be entrusted with a public mandate (for instance, through a universal service) pursuant to Article 106 TFEU, inasmuch as they collect data that do not belong to them.

In particular, Member States, for securing the universal big data service, which entails the duty to collect and make such data available irrespective of the

³³ See, for instance, EU Commission, Decision 11 March 2008, declaring a concentration to be compatible with the common market and the functioning of the EEA Agreement, Case COMP/M.4731, *Google/DoubleClick*, C(2008) 927 final, in O.J. 2 October 2007 (C230), par. 365.

profitability of the sector being served (ECJ, judgment 17 May 2001, C-340/99, *TNT Traco*: par. 53), may confer on the relevant undertakings exclusive rights. These exclusive rights may hinder the application of the rules of the Treaty on competition in so far as restrictions on competition, or even the exclusion of all competition, by other economic operators are necessary to ensure the performance of the particular tasks assigned to the undertakings possessed of the exclusive rights (ECJ, judgment 19 May 1993, C-320/91, *Corbeau*: par. 14).

Given that the activities carried out by the undertakings at stake have a cost and should be performed in conditions of economic equilibrium, they may offset less profitable sectors against the profitable sectors and apply charges to remunerate that activity (ECJ, judgment 19 May 1993, C-320/91, *Corbeau*: par. 17). In this respect, as noted by the ECJ, it may prove necessary to permit the undertaking entrusted with the task, in the general interest, of operating the universal service to offset profitable sectors against less profitable sectors (ECJ, judgment 19 May 1993, C-320/91, *Corbeau*: par. 17). In addition, it may be necessary to require suppliers of the service at stake (namely, economic operators in downstream markets) not forming part of the universal service to contribute to the financing of the universal service so enabling the undertaking entrusted with that task to perform it in conditions of economic stability (ECJ, judgment 17 May 2001, C-340/99, *TNT Traco*: par. 55).

Moreover, the undertaking responsible for the universal big data service must also be required to pay the charges (ECJ, judgment 17 May 2001, C-340/99, *TNT Traco*: par. 58), when it operates in a downstream market not forming part of that service. It must also ensure that neither all nor part of the costs of its service are subsidised by the universal service, lest charges for the universal service and, consequently, the potential losses of that service be improperly increased (ECJ, judgment 17 May 2001, C-340/99, *TNT Traco*: par. 58; Tesouro, 2012: 823).

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CHAPTER 3

TOWARDS A REGULATORY FRAMEWORK FOR ARTIFICIAL INTELLIGENCE - AN EU APPROACH

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Abstract

The digital revolution facilitates innovation models that generate new markets and business models. Together with Internet, it has opened up a vast array of new possibilities. Latest reappearance of the artificial intelligence has created further potentials and types of market participation. Artificial intelligence is understood as a cutting-edge technology and a key-driver of transition of our economy into digital economy. The expansion and use of artificial intelligence will have a positive impact on many diverse sectors, such as healthcare, farming, security, climate, etc. Potential risks should not be underestimated as well. The pervasive recognition of the advantages of artificial intelligence will depend on legal certainty. The European Union is well aware of it. The main dilemma is to regulate or not to regulate. Too much regulation could stifle innovation and possible new incentives. On the other hand, certain minimum rules are necessary. The most important question is, should the current legal system be adapted to address the new challenges associated with the application of artificial intelligence, and how? Besides developing a proper legal framework, it is necessary to ensure appropriate ethical framework to enhance the trust of consumer, as well as to improve business outcomes. Certain rules already exist, but none of them regulate artificial intelligence specifically. The article questions a premise whether it is suitable to develop one legislative instrument, or whether it would be better to leave it to the sector regulations. The main idea behind it is that new technologies are moving too fast and the regulation is lagging behind. Certain regulation is needed, but with the caveat that any framework must be able to respond to new developments. The first challenge is to opt for a proper definition in order to be able to propose possible solution. The article will address those issues and offer potential answers. It will conclude that certain rules are definitely needed in order to preserve the fundamental values and standards.

Key words: Artificial Intelligence, European Union, Regulatory Framework

JEL classification: K20

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1. Introduction

Artificial intelligence (AI) is becoming one of the key technologies of the 21st century. It is part of the fourth industrial revolution that is “characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human” (Schwalb, 2016).

The technological improvement triggered by AI is not new. Some aspects have already become part of our everyday life. It has been applied in the traffic sector, health sector, climate sector, energy, agriculture as well as financial markets and data driven economy (European Commission, 2018a).

These topics are in focus in the European Union. The future development of AI and especially its appreciation in the community will depend on legal certainty of all stakeholders involved. The European Commission is leading the European Union’s efforts to tackle many issues arising in connection with AI. In 2018 it published a Communication on the Artificial Intelligence for Europe (European Commission, 2018a) and the accompanying document Liability for Emerging Digital Technologies (European Commission, 2018b). The Commission believes that the way we approach AI will define the world we live in (European Commission, 2018a). The main concern is to develop AI that can benefit people and society. If the advancement of the AI and its control are easily understandable, the possible risks to the whole society will be diminished.

The AI system causes legal, social and ethical dilemmas. In an attempt to offer possible solutions, it is necessary to understand the basic structure of the system. The legal framework must leave room for future technological innovation, while respecting fundamental values enshrined in the EU Treaties. The innovations are moving so fast and they are usually ahead of legislators. Today, we encounter a legal vacuum in almost every aspect of AI. Certain regulation is needed, but with the caveat that any framework must be able to respond to new developments. The first challenge is to opt for a proper definition in order to be able to frame appropriate policy and regulatory responses.

2. Definition of the Artificial Intelligence

The notion of AI is difficult to define. There are various definitions proposed in doctrine, from the laconic definitions of AI as “intelligent machines”, or at least “machines acting in ways that seem intelligent” to the more complex and comprehensive ones, referring to AI is “an umbrella term embracing computer (machine) vision, natural language processing, virtual assistants and bots, robotic process automation, machine learning (including most advanced techniques like deep learning) and cognitive processes in organizations” (European Parliament, 2019a). Russel and Norvig organize different definitions of AI along four different axes, depending on the approach taken, i.e. whether the accent

is on thinking humanly, acting humanly, thinking rationally or acting rationally (Russel and Norvig, 2010: 1-2). This illustrates how difficult it may be to find a common understanding.

In order to understand the main features and possible legal implications associated with AI, a clear, comprehensive and easily understandable definition is needed. This is the task for the policy and decision makers, which requires cooperation and consensus among lawyers, engineers, data scientists, economists, etc. Since AI-based solutions may be applied and used in very different economic and societal sectors, only an interdisciplinary approach may offer acceptable results. Finding an appropriate definition exceeds the limited scope of this paper. The authors will therefore concentrate on identifying some crucial arguments which are important and are able to contribute to the ongoing discussions on legal aspects of AI.

For a layperson in this field, so many aspects require clarification. The intention of this article is not to discuss all the elements of AI, but only to explore and pinpoint specific areas where regulatory intervention is either needed or appears redundant. When describing AI, the temporal element should be taken into consideration. AI technology is developing very fast, which is always problematic when it comes to definitions (European Parliament, 2019a). The definitions evolve over time and depend on the level of technological advancement. One example is the natural language processing that once has been thought of as forming part of the AI.³

The notion of AI is so wide that it encompasses various products and applications. Certain definitions cover vast array of products and some are sector – oriented (European Parliament, 2019b).

The fascination with AI is not new. In the 1940s there had already been attempts to explain its elements (European Parliament, 2019a; Russel and Norvig, 2010: 16 and further). During the years, there have been different attitudes towards AI, from total ignorance to only sporadic interest. In recent years we are facing the re-rise of the AI.

The European Commission underlines that “AI refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goal” (European Commission, 2018a: 1). AI is actually a collection of technologies that combine data, algorithms and computing power (European Commission, 2020a: 2). AI can be purely software based or can be embedded in hardware devices (European Commission, 2018a).

In the sea of so many proposed definitions we find the definition suggested by Policy Department for Economic, Scientific and Quality of Life Policies the one that best explains the complex notion of AI as a “branch of science and as such it can be defined as a set of computational technologies that are inspired by

³ Today it is perceived as forming part of computer science (European Parliament, 2019a).

the ways people use their nervous systems and bodies to sense, learn, reason, and take action” (European Parliament, 2019a). The last definition is wide and flexible enough to be able to adjust to rapid technological developments. Too rigid and strict definition could be an obstacle in future discussions concerning possible legal framework.

3. The EU Approach

AI has been brought to the forefront of the political agenda in the European Union in the last few years. In 2017 the European Council called the Commission to develop a European approach to AI. In 2018 the Commission published a Communication with the aim “to boost the EU’s technological and industrial capacity, prepare for socio – economic changes and ensure an appropriate ethical and legal framework”. The Commission stressed that all these priorities need to be coordinated with member states (European Commission, 2018a).

The Commission’s proposal aims at promoting appropriate ethical and legal framework taking into consideration fundamental values enshrined in Article 2 of TFEU (European Commission, 2018a). Possible regulatory proposals must take into consideration the fact that any misplaced regulation has a potential to stifle innovation in every sector, especially the AI sector. Elon Musk said that it is necessary to regulate AI before it is too late (Musk, 2017). Etzoni proposes a middle way, he calls for regulating AI applications, not AI research. He sees this solution more practical and beneficial as he believes that regulating applications in areas such as transportation, medicine, politics and entertainment are essential. He proposes five guidelines in regulating AI: to set regulations against AI – enabled weapons, to regulate the questions of liability, to disclose that AI is not human, to look at the privacy questions and to prevent the discrimination bias. He concludes that “the difficulty of regulating AI does not absolve us from our responsibility to control AI applications. Not to do so would be, well unintelligent.” (Etzoni, 2018). So, certain minimum standards are necessary.

The purpose of any regulation is to protect humans and society from harm. The principles of responsibility, transparency, privacy and protection against discrimination bias must be embedded in existing or new regulations.

The main problem is that today we do not have systematic legal initiatives concerning AI. Currently we have a patchwork of national rules. The picture in the EU is fragmented as well. That undermines legal certainty and security. One can rightly argue whether any regulation is needed at all. The question is to regulate or not to regulate. This problem will have to be addressed at EU level as well as national level. The EU already has a vast array of secondary legislation. Existing rules should be adapted to new developments. Too much regulation can have adverse effects to future innovations. Instead of enacting binding legal instruments, soft law instruments could also offer possible answers.

The latest initiative by the Commission is the White paper on artificial intelligence (European Commission, 2020a). The idea behind it is to maintain scientific discovery, preserve the EU's technological leadership while improving the lives of its citizens. The development of AI must be based on European values. One of the priorities of the current President of European Commission is a coordinated European approach on human and ethical implications of AI and the better use of big data innovations. The Commission's White paper offers policy alternatives to advance regulatory and investment approach that promotes AI (European Commission, 2020a).

Confidence should be the crucial feature of any regulation aiming to promote the growth of AI. The Commission understands that in order to become a leader in AI economy, there must be an appropriate framework that respects the EU fundamental values. The AI must be grounded on values of freedom, human dignity and privacy. The White paper calls for a European approach that will diminish national fragmentation of rules. The Commission refers to an ecosystem of trust and excellence (European Commission, 2020a).

In order to enhance trust, the Independent High-level expert group on AI (AI HLEG), set up by the Commission, issued the Ethics Guidelines for Trustworthy AI in 2019 (European Commission, 2019). The Guidelines propose seven specific requirements for a trustworthy AI: Human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, societal and environmental well-being and accountability. The accent is on the trust in the development, deployment and the use of AI systems as the essential part of every regulation aimed at establishing lawful, ethical and robust AI systems (European Commission, 2019: 5).

There is a tension between the efforts of the EU to promote innovation and new technologies, and its task to ensure socially and economically optimal outcomes. Certain rules in the area of data protection, privacy, non-discrimination, gender equality, consumer protection, product safety and liability apply to AI as well. In the European Union, there are already specific rules in place which can serve as a starting point in discussions concerning their application in connection with AI systems. The General Data Protection Regulation (GDPR, 2016) with its principles such as lawfulness, fairness and transparency, purpose limitation, data minimization, accuracy, storage limitation, integrity and confidentiality and accountability (see Article 5 GDPR) is a solid tool. Another regulatory area concerns product liability. The Commission has undergone preparations for amending the EU rules on product liability and machinery (European Commission, 2018b). The idea behind it is to see whether these rules are adequate or have to be altered. Since AI systems develop very fast, any regulatory instrument should be flexible enough to adapt and apply in rapidly changing environments.

Besides potential advantages of AI, possible risks should not be underestimated. A regulatory framework should take them into consideration.

Risks relate to fundamental rights, privacy, data protection, discrimination bias as well as perils connected to freedom of association, expression, the privacy and the protection of personal data.

According to the Commission, there is a need for continuous work in the area of effective application and enforcement of existing EU and national legislation. The limitations in scope of the existing EU legislation should also be tackled.

3.1. Examples of Possible Regulation in the AI system

In this section we draw attention to two topics that can trigger problems from the perspective of AI. One concerns the question of liability and the other competition matters. The intention is to shed some light on the possible future directions in those sectors.

AI systems, robots and other new technologies open questions concerning the liability for possible defects. The European Union's legislative framework consists of legal sources aiming to guarantee product market surveillance. The sectoral legislation is supplemented by the General Product Safety Directive (GPSD, 2002), which requires all products to meet safety standards. In the last years, the attention has been on the supply of digital content and data protection, rather than on the question on non-contractual liability. We shall show that the existing rules, with some clarifications and modifications, are adequate for innovative systems.

Autonomous systems have some special features and functions that cannot be determined in advance, but may result in damage. Unintended outcomes could cause damage to users. AI systems are so complex and involve a lot of actors, e.g. manufacturers, distributors and end users. In those complex interrelations there are some questions that have to be addressed. The precise rules are necessary so that the full benefits of new technologies prosper (Lohsse et al., 2019: 12). Those issues have already been discussed in the Digital Single Market Strategy (European Commission, 2015), as well as Data Economy Communication (European Commission, 2017) and Resolution on Civil Law Rules on Robotics (European Parliament, 2017). The European Parliament called a Commission to recommend a legislation on legal questions related to the development and use of robotics and AI. The digital revolution has provoked the revolution of non – contractual liability. Is strict liability appropriate to deal with risks associated with AI, and if the answer is affirmative, which regulatory level should be suitable? One of the proposed ways is the global approach, as different national initiatives may hinder cross – border transactions (Lohsse et al., 2019: 16). In the absence of the consistent global approach, presently, the European approach is more likely.

When we talk about responsibility, the key question is which actors are responsible for damage resulting from the use of AI systems? The first addressee of a damage claim is the producer of the AI system. Having in mind the peculiarities

of the AI systems, the question is whether we should attribute certain responsibility to the operator and the user of the system, as well. Further research and analysis of particular features of non-contractual liability in the field of AI is needed. In this respect, the Commission published the Report on the safety and liability implications of Artificial Intelligence, the Internet of Things and robotics (European Commission, 2020b). The first question to be addressed is the responsible person in the value chain: the producer, the user or the operator of the system. The Product Liability Directive (PLD, 1985) can provide some answers. It imposes a strict liability regime of the producer for the damage caused by the defect in their products. Until now, the EU legislator has not decided if strict liability regime should cover also operators and the user of the autonomous systems. There are a lot of risks associated with the way we use AI. A good example concerns autonomous cars, where the same regime as for the cars with drivers apply. The next point concerns the nature of AI systems that have a capability of self-learning and adapting to new situations. Those situations cannot be perceived at the outset. The last dilemma goes in favour of a possible exemption of the operator's liability (Lohsse et al., 2019: 20). The task of finding a responsible person will not be straightforward, but it will have to take into consideration different roles and contribution to the damage.

New technological development has blurred the dividing line between product and services. They are interconnected. The software is one example that could be problematic regarding AI. Software can be a part of product or sold separately. The software programmer could be held liable if a mistake is caused by the hardware, but if it is sold separately, he could escape the responsibility. The Product Liability Directive defines a product as all movables, whether incorporated into another movable or immovable (PLD, Article 2). Further clarification is needed concerning the issue whether software and data are products as well. The Directive does not apply to provision of services and license rights. In the last example national rules apply, which might create legal uncertainty. The situation is as follows. Article 2 of the Product Liability Directive will apply on a bundle of hardware and software. In those situations, if the software is defective, the Directive applies. The difficulty will be in those situations where the software is sold as a separate product. Software can take a lot of different shapes and it ought to be clarified if it is a product or a service. The scope of the Directive will have to be clarified and adapted to the new digital developments so that it also covers situations in which damage has resulted from the digital content or software.

We have seen that the main challenge is connected to the strict liability. It will have to be decided which actor should bear the possible consequences. As mentioned before, a lot of actors are involved. It is a situation of a complex value chain. It is important to define a responsible person with full awareness that too much regulation could disincentivize innovators to develop new systems. Here again, it is necessary to define the AI and then decide on possible responsible persons. There are two possible directions proposed in the literature. One is a general rule of objective liability and the other is to develop different sector-specific regimes. General clause would allow more flexibility,

but as all broad definitions, it can create legal uncertainty. On the other hand, sector regimes may initially be considered as a good solution, as they result from experiences connected to specific sector, but sometimes they need a lot of time to adapt to new technologies. Strict liability will not be the answer without the accompanying necessary insurance schemes (Lohsse et al., 2019: 21-23).

Other questions to be resolved concern the threshold (see PLD, Article 9), the burden of proof and the possibility of insurance. The burden of proof is the most problematic and sometimes it poses an obstacle to the injured person. The Report refers to the complex IoT environments where different product and services interrelate (European Commission, 2020b: 14). The injured party has to prove the damage, the defect and the causal link between the defective product and the damage. National law should facilitate the burden of proof for injured persons. It is suggested that a burden of proof is connected to the compliance with cybersecurity or other safety regulations. The problem is that the Product Liability Directive requires the victim to prove a defect, and national rules on evidence and causation apply.

As the Product Liability Directive does not refer to cybersecurity breaches in the product, it is debatable whether the latter situations are also covered. Another point is the development of the risk defense, which means that a producer is not liable if the defect has not existed at the time the product was put into circulation. AI products may evolve over time (European Commission, 2020b: 13-14). The algorithms are sometimes difficult to predict and understand and sometimes they require special knowledge. Those situations may create problems for the victims in their claims. There is an obligation of all producers to put safe products on the market. The AI system must meet the minimum of safety standards. The problems could arise in connection with possible future autonomous systems that operate independently of their creators. For how long would the producers be held liable?

The idea is to have a holistic approach that will take in consideration the liability of operators, owners and insurers, as well as the matter of redress in the value chain. There is also uncertainty as to the allocation of responsibilities between different economic operators in the supply chain. It seems that those questions will have to be addressed in a different way from the traditional civil law concepts such as traditional liability theories, negligence and strict liability regimes. The challenge for civil law is to make a well-defined division of responsibilities between designers, service providers and end users. In this context, the European Parliament's Resolution on Civil law rules on robotics (European Parliament, 2017) proposes a compulsory insurance scheme, compensation fund and a Union register. The resolution proposes that the most complex robots should have a status of electronic persons. Liability rules must make a balance between the protection of citizens and protection of innovation. It seems that gaps have to be confronted in a comprehensive approach (European Commission, 2020b: 6).

AI should take special care of consumers as well. Unfair Commercial Practices Directive (UCPD, 2005) and Directive on misleading and comparative

advertising (DMCA, 2006) can be applied to some parts of AI. Certain modifications will be necessary. For example, unfair practice is defined as a commercial practice that is contrary to the requirements of professional diligence and materially distorts or is likely to distort the economic behaviour of the average consumer. The unfair commercial practices can be aggressive or misleading. Is this definition enough to cover all the practices connected to AI systems? Advertising is one way to attract consumers. The new technology will create problems regarding the possible misleading and comparative advertising. The consumer protection rules come along with the rules that protect personal data. The vast amount of different data involving race, gender, ethnicity could raise concern. It has almost become a usual practice to infer such sensitive data (either directly or from proxy attributes) from online behavior, without users ever being aware, and used for profiling and personalized and targeted advertising (Wachter, 2020: 12-13; see also Goodman, 2016).

Although consumer protection rules are not part of competition law, they are intertwined, as one of the primary aims of competition law is the protection of consumer welfare. In that context, the relationship with competition issues should also be mentioned.

When speaking of competition, we must ask ourselves whether competition law is still adequate for dealing with challenges of the digital revolution, or whether competition policy needs new concepts and instruments. The well-known competition tools that focus mainly on price effects on markets might not be capable of dealing with AI systems. The main query is about the role of competition law in this almost perfect competition with many pricings aligned initiatives. The dilemma is whether rules in the field of competition law, prohibiting cartel as well as the abuse of dominant position, may adequately respond to the challenges of this new systems (see e.g. Mehra, 2016; Beneke and Mackenrodt, 2019; Harrington, 2018). The last quandary will be analyzed from the perspective of prohibited agreements and the use of algorithmic predictions on the market.

Article 101 TFEU prohibits collusion between undertakings that restricts competition. The General Court stated that the proof of an agreement must be founded upon the existence of the subjective element that characterizes the very concept of the agreement. Today we are facing situations where undertakings use pricing algorithms to monitor or adjust to each other's prices and market data. Here we might not have the collusive agreement because the essential element misses, the anticompetitive intent (see e.g. Bathaee, 2018: 890 and further). Ezrachi and Stucke's four scenarios illustrate the anti-competitive effects associated with the use of algorithms and AI particularly well (Ezrachi and Stucke, 2016: 35 and further; Ezrachi and Stucke, 2020). The first situation is one where the computers perform the will of humans. The undertakings agree on a cartel, and use computers in the implementation and policing the cartel. The second situation they call 'Hub and Spoke', where the undertakings use one algorithm that determines the market price, which other undertakings implement. The decisive element to demonstrate here is the anticompetitive intent.

The Predictable Agent is the third possible situation. Here, the undertaking designs a machine that delivers predictable results, which the other undertakings follow. The possible collusion can be a result of a mere parallel behavior, which is not illegal in competition law, but should come under scrutiny in cases which involve the use of AI solutions. The last proposed situation is presently still a science fiction. It is referred to as the 'Digital Eye' scenario, where the computer plays a strategy according to data it was fed with and according to the information it learned from the market. Here we do not have an intent, nor attempt by the designers of the algorithm to distort competition (Ezrachi and Stucke, 2016: 35 and further; Ezrachi and Stucke, 2020).

The latter hypothetical situations show the complexity and future challenges for the enforcers in the competition law. It will be extremely challenging to condemn undertakings' decision to use advanced algorithms to analyse market information and define prices. Margarethe Vestager, European Commissioner for Competition stressed in 2017 that "It's true that the idea of automated systems getting together and reaching a meeting of minds is still science fiction. But illegal collusion isn't always put together in back rooms. There are many ways that collusion can happen, and some of them are well within the capacity of automated systems." (18th Conference on Competition, Berlin, 16 March 2017).

The question of Big Data pose competition law concerns also in connection with the abuse of dominant position. The dominant position is not prohibited, but its abuse is. What happens when an undertaking in a dominant position possesses a large amount of data? Will this undertaking be subject to inspection? Applying AI systems, the dominant company in the market which possesses large amounts of data is in the position to generate specific new information, which can lead to possible abuses. The evolution of AI systems can advance a data driven economy. AI systems are based on data collection and coordination (Hayashi et al., 2018: 164). The amount of data possessed may determine and strengthen market power of the undertaking. The question of data – related competition issues is not yet resolved as there are no common rules on the measurement of data. Today, we are speaking of data as the new currency. Traditional tools for market power assessment are not adapted to this new reality. When speaking of data as a driver in the AI sector we must not condemn every undertaking having a large amount of data. Thanks to available data, a company may invest and offer new innovative services (Hayashi et al., 2018: 166 -167). In the digital competition and especially AI industry the decisive factors are big data and innovation. The competition enforcers will have difficulties in assessing situations involving advanced digital technology and AI systems.

4. Conclusions

Different national rules could hinder free movement of ideas, products and services. Some minimum standards are necessary. The Commission proposed to complement existing legislation and pass additional rules where needed.

Before enacting or amending certain legislation, its scope of application must be precisely defined. We have seen how the notion of artificial intelligence is vague. It is difficult to offer the comprehensive and precise definition.

Any accepted definition must be accurate, but also flexible enough to cover all the future technological innovations. In order to implement certain rules, we have to understand requirements and possible advantages, as well as risks of AI systems. The AI systems pose challenges in the area of liability, product safety, autonomy and data. There are numerous points that have to be resolved in the existing legislation. The same level should be maintained as for the traditional liability, but adjusted to new technologies. Every legislative intent has to follow specificity of AI systems. The confidence of consumer plays an important role in the efficient, transparent and fair transaction involving AI systems. Therefore, there is an urge for a close cooperation between the legislators, IT experts and economists. The legislator will have to be original, but also adhere to the traditional human and ethical values.

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CHAPTER 4

CENTRAL BANK DIGITAL CURRENCIES – AN INNOVATION IN THE REALM OF MONEY

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Abstract

Payment services are one of the core central banking activities. Payment related innovations promote safe and sound payment systems that are allowing faster transactions. Central bank digital currencies (CBDCs) have potential to revolutionize the payment system while having effects on the monetary policy and financial stability. Currently, many of the leading central banks in the world are considering the possibility for launch of CBDCs. The paper analyses the phenomenon of the CBDCs. It aims to examine the role of the central banks in the realm of digital money while exploring their design as an alternative for cash. The legal basis for issue of the CBDCs, the relation with the legal tender in the country and other legal issues are particularly examined.

Key words: Central bank digital currencies, Payment system, Money, Legal tender

JEL classification: E42, K24

1. Introduction

The entire monetary system lays on trust. The status of *money* in a society is achieved only if there is a confidence among members of the society that those money can be easily accepted in future payments. Thus, money might perform its functions of store of value, medium of exchange and a unit of account. The trust is strongly connected to the fundamental characteristic of money i.e. their acceptance. As Hyman Minsky (1986, p.79) put it *everyone can “create” money-the only problem for the creator being to get it “accepted”*. The status of money is lost when there is a credibility problem related to some characteristics of money (related to the issuer, for instance) or when there is a technological breakthrough which makes a new form of money more trusted and convenient to be used as a means of exchange. Usually, the shift from one to another monetary system is done during or in the aftermath of severe economic and financial crises.

In the last fifteen years we live in a period of intense economic tensions marked with financial crises, sovereign debt crisis, trade wars etc. The world is multi-polar while there are multiple players such as the USA, China, the EU, Japan, India, Russia etc. This new reality is not reflected in the monetary order which continues to function within the framework of its old Bretton Woods design.

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However, the existing monetary framework is challenged from different sides as never before. On one hand, since 2008 there is an aggressive monetary policy which at certain point may undermine the value of the sovereign currencies and on the other hand the technological advancements in the realm of money are offering different possibilities that were unimaginable in the past. The need for a change is recognized at highest level among central bankers while some of them are looking beyond the traditional understanding of money and currencies. Thus, in his last days in office the governor of Bank of England Mark Carney said in his speech that in order to realise its full potential the multi-polar global economy requires a new international monetary and financial system which on the long run will use the benefits of the technological developments by creating a network of central bank digital currencies (Carney M., 2019).

The question is how that change will happen. Will it take the revolutionary step where a new form of *money* (cryptocurrencies, for example) will dominate or evolutionary path by gradually accepting the technological innovations in the monetary structure? Cryptocurrencies are pointed as an alternative for traditional money that has great potential to make fundamental changes in the monetary sphere. The principle idea behind them is to create a monetary system that will be neutral and outside the state powers. The *blockchain* technology offers a possibility for bridging the double spending problem. This makes the third or trusted party in charge of centralized ledger which by definition is the central bank obsolete. At least for now, the cryptocurrencies are not widely used by the broader public and they do not fulfil the criteria for *money* simply because they are not trusted to be a better means of exchange or store of value in comparison to the dominant world currencies (Carney M., 2018).

Many thought that the cryptocurrencies will bring a revolution that in times of severe economic crisis will alter the trust from the state sovereign money to the crypto assets making a revolution in the payment system and in the monetary system in general. However, in the monetary sphere, the recent crisis caused by COVID 19 pandemic has shown two important things. Firstly, at least for now, the *cryptocurrencies* are not safe haven assets as some people claimed that they will be, as it is the case with the gold, for example. The value of Bitcoin has dropped at the beginning of the pandemic, and secondly, as far as the money creation is concerned only the sky is the limit for the central bankers. Trillions of dollars Euros pounds yens etc. were pumped into the economy for simulating the demand. This is nothing new². At least on a short run, this massive liquidity is not a problem, people are still spending less, the velocity of money is low and the inflation is nonexistent. But the things might change overnight and inflation and even hyperinflation might destroy the economies and savings. Even today there is a strong discrepancy between the real economy that is shrinking and the financial markets that are surging. For example, in august 2020 the US market capitalisation to GDP ratio was more than 170%.

² As Douglas E. French has said *history shows that central bankers have but one strategy to cure all things especially their past mistakes: print more money, with their plans for stabilization resulting just in opposite* Foreword in Carl Menger, *The Origins of Money*, Ludvig Von Mises Institute, 2009

On one hand, in terms of low and even negative interest rates the cash is attractive and provides anonymity but on the other hand central banks are keen to reducing the cash in the economy in order to make their monetary policies more efficient. The pandemic will foster the efforts and arguments for cashless economy because the cash as a medium for exchange is perceived as a factor that contributes to the spread of COVID 19. The real question is how to use the modern technology in a way that even in a cashless economy the people are able to hold risk-free central bank money. The issuance of a new form of central bank money CBDCs alongside the traditional cash and central bank deposits might be a good solution.

The problem is that there are multiple ways of how to do it, and the present paper is a modest attempt to contribute to the debate on the legal questions arising from the introduction of this new form of money. The paper analyses the phenomenon of the CBDCs. It aims to examine the role of the central banks in the realm of digital money while exploring their design as an alternative for cash (2). The legal basis for issue of the CBDCs, the relation with the legal tender in the country and other legal issues are particularly examined (3). The topic is novel which means that the paper will open more question than it will answer.

2. Design and key characteristics of CBDCs

Cryptocurrencies are changing the traditional understanding about money and offer new possibilities for using the technology in the realm of money. Even if at present they are not widely used and with limited effects on the monetary system, their use has potential to distress the entire economy and to influence the monetary and financial stability (Ali R. et al., 2014). The initial idea behind the creation of the cryptocurrencies was to bypass the intermediary i.e. the state in the payment system by offering direct transfer of money. Moreover, there is a strong incentive for using the blockchain technology for creation of public virtual currencies that are issued by the central banks.

There are different motivations for introduction of the CBDCs. On one hand developed countries where the use of cash is diminishing are trying to find an alternative for cash that will provide peer-to-peer transactions, on the other hand the countries where cash is the principle means of payment are trying to provide an option for opening accounts by the public that will facilitate the transfer of funds and will provide more control and make the monetary policy much more efficient. Currently, many of the leading central banks in the world are considering the possibility for launch of CBDCs but there are no concrete results yet. Recent survey by the BIS shows that most of the central banks are conducting research into the CBDCs but their issuance is unlikely on short or medium term (BIS, 2020). The recent crisis will have dramatic impact on the global monetary and the financial system and will possibly foster the process of creation of CBDC.

Payment services are one of the core central banking activities. Payment related innovations promote safe and sound payment systems that are allowing faster transactions. Central bank digital currencies have potential to revolutionize the payment system while having effects on the monetary policy and financial stability. The idea is to add a new form of digital central bank money that will be different from the existing, reserves or settlement balances held by commercial banks at the central bank and also different from the only central bank money available to the public i.e. the cash. Depending on the various characteristics the CBDC might have different place in the taxonomy of money.

In relation to the taxonomy based on four key properties: *issuer* (central bank or other), *form* (electronic or physical), *accessibility* (universal or limited) and *transfer mechanism* (centralized or decentralized) the CBDCs might be defined as an *electronic form of central bank money that can be exchanged in a decentralized manner known as peer-to-peer, meaning that transactions occur directly between payer and payee without the need for a central intermediary.* (Bech M. and Garratt R., 2017, pp. 55-56). However, this definition largely depends on the design of the CBDCs which is crucial for their role end effects on the monetary and financial system. Here the key question is who can have access to the CBDC' and a decision on *wholesale* or *retail* CBDC's has to be made. The introduction of the former that are restricted to a limited group basically financial institutions will not change things dramatically because these institutions are already using central bank's digital money. Conversely, the adoption of the latter might be a game changer that will open series of legal and economic questions bringing not only advantages but also risks for the monetary and financial system (BIS, 2018, pp. 7-9).

There are many *pros* and *cons* for introduction of the CBDCs. The advantages of the introduction of CBDCs are basically related to the new options for the monetary policy makers and above all the option for a substitution of the cash that will keep the anonymity of the transactions. Introduction of CBDCs opens possibilities for using new policy tools for implementing non standard monetary policies such as negatives interest rates and *helicopter* money (Dyson B. and Hodgson G., 2016). The disadvantages are related to the risks for the stability of the financial system. There are certain risks associated with use of retail the CBDCs, namely (i) risk of structural disintermediation of banks and centralization of the credit allocation process within the central bank and (ii) risk of facilitation systemic runs on banks in crisis situations (Bindseil U., 2020). The problem of disintermediation of the banking sector is of great concern for the consequences it may have for the current financial system (Bank of England, 2020, pp. 35-36). Broad access to CBDCs might endanger the functioning of the current two-tier banking system. The central bank will act as a commercial bank taking the role of the banks in the private sector. Also, there will be increased risk for bank runs in periods of crisis when the broad public may decide to switch over from bank deposits to CBDCs which will be much easier than changing the bank deposits to physical cash (Jordan J.T., 2019, p.6).

However, the idea for disintermediation the banking sector has deep roots in the monetary theory. Today, the breakthrough in the technology provides conditions for realization of the ideas of the so-called Chicago plans whose proponents foresee separation of the monetary and credit functions of the banking system which included the obligation for 100 percent reserve backing for deposits (Gleeson S., 2018, p.153).

However, the theoretical debate about the usefulness and design on the CBDC should be focused on finding a proper solution for creation of an instrument that will be an alternative for cash. Besides all theoretical appeals (Rogoff K., 2016) and different experiences in some developed countries the cash as a means of payment is still largely used. This is even more accentuated in times of financial insecurity when people are more confident to keep central bank issued money, the only available to them, instead of holding bank deposits that include risk of bank failure and risk of government policies (negative interest rates, bail-in of banks, for example) that will melt their deposited amount. The coronavirus pandemic crisis caused spike in demand for cash that reached the historical peak in mid-March. The weekly increase in the value of banknotes in circulation was almost at historic high of €19 billion (Panetta F., 2020). And it is not only during the crisis when the cash is attractive. A survey shows that in 2016 cash was the dominant payment instrument in Euroarea. Around 79% of all transactions were carried out using cash, amounting to 54% of the total value of all payments. Moreover, in some Member States such as Germany, Austria and Slovenia 80% or more of POS transactions were conducted with cash (Esselink, H. and Hernández, L., 2017). All this suggests that the future design of CBDC should include the key characteristic of the cash. They should provide anonymity in the transactions or peer-to-peer transactions that are using distributed ledger and are available to broader public i.e. retail CBDCs.

The proposal for new central bank money alongside with cash and reserves opens various legal questions that will be examined next.

3. Legal issues related to the CBDCs

Central banks do have experience in issuing digital money. Namely, currently digital money are issued through wholesale credit operation with different financial and non financial institutions participating in those operations. Thus, a CBDC that will be for the wholesale purposes or in form of deposits that are held at the accounts in the central banks that are used for settling large-scale transactions between financial institutions will not have a dramatic impact. However, an introduction of a new retail CBDC will open a new chapter in central banking and there should be a solid legal basis for doing it. Different scenarios for introduction of the CBDC open different set of legal questions that should address numbers of concerns about the introduction and the use of this new form of central bank money. For this reason central banks are developing different stylized models. (See for example: Bank of Japan, 2019).

The creation of a new form of central banks money alongside with banknotes and coins and the reserves challenges the traditional legal framework and poses dilemmas about the legal basis for the introduction of this new form of CB money, the question should they have the same legal tender status as banknotes and coins and on the relations between the various forms of central bank money.

As far as the *legal basis* is concerned a recent survey made by the Bank of International Settlements (2020, p.6) shows that only a quarter of central banks have or soon will have authority to issue CBDC. A third of the central banks do not have such authority while there is a considerable part that is not sure about their mandate in this respect. This is completely understandable considering the fact that the legal framework regulating the central bank and its operation predates the electronic, digital, crypto money and all the technology accompanying them. So, the central banks will either have to ask the legislature for change in legislation providing a new mandate in the field of digital money or they have to use the current provision on the banknotes and coins and adopting them on the new circumstances. In some cases, as in the Eurozone for example, it is a difficult task. In the Eurozone, it is the ECB that may authorize the issue of the euro while the banknotes are issued by national central banks (Siekmann H., 2018, p.7). ECB's price stability mandate might be a solid legal basis for issuing CBDCs by the ECB, its basic tasks of the definition and implementation of monetary policy, and promotion of the smooth operation of payment systems. Thus, in order to achieve its principal objective i.e. the price stability and to define and implement monetary policy, the ECB is given the exclusive right to issue banknotes and coins, which have the *legal tender* status within the Union. A possible interpretation of the primary EU law would be that the exclusive right to issue banknotes and coins also includes the issuance of the CBDCs (Nabilou H., 2019). This is, however, one of the possible interpretation and a weak argument when it comes to the legal basis in the European legal framework relating the CBDCs. That the ECB is the ultimate responsible for issuing money in the Eurozone became clear after Estonia's failed attempt to issue a cryptocurrency called Estcoin. The president of the ECB at that time, Mario Draghi has clearly stated that *no member state can introduce its own currency; the currency of the eurozone is the euro* (Financial times, 2017). At European level, at least for now, the cryptocurrency issued by a central bank of Lithuania is the digital collector coin LBCOIN as the first digital coin issued by a central bank not only in the euro area, but also across the world. LBCOIN is dedicated to Lithuania's 1918 Act of Independence and its 20 signatories (Bank of Lithuania, 2020).

Another question arising from the creation of the CBDCs is the question of *legal tender status*. When the broader public has access and uses the CBDCs they should have the status of legal tender for discharging all obligations in the currency unit in which they are issued. Same legal tender status as banknotes and coins implies that CBDCs should be accepted and usable at any location

and under any condition by economic operators. This should be the case even when the operators are offline (Mersch Y., 2020).

The introduction of a new form of central bank money opens the discussion about the relationship between the existing forms of money i.e. cash banknotes and coins and bank deposits and the CBDC. The convertibility of one form of money to another is an important element that will determine the attractiveness of the means of payment. Also, there is a possibility for different interest rates that will be applied to different forms of money. In this respect, the bank deposit should bear higher interest rates for the reason that the risk of bank default is present. The convertibility of one form of central bank money should be particularly regulated for the periods of crises when bank runs are probable and people are expected to convert their bank deposits into central banks money.

The country that decides to introduce CBDCs should adopt a proper legislation on crimes of counterfeiting of CBDCs. Currently, there are many provisions in the penal codes in the countries that are regulating the crimes of counterfeiting or duplicating banknotes and coins but due to the electronic design of the CBDCs they will be unable to cover the situation of counterfeiting or duplicating this new form of central bank money. Also, depending on the design of the CBDCs and the anonymity of the transactions a new set of rules should be included on the question of taxation and prevention of tax evasion in the cases of the use of this new form of central bank money.

4. Conclusion

The recent turbulences in the economic and financial sphere caused by COVID 19 pandemic showed that in times of financial uncertainty the cash is still very attractive. That will probably foster the efforts of the private and the public sector in their quest for finding an alternative for cash that will include the technological innovations.

The creation of a new form of central bank money CBDCs alongside the traditional cash and central bank deposits offers a solution that provides a use of the modern technology in a way that even in a cashless economy the people are able to hold risk-free central bank money. A key decision in this respect is the design of the CBDCs. A wholesale CBDC accessible to financial institutions that already use central bank digital money will not introduce a major innovation. However, retail CBDCs available to a broad public will be a game changer and will open a new chapter in the monetary sphere. Here, decentralization of the ledger is an important pillar for providing anonymity of the transactions with CBDCs that will make it very close to the cash.

Depending on the choice of their design the CBDCs will bring not only benefits for the entire economy but will also open the door for unavoidable disintermediation of the financial system.

The creation of the CBDCs needs a proper legal basis and raises several legal questions relating to the legal basis for their issuance, the status of legal tender, relation with other forms of money and on the rules on duplicating and counterfeiting.

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CHAPTER 5

DETERMINANTS OF CITIES' POPULATION SIZE: THE MAGNETISM OF GLOBAL CITIES IN ATTRACTING INHABITANTS¹

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Abstract

Urbanization is one of the main phenomena of today, with more than half of the world's population living in the cities of which more than twelve percent live in megacities. The importance of large global cities is multifaceted. On the one hand, those cities are the bearers of economic growth and development, while on the other, they represent a place to live for a large number of people with different cultural, social and economic needs. People, i.e. human capital, are the core strength that drives cities development, and their decision to stay or move to in a particular urban area depends on the city's ability to meet their needs. With increasing urban competitiveness, the magnetism and ability of the city to attract inhabitants will be a significant competitive advantage that contributes to its power. Therefore, the main goal of the paper is to identify the main urban functions that affect the size of the cities' population with an analysis focusing on major cities around the world. The influence and dynamics of variables represented by the primary functions of the city within the Global Power City Index was examined by applying statistical analysis on a sample of 39 global cities in the period 2013 to 2019. The results indicate that the size of global cities population is positively affected by urban functions related to cultural interaction, and research and development function, while the influence of environmental function on the size of the urban population is negative.

Key words: Cities, Population, Correlation analysis, Base indices, Chain indices

JEL classification: C33, J11, R12

1. Introduction

In 2018, the urban population accounted for 55.27% of the world's population (World Bank, 2020), with the expectations that this percentage will rise to 68% by 2050 with urban dwellers totalling 6.7 billion (United Nations, 2019).

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With this amount of urban population, the cities have become an important actor for the economy at all levels which stresses out the problem of obtaining urban attractiveness and competitiveness (Bogdanov et al., 2019, Ruso et al., 2019 Snieska and Zykiene, 2015). Around the world, cities are gradually perceived as engines of sustainable development and economic growth (Kourtiti et al., 2014). Under the influence of rapid urbanization and economic globalization, there have been numerous changes within global inter-city connections, urban functions and organizational structures, with the increasingly rapid growth of urban agglomerations and the accumulation of power in the so-called global cities (Fang, Pang & Liu, 2017). In addition to being centres for financial services and centres of operations of most important production companies these cities also represent headquarters of the major world-power governments (Hall, 2005). Global cities represent foremost financial and corporate hubs that serve as command points in the global urban system by facilitating the dissemination of knowledge and information, the flow of goods and capital, and the interaction of different ideas (Wang, 2019). The existing literature lists four key groups of advanced service industries offered by global cities (Hall, 2005): finance and business services; command and control services; creative and cultural industry services; and tourism services. Cities that provide these services at a satisfactory level, that enable the satisfaction of various aspects of quality of life, and that offer adequate living conditions for residents are the cities with the greatest magnetism. Global competition for attractiveness or magnetism is crucial for determining future economic and overall success in a city's development (Ichikawa, Yamato, & Dustan, 2017). In order to attract a talented workforce, cities must identify the basic features of their attractiveness. Therefore, this paper aims to reveal the relationship between cities' magnetism and functions of global city on the sample of 39 global cities from the Mori Memorial database over the period 2013 – 2019 using correlation analysis.

Global cities are becoming desirable places to live, with the number of inhabitants in cities being affected by their success in performing six main functions (GPCI, 2019): Economy, Research & Development, Cultural Interaction, Livability, Environment, and Accessibility. With this in mind, several research hypotheses have been developed:

- H1: There is a significant positive relationship between the number of inhabitants in cities and the Economy function of global cities.
- H2: There is a significant positive relationship between the number of inhabitants in cities and the Research & Development function of global cities.
- H3: There is a significant positive relationship between the number of inhabitants in cities and the Cultural Interaction function of global cities.
- H4: There is a significant positive relationship between the number of inhabitants in cities and the Livability function of global cities.
- H5: There is a significant positive relationship between the number of inhabitants in cities and the Environment function of global cities.

H6: There is a significant positive relationship between the number of inhabitants in cities and the Accessibility function of global cities.

The remainder of the paper is structured as follows: the second section provides an overview of the literature related to global cities and determinants that affect the size of global cities, the third section presents the research methodology applied in the paper, the fourth section offers empirical data and analysis, and the fifth section provides research results and discussions. The concluding remarks are offered in the sixth section.

2. Literature review

The field of urban studies has been developing rapidly since the 1970s when the focus was on exploring cities and urban life based on the circulation of capital and the flow of power and knowledge, while in the 1980s a new object of study emerged - a global or world city (McCann, 2004). Research in that period began to focus on cities that were viewed as strong organizing nodes of the overall economy. In recent decades, urban researchers have identified various global cities as strategic spatial hubs of the world economy, localized starting points for capital accumulation in an era of intensified globalization (Brenner, 1998). Global cities are at the top of the hierarchy of command and control of the world economy. The position that the city occupies in the hierarchy is primarily influenced by the nature and degree of integration into the global economy and the influence that the city achieves by being a corporate headquarters, a center for significant financial and production services, a cultural center or a center of sophisticated technological infrastructure (Forrest, La Grange & Yip, 2004). The basic characteristics of global cities imply that they represent (Olds & Yeung, 2004): command posts in the organization of the world economy; key locations and markets for today's leading industries; major manufacturing sites for these industries, including creating innovation.

The greater power of global cities also entails greater urban attractiveness, with a number of determinants affecting population growth. Population growth is an important measure of economic development as it reveals the relative attractiveness of a particular place (Partridge & Rickman, 2003). Cities with higher economic growth usually have more accumulated wealth, a better quality of life, and better employment opportunities (Bhatta, 2010). In addition, the increase in urban magnetism of cities is influenced by pleasant climatic conditions, friendly environment and availability of affordable accommodation (Barreira et al., 2017). Numerous studies have investigated the factors that influence urban attractiveness. Duranton (2016) examined determinants of population growth in Colombian cities between 1993 and 2010 and discovered that the main factors of population growth are fertility rates, earnings, education, and road infrastructure. Garza-Rodriguez et al. (2016) investigated the influence of economic growth on population growth in Mexico using a structural break cointegration analysis for the period 1960-2014 and discovered that economic growth has

a negative effect on population growth in the short run, and positive in the long run. Pirotte and Madre (2011) examined the determinants of urban growth using panel datasets for the four largest metropolitan areas in France (Paris, Lyon, Marseille, Lille) over the period 1985 to 1998. Amado et al. (2019) studied the influence of quality of life on population changes in all mainland Portuguese cities and discovered that the cities that had shrunk on average have a higher quality of life compared to cities that grew. Barreira et al. (2017) examined the population dynamics in Portuguese cities for the period 1991–2011 and discovered that employment rates, favorable climate conditions and a higher proportion of middle-aged vacant houses improve urban attractiveness. Haque and Patel (2018) studied the population dynamics of metro cities in India and discovered that the geographical position of the city plays an important role in the city's urban magnetism. Romão et al. (2018) investigated the determinants of population growth in 40 global cities. Hasan, Jiang and Kundu (2017) examined the determinants of city size and growth in India and discovered that economic activity and better connectivity increase urban attractiveness. Dubé and Polèse (2016) studied the factors that influence the growth of 135 Canadian cities using panel data regression analysis with city fixed effects. Alvarez-Dias et al. (2018) offered an extensive literature review regarding factors of urban growth and conducted an empirical analysis of the determinants of population growth in EU sub-regions over the period 2000-2010. Rickman and Wang (2017) investigated the effects of natural amenities and urban agglomeration economies on regional growth patterns in the United States from 2000 to 2010.

A large number of researches in this field indicate the topicality and importance of discovering the factors that influence urban magnetism, and the contribution of this paper is reflected in the examination of the influence of the functions of global cities on their size.

3. Methodology

Descriptive analysis, dynamic analysis and correlation analysis will be applied to determine the factors that affect the size of cities, as well as the tendency in the movement of the basic functions of global cities.

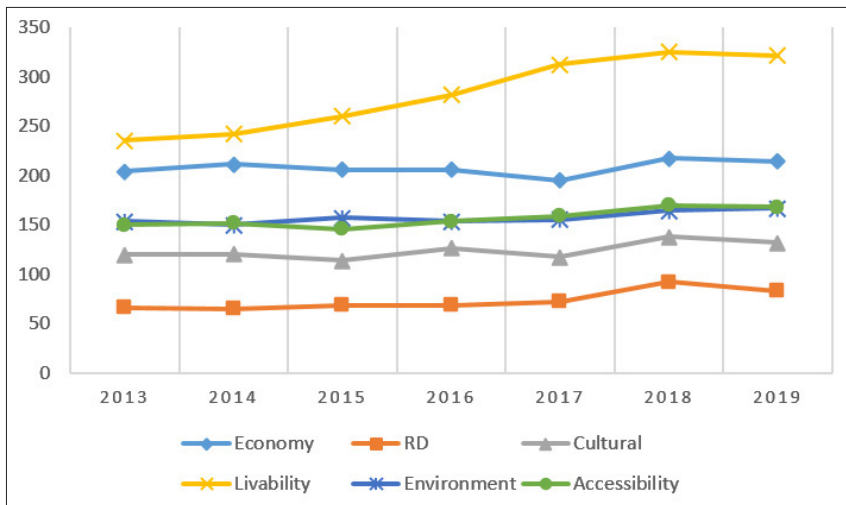
Descriptive statistics represents a part of mathematical statistics and is applied to describe different groups of data. It is used to calculate, display and describe the basic characteristics of the statistical series. If the statistical series are observed over time it is possible to apply dynamic analysis to observe the regularity in the movement of values. Dynamic analysis involves the calculation of indices, both base and chain indices. Indices represent relative numbers expressed in percentages and denote the relationship between two levels of the same variable. Base indices express the relative relationship between levels of the variables in several time periods in relation to the level of the same variables in one (base) period. Chain indices express the relative relationship between levels of variables in the current time period in relation to the previous time period.

To examine whether there is a dependence between two (or more) features, the existence of a correlation between these features should be inspected. One of the measures of the association between the two features is the Pearson coefficient of correlation. The positive coefficient between two variables indicates that the increase in the values of the first variable leads to the increase in the corresponding values of the second variable. A negative coefficient of correlation indicates conversely, that if the values of the first variable increase, then there is a tendency for the corresponding values of the second variable to decrease, or vice versa if the values of the first variable decrease then the values of the second variable increase.

4. Empirical data and analysis

The empirical analysis is based on the data obtained from the 'Global Power City Index' (GPCI) database published by the Institute for Urban Strategies of the Mori Memorial Foundation and is used for assessment of the major world cities according to their overall power to attract capital, people, and enterprises worldwide (GPCI, 2019). The index analyzes the performance of cities through six functions: Economy, Research & Development, Cultural Interaction, Livability, Environment, and Accessibility, wherein each of the functions consists of several indicators aggregated by the weighted average approach. Economy function reflects the city's economic performance, Research & Development function assesses the academic and innovative potential of the city, function related to Cultural Interactions assesses cultural capacity and resources of the city, Livability function evaluates the city's quality of life, Environment function assesses the condition of the natural environment while the Accessibility function encompasses the suitability of inner-city and international transport (Wang, 2019). The evolution of the mean values of cities' functions is presented in Figure 1.

Figure 1: Evolution of mean values of cities' functions



Source: GPCI (2013, 2014, 2015, 2016, 2017, 2018, 2019)

It can be noticed that in the analyzed period there was an improvement in the Livability function of cities in the Mori Memorial database, while all other functions remained at a relatively similar level. However, in order to notice the magnitude of the relative growth or decline in the value of a particular function of global cities, it is necessary to perform a dynamic analysis.

5. Results and discussion

The results of the dynamic analysis indicate the magnitude of the change in each of the functions of global cities, as well as the dynamics of change in the number of inhabitants in cities. According to the values of the base indices an increase of all indicators related to the functions of global cities and also the number of inhabitants in the cities can be observed (Table 1).

Table 1: Base indices (2013=100)

Year	Economy	R&D	Cultural Interaction	Livability	Environment	Accessibility	Population
2014	103.28%	96.85%	100.71%	102.39%	97.31%	100.50%	101.15%
2015	100.16%	103.58%	95.49%	131.96%	102.08%	96.72%	102.26%
2016	100.07%	103.50%	104.93%	119.22%	100.14%	101.93%	103.40%
2017	95.18%	107.82%	98.43%	132.52%	100.67%	105.18%	104.56%
2018	106.07%	139.59%	115.11%	137.95%	107.00%	112.26%	105.51%
2019	104.50%	123.94%	110.43%	136.25%	108.29%	111.44%	106.48%

The largest increase is recorded in the Livability function, where the value of this function in 2019 is 36.25% higher compared to the value in 2013. The smallest increase was recorded by Environment function, where the value of this function in 2019 is 8.29% higher compared to the value in 2013. There is also a noticeable growth in the number of inhabitants in cities, which has increased by 6.48% in the period from 2013 up to 2019.

The annual dynamics of the movement of the values of the functions of global cities and the size of cities can be analyzed by applying chain indices (Table 2).

Table 2: Chain indices

Year	Economy	R&D	Cultural Interaction	Livability	Environment	Accessibility	Population
2014	103.28%	96.85%	100.71%	102.39%	97.31%	100.50%	101.15%
2015	96.98%	106.94%	94.82%	128.87%	104.91%	96.24%	101.10%
2016	99.91%	99.92%	109.89%	90.35%	98.09%	105.38%	101.11%
2017	95.11%	104.17%	93.80%	111.15%	100.53%	103.19%	101.12%
2018	111.44%	129.47%	116.95%	104.10%	106.29%	106.73%	100.91%
2019	98.53%	88.79%	95.93%	98.77%	101.21%	99.26%	100.92%

It can be noticed that only the number of inhabitants in the cities has a constant growth tendency, while the functions of global cities record oscillations in the values, with the largest oscillations being recorded by the Cultural Interaction and Livability functions. In addition, the Economy function recorded a decline in the three-year period, from 2015 to 2018, only to record growth in 2018, and then decline again in 2019. The only function that recorded growth in 2019 compared to 2018 is the Environment function of Global Cities.

The nature of the relationship between each of the functions of global cities and the number of inhabitants was examined through correlation analysis. The results of the correlation analysis between the Economy function of global cities and the population of global cities indicate that there is no statistically significant relationship between these variables (Table 3).

Table 3: Results of the correlation analysis between Economy function and the number of inhabitants

		Economy	Population
Economy	Pearson Correlation	1	.064
	Sig. (2-tailed)		.293
	N	273	273
Population	Pearson Correlation	.064	1
	Sig. (2-tailed)	.293	
	N	273	273

The results of the correlation analysis between the Research & Development function of global cities and the population of global cities indicate that there is statistically significant positive relationship between these variables (Table 4).

Table 4: Results of the correlation analysis between Research and Development function and the number of inhabitants

		Research & Development	Population
Research & Development	Pearson Correlation	1	.191**
	Sig. (2-tailed)		.002
	N	273	273
Population	Pearson Correlation	.191**	1
	Sig. (2-tailed)	.002	
	N	273	273

** . Correlation is significant at the 0.01 level (2-tailed)

The results of the correlation analysis between the Cultural Interaction function of global cities and the population of global cities indicate that there is statistically significant positive relationship between these variables (Table 5).

Table 5: Results of the correlation analysis between Cultural Interaction function and the number of inhabitants

		Cultural Interaction	Population
Cultural Interaction	Pearson Correlation	1	.225**
	Sig. (2-tailed)		.000
	N	273	273
Population	Pearson Correlation	.225**	1
	Sig. (2-tailed)	.000	
	N	273	273

** . Correlation is significant at the 0.01 level (2-tailed)

The results of the correlation analysis between the Livability function of global cities and the population of global cities indicate that there is no statistically significant relationship between these variables (Table 6).

Table 6: Results of the correlation analysis between Livability function and the number of inhabitants

		Livability	Population
Livability	Pearson Correlation	1	-.115
	Sig. (2-tailed)		.057
	N	273	273
Population	Pearson Correlation	-.115	1
	Sig. (2-tailed)	.057	
	N	273	273

The results of the correlation analysis between the Environment function of global cities and the population of global cities indicate that there is statistically significant negative relationship between these variables (Table 7).

Table 7: Results of the correlation analysis between Environment function and the number of inhabitants

		Environment	Population
Environment	Pearson Correlation	1	-.479**
	Sig. (2-tailed)		.000
	N	273	273
Population	Pearson Correlation	-.479**	1
	Sig. (2-tailed)	.000	
	N	273	273

** . Correlation is significant at the 0.01 level (2-tailed)

The results of the correlation analysis between the Accessibility function of global cities and the population of global cities indicate that there is no statistically significant relationship between these variables (Table 8).

Table 8: Results of the correlation analysis between Accessibility function and the number of inhabitants

		Accessibility	Population
Accessibility	Pearson Correlation	1	.017
	Sig. (2-tailed)		.781
	N	273	273
Population	Pearson Correlation	.017	1
	Sig. (2-tailed)	.781	
	N	273	273

Regarding the obtained results it can be concluded that the second and the third hypothesis cannot be denied, while the fifth hypothesis is partially denied due to the existence of a significant yet negative relationship between the number of inhabitants in cities and the Environment function of global cities. The first, third and fourth hypothesis are denied.

The existence of the significant positive relationship between the number of inhabitants and Cultural Interaction function can be explained by the fact that major cultural events are becoming one of the key tools to improve the competitiveness of cities, serving as a tool to improve the image, encourage economic development, improve infrastructure, and attractiveness of urban areas (Absalyamov, 2015). The function of Cultural Interaction includes subgroups of indicators related to tourism resources, trendsetting potential (number of conferences and cultural events), visitor amenities, cultural facilities and international interaction. The cultural content offered by cities is a significant resource in cities development since culture has an indisputable economic impact on urban development (Herrero et al., 2006). Greater availability of cultural content improves the quality of life of residents by creating a pleasant environment, which mitigates the negative effects of excessive urbanization (Bandarin & van Oers, 2012). It can be concluded that a better offer of cultural content increases the urban magnetism of cities which is confirmed by the results of the analysis. Similarly, the Research & Development function of global cities increases the attractiveness of cities since urban environments are richer, more diverse, more knowledge-intensive, and more specialized than non-urban areas (Glaeser, 2011). Research & Development function of global cities relates to subcategories that refer to academic resources, research environment and innovation. The existence of diversity in the urban population and activities represents a crucial component of urban innovation, which is based on the recombination of various features of knowledge and competencies (Johnson, 2008).

Research & Development function can create a favourable environment for residents by increasing the quality of life through better education and better employment opportunities and increase the urban magnetism of the cities.

The discovery of a significant negative relationship between the Environment function and the number of inhabitants requires further explanation. Sustainability and environmental protection represent an issue covered by a number of global city strategies. Many cities have already realized the seriousness of this problem and have made environmental protection one of their top priorities. However, cities have to maintain a complicated balance between environmental protection, quality of life and competitiveness, with the problem of environmental concerns often being neglected in order to develop the competitiveness of cities. It is quite clear that with the increase in the number of inhabitants and the increase of the pressure on the environment, numerous ecological problems are manifested. Romão et al. (2018) have shown that cities with a very large population have a negative influence on environmental indicators because the size of the city exacerbates mobility and pollution problems.

6. Conclusions

Numerous economic, political and cultural changes resulting from dynamic global processes have led to the emergence of global cities. Due to the accelerated globalization global cities worldwide are more and more confronted with the direct competition for various resources, with one of the most desirable resources being a talented workforce. Formerly, financial incentives were considered to be the main factor in the decision to relocate, but today other benefits are equally attractive - such as the quality of the environment, the availability of cultural events or the convenience of transport (Ichikawa, Yamato, & Dustan, 2017).

The main objective of this paper was to determine the elements of cities' magnetism. The results of the analysis reveal that functions of Cultural Interaction, Environment and Research & Development represent significant drivers of the magnetism for residents. On the other hand, Livability, Economy and Accessibility function are not important features of urban magnetism of global cities in the Mori Memorial database.

The practical significance of this paper is reflected in the fact that it contributes to the existing knowledge about the factors that attract residents to the city. The results show that cultural content and innovations play an essential role in the attractiveness of cities for residents. On the other hand, with the increase in the number of inhabitants there are numerous environmental problems and it was noticed that in the analyzed sample larger cities have worse values of the Environment function. These conclusions can help city actors in creating development strategies aimed at increasing the magnetism of global cities.

Even though the conducted analysis offers a comprehensive evaluation of the influence of different functions on the global cities' magnetism, individual characteristics of each city need to be taken into account in the process of formulation of particular development strategies. Nevertheless, the research results can serve as a general guideline for urban actors when formulating urban policies.

Further research in this area may be directed towards the examining of the strength of the influence of each of the function on the cities magnetism using panel data regression analysis. Additionally, it is possible to examine the determinants of the magnetism of cities from the tourists' standpoint.

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CHAPTER 6

DEVELOPMENT ISSUES OF MOUNTAIN AREAS IN THE REPUBLIC OF CROATIA¹

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Abstract

Considering their geographical, climatic, transport, and socioeconomic specifics, mountain areas are of particular interest for the European regional and cohesion policy. The regional policy of the Republic of Croatia also recognizes the sensitivity and specificity of these areas and seeks to foster their development and reduce development lags through special mechanisms. The aim of this paper was to investigate long-term demographic and economic characteristics of mountain areas in Croatia and, based on the results of the analysis, to assess the effects of the regional policy, i.e. the current system of fostering the development of mountain areas, both in terms of regional development goals and aspects of reducing development divergences in Croatia. The analysis of characteristics of mountain areas is based on long-term trends of relevant demographic and economic indicators for the period from 2001 to 2017. The key findings indicate extremely negative demographic and economic trends, as well as a continuous lag in relation to other regional areas of Croatia. Thus, the authors propose the implementation of an integrated management system for the next development perspective, in accordance with modern changes in the regional and local paradigm. The key instruments of all aspects of such a system should focus on the development of innovation, human resource development, as well as creative forms of entrepreneurs' networking. In this process, it is important to balance the system of incentives by respecting the criteria of productivity, sustainability, and equity.

Key words: Mountain areas, Regional policy, Regional development, Development incentives

JEL Classification: Q29, Q50

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1. Introduction

As a segment of overall economic and social development, regional development is in the focus of intensive research of economists, as well as scientists from other research areas such as demographers, sociologists, geographers, planners. The research focus of regional economics is focused, among other things, on the consideration of the causes and effects of developmental disparities between specific territorial areas (localities) within a single national space. The causes of significant developmental disparities are numerous, and one of them refers to the inability to effectively use the existing development resources of depressed areas. The consequences of long-term and growing regional disparities are reflected in the persistent lag of less developed areas behind national social and economic values, but they at the same time affect productivity and competitiveness of the overall national economy. Therefore, certain measures and the established support systems within the framework of regional policy aim to increase the economic, demographic and other capacities of less developed areas and thus reduce existing territorial imbalances, and at the same time increase the competitiveness of the national economy in all development aspects.

This paper explores long-term demographic and economic characteristics of hill and mountain areas (HMA), which are specific in relation to other areas of the Republic of Croatia according to natural, geographic, and other attributes.

The purpose of this research is to determine the developmental characteristics of Croatian HMA based on the results of the analysis of long-term trends of demographic and economic indicators. The analysis was conducted for the period 2001-2017 and is based on the old scope of HMA that was valid until 2019. The aim of the research is to evaluate the effects of regional policy, i.e. the current system of fostering the development of hill and mountain areas from the point of view of reducing developmental divergences on the Croatian territory.

The problem matter of hill and mountain areas is part of the scientific and empirical corpus of regional development policy. Special attention is paid to fostering development in these areas within the framework of the EU regional and cohesion policy. This is also the conceptual framework of the research, which is summarized in the second chapter, and it is important for the consideration and positioning of the problems of the development of hill and mountain areas within the existing Croatian regional policy.

The third chapter presents, on the basis of the results of the conducted analysis, long-term characteristics of hill and mountain areas of the Republic of Croatia.

The fourth chapter examines the effectiveness of the current regional policy, i.e. the current support system for HMA development, and proposes a possible new concept for managing the development of the Croatian HMA.

2. Theoretical and conceptual framework of the problem matter of hill and mountain areas

In the past 50 years, especially since the 1990s, the interest in regional growth and development research has been rising. Why some regions are developing faster than others, why social and economic differences between regions are increasing, why some regions are more attractive to industry and innovation, are questions that are to be answered not only by economists and geographers, but also by other experts and scientists: demographers, spatial planners, urban planners, political scientists, sociologists. This increased interest in the study of regional development is partly invoked by the insights of researchers and experts that innovative processes and national economic growth are fundamentally spatial. Meaning, “space is important” (Dawkins, 2003). The literature covers numerous approaches to defining regions, numerous theories of regional growth, classical, neo-classical, and alternative theories of regional development⁵. Since traditional growth and development theories are quite limited in explaining growth patterns, scientists have been looking for new concepts of regional and local development from the 1980s. These concepts increasingly rely on and are linked with economic geography (Barca, McCann, and Rodriguez-Pose, 2012; Capello and Nijkamp, 2009), changes in the “top” model management patterns towards the “bottom” management model, and shifts from the same approaches to fostering the development of all regions and sites according to approaches dependent on spatial, economic, and other specificities. The change in the theoretical paradigm of regional and local development underlines the importance of human resources and innovation, agglomerations, institutions, and spatial distances. Also, local specificities, as well as tangible and intangible assets which are the basis for regional competitiveness, are in the focus of new approaches to regional development (Capello and Nijkamp, 2009; Rodriguez-Pose, Crescenzi, 2008).

From the point of view of this research, it is important to emphasize that more and more authors point to the disparities between social and economic spatial trends, which have recently become more pronounced, marked by growing globalization, but also the emergence of new territorial structures (Rodríguez-Pose and Tijmstra, 2009). Thus, Ascani, Crescenzi, and Iammarino (2012) indicate that several rapidly growing and innovative places, mainly large urban areas, are mostly responsible for the growth of the national economy. Therefore, it is not surprising that social and economic well-being is concentrated in these areas, which can result in great spatial disparities within the national territory. Empirical research of the selected OECD countries proved a long-term strong impact of economic growth and regional disparities, i.e., that research confirmed that increasing economic growth simultaneously increases regional disparities (Obradović, Lojanica, Janković 2016). Empirical surveys on regional

5 For an overview of regional development theories in domestic literature, see e.g. Puljiz (2010) and in foreign literature, see e.g. Dawkins (2003), and Ascani, A., Crescenzi, R., and Iammarino, S. (2012).

convergence in the EU case are suggesting that the poorest regions are mostly lagging behind while the most prosperous areas are steadily growing (Marcet and Canova, 2005; Magrini, 1999; Cheshire and Magrini, 2000; Magrini, 2004).

Therefore, for the implementation of the EU regional policy, more and more financial resources are planned and allocated for reducing regional divergences. Thus, the Treaty on the Functioning of the EU⁶ defines that the Union will develop and implement its activities leading to the strengthening of economic, social, and territorial cohesion. The Union aims to reduce the degree of development divergences of different regions and lagging behind in the least developed regions. Among regions, special attention should be devoted to rural areas, areas affected by the industrial transition, and to regions suffering from severe and persistent natural or demographic handicaps, such as the northernmost regions with very low population density and islands, cross-border, and mountain regions.

Mountain regions are of particular interest to the EU regional and cohesion policy. Thus, the 2004 European Commission document (NORDREGIO 2004) highlights the global importance of mountain areas and especially European mountain regions. Their economic and ecological function for the population is emphasized from the aspect of water supply, biological and cultural diversity, specific recreational and tourist offers. European mountain regions cover about 30% of the territory and are occupied by about 17% of the EU population (Carbone, 2018). Due to their topographic and climate characteristics, these areas are considered to have significant and permanent limitations for the development of certain economic activities, as well as the availability of certain public services. Mountain areas are often far away from larger urban centres and main roads, with pronounced depopulation problems, problems of access to public services, especially health care and social welfare. However, these areas in the EU countries have great development potential, especially in tourism, the agricultural sector, and activities based on the exploitation and processing of existing natural resources.

The analysis carried out for the mountain areas of the EU countries within the framework of the cohesion policy and operational programmes for the period 2014-2020 showed that the promotion of sustainable development of mountain regions was based on two key directions (according to Carbone, 2018): one was related to the preservation and protection of the environment and the promotion of resource efficiency, while the other related to increasing the attractiveness of mountain areas from the aspect of economic activities, improving the quality of life of inhabitants and providing better access to public services.

This indicates that the implementation of national regional development policies in hill and mountain areas should be based on a balance between environmental and resource protection measures on the one hand, and measures for fostering economic and social growth and development on the other.

6 Treaty on the Functioning of the European Union available at: <http://eurlex.europa.eu/legalcontent/EN/TXT/?uri=celex%3A12012E%2FTXT>.

Within the framework of the regional policy of the Republic of Croatia, from the mid-1990s to 2002, a set of laws aimed at specific areas was adopted aiming to encourage their faster development, among which the Hilly and Mountainous Areas Act⁷. Since then, management of the development of hill and mountain areas, as areas with development specificities, is an integral part of the general policy of regional development of the Republic of Croatia. Based on the aforementioned Act, the system of incentives, i.e. the implemented system of measures, was aimed at the realization of three key objectives: demographic renewal, economic growth, and sustainable development, and at increasing the living standards of the population in hill and mountain areas.

3. Long-term demographic, economic, and fiscal trends in hill and mountain areas

This chapter, based on the previously conducted detailed analysis of relevant indicators⁸, points to the basic characteristics of long-term demographic, economic, and fiscal trends in hill and mountain areas of the Republic of Croatia.

3.1. Methodological Approach

In order to define specific characteristics of hill and mountain areas, an analysis of long-term demographic, economic, and fiscal trends was carried out based on the HMA coverage valid from 2002 to 2019⁹.

The analysis covers the period 2001-2017. The analysis of demographic trends is based on the initial 2001 census year and on 2011, also a census year. Some demographic indicators for which data were available also include 2017. The analysis of economic and fiscal trends mainly covers the period from 2008, as the year of the beginning of the economic crisis in the Republic of Croatia, but also the year in which most socioeconomic indicators had maximum positive values. Depending on the available data, the analysis of economic and financial trends covered the long-term period from 2008 to 2017, but also the period from

7 These are the following acts: *Act on Areas of Special State Concern* (PPDS) (Official Gazette 44/96), *Act on Islands* (Official Gazette 34/99), *Act on Reconstruction and Development of the City of Vukovar* (Official Gazette 44/01), and the *Act on Hilly and Mountainous Areas* (Official Gazette 12/02).

8 The results presented in this paper are part of a wider and more detailed research of selected social and economic components carried out by the authors in order to determine key development characteristics, as well as limiting factors of economic and social progress in hill and mountain areas of the Republic of Croatia.

9 *Act on Hilly and Mountainous Areas* (Official Gazette 12/02) covered 45 local self-government units with the hilly and mountainous area status. Pursuant to the new *Act on Hilly and Mountainous Areas* (Official Gazette 118/18) the Government of the Republic of Croatia adopted the Decision on the scope and classification of local self-government units which acquire the status of hilly and mountainous areas (Official Gazette 24/2019). According to the current coverage, 85 local self-government units are classified into three groups of hilly and mountainous areas.

2008 to 2015 (beginning and the end of the economic crisis), and from 2015 to 2017 (post-crisis period).

Demographic, economic, and financial trends were considered at the aggregated level, i.e. total for all local self-government units with HMA status until 2019.

3.2. Demographic trends

The basic characteristic of hill and mountain areas of the Republic of Croatia refers to extremely negative demographic population trends, both from the aspect of its size and structural changes. Although negative demographic tendencies are characteristic of the entire national territory, the dynamics of population loss in local self-government units (LSGU) with HMA status is extremely large, and it assumes dramatic values from the aspect of bio-reproductive and economic potentials. Given the long-term process of population loss, its structural characteristics are unfavorable, especially the age structure, and consequently the structure of the working-age and non-working age population.

In terms of the population size, Croatian HMA is characterised by above-average population loss in relation to the national average, irrespective of whether the trends are observed between the two census periods (2001-2011) or until 2017 (2001-2017) (Table 3.1).

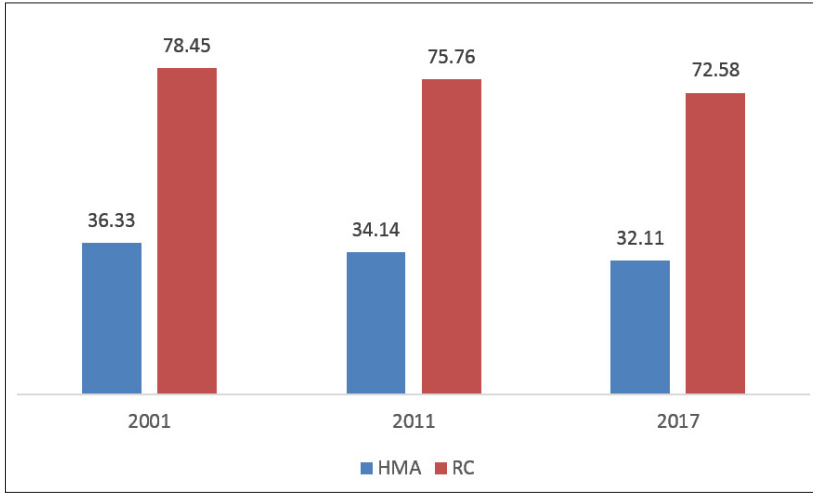
Table 3.1: Total number of inhabitants in HMA and in the Republic of Croatia in 2001, 2011, and 2017

Territory/area	2001	2011	2017	Change index 2001/2001	Change index 2017/2011	Change index 2017/2001
HMA – total	215,093	202,115	190,121	93.97	94.07	88.39
RC	4,437,460	4,284,889	4,105,493	96.56	95.81	92.52
The share of HMA in RC (%)	4.85	4.72	4.63	97.31	98.18	95.54

Source: Prepared by the authors according to CBS data

Between the two census periods (2001-2011), the number of inhabitants in LSGU of hill and mountain areas decreased by approximately 13,000. When looking at the period 2001-2017, the absolute loss of population in HMA amounted to slightly less than 25,000, i.e. 1.470 inhabitants per year. The consequence of such population movement is the worrying “emptying” of spaces, which makes these areas particularly sensitive from the aspect of current development capacities, and future economic and social changes (Figure 3.1).

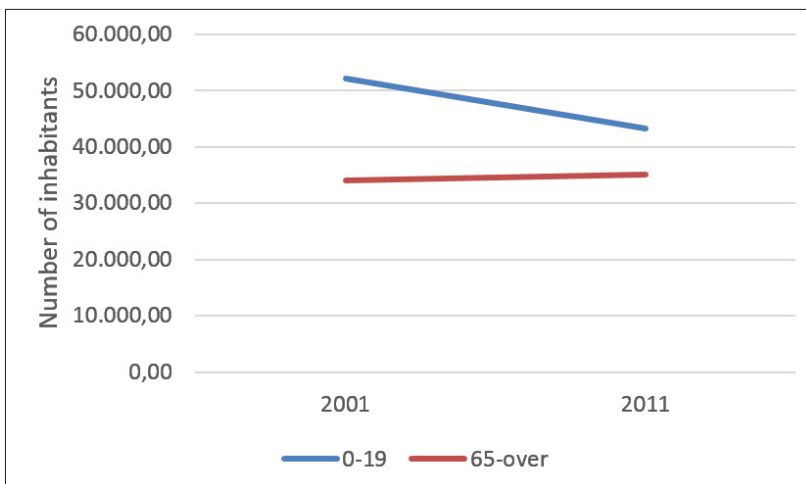
Figure 3.1: Average population density (number of inhabitants per km²) in the Republic of Croatia and HMA in 2001, 2011, and 2017



Source: Prepared by the authors according to data from the Ministry of Regional Development and EU Funds and CBS

Such demographic trends should also be considered in the context of significant changes within individual population structures in HMA. The structure of the population with regard to age has significantly deteriorated over the observed period (Figure 3.2) and the working-age population has decreased. This reduces local resources crucial for the launch and development of economic activities, strengthening of the local economy and raising the standard of living.

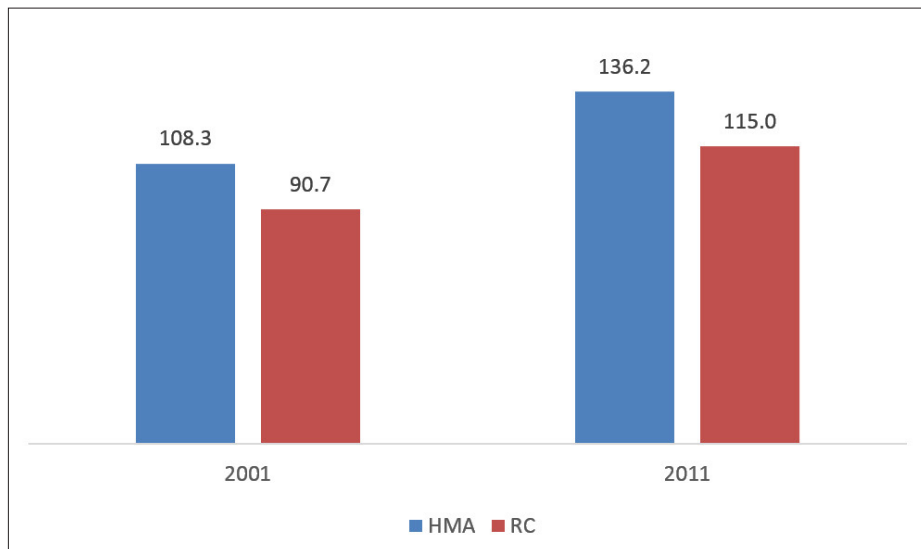
Figure 3.2: Comparison of the population aged 0-19 and 65 and over in the HMA of the Republic of Croatia in 2001 and 2011



Source: Prepared by the authors according to CBS data

Negative changes in the age structure of the HMA population are confirmed by the aging index trend (Figure 3.3), as one of the key indicators of vital processes at a location¹⁰.

Figure 3.3: Average value of the aging index in HMA and the Republic of Croatia in 2001 and 2011



Source: Prepared by the authors according to CBS data

The aging index on the territory of the Republic of Croatia increased significantly between the two census periods: from 90.7 in 2001 to 115.0 in 2011, as much as 26.8%. However, at the locations with HMA status, the values of this indicator indicate extremely difficult demographic problems: this index amounted to 108.3 in HMA in 2001 and 136.2 in 2011, which is 18.5% above the national average and three times higher than the level that can be considered favorable from the aspect of demographic trends.

The educational structure of the population in the intercensus period has improved (Table 3.2). Increase in the total number of inhabitants with completed tertiary education in the HMA is certainly a result of national educational policy in terms of encouraging tertiary education, but also of individuals' awareness of the necessity of acquiring knowledge and developing competences at a higher educational level, as a prerequisite for successful entry into the labor market and career development.

¹⁰It is calculated as a ratio between the number of persons aged 60 and over and the number of persons aged 0-19. The index of more than 40% indicates that the population of a given area is in the process of demographic aging.

Table 3.2: Number of inhabitants with completed tertiary education (university degree) and the share of population with completed tertiary education (university degree) in the 20-65 working-age population in HMA and the Republic of Croatia, 2001 and 2011

Education indicators	HMA			RC		
	2001	2011	Change rate 2011/2001 (%)	2001	2011	Change rate 2011/2001 (%)
Total number of inhabitants (university degree holders)	13.341	18.562	39.13	438.034	595.233	35.89
The share of university degree holders in the 20-65 working-age population	10.34	15.01	4.67	16.28	22.64	6.36

Source: Prepared by the authors based on CBS data

However, the above-average increase in the share of HMA population with completed tertiary education between the two censuses is the consequence of the presented negative structural changes within the age groups of the population in relation to the national average. Also, despite a significant and above-average increase in the total number of persons with a university degree in HMA, their share in the working-age population in HMA remains below the average of the Republic of Croatia: in 2011, the share of persons with completed tertiary education in the working-age population of the Republic of Croatia was 23% and in HMA 15%. Compared to 2001, the developmental disparity according to this indicator has increased, which can also be considered a serious limitation of production and development potentials in hill and mountain areas.

3.3. Economic and fiscal trends

Basic long-term economic characteristics of hill and mountain areas are continuous reduction of employment as a key driver of economic and social changes, which resulted in a reduction in the volume of economic and entrepreneurial activities. The indicators of purchasing power of the population and fiscal capacity of local communities, despite absolute and relative growth, indicate significant developmental divergences between HMA and other territorial areas in the Republic of Croatia.

3.3.1. Employment and unemployment

In the long-term period from 2008 to 2017, the number of employees in HMA continuously decreased, although positive trends were evident in the post-crisis period (2015-2017) (Table 3.3).

Compared to the Republic of Croatia, the intensity of reducing the number of employees in the long term was higher, and the intensity of increasing employment in the period from 2015 to 2017 was lower, which indicates that the consequences of the long-term economic crisis have “hit” the LSGU with HMA status more severely.

Table 3.3: Total number of employees in the Republic of Croatia and HMA in 2008, 2015, and 2017

Years	HMA-total	RC
2008	79,534	1,719,141
2015	73,811	1,624,323
2017	77,403	1,705,886
Change indeks 2017/2008	97.32	99.23
Change indeks 2017/2015	104.87	105.02

Source: Prepared by the authors based on CBS and Tax Administration data

As another important component of the labor market, unemployment decreased in the period 2008-2017, and a significant decrease in unemployment occurred in the post-crisis period 2015-2017. However, it should be stressed here that the reduction of unemployment in the HMA was primarily determined by negative demographic and migration trends, and not by a significant revival of economic activities and transition of unemployed persons to the category of employed. This is also confirmed by the fact that unemployment decrease was faster than employment increase in the aforementioned three-year period (Tables 3.3 and 3.4). Also, despite the decrease in the number of unemployed in the post-crisis period, this process took place at a slower pace in relation to the national average (Table 3.4).

Table 3.4: Total number of unemployed in the Republic of Croatia and HMA in 2008, 2015, and 2017

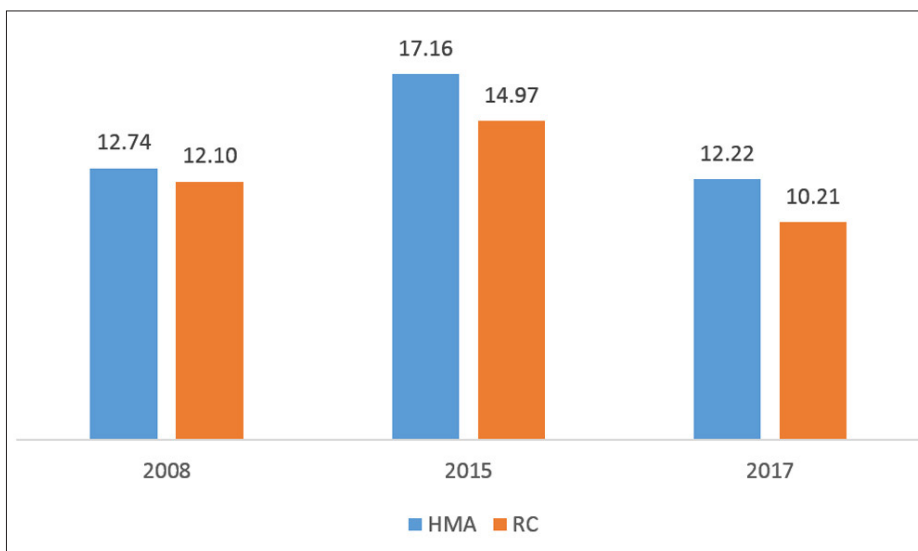
Years	HMA-total	RC
2008	11,611	236,741
2015	15,287	285,905
2017	10,778	193,966
Change indeks 2017/2008	92.83	81.93
Change indeks 2017/2015	70.50	67.84

Source: Prepared by authors based on CES data

As a result of total employment and unemployment trends, the unemployment rate¹¹ in 2017 in the Republic of Croatia decreased by 15.62% compared to 2008. At the same time, this decrease in HMA was only 4.08%.

¹¹ It is calculated as a ratio between the number of unemployed and the total number of employed and unemployed persons.

Figure 3.4: Average unemployment rate in HMA and in the Republic of Croatia, 2008, 2015, and 2017



Source: Prepared by authors based on CBS and Tax Administration data

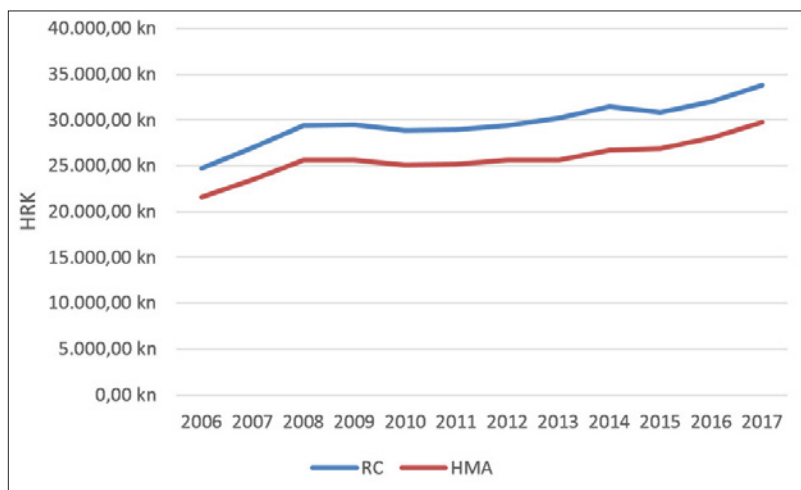
However, in the 2008-2015 period, the unemployment rate increased by 23.72% at the level of the Republic of Croatia, while in the same period, despite a decrease in the number of inhabitants and a decrease in the working-age population, the unemployment rate in HMA increased by as much as 34.70%. This is also an indicator of growing developmental disparities between hill and mountain areas and other regional areas of Croatia.

The increase in development divergences is also indicated by the trend of total and relative nominal income of the HMA population, as indicators of purchasing power. Although the total realised nominal income¹² increased by 8.61% in HMA between 2006 and 2017, growth dynamics was lower compared to the Republic of Croatia (9.68%). During this period, the purchasing power of the HMA population, measured by income per capita¹³, increased by 16.5%, while growth dynamics was even faster compared to the entire territory of the Republic of Croatia (15.09%). However, this is primarily the consequence of a faster reduction in the number of inhabitants in HMA compared to the average of the Republic of Croatia. Despite positive income trends, there is a long-term decline in the purchasing power of the population in the HMA in relation to average national values (Figure 3. 5).

¹²Total income represents the sum of incomes realised by residents of a local unit during one calendar year.

¹³The indicator is the ratio between the total amount of income realised by taxpayers, natural persons residents or habitual residents in HMA and the number of inhabitants living in that area during one tax period (calendar year).

Figure 3.5: Long-term trends in nominal income per capita, average for the Republic of Croatia and average for HMA, 2006-2017



Source: Prepared by the authors based on Tax Administration data

Total budget revenues, as well as per capita budget revenues, are one of the indicators of economic strength of local economy and financial capacity of local self-government units. Since they represent a key source of financing public needs, the value of budget revenues generated in HMA indirectly points to the level of the living standard of the population from the aspect of availability of local public services and their standard of living.

In the 2008-2017 period, total budget revenues in the Republic of Croatia decreased by approximately HRK 640 million, i.e. by 3.93%. At the same time, the value of budget revenues generated in the HMA increased by 15.21%, which resulted in an increase in the share of budget revenues of local self-government units in HMA in total budget revenues of the Republic of Croatia from 2.1% in 2008 to 2.5% in 2017 (Table 3.5).

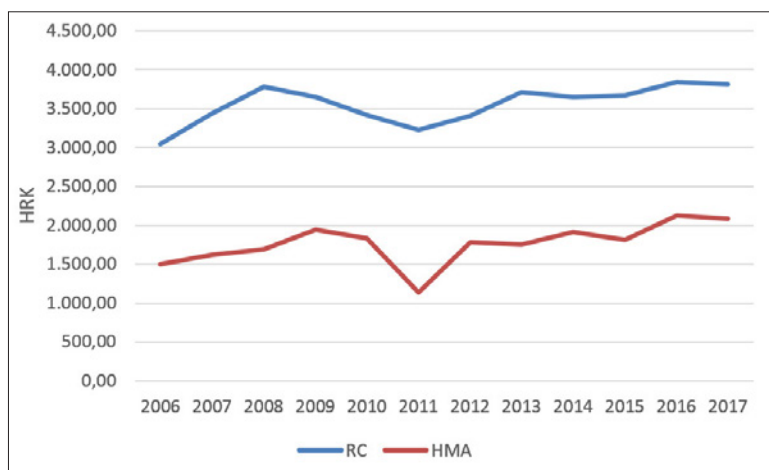
Table 3.5: Own-source budget revenues in HMA in 2008, 2015, and 2017 (HRK)

Area	2008	2015	2017	Change rate 2017/2008	Change rate 2017/2015
Republic of Croatia	16,296,790,136.33	15,372,439,287.63	15,656,193,532.79	-3.93	1.85
Hill and mountain areas	344,080,426.97	354,049,493.93	396,431,105.37	15.21	11.97
Share of HMA in the Republic of Croatia (%)	2.1	2.3	2.5		

Source: Prepared by the authors based on the Ministry of Finance data

Significantly faster dynamics of increasing budget revenues in HMA compared to the Republic of Croatia was also realized in the three-year period 2015-2017. During this period, the growth rate in HMA was 6.5 times higher than that of Croatia. However, despite such above-average dynamics of changes in the value of budget revenues in the HMA in the observed periods, if relative values are compared (budget revenues per capita), it is evident that the economic strength and living standards of the population in the HMA lag significantly behind in the long term in comparison to the national average (Figure 3.6).

Figure 3.6: Trends of own-source budget revenues per capita, average for the Republic of Croatia and HMA 2006-2017



Source: prepared by the authors based on the Ministry of Finance data

The long-term gap in fiscal capacities represents a serious developmental constraint of local self-governments in HMA. Although the continuous increase in the value of absolute budget revenues can be attributed to the current government and regional incentives to HMA development, they obviously did not have the expected effects, both on economic developments and elimination of negative demographic processes.

4. Effectiveness of the current system of fostering the development of hill and mountain areas

Long-term Croatian regional policy is focused on supporting and fostering the development of underdeveloped local and regional self-government units, as well as areas with development specificities which, along with islands and border areas, include hill and mountain areas. In accordance with the relevant EU policies, the regional policy of the Republic of Croatia aims to reduce the level of development divergences at the national level, and various types of government incentives are granted accordingly to less developed areas. This creates the preconditions for a more efficient use of own local, regional, and national development potentials.

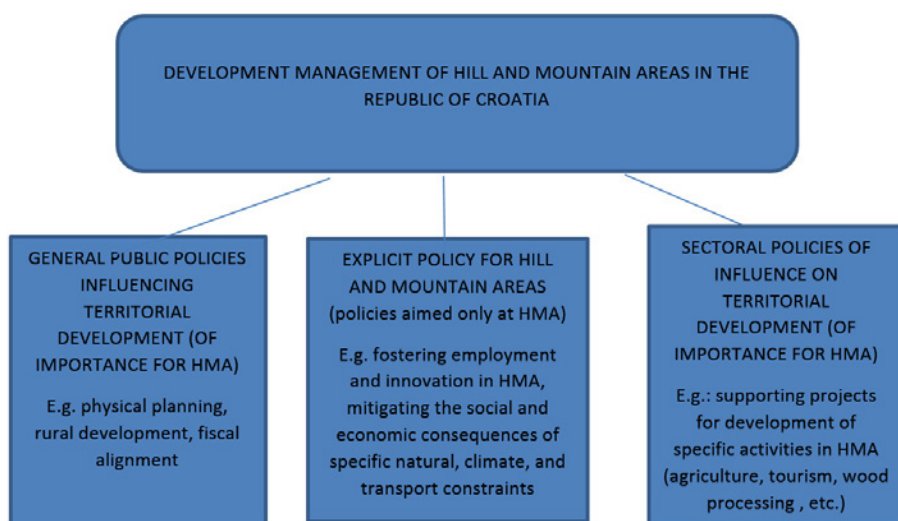
In order to foster the development of HMA and mobilize their development resources, the state aid system has included various measures mainly aimed at strengthening the fiscal capacity of LSGU with HMA status, as well as direct aid to the population in order to solve specific problems, such as housing and raising the standard of living. Despite significant institutional efforts, HMA-oriented regional policy has not produced effective and satisfactory results. As is apparent from the results of the analysis of demographic and economic characteristics, the basic objectives of fostering the development of these areas: encouraging demographic renewal (survival and population settlement), economic growth and sustainable development of HMA, and raising the standards of living of the population in HMA, have not been achieved. Based on the results of the conducted analysis, it is evident that the current system of measures has not led to significant developments in the HMA, nor to a reduction in development divergences.

It should be emphasized once again that, in the period 2001-2017, all demographic indicators indicate negative trends, lagging behind average national values, and increase in regional disparities in the territory of the Republic of Croatia. With regard to the indicator trends in the post-crisis period (2015-2017), it can be concluded that the effects of the long-term economic crisis were less favorable in HMA compared to the total national economy. Although regional policy instruments have been created with the intention of revitalisation, in the long term, there has been further population loss, space emptying and disruption of population structure in the HMA. In addition to the inefficiency of regional policy measures from the point of view of demographic trends, there were consequently no results in the area of planned economic growth and development. One of the characteristics of HMA is the longevity of unfavorable economic trends, which relate in particular to the inefficient use of existing labor resources, i.e. labor force. Although income and fiscal capacities have increased, the fact that long-term developmental divergences are present in the purchasing power and standard of living of the population also confirms that the current support system to the development of hill and mountain areas has not been effective and has not contributed to the reduction of regional imbalance in the territory of the Republic of Croatia.

Since the current approach to the development of HMA, based primarily on the increase of funds from local budgets of local self-government units, as well as tax benefits for the population, did not result in a reduction of development problems, there is a need to create and implement an alternative concept that will achieve visible demographic and economic shifts in the following development and program period. The framework of this new concept should be sought taking into account recent changes in the paradigm in regional politics cited in the second chapter. These changes also include new objectives, new geographic coverage, new governance, and new policy instruments for regional development (OECD, 2010). From the aspect of managing the development of the Croatian HMA, the dominant approach of transferring national

financial resources to the level of local HMA budgets should be corrected by an approach based on fostering development programs and investments aimed at strengthening local, especially entrepreneurial capacities and competitiveness of the local sites. In accordance with the modern paradigm of regional and local development, the key instruments of such an approach for HMA should be to significantly stimulate innovation, develop human resources, and encourage different forms of networking between entrepreneurs (according to: Capello and Nijkamp, 2009; Rodriguez-Pose and Crescenzi, 2008). Although the current system encourages the development of HMA by a large number of national and regional development policy holders, given the proven unsatisfactory results, it is necessary to create a coherent and effective integrated development management system of these sensitive and specific areas. Such a system would encompass coordinated and targeted measures and activities of all public policies in the segment of territorial orientation, as well as measures of explicit policies for hill and mountain areas, and measures and activities of sectoral policies aimed at the development of HMA (Figure 3.1).

Figure 3.7: Integrated HMA development management model



Source: Adapted by the authors according to: Stucki, E. W.; Roque, O.; Schuler, Perlik, M. (2004): *Contents and impacts of mountain policies Switzerland*, National report for the study on "Analysis of mountain areas in the European Union and in the applicant countries"

Considering the unfavorable demographic and economic characteristics of HMA in the Republic of Croatia, all three areas of activity should primarily focus on increasing employment as a key driver of social and economic changes, and particularly demographic revitalisation. At the same time, it is important to focus on measures and projects that influence the increase of production potential and productivity in HMA, because productivity growth is the key factor of convergence and growth of national economy standards, while all demographic

measures can at best only mitigate or slow down the lag dynamics in relation to other EU member states (according to Lovrinčević, 2019). Accordingly, the crucial criterion of the implementation of a coordinated system of instruments under the integrated HMA development management model should relate to an increase in labor productivity in order to reverse the lag process in HMA compared with the Republic of Croatia into the process of development convergence. However, since these are areas of pronounced natural and ecological sensitivity, the integrated management model should take into account sustainability criteria in terms of preserving biodiversity and the value of the ecosystem in HMA, but also the criterion of fairness in terms of ensuring the necessary living conditions for all inhabitants regardless of where they live.

5. Conclusion

Extremely negative demographic trends, both from the aspect of population density and its structure, inefficient use of human resources and economic lag, and an increase in the development “gap” between purchasing power and standard of living of the population in relation to the national level are the most important long-term characteristics of hill and mountain areas in the Republic of Croatia. Despite a long-term regional development policy aimed at demographic revitalisation, increasing economic growth and development, and raising the standard of living in HMA, the current system of fostering HMA development has not produced satisfactory results, nor reduced regional demographic and economic disparities. This system was primarily based on, on the one hand, the creation of additional fiscal capacity for local self-government units with HMA status, and on the other hand, the encouragement of higher standards of living for citizens through significant tax benefits. Since the expected effects have not been achieved, it is necessary to create a new integrated HMA development management system which includes the functioning of all public and sectoral policies that have an impact on territorial development and particularly the development of HMA, as well as functioning of an explicit policy for hill and mountain areas. Such an integrated system must be based on the contemporary paradigm of regional and local development whose key instruments are aimed at developing innovation, human resources, as well as creative forms of networking between entrepreneurs. In this process, it is important to balance the system of incentives by taking into account the criteria of productivity, sustainability, and fairness.

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CHAPTER 7

Sustainable business models in the light of the digital transformation: Smart City perspective

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Abstract

The main objective of this paper is to investigate whether the model of smart cities contributes to creating a sustainable business environment. Researches on the development of the Smart City models are increasing significantly. The main motive for this research is the fact that 2.5 billion new residents will live in cities by 2050, which create the need for smart and sustainable development. The point of departure for this paper is the understanding of Smart City models as an imperative of global trends, and as market for applicable technology solutions. Upon confirmation of hypotheses that Smart Cities concept is prerequisite for sustainable business environment in national economy, the subsequent validation of such model should bring a better understanding of the impact of its components on each dimension of sustainability (economic, environmental, and social). Indeed, this research model may be the basis for a more specific methodology to measure the impact and benefits of applying smart cities, as we will contend, both in terms of sustainable environment and digital transformation.

Key words: Sustainability, Business model, Smart City, Digital transformation

JEL classification: M21, Q56

1. Introduction

The digital imperative (or the inability of a majority of cities to adopt new digital realities) shows that organizations must be able to sense opportunities, craft transformative sustainable business models, and reconfigure business strategies. Firms have to understand current business models and identify existing and potential future drivers of digital value, but also use their dynamic capabilities to strategically exploit digitization. For firms addressing challenges in the field of smart city solutions, the awareness of the level of complexity is very important. Smart city solutions are expected to evolve in the years to come providing opportunities for further scientific groundwork both on a macro as well on a micro level.

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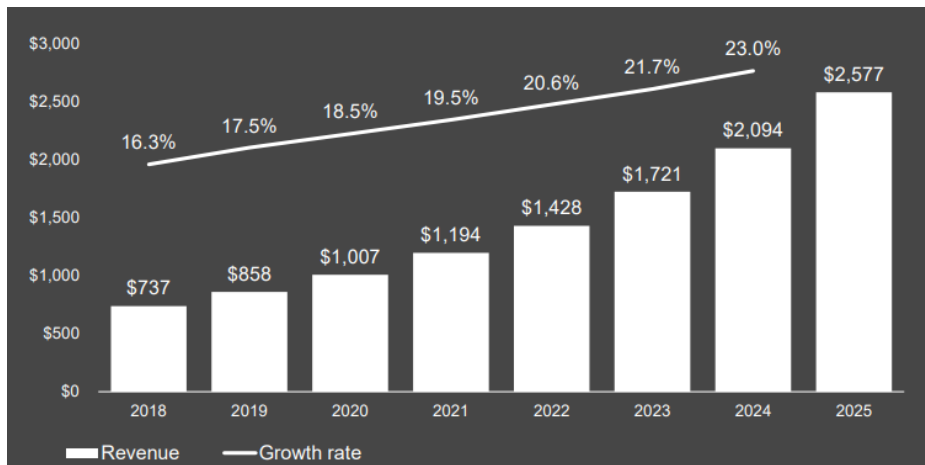
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The development of smart cities is set to be one of the crowning achievements of societies worldwide in the 21st century. As this growth continues, one of the most important and dynamic aspects of smart cities is the evolution of the roles and relationships between the key participants involved in envisioning and creating them. These are primarily government bodies aiming to transform the lives, wellbeing and safety of their citizens; and an ever-widening array of private sector players helping to realize these aspirations, by building, managing and funding digital urban infrastructure and services. While other stakeholders are also involved, including not-for-profit organizations and citizens themselves, its government and the private sector that are largely building the digital infrastructure of the city. The concept of smart city has been gaining popularity, cities have developed strong interest for transformation into smart cities, and consequently, such transformation requires an appropriate approach.

The development of smart cities around the world is gathering pace, with the total value of the global smart city market projected to exceed US\$1 trillion by 2020 and US\$2.5 trillion by 2025 (see Figure 1). Smart cities have a huge potential for improving sustainability, but they are limited by market focused economic models. Nevertheless, smart cities effectively integrate the influence of physical, digital, and human systems; as well as institutional, technological and human factors. In addition, they are characterised by having: smart economy, smart citizens, good governance, smart environment, smart mobility, data collection and management excellence. Figure 1 suggests a huge potential for sustainable business model solutions for smart cities.

Figure 1. Global Smart Cities Market Growth 2018-2025.



Source: PwC (2018).

Technology is starting to play a key role in cities' urban sustainability plans. This is because new technologies can provide them with robust solutions that are of benefit to citizens. Cities aim to incorporate smart systems in their industrial, infrastructural, educational, and social activities. A Smart City is managed with intelligent technologies which allow improving the quality of the services offered to citizens and make all processes more efficient. However, the Smart City concept is fairly recent. The ideas that it encompasses have not yet been consolidated due to the large number of fields and technologies that fit under this concept (Chamoso, González-Briones, De La Prieta, Venyagamoorthy, & Corchado, 2020). The implementation of smart technology in cities is often hailed as the solution to many urban challenges such as transportation, waste management, and environmental protection (Laufs, Borrión, & Bradford, 2020).

Considering the fact that smart city is an entrepreneurial city, there is a bidirectional relationship between entrepreneurship and smart cities. First, entrepreneurs initiate technological interventions that help cities undergo socio-technical transitions and become smart cities. Second, the technologies being adopted in cities generate data which then helps enterprises to explore new opportunities. Therefore it can be said that smart cities influence entrepreneurial business models (Kummitha, 2019). The scope of changes in the morphology of business models is caused by the massive technological development, framed under the concept of digital transformation (Kotarba, 2018).

Transformative sustainable business models are based on shared-value logic and on innovative digital solutions that can reduce costs, enhance resource efficiency, advance customer experience, and add value, both within single stages of the value chain and across its entirety. As a result, the traditional concept of the value chain, as established by Michael Porter in 1985, needs to be carefully rethought. To maximize synergies based on digital technologies, the transformative value chain must be multilayered and involve future customers at the product/service design stage. Demand-driven supply chains are based on a combination of data analytics and monitored real-time shifts in demand. Synergies between societal progress and productivity in a multilayered digital value chain give rise to more sustainable understanding of productivity and the fallacy of a focus on mere short-term economic gains. Distribution in transformative value chains often uses multiple channels simultaneously (Brenner, 2018).

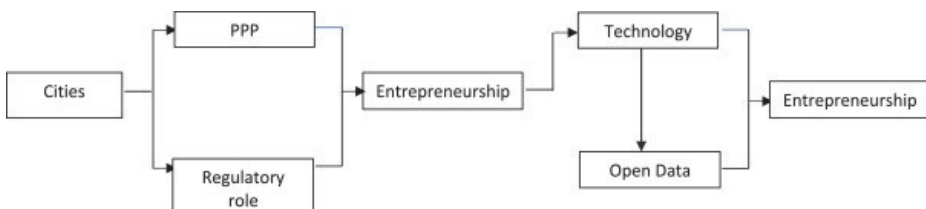
This paper aims to provide a methodological framework as an analytical method to examine smart cities by dimensions, and performance measurement, both in terms of sustainable environment and digital transformation. The paper consists of five sections and it is structured in the following way: Chapter 2 defines the literature review, Chapter 3 covers the research methodology and design, Chapter 4 presents the key findings and policy recommendations. The paper ends with a conclusions.

2. Literature review

The definition of smart city was developed highlighting the aspect of smartness (that is innovative methods and technologies to enable sustainability) in the definition: A smart city is a city that efficiently mobilizes and uses available resources (including but not limited to social and cultural capital, financial capital, natural resources, information and technology) for efficiently: improving the quality of life of its inhabitants, commuting workers and students, and other people; significantly improving its resource efficiency, decreasing its pressure on the environment and increasing resiliency; building an innovation-driven and green economy; fostering a well-developed local governance (Bosch et al. 2017). Smart city applications are designed to manage urban flows and provide real-time answers to such issues as energy efficiency, demand side requests, as well as energy management (Jindal, Kumar, & Singh, 2018; O'Dwyer, Pan, Acha, & Shah, 2019). Cavalcante, Cacho, Lopes, and Batista (2017) present smart city as a complex system-of-systems, which characterizes: managerial independence of constituent systems, geographical distribution of constituent systems, evolutionary development, and inherent dynamicity. A smart city system-of-systems can integrate both public and private heterogeneous, independent systems across different domains. In addition, integration of different heterogeneous systems should support smart management in different areas (Cavalcante, Cacho, Lopes, & Batista, 2017).

Smart city can be defines as an entrepreneurial opportunity. Cities typically adopt two types of approaches in encouraging entrepreneurs to participate in smart city interventions: promote public–private partnership (PPP) and play regulatory roles. In one hand, as a part of the PPP model, city governments partner with corporates, SMEs, and citizens directly. In the other hand, as part of the regulatory role, cities reposition their ecosystems, allowing greater private sector participation. Also, policymakers create a supportive environment for entrepreneurs to benefit from. Kummitha (2019) summarized how cities offer various entrepreneurial opportunities, as given in Figure 2:

Figure 2. Smart cities and entrepreneurial opportunities



Source: Kummitha, 2019, pp. 3.

Different concepts of smart cities are based on the existing technology. Therefore, it is important to point out economic challenges to the development of smart cities. In this regard, we genuine challenges that need to be addressed are briefly discussed below:

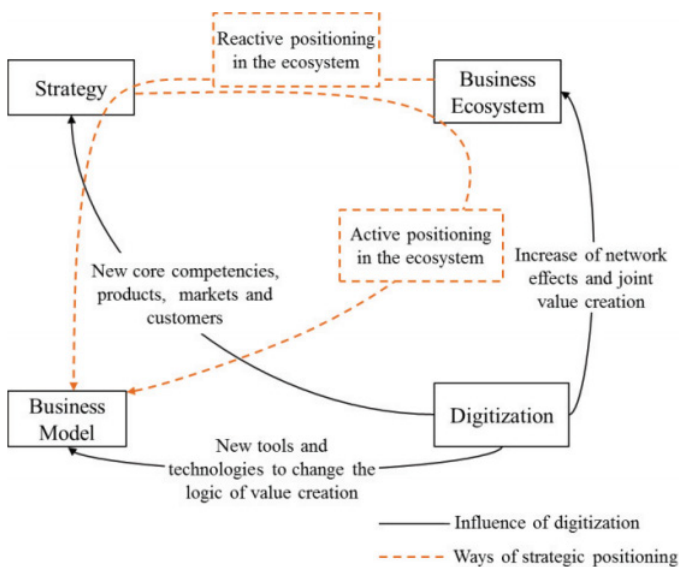
- [1] *Implementation cost*: the development of smart cities involves technologies that are incurring huge cost.
- [2] *High energy consumption*: the sustaining of the technologies needed for running of smart cities requires high energy.
- [3] *Privacy and security*: privacy and security will play a very vital role due to people in smart cities will use smart city services with smart phones and computers that are connected through networks.
- [4] *Integration of technologies*: smart cities are fast emerging as a possible solution for brighter future prospects.
- [5] *Traffic management system*: traffic management systems range from need for a highly reliable and fast access protocol to data forwarding mechanisms for ensuring critical message transmissions that carry information regarding emergency situations on roads.
- [6] *Infrastructure*: the key pillars are located in the interconnected sensors, intelligent transportation systems (metro, train, drones), public space with gardens, automatic and efficient lighting, gas system, water, telecommunication and infrastructure for energy sharing (Oliveira, Oliver, & Ramalinho, 2020).
- [7] *Mobility*: it is very much essential to guarantee uninterrupted service to mobile users while shifting between different access networks.
- [8] *Scalability*: the limitations with respect to restrictions in storage, bandwidth and computational abilities that act as a hindrance to service providers while handling large number of users should not come in the way of proper functioning of the different services.
- [9] *Fault-tolerance*: this is a real challenge while designing smart cities as information and communication technologies should be implemented in such a way such that they are highly resilient to system failures.
- [10] *Upgradation*: This feature is true for the development of any technology and likewise for smart cities too. Upgrading a smart city will incur a huge cost as such a city is very much dependant on communication and technologies (Kostić, 2020).

With the development of digital technologies, the classical system of doing business has been disrupted and companies have to react to digitalization. At present, this situation is called "digital disruption," which can be interpret as a digital disruption to the market. This concept is a result of the continued emergence of new digital technologies and new business models. The emergence of these innovations brings new insights into the product, its production, and may even influence the value of existing products. Digitalization is hindering the market that has been hampered so far and the consequence of this disturbance is the need to re-evaluate the systems used so far. The disruption of the market is reflected in the fact that digital technologies can plunge into the market much

faster, and the modular features of the platform allow rapid and global adoption by users. This raises the question of how to integrate these systems into the supply chain at multiple levels to achieve efficiency. This fact leads to the creation of new business models with the attribute digital (Genzorova, Corejova, & Stalmasekova, 2019, pp. 1054). Customer relationship management (CRM) can be considered a sort of Green IT, oriented toward digital transformation and sustainable business model innovation (Gil-Gomez et al. 2020).

A combination of new business models, new technologies, market volatility, the digital transformation, as well as a commitment to operational excellence are all contributing to a considerable differentiation and competitive advantage. In this regard, it is critical for companies to understand the digital transformation, its associated opportunities and risks, the possibilities for new operating models and new levels of optimization. Some authors give a conceptualization framework for modelling the digital disruption dynamics (Radukić, & Kostić, 2019). According to Business model generation (Osterwalder, 2010), business model is way or path how company can create, deliver and capture value. Business model is divided into ten Building blocks: 1) Customer segments, 2) Customer relationships, 3) Channels, 4) Value proposition, 5) Revenue streams. 6) Key resources, 7) Key activities, 8) Key partners, 9) Cost structure, and 10) Revenue streams. The Building block is characterized by certain features which describe the main definition of a business model more properly. Also, business model is the way of entrepreneurship which creates, maintains or keeps values important for company and customer (Osterwalder, & Pigneur, 2010).

Figure 3. Simplified interaction between business ecosystem and business model influenced by digitization

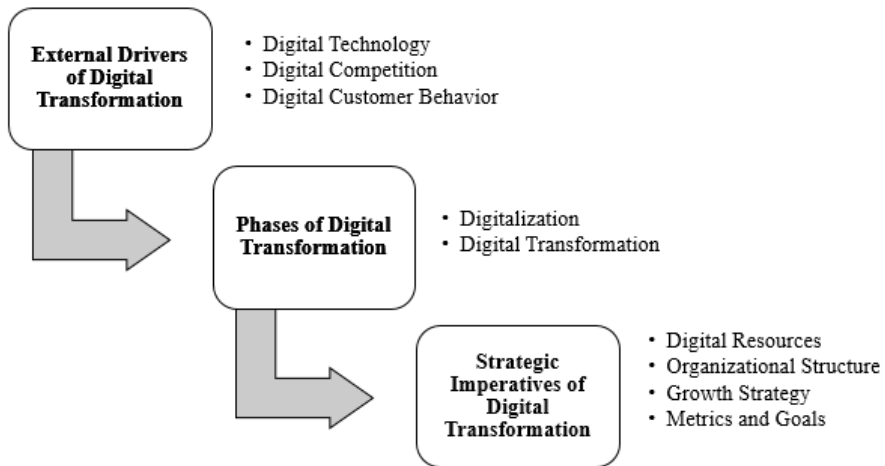


Source: Paulus-Rohmer, Schatton, & Bauernhansl, (2016). pp.11.

Figure 3 presents an overview of the interaction between business ecosystem and business model influenced by digitization. To start with, digitization is the main driver for a change in competition and the organization of different sectors. Companies, consumers and products will be massively interconnected due to digital networks. This leads to increased network effects and a joint value creation in business ecosystems, which provide solutions for end customers. Digitization also has a significant impact on strategy. Due to the increased transparency, it is hard to establish operational advantages and the barriers of entry for new firms are lowered. From the buyers' perspective, bargaining power is shifted towards end customers, also because switching costs are reduced. On the other hand, there are new markets that can be addressed by using the means of digitization. Finally digitization also provides new technologies or platforms to design new business models according the goal set by strategy. A fundamental factor for the cost structure of a business model is the transformation of fixed costs into variable costs by digitization.

In discussion, we follow a commonly used flow model (depicted in Figure 4) to describe the drivers, phases or levels, and imperatives of digital transformation. Based on an understanding of these phases, the figure 3 highlights the strategic imperatives that result from digital transformation, including digital resources, organizational structure, growth strategy, and metrics and goals.

Figure 4. Flow Model on Digital Transformation

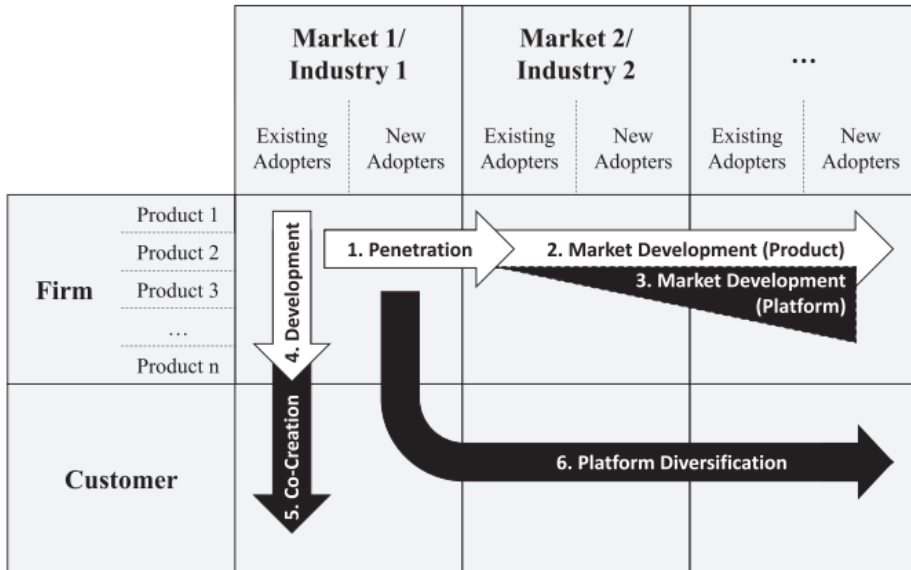


Source: Authors according to Verhoef, Broekhuizen, Bart, Bhattacharya, Dong, Fabian, & Haenlein, (2019). pp. 2.

In order to understand how digital firms can grow using a platform business model, the attention is paid on the Ansoff matrix, which identifies four growth strategies: market penetration, product development, market development and diversification. The Ansoff matrix shows the opportunities for revenue growth through the development of new products, new markets or both. In Figure 5 shows Ansoff's growth strategies to platform firms to assess the growth

opportunities that may emerge. Looking horizontally, i.e., growing across markets or industries, there are three strategies. The first two are (1) market penetration and (2) (product-based) market development, representing two traditional dimensions of Ansoff's original work.

Figure 5. Sustainable business model: Digital Growth Strategies



Source: Verhoef, Broekhuizen, Bart, Bhattacharya, Dong, Fabian, & Haenlein, (2019). pp. 7.

Platforms can leverage their digital and disruptive (Christensen, 1997) technologies to achieve significant growth by attracting non-users, who have never consumed the product or a traditional substitute before, into customers. In addition to these more traditional strategies, digital firms can also execute (3) platform-based market penetration, introducing a platform consisting of various existing products into a new market that are offered by external parties. Looking at the vertical dimension, there are two distinct strategies. The first strategy, (4) product development, introduced by Ansoff, can also be followed by digital firms. Digital firms can often more efficiently develop and launch new products in a platform environment, as platforms allow for stronger synergies among products. The second strategy consists of developing a (5) co-creation platform that allows external users to actively co-create value by giving them the authority to perform certain activities themselves on the platform (Grönroos & Voima, 2013). Finally, some firms are able to combine all approaches in a single strategy, which is labeled as (6) platform diversification. This growth strategy is often deployed by large, successful platforms aiming to create additional growth in unexplored markets with new products. This approach consists of expanding the platform to serve new markets, update the product and service assortment, and open the firm to concrete value.

The strategy is implemented by an according business model. New business models will cause the active change of the organization's role in the ecosystem and the digitization offers opportunities for implementation. Thus, the change of the industry logic needs to be integrated into strategic decisions to be competitive in the future (Paulus-Rohmer, Schatton, & Bauernhansl, 2016).

While theory and practice show a growing interest in the potential of new business models as a result of digitization, research to date has not yet shown the main impetus for how the potential of digital business models can be significantly used across industries. Based on a theoretical foundation, four main drivers regarding cross-industry potentials of digital business models are: Key Performance Indicators, Individualization, Efficiency and Communication. The findings of the structural equation model analysis show that three determinants (Key Performance Indicators, Individualization and Efficiency) do have a positive as well as significant influence on the potentials of digital business models. Just the determinants Communication do have a negative as well as insignificant influence on the potentials of digital business models (Härtig, Reichstein, Laemmle, & Sprengel, 2019).

3. Methodology framework

The main methods include an economic analysis of the newest data, and the focus is on highlighting the selected input, output, outcome, process and impact indicators for assessing the sustainability of the Smart City models in the context of the economics of digital transformation. For evaluating smart city models, it is important to note the degree to which they contribute to reaching city targets with regard to smart sustainable development. That means that the primary focus is on impact indicators (see Bosch et al. 2017, pp. 15-18). Starting from the definition of a smart city, we give the list suggestions referring to indicators for a comprehensive economic analysis of the smart city models. In addition, proposed indicators are key performance indicators for tracking the progress towards sustainable development.

Input indicators refer to the resources needed for the implementation of an activity or intervention, measuring the quantity, quality, and timeliness of resources. They are using for measuring the quality and quantity of long-term results generated by outputs. Policies, human resources, materials, financial resources are examples of input indicators. The phased process of identifying input indicators can include the following: development of smart city policy, smart city expenditures, cross departmental integration of smart city policies, establishment within the administration, monitoring and evaluation of smart city models.

Output indicators add more details in relation to the product of the activity, e.g. the number of smart meters distributed, the area of roof that has been isolated, and the number of electric busses in the system. We suggest some of the possible indicators for creating an adequate smart city model such as: proportion of

homes using smart home monitoring systems, share of households with smart meters, percentage of electric vehicles, number of public charging stations, integrated fare system for public transport, availability of multi-modal transit app with at least 3 services integrated, proportion of public parking connected to the parking management system, proportion of traffic lights connected to the traffic management system, coverage of roads sensing terminals connected to a control system, coverage of parking guidance systems, share of city's solid waste disposal managed with ICT measures, heavy rain/flood control monitoring by means of ICT measures, sewage discharge management/water pollution control with ICT measures, number of infrastructure components with installed sensors, number of technologies in use to assist with crime prevention, number of smart apps developed using open data platforms, etc. The number and types of these output indicators depend on: online services, number and quality of open datasets, and number of innovation hubs in the city.

Outcome indicators are used for measuring the intermediate results, they refer more specifically to the objectives of an intervention. These indicators refer to the reason why it was decided to conduct certain interventions in the first place, so they are the result of both the quantity and quality of the activities implemented. Often they are 'coverage indicators' measuring the extent to which the target population has been reached by the model. Some of the outcome indicators are: internet penetration rate, share of intelligent buildings, share of municipal energy networks with real-time information for customers, use of smart mobility apps, share of electric car owners in the district which participate, use of e-bike/e-car rental schemes, and share of total revenue from public transit obtained via unified smart cards systems, etc. The number and types of these outcome indicators depend on: access to high speed internet, access to public WIFI internet connection, people reached by the project.

Process indicators refer to indicators to measure whether planned activities took place. Examples include holding of meetings, conduct of training courses, distribution of smart meters, number of ways in which citizens can communicate with the municipality (e.g. phone, mail, social media, etc.), increased computer literacy of elderly people, presence of demand-based pricing (e.g. congestion pricing, variably priced toll lanes, variably priced parking spaces), and use of standard interfaces. The number and types of these process indicators depend on: interoperability, cyber security, privacy, and improved digital literacy.

In general, indicators should express as precisely as possible to what extent an aim, a goal or a standard has been reached or even surpassed. Data that are not linked to standards or specific goals of projects can be used as quantitative background information but are not suited for evaluative purposes.

Often, however, various indicators are available to assess the progression towards a certain goal (van Rooyen and Nesterova, 2013). The phase process of selecting indicators must respect the following principles:

1. *Relevance*: each indicator should have a significant importance for the evaluation process. That means that the indicators should have a strong link to the subthemes of the framework.
2. *Completeness*: The set of indicators should consider all aspects of the implementation of smart city models. Indicators can be selected according to the people, prosperity and governance themes, which framework is fairly comprehensive in describing public policy goals.
3. *Availability*: data for the indicators should be easily available. As the inventory for gathering the data for the indicators should be kept limited in time and effort, the indicators should be based on data that are available or can easily be compiled from public sources, and can easily be gathered from interviews, maps, or terrain observations.
4. *Measurability*: The identified indicators should be capable of being measured, preferably as objectively as possible. For the majority of indicators in the social sciences quantitative measurability is limited (Abeyasekera, 2005).
5. *Reliability*: the definitions of the indicators should be clear and not open for different interpretations. This holds for the definition itself and for the calculation methods behind it.
6. *Familiarity*: The indicators should be easy to understand by the users. For new indicators a definition should be developed that has a meaning in the context of existing policy goals.
7. *Independence*: Small changes in the measurements of an indicator should not impact preferences assigned to other indicators in the evaluation.

4. Key findings and policy recommendations

While smart cities have the potential to change cities for the better, they also come with potential hidden costs. Defining scalable, efficient and realistically achievable smart city policies requires a clear understanding of the strengths, weaknesses, opportunities and threats facing smart cities. Table 1 present SWOT analysis of smart cities and highlights the main internal and external factors for sustainable smart city model.

Table 1. SWOT analysis of smart cities

<p>Internal factors</p> <p>Menageral and organizational issues</p> <p>Cross sectoral cooperation challenges</p> <p>Lack of multi-temporal and multi-source data</p> <p>Lack of real-time decision mechanism</p> <p>Citizen awareness and involvement</p>	
<p>Strengths</p> <p>Widespread digitalization</p> <p>Efficiency outcomes (traffic fluidity, sensors detecting water leakages)</p> <p>Well-functioning urban city</p> <p>Well defined and realistic goals</p> <p>Higher stage of digital and intelligent city</p>	<p>Weaknesses</p> <p>Budget constraints</p> <p>Lack of supportive infrastructure</p> <p>Lack of human capital to implement digitally-driven policies</p> <p>Lack of supportive regulatory frameworks</p> <p>Building the capacity of cities to collect and use the right data</p>
<p>Opportunities</p> <p>Data as a means to improve well-being</p> <p>Innovative financial instruments</p> <p>Efficient service delivery</p> <p>Digital inclusion</p> <p>New forms for citizen participation and cooperation</p> <p>Increased sustainability and resilience</p> <p>Profitability of smart city investment and return on investment</p> <p>Aligning smart city investment with a city's strategic priorities and citizens' needs</p>	<p>Threats</p> <p>Fair competition</p> <p>Consumer protection</p> <p>Possible abuse of citizen data, privacy and safety</p> <p>increased inequality among digitally marginalized groups</p> <p>Measure trust in online environments</p> <p>Differences among cities in levels of economic development</p>
<p>External factors</p> <p>Institutional interactions</p> <p>Innovation and Entrepreneurship</p> <p>Handling of heterogeneous system</p> <p>Large scale space-time and service platform</p>	

Source: Authors systematization according to OECD (2020) and Halepoto et al. (2015).

Smart city policies need to be designed, implemented and monitored as a tool to improve well-being for all people. Building smart cities is not only the business of cities or the private sector. Citizens are not only recipients but also actors of smart city policies. Putting people at the centre of smart cities means co-constructing policies with citizens throughout the policy cycle. Policy recommendations in this field refer to:

- National governments can and should play an enabling role to support innovative solution delivery, capacity building and upscaling;
- Measuring smart city performance is a complex task but is critically required. Advancing the measurement agenda calls for a comprehensive, multi-sectoral and flexible framework that is aligned with local and national strategic priorities and embraces efficiency, effectiveness and sustainability dimensions.
- Smart cities need smart governance. Establishing new government departments with expertise in urban ICTs can enable agile governance, using new models of multi-level governance that take into account that governance and technology mutually evolve and affect each other.
- Business and contractual models need to adapt to rapidly changing urban environments and encompass a more holistic approach, sometimes re-regulate rather than simply de-regulate (OECD, 2020).
- Relying solely on new digital technologies creates vulnerability and risks excluding people with limited ICT access;
- The development of city data platforms should follow international standards to ensure systems can operate across country borders and different system providers;
- Policymakers should prioritize access to real-time and long-term urban data on energy use, air quality, transport and emissions, to support development of new services;
- Digital developers could be offered support to focus on urban sustainability as a priority area for experimentation. This could include financial incentives, opportunities for knowledge exchange and placements, or support for other collaborative schemes across academia, business and governance.

The majority of smart city initiatives are aimed at finding cost efficiencies within existing systems, they are not developed with the sustainable development goals in mind. In addition, smart cities are commonly understood as incorporating the development of new digital markets, efficient urban management systems, and more informed citizens. However, badly planned implementation of smart city initiatives can cause societal harm, large technology companies provide data collection and access hubs for smart cities, which increases the risk of private companies controlling the data of governments and citizens.

Therefore, optimising the system alone cannot deliver greater improvements and longer-term sustainability, smart cities should be partners and enablers in ICT development, regulation, support and implementation.

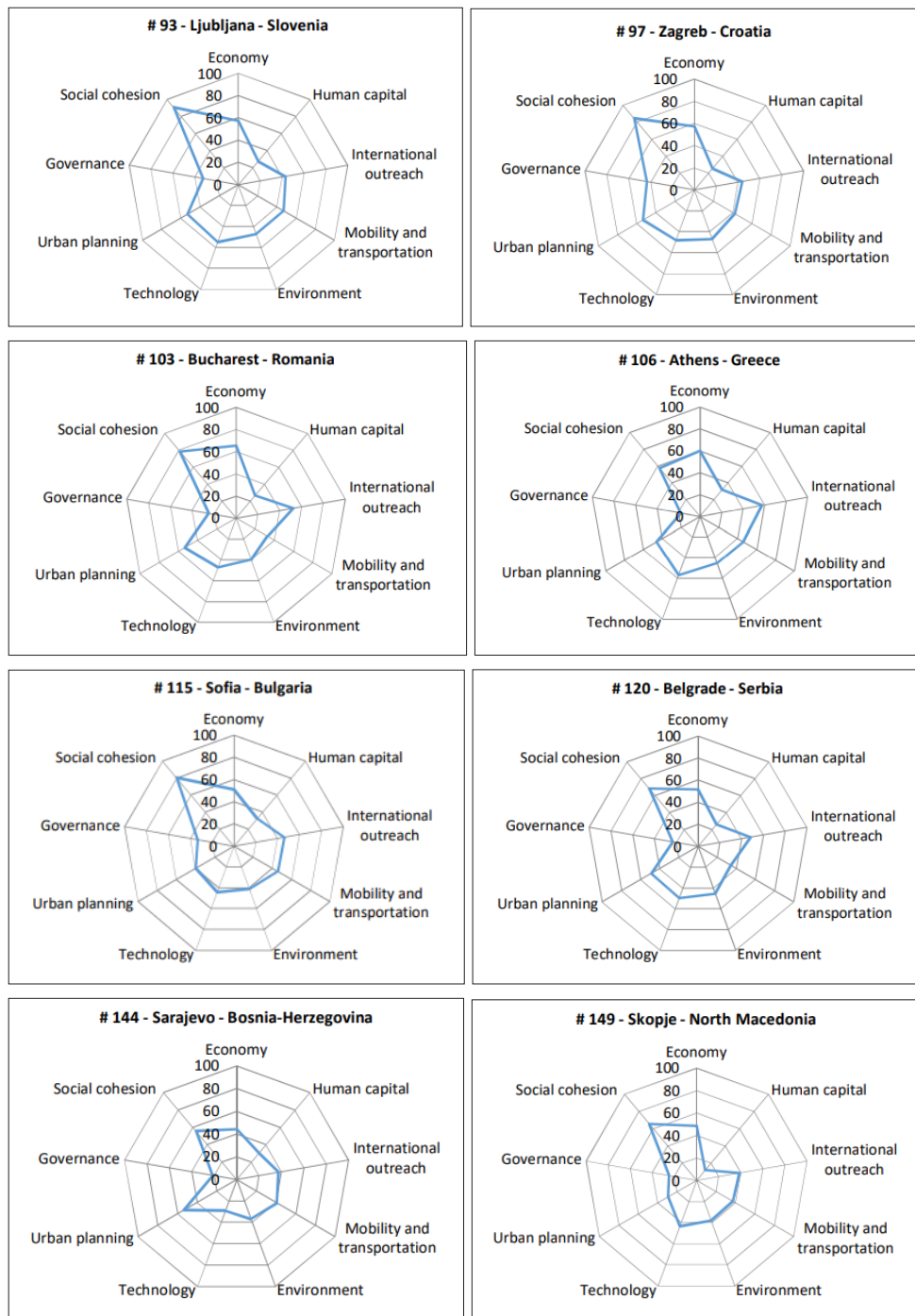
Table 2. Smart city performance measurement dimensions and indicator framework

Dimensions	Indicators
Economy	Cost performance (Cost of living) Productivity Employment
Environment	Pollution Environmental protection and quality Energy Resource management Pollution and waste
Society and People	Education Lifelong learning Social and ethnic plurality Social cohesion, connectedness and safety
Governance	Participation in decision making Multilevel governance transparent governance Community involvement
Intelligence	Intelligent technology solutions Digital transformation forms of public engagement
Sustainability	Smart green service Start-up and eco-system programs Urban innovativeness

Source: Authors systematization according to Junghoon Lee (2019).

In order to ensure the successful implementation of this concept, it is necessary to develop a methodological framework with city performance measurement dimensions and selected indicators.

Figure 6. Analysis of the smart capital cities in Southeast European countries by dimensions



Source: Authors presentation according to Berrone, P., Ricart, J. E., Duch, A., & Carrasco, C. (2019).

Table 2 shows six dimensions (*economy, environment, society and people, governance, intelligence, sustainability*) with the corresponding indicators to propose a framework for measuring the performance of smart cities. Some authors suggest nine dimensions for smart city performance measurement. Hence, Figure 6 shows graphical analysis of the capital cities in Southeast European countries (Slovenia, Croatia, Romania, Greece, Bulgaria, Serbia, Bosna and Herzegovina, North Macedonia), based on the nine dimensions (*economy, human capital, international outreach, mobility and transportation, environment, technology, urban planning, governance, social cohesion*). These radar charts, arranged according to ranking, aim to facilitate the profiles of the cities by identifying the values of the various fields and, at the same time, they enable comparisons of two or more cities at a glance.

5. Conclusion

Smart City models are an imperative of global trends and market for applicable technology solutions. Also, Smart City concept is prerequisite for sustainable business environment in national economy and the validation of such model bring better understanding of the impact on each dimension of sustainability. Furthermore the paper considers additional dimensions for performance measurement (*economy, environment, society and people, governance, intelligence, sustainability*) and proposes indicator framework for determining the optimal model. Empirical part of the paper pay attention to graphical analysis of the capital cities in Southeast European countries (Slovenia, Croatia, Romania, Greece, Bulgaria, Serbia, Bosna and Herzegovina, North Macedonia), based on the nine dimensions (*economy, human capital, international outreach, mobility and transportation, environment, technology, urban planning, governance, social cohesion*). The obtained results show that Ljubljana is the best ranked, followed by Zagreb, Bucharest, Athens, Sofia, Belgrade, Sarajevo and Skopje, respectively. This paper reflects the state of development of the capital smart cities in Southeast European countries by dimensions and suggests indicators which have been tested and which can be incorporated in the optimal model. The phase process of selecting indicators for each dimension have to respect the following principles: relevance, completeness, availability, measurability, reliability, familiarity, independence.

One of the key contributors to the research is conducted SWOT analysis of smart cities. This is first step towards defining scalable, efficient and realistically achievable smart city policies. Clear understanding of the strengths, weaknesses, opportunities and threats facing smart cities, which highlight the main internal and external factors for sustainable smart city models, is given in the empirical part of the paper.

Policy recommendations in this field relate, inter alia, to: measuring smart city performance, relying solely on new digital technologies which creates vulnerability and risks excluding people with limited ICT access, need for smart

governance, business models need to be adapted to rapidly changing urban environments and encompass a more holistic approach, urban sustainability is a priority area for experimentation which can include financial incentives, opportunities for knowledge exchange and placements, or support for other collaborative schemes across academia, business and governance, etc. However, badly planned implementation of smart city initiatives can cause societal harm, large technology companies provide data collection and access hubs for smart cities, which increases the risk of private companies controlling the data of governments and citizens. Therefore, optimising the system alone cannot deliver greater improvements and longer-term sustainability, smart cities should be partners and enablers development, regulation and support.

In the light of overwhelming challenges to the development of smart cities (implementation cost, high energy consumption, privacy and security, integration of technologies, traffic management system, infrastructure, mobility, scalability, fault-tolerance, upgradation), there is a broad consensus that incremental innovation and improvements of urban living will not be sufficient to reach crucial overarching targets such as quality of life or sustainability (Grab, & Ilie, 2019). With this in mind, smart city is a disruptive innovation approach that focuses on a forward-looking city.

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CHAPTER 8

E-GOVERNMENT INNOVATION: THE CASE OF E-ESTONIA AND IMPLICATIONS FOR ENTREPRENEURSHIP AND PUBLIC SECTOR IN SOUTH-EAST EUROPE¹

Darko Rendulić², Damir Mihanović³, Rea Troković⁴

Abstract

In this paper, the authors present the development of e-government in Estonia, with the special reference to the Estonian e-Residency program, as a part of the comprehensive innovation in the public sector management. It is hypothesized that the development of the entrepreneurial sector, i.e. small and medium enterprises is significantly influenced by the innovation in the public sector (including the grade of public administration effectiveness, lowered number of procedures and time needed to start a new enterprise, attracting new foreign investment). Based on the presented research results, implications of e-government innovation for South East Europe are explored, including both the dimension of innovation and change in the public sector, as well as the potential for development of entrepreneurship.

Key words: e-government, innovation, entrepreneurship, Estonia, South East Europe

JEL classification: M38, O38, H11, D73

1. E- government

E-government (electronic government) concept is related to the use of information and communication technologies, particularly the Internet, in public administration and governance. Wider understanding of e-government includes facilitating of the process of informing, communicating, making transactions among state institutions, citizens and companies. It consists of three main parts: e-administration, e-democracy and e-law (Brown, 2005).

Every Estonian, irrespective of their location, has a state issued digital identity. Thanks to this Estonia is years ahead of countries still trying to work out how

1 A previous version of the abstract of this paper has been presented and discussed at the 9th Meeting and scientific Conference of South East European Management Departments, Sarajevo (Bosnia and Herzegovina), September 20-21, 2019. The full version of the paper has been developed for the EDT Conference in Rijeka.

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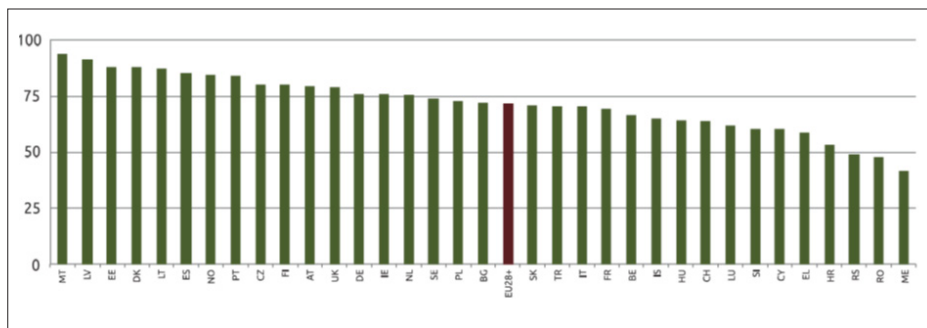
to authenticate people without physical contact. In Estonia, every person can provide digital signatures using their ID-card, Mobile-ID or Smart-ID, so they can safely identify themselves and use e-services.

The Estonian dream is to have as little state as possible, but as much as is necessary. Thanks to e-solutions, communications with the state are fast and convenient for all, and the country is more effective as a result.

E-Estonia's success relies on a clever infrastructure that has made it possible to build a safe e-services ecosystem. An important part of this ecosystem are flexibility and ability to integrate its different parts, while improving e-services and allowing government systems to grow. 99% of public services are available to citizens as e-services.

It is expected that modern information technology (IT) is a source of performance improvement, its technological potential and capability. Empirical researches have confirmed this assumption since efficient exploiting IT tools demands extensive organizational restructuring, in order to be properly and successfully implemented. The best results are achieved by those who manage to optimize organizational factors exploiting IT as solid infrastructure (Carr, 2003). Adequate software using „single point of truth“ principle can avoid endless repetitions of data inputs at various stages of administrative procedures and thus reduce the time needed for solving formalities. At the same time, it saves efforts, money and increases competitiveness on the area of application (Alfirević et al. 2018). Public sector tries to exploit new information technologies in the most innovative and competitive way.

Figure 1: Country ranking of average of top-level benchmarks in the life event “Regular business operations”



Source: Table 4.7 of EU Commission eGovernment Benchmark 2018 (https://ec.europa.eu/information_society/newsroom/image/document/2018-47/egovernment_benchmark_2018_background_report_F21FA84B-0254-F4DB-7B2FC4567D4AA925_55487.pdf)

2. Methods

In the empirical part the influence of the e-Residency program to the indicators related with enterprise establishing will be evaluated by further methods:

- **Methods of nonparametric statistics** considering less observations - **Mann-Whitney U test.**
- **Methods of descriptive statistics** for visual presenting median values and indicators of dispersion of the economic results.

Collected data for the empirical research are taken for the period 2006.- 2017. As the program e-Residency was introduced in 2014. its influence is measured since 2015. Mann-Whitney U test was applied. Analysis was conducted by done by the IBM SPSS 21 statistical analysis tool. Conclusions were taken at the significance of 5%. Data were tested against assigned values from 1 to 7 and rank it sets Estonia in European scale. Rank of the Estonia at certain variable refers to its ordinal number in a series of the 140 countries.

Predictor variables:

1. **Position of the state in the index of global competitiveness.**
2. **Government efficiency evaluation.**
3. **Evaluation of the transparency of the government politics.**
4. **Number of the procedures needed for establishing an enterprise.**
5. **Time needed for establishing an enterprise.**
6. **Number of foreign greenfield investments.**

Testing differences refers to the control of the efficiency of the introduction of the E-residency program in Estonia. Each of the variables was tested separately, its value and rank.

3. Empirical data (documentation background) and analysis

Nowadays knowledge society is based on increasing importance of „Industry 4.0“– the digital revolution (Baets, 2006). Estonian government differentiates by radical changes in public sector through the project e-Residency introduced at the end of 2014. It enables Estonian citizens to access public services like establishing enterprise, banking, payments and taxation. Due to that particularity the example of Estonia was chosen in order to emphasize the potential of organizational changes in public sector to economic performances of the state. It provides liberty at starting and running global business by e-resident from any location worldwide. It enables establishing of the enterprises, signing and exchange of encrypted documents, online banking, tax applications, health care requirements while at the same time has neither influence to income taxation nor creates obligation of income taxation in Estonia or resident country (The Guardian, 2016).

Central Bank of Estonia published in 2017. data which confirm its peak reached after financial crisis 2007-2008. Total output in 3rd quarter 2017. was higher 4,2% compared to the previous year. This information encourages and predicts

further growth 4% in the next year. In March 2017, World Economic Forum declared Estonia the most enterprising country in the Europe (Estonian World, 2017).

Services that government provides are sorted into eight subcategories:

- Licenses and registrations
- National defense
- Traffic
- Legal counselling
- Retrieving licenses for companies and activities
- Taxes and customs
- Business environment
- Financial reporting

E-residency and e-business register are programs which differentiate Estonian government from the other e-governments.

3.1. E-Residency

“E-Residency” is program by which Estonia in 2014 pioneered in providing digital state identity to the nonresidents by digital authentication and digital signing of the documents approaching the idea of the country without borders.

Each e-resident gets smart digital card which enables core business activities. Application is available online by explaining intentions and attaching scans of passport and photography. The e-Residency program also allows non-Estonian citizens to access the register and use the digital solutions when establishing a company in Estonia.

3.2. Business and finance support

Advertised: „Did you know that you can establish a company in Estonia just in 3 hours?”⁵

E-government provides further business support:

- **e-Tax** is the electronic tax filing system set up by the Estonian Tax and Customs Board. Each year, around 98 per cent of all tax declarations in Estonia are filed electronically – 3 minutes to file taxes online. Using a secure ID, a taxpayer logs onto the system, reviews their data in pre-filled forms, makes any necessary changes, and approves the declaration form. The process typically takes three to five minutes. Even one-click

⁵ <https://e-estonia.com/solutions/>

tax returns have been possible since 2015 – the data that is already in the system is displayed for the user along with the calculated result, then all the users must do is click on the confirmation button. All this can take less than a minute. In addition to individual income tax claims, other declarations can be made in the system⁶:

- An enterprise's declarations for income tax, social tax, unemployment insurance and contributions to the mandatory pension fund
- Value-added tax returns
- Alcohol excise, tobacco excise, fuel excise and packaging excise duty returns
- INF declarations
- Customs declarations
- **e-Banking** wholeheartedly embraced e-ID encouraging customers to use their ID cards for secure transactions giving away free card readers. Helped to move the population online by developing and offering high-quality internet banking services - over 99% of all banking transactions in the country are carried out online. Internet banking services are accessible online anytime from anywhere in the world without visiting a bank. Such e-banking system is simple, secure and practically instantaneous. The most innovative Estonian e-banking solutions is the Pocopay application which allows customers to open and use a bank account from their mobile phone so far available in the Netherlands and Spain, too.⁷
- **e-Business Register** is advanced and secure tool which provides registration of new entity via Internet in few minutes. The e-Business register allows you to register a new company over the internet, change data in the business register, file annual reports, manage the members list for political parties or make detailed inquiries about other companies. All it takes to register an Estonian company is an ID card, Mobile-ID or e-Residency card, and an internet connection.⁸ It makes the process of registering a company and submitting documents like annual reports easy and efficient for users online no matter where they are containing:
 1. free overview of companies' data
 2. search by company name, registration number, location, activities etc.
 3. overview of annual financial reports, statutes, personal and commercial data etc.
 4. monitoring data processing and changes in evidence of the companies in real time

6 <https://e-estonia.com/solutions/business-and-finance/e-tax/>

7 <https://e-estonia.com/solutions/business-and-finance/e-banking/>

8 <https://e-estonia.com/solutions/business-and-finance/e-business-register/>

5. free of charge of the business and entrepreneurs' bans of Estonian citizens
6. visual relations among different companies and persons enabling overview of present and former relations, evidence of persons, owners, connections with European business registry, e-land registry and official announcements.

3.3. Basic values of observed indicators

Table 1: Multimodal distribution, screened values of the smaller mod

INDICATOR	N	AVERAGE	MEDIAN	MOD	INTERQUARTILEL	
					Q1	Q3
Index of Global Competitiveness (GCI)	12	5,00	5,00	5,00	5,00	5,00
Rank by GCI	12	30,83	31,00	29*	29,00	33,00
Evaluation of Government Efficiency (EGE)	11	4,00	4,00	4,00	4,00	4,00
Rank by EGE	11	24,91	23,00	20*	22,00	29,00
Procedures needed for establishing new enterprise	12	4,75	5,00	5,00	4,25	5,00
Rank by the procedures needed for establishing new enterprise	12	19,58	19,50	16*	12,25	27,50
Days needed for establishing new enterprise	12	10,83	7,00	7,00	4,50	7,00
Rank by days needed for establishing new enterprise	12	25,50	21,00	9*	13,25	29,50

Source: authors

Average value of the **Global Competition Index (GCI)** of Estonia in past 12 years (2006.-2017.) equals 5. Median equals 5, too what implicates that in the first half of the period the values were ≤ 5 and in the second half ≥ 5 . Mod indicates 5 as the most frequent value of the index. Interquartile shows that excluding 25% of the best and 25% of the worst values GCI value varied from 5 to 5 i.e. wasn't changing. In average Estonia was ranked 30,83 by GCI. Median of the rank equals 31 indicating value in the first half of the period ≤ 31 and in the second half ≥ 31 . Mod indicates that Estonia was ranked 29. according the GCI. Interquartile indicates that extracting 25% of the best and 25% of the worst countries Estonian rank varied between 29 and 33 at dispersion of 4.

Average value of the Estonian government efficiency in observed 11 years (2006-2016.) was 4 in the range 1 to 7. Median of that rank equals 4 indicating efficiency in the first half of the period ≤ 4 and in the second half ≥ 4 . Mod of the index value indicates the most frequent value of 4. Interquartile indicate that excluding 25% of the best and 25% of the worst countries indicates the most frequent value at 4 – wasn't changing.

At average Estonia's government efficiency was valued 24,91. Median of the rank equals 23 indicating that in the first half of the period it was ranked ≤ 23 and in the second half ≥ 23 . Mod indicates that Estonian government was most often ranked 20th. Interquartile indicates when exclude 25% of the best and 25% of the worst ranked Estonian rank was 22. – 29. at average deviation 7.

Average number of the procedures taken for establishing an enterprise in Estonia within 12 observed years (2006.-2017.) equals 4,75. Median equals 5 meaning that in the first half of the period it was ≤ 5 and in the second half ≥ 5 . Mod indicates the most frequent number of the procedures 5. Interquartile indicates at excluding 25% of the worst and 25% of the best countries the average number of the days needed for establishing was in the range of 4,25, to 5 at average deviation 0,75. In average Estonia was ranked 19,58. Median of the rank equals 19,5 what implicates that in the half of the period it was $\leq 19,5$. Mod value shows most frequent rank 16. by the number of the procedures needed to establish an enterprise. Interquartile indicates that when 25% of the worst and 25% of the best are excluded the rank was in the range form 12,25, to 27,5 at average deviation 15,25.

Average number of the days needed to establish an enterprise in Estonia in observed period of 12 years (2006.-2017.) was 10,83. Median was 7 meaning that in the first half of observed period it was ≤ 7 and in the second half ≥ 7 . Mod indicates the most frequent number of the procedures was 7. Out of interquartile can be concluded that at excluding 25% of the best and 25% of the worst countries number of the days was in the range of 4,5 to 7 at average deviation 2,5. In average Estonia was ranked 25,5 by that criteria. Median equals 21 implicating rank in the first half of the observed period ≤ 21 and in the second half ≥ 21 . Mod value indicates most often rank 9. by that criteria. Interquartile indicates at excluding 25% of the worst and 25% of the best Estonia was ranked 13,25 to 29,5 at average deviation 16,25.

3.4. Hypotheses

Following a.m. further hypothesis are set to confirm or deny potential effects of the program e-Residency through the process of establishing enterprise based on the data of World Economic Forum Global Competitiveness Index:

1. Influence of the e-Residency program is statistically significant for comparative evaluation of the government efficiency.

2. Influence of the e-Residency program is statistically significant for reduction of the number of the procedures needed for establishing an enterprise.
3. Influence of the e-Residency program is statistically significant for reduction of time needed for establishing an enterprise.

4. Results and discussion

H1: Influence of the e-Residency program is statistically significant for comparative evaluation of the government efficiency.

Figure 2: H1 Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	H1: Influence of the e-Residency program is statistically significant for comparative evaluation of the government efficiency.	Independent-Samples Mann-Whitney U Test	1,000 ¹	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

¹Exact significance is displayed for this test.

Source: authors

Empirical value p of 1,00 indicates no statistically significant influence of e-residency to the government efficiency. Therefore, H1 is rejected.

H 2: Influence of the e-Residency program is statistically significant for reduction of the number of the procedures needed for establishing an enterprise.

Figure 3: H2 Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	H 2: Influence of the e-Residency program is statistically significant for reduction of the number of the procedures needed for establishing an enterprise.	Independent-Samples Mann-Whitney U Test	,009 ¹	Reject the null hypothesis.

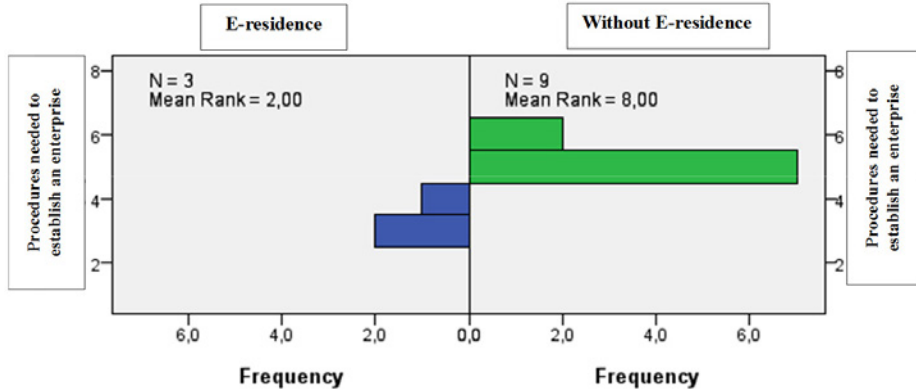
Asymptotic significances are displayed. The significance level is ,05.

¹Exact significance is displayed for this test.

Source: authors

Empirical value $p = 0,009 (<0,05)$ indicates the existence of statistically significant difference in the procedures needed for establishing an enterprise depending on e-Residency program. Ranking values indicates minor or major values upon which the hypothesis is accepted or rejected.

Figure 4: H2 Mean ranking



Source: authors

Figure indicates the existence of the lower value rank in the years of introduced e-residence i.e. it reduces number of the procedures needed for establishing an enterprise. Thus, H2 is accepted.

H 3: Influence of the e-Residency program is statistically significant for reduction of time needed for establishing an enterprise

Figure 5: H3 Test summary

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	H 3: Influence of the e-Residency program is statistically significant for reduction of time needed for establishing an enterprise.	Independent-Samples Mann-Whitney U Test	,009 ¹	Reject the null hypothesis.

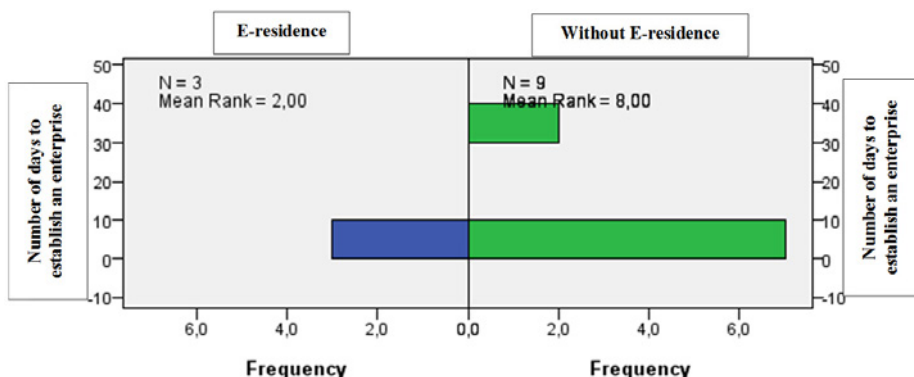
Asymptotic significances are displayed. The significance level is ,05.

¹Exact significance is displayed for this test.

Source: authors

Empirical p value $0,009 (<0,05)$ leads to the conclusion that there is statistically significant difference in the days needed for establishing an enterprise depending on e-residency program. Ranking values is base for deciding on accepting or rejection of the hypothesis.

Figure 6: H3 Mean ranking



Source: authors

Figures indicate existing of the lower rank values in the years of introduced e-Residency program i.e less days are needed for the establishing enterprise. Thus, H3 is accepted.

5. Conclusions

Information technology has been one of the key drivers of government reforms over the past decade and is still being used as precondition to increase efficiency. For public sector organizations changes need to be executed in a way of facing external political regulatory influences, but also to using the new IT opportunities to improve institutional environment and thus support the economy. Authorities may successfully use information technologies for the purpose of automation, but also for setting up a system for processing information and providing services, and connecting and networking. Contemporary IT solves the appearance of big data effectively. Establishing such a system transforms the government into e-government, which in a wider sense means facilitating the process of informing, communicating, and performing transactions between and within state institutions, citizens, and businesses. The results of the research have confirmed theoretical knowledge and assumptions of the positive impact of e-government to certain economic indicators. E-government provides public services faster, more efficiently and flexibly, creates a better business environment, increases administration productivity, saves time and money, and affects overall quality of life.

Small countries with weak resources have always had a problem of attracting manpower and capital to provide sustainable growth. However, discovering and exploiting existing resources in a new way, as sustainable development, may develop necessary attractiveness which will consequently generate growth. “Peripheral” countries suffer the crisis first and exit last. Estonian government managed to exit the economic crisis started 2007. very quickly.

Figure 7: Estonian GDP in bUSD

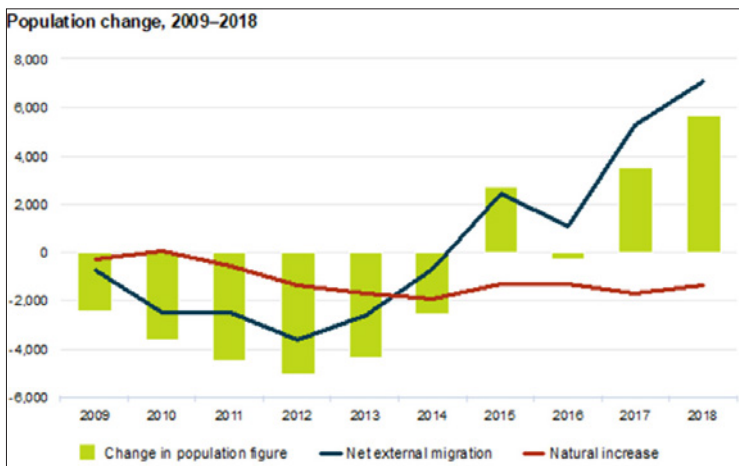


Source: <https://countryeconomy.com/gdp/estonia>

It is indicative that Estonia managed to revert negative trends (GDP decrease 2008/9 by 17.5%; emigrations) by, besides others, transparency of official politics and improvement of public e-administration. Lessons learnt by Estonia can evidently be used as quality basement for public politics oriented towards liberalization and dynamization of the economy, strengthening the entrepreneurship an attracting global talents from peripheral EU and other countries. It requires very brave and devoted executives since intensive exploiting „humanless“ digital technologies bring evidently security risks, too. Hence, defense may be even more complex than exploiting itself but that has to be considered as any other business risk with alternative solutions.

Significance of the human capital is of importance since nationalist-isolationist politics do not provide clear answer to the questions what to do when middle aged generations retire and youngsters leave or which human capital, we can count on in dynamization of the economy and strengthening of innovative entrepreneurship.

Figure 7: Population change in Estonia, 2009-2018



Source: <https://news.err.ee/937628/estonian-population-increases-by-over-5-000-in-2018>

Due to the complexity of evaluating effectiveness of the public administration it is not possible to determine exact influence of the extracted variable like e-government to a.m. socio-economic indicators, but the quality of governing and opening towards global talents evidently empower entrepreneurship dynamics in the country.

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CHAPTER 9

MOVEMENT FROM E-GOVERNMENT TO SMART GOVERNMENT

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Abstract

With the extend of the use of Internet and other information technologies in different aspects of life, we increasingly meet the terms such as e-administration, e-services, e-government as well as some newer terms such as smart cities, smart environment and smart government. If we take into account the role of government for implementing various services using information and communication technologies (ICT), we can consider the terms e-government and smart government as some more general concepts that cover the other aforementioned terms. Smart government is more advanced stage than e-government. But, what is their difference and how can we evaluate them? In this paper, we tried to clarify these two concepts comparing them with other related terms such as e-governance and smart cities. In addition, we studied the way for a movement from e-government to smart government as well as different approaches for evaluating the success of such a movement. Among various measurement approaches, we focused more on the cost-benefit analysis as a useful method to evaluate the success of a smart government project regarding different challenges and opportunities.

Keywords: e-government, smart government, smart governance, smart city, cost-benefit analysis

JEL classification: H11, O33, R58, D61

1. Introduction

E-government and smart government are two relative concepts with some important differences which make smart government more advanced than e-government; e-government is about digitalization and smart government about smartness.

According to *the E-Government Handbook for Developing Countries*, this process has many promises of the digital revolution and among them is “its potential to strengthen democracy and make governments more responsive to the needs of their citizens. As a general definition, E-Government is the use of information and communications technologies (ICT) to transform government by making it more accessible, effective and accountable.

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E-government includes:

- Providing greater access to government information;
- Promoting civic engagement by enabling the public to interact with government officials;
- Making government more accountable by making its operations more transparent and thus reducing the opportunities for corruption; and
- Providing development opportunities, especially benefiting rural and traditionally underserved communities.” (InfoDev and The Center for Democracy & Technology, 2002: 1)

On the other hand, Smart Government can be defined as the use of innovative policies, business models, and technology to address the financial, environmental, and service challenges facing public sector organizations. The concept of Smart Government relies on consolidated information systems and communication networks (Jiménez et al., 2015).

Governments for adapting to world’s new requirements and for better responding to the needs of citizens and private sector, economy, environment, etc. try to digitalize their activities and services; this digitalization which means the use of information and communications technologies (ICT), could be realized in different levels corresponding to different levels of e-government. Smart government is a higher step in this way. Indeed, digitalization and the use of Internet could be considered as a necessary but not sufficient step to make a smart government; smartness is a more advanced level in governance comparing with digitalization and the simple use of electronic facilities; the efficient management to respond to rapidly changing needs is essentially important. As Harsh and Ichalkaranje (2015) indicate, the governments take the concept of e-government to a new level by realizing the power of data they hold; this process, by improving governments’ services, contributes to realize an integrated, seamless service experience, which engages with citizens, co-develop policies and implement solutions for well-being of the community and transforming themselves into *smart government*.

To move from traditional systems towards e-government and then towards smart government, we need to know the requirements, ways and methods as well as challenges and obstacles.

As we talk about the digitalization and the smartness of government, the act or activity (governance) to achieve the goal and the body or authorities (government) to implement this act are at the center of attention.

In a digitalization process of government as well as for making it smarter, we confront – like other activities – various costs and benefits which should be studied and compared in order to verify the efficiency of the activity. For such an activity, there might be the costs and benefits for government or private sector (as this sector can also be active in digitalization and in the use of information

and communications technologies) as well as the costs and benefits for society and citizens regarding their satisfaction. In addition, there will be direct and indirect costs and benefits for environment, economy, etc. The focus of present study is on the direct costs and benefits (expenditures and incomes) of government as the main body of the process of digitalization.

We can summarize questions and objectives of this study as follows:

- Studying the terms *e-government* and *smart government* comparing with other related terms;
- How could an e-government transform to smart government?
- What are the objectives, benefits, costs and challenges of the implementation of smart government?
- How to measure the success and outcome of smart government?

The paper is conducted in three sections: firstly and as the main part of the paper, we review the literature about e-government and smart government, the transformation of the first one into the second one, the related terms and concepts, the approaches for the evaluation of digitalization projects. We also devote a part of this section to the review of the cost-benefit analysis especially in the case of government projects along with associated challenges and risks. This section will lead us to the next section in which we will explain some possibilities and approaches for benchmarking smart government projects especially using the cost-benefit analysis. In the last section, we conclude our discussion.

2. Literature review

Although the main part of this paper is literature review, we do not aim at presenting a detailed review of the works done in the domain of e-government and smart government; some previous studies have already carried out such reviews. Our objective is to review different aspects of e-government and smart government and verify their concepts compared with some related terms. In this way, we refer to some resources in order to clarify the issues.

We can generally consider three general steps of government system development: traditional system, e-government and smart government. We assume e-government as a prerequisite of smart government; a traditional system should upgrade to e-government and then, by considering and using especial management tools, we can step up to smart government. Therefore, a traditional system should first be improved to e-government and then, to smart government.

Literature about e-government, its required tools, its management and the ways to achieve it are numerous, but we did not find as many as works about smart government and its requirements and evaluation criteria. According to Anthopoulos and Reddick (2016) smart government is a recent topic whose first articles were published in 2012.

To obtain a better knowledge about e-government and smart government as well as about the related concepts and issues, we review the literature in different parts in each one an especial aspect of e-government and smart government is discussed. As literature about e-government is more categorized, we focus on them, and will then try to derive some useful information about smart government.

2.1. Difference between e-administration, e-government and e-governance

Michel (2005) explains the difference between e-administration, e-government and e-governance as three modes for citizenship management. According to her, in the e-administration mode, the citizen is considered as a *consumer of rights* claiming personalized and efficient public services; this mode corresponds to a government *for the people* with a strategy of citizen satisfaction improvement. The e-government mode reflects a vision of a relatively passive citizen-agent, who responds to his duties; based on the need of quantifying and comparing solutions, this government of the people relies on regular consultations in order to improve the policy's acceptance. In the e-governance mode, the citizen is considered as active agent of local democracy; the citizen is now considered as a source of ideas and initiatives that provides a mutual enrichment. Regarding these three modes and as their result, Michel then introduces a fourth type of the citizen relationship management which would not be a government of the people, for the people or by the people, but according to the people. She calls this mode *the Learning City* whose logic is: *learn how to learn*, defining a range of possible actions, choosing the decision corresponding to the criteria considered being essential to the success; in this approach, the citizens would be at the same time actors and determinants of the rules.

In our opinion, this forth step could correspond to the concept of *smart government*. Regarding this category, we may also consider the concepts of smart administration and smart governance as well.

Scholl and Alawadhi (2016) define smart governance and smart government as follows:

Smart governance is the capacity of employing intelligent and adaptive acts and activities of looking after and making decisions about something, and smart government is the intelligent and adaptive office, authority, or function of governing.

Therefore, e-governance and smart governance specify the act or activity, while e-government and smart government refer to the office or authority.

And then, the difference between e-government and smart government could be seen in the intelligence character and capacity of the second one compared with the first one.

2.2. Difference between the nature and the area of smart government and smart cities

Many works study or consider the area of smart government in combination with smart cities. But are these terms synonymous? And if not, what is the difference between them?

According to the literature review done by Anthopoulos and Reddick (2016: 351), smart city is “defined as innovation, not necessarily but mainly through information and communications technologies (ICT), which enhance urban life in terms of people, living, economy, mobility and governance.” On the other hand, “there is no widely accepted definition for smart government, but it appears to be the next step of e-government with the use of technology and innovation by governments for better performance.”

The authors’ findings show that smart government seems not to be synonymous with smart city, but a broader term that describes the next step for government transformation, while the smart city is considered to be an area within the overarching term of smart government. Smart city has a dimension of smart government, and smart government uses smart city as an area of practice. The authors conclude that smart city is complimentary, part of larger smart government movement. Indeed, smart government leads smart city development, while it uses smart city as an area for its practice (collaboration and service co-production testing, etc.).

Consequently, although these two terms are not synonymous, they are complementary and related to each other. Smart government covers various areas such as smart environment, smart organization and smart cities, and is the essential factor for implementing them. The experience of smart cities could then be studied and evaluated as a part of and within the broader experience of smart government.

2.3. Criteria for distinguishing between e-government and smart government

To achieve the status of smart government and to compare it with that of e-government, several criteria or indicators need to be considered. Analyzing such criteria can show whether a smart government program is success and achieve its promised goals.

One research in this area is the work of Tahir and Abdul Malek (2016) about such criteria for smart cities. As smart city is a part of larger smart government movement, these criteria can also somehow be considered for smart government. The authors focus on various elements of humanity, technological infrastructure, the environment, learning, social development, and urban growth. They examine these requisites or criteria of a smart city using the Analytic Hierarchy Process (AHP) methodology assigning weight to each element that is

considered essential to its development. According to the results of this analysis, smart environment and smart mobility are the top two important factors in the successful building of a smart city. The actual values that shape smart cities are based on a balance of factors such as smart governance, smart economy, smart environmental practices, smart living, smart mobility and smart people. These principal key elements work together to exploit the technologies which help to realize a smart city.

Pereira et al. (2018) consider, in their literature review, the concepts and elements of e-government and smart government, but also two other terms: smart governance and smart city governance. According to their definitions, smart government can be considered as a basis for developing smart governance through the application of emergent information and communication technologies (ICT) for governing, while smart governance is the intelligent use of ICT which improves decision-making through better collaboration among different stakeholders, including government and citizens. Indeed, the engagement of citizens can support the development of new governance models for smart government.

Moreover, the authors explain that smart city governance fundamentally deals with government decisions for improving quality of life and emphasizes the citizens' role in collaborative decision-making. Actually, after transforming e-government to smart government, this last one could prepare the conditions to have smart governance and through that, smart city governance.

The authors "found that the development of e-government and therefore the use of ICT for purposes mainly related to improving administrative efficiency, performance, citizen-centricity and improved service delivery, lays the foundation as an essential prerequisite for the development of a smart government." (Pereira et al., 2018: 157)

They conclude from their literature review some definitions for e-government and smart government along with some indicators that may be considered for the evaluation:

- **E-government:**
 - Definition: Introduction of ICT in government organizations in order to achieve administrative efficiency and interoperability, service improvement and citizen centricity.
 - Indicators: Administrative efficiency, Interoperability, Service Improvement, Citizen centricity (focus on transparency and trust in government)
- **Smart government:**
 - Definition: Initiatives undertaken by the government to integrate ICT in their operations, functions, processes and relationships with other stakeholders.
 - Indicators: Evidence-based, Participatory decision-making process, The rise of social media, ICT-promoted internal transformation" (Pereira et al., 2018: 154)

A distinctive definition of smart government comparing it with e-government is presented in *the national plan for UAE smart government goals*, in which these two terms are also compared with traditional government (as the stage before e-government) as well as with mobile government (as the intermediate stage in the way of the movement from e-government into smart government). This work summarizes the characteristics of these four stages as follows:

- **Traditional government**
 - Limited electronic or electronic access channels;
 - No unified strategy or operating model;
 - Low accessibility or availability of services;
 - Limited citizen outreach targeting constituents.
- **Electronic government**
 - Services support electronic delivery;
 - Transformation and/or service prioritization criteria does not exist;
 - Dedicated ICT resources support government service delivery;
 - Strategic planning exists.
- **Mobile government**
 - Services delivered through targeted access channels;
 - Services prioritized and selectively enabled;
 - Consistent methodology applied to evaluate strategic impact;
 - End-to-end data exchange.
- **Smart government**
 - Cloud-based and dynamically provisioned resourcing;
 - Services selectively target specific demographic indicators;
 - Intelligent service delivery based on predictive analytics.” (Telecommunications Regulatory Authority, 2015: 7)

2.4. Evaluation of e-government and smart government

Evaluating e-government and smart government is important – like other development plans – as it is essential for public policy definition and government budget allocation. This evaluation can be considered as measuring the development through government transformation. Here, we review some works devoted to such evaluations. The indicators reviewed in the last part for distinguishing between e-government and smart government could be used for this purpose as well.

Sakowicz (2004) identifies different approaches to measure the development of e-government and proposes some indicators appropriate for countries of Central and Eastern Europe considering the experiences of leading information technology in advanced countries like the USA and the European Union.

He believes that the concept of e-government can be narrow (associated with implementation of e-administration) and broad (includes all information and communication technology to support government operations, engage citizens, and provide government services, and therefore contains e-services, e-democracy, e-voting, e-justice, etc.)

The author reviews some methodologies and indicators used by different organizations for the evaluation of e-government. They are generally based on the extent of using Internet and ICT, stakeholders' satisfaction, public trust, service relevance, benefit, efficiency, participation, transparency, management, etc. Sakowicz indicates that a holistic measurement of e-government development should cover four dimensions: e-services, e-management, e-democracy and e-commerce; although, in practice, many studies are more limited.

According to this research, for the evaluation of e-government, we should measure effective use of Internet enabled technologies; how people use the Internet not only for their private tasks but also as a means of involving them in public affairs. The implementation of ICT will not guarantee stable democratic governance but may be perceived as tool for upgrading operations of public administration.

Finally, the author underlines a more wisely and efficiently expenditures especially in countries facing budgetary constraints, also the relation between government, public sector and NGO's for a better implementation of e-government.

While e-government evaluation was historically restrained to supplier-side measurements with focus on benchmarking vision, recent researches are pointing towards end-user usage and the importance of usability that is an essential variable for measuring e-government success, and ultimately determines efficiency and effectiveness (Assar and Boughzala, 2016).

2.5. Evaluation of the transformation from e-government into smart government

While setting up e-government needs overall digitalization and necessary digital infrastructures, for stepping up to smart government, we need some improvements in existing infrastructure, changes in management as well as some initiatives in order to better meet the needs of economy and society.

Most researches in this area focus on people satisfaction measurement. Therefore, the principal methods used for evaluating or measuring e-government or smart government success are based on field research and then analysis of collected data and information using appropriated models and software.

In a study on the City of Munich, Scholl and Alawadhi (2016) analyze the success of change to both a municipal government ICT infrastructure and its governance model. These changes were assumed necessary in order to provide prerequisites for smart government and smart government services.

The research objectives are to find out the motivation, the challenges and the choices (approaches) for a local government to implement a grand-scale ICT overhaul program. The study is carried out in five steps: 1) case overview and boundary; 2) sample (interviewees); 3) interview instrument; 4) data collection; and 5) coding and data analysis.

The authors found several indicators in two categories *people-related risks* and *process-related risks*. These risks are considered as the obstacles for the success of the project. In the first category, two indicators *lack of top management support* and *weak project manager* have the highest rank and in the second category, *lack of documented requirements and/or success criteria* and *absence of change management* are identified as the top failure indicators. The authors believe that, in terms of theory building, the result of their study can suggest that 1) radical change of ICT processes and structures is possible in City government and can be implemented successfully; 2) overcoming departmentalism in City government is possible; and 3) a number of elements can be identified that appear to jointly promote successful change program/project outcomes.

2.6. Challenges and opportunities

There are challenges and obstacles that may not let e-government or smart government succeed in achieving their promised goals. Governors need to understand potential obstacles in order to be able to overcome them. Beside the challenges, there are also opportunities that could enhance the program. *The E-Government Handbook for Developing Countries* has identified seventeen challenges and opportunities of e-government implementation that are listed for e-government initiatives of developing nations, but can also be considered in developed countries:

- Infrastructure development
- Law and public policy
- Digital divide (E-literacy, Accessibility)
- Trust (Privacy, Security)
- Transparency
- Interoperability
- Records management
- Permanent availability and preservation
- Education and marketing
- Public/private competition/collaboration
- Workforce issues
- Cost structures
- Benchmarking/qualitative methods” (InfoDev and The Center for Democracy & Technology, 2002: 11)

2.7. Evaluation of government costs and benefits

The cost-benefit analysis as a traditional method is nowadays still useful for different types of projects. It includes measuring all kinds of costs and benefits of a project in financial terms in order to compare them for an optimal decision about resources allocation. The important is how to completely recognize all the costs and benefits related to a project and how to efficiently measure them. Beside direct costs and benefits, there are always indirect costs and benefits as well which are more difficult to be measured. These second ones are more important for public projects set up by government. A digitalization project aiming at creating an e-government or smart government faces numerous direct and indirect benefits and costs that are referred to citizens, social life, economy, environment as well as the government body. We did not find the works on such analyses for a smart government project, but meanwhile, there are studies on the cost-benefit analyses in the case of digitalization projects hold by public or private sectors that could be useful for extracting from them an acceptable framework for the cost-benefit analysis of an e-government or a smart government project.

Firstly, we need to know about the cost-benefit analysis of a general project run by government. Boadway (2006) explains different methods and functions for carrying out such an analysis. The author studies the social welfare function underpinnings of cost-benefit analysis including the role of distributive weights and the choice of numeraire. He also reviews the social cost-benefit analysis using the net present value criterion; in this part, the author considers the shadow pricing of market products and inputs affected by the project, indirect welfare effects, the opportunity cost of project finance, the evaluation of non-marketed inputs and outputs, and the opportunity cost of risk.

An important issue for using the cost-benefit analysis is the selection of a discount rate. This issue is discussed in the study of Boadway, especially in imperfect capital markets. He also verifies the role of risk and uncertainty in this issue. At the end, since many public projects are planned for long-term, the effects of such projects on future generations are studied reviewing some techniques such as generational accounting. Moreover, for evaluating intergenerational transfers, the author considers the principles of intergenerational benefit, intergenerational risk sharing, tax smoothing, and intergenerational equity.

Although this general study about the economic evaluation of government projects is not about the especial issue of electronic or smart government processes, its methodologies could be considered for the evaluation of such projects.

Tilea (2011) categorizes the possible costs and benefits of an IT project and besides, pays a special attention to risks as important factor that can affect the final benefits of the project. For the author, the risks of an IT project refer to equipment, software, documentation, the costs of the improving of the existing system, staff, conversion, installation expenses, office supplies, management, maintenance/safety, financial expenses, the maintenance of the working

environment and physical security, while the quantifiable and unquantifiable benefits of the project can include savings made by reducing the number of the clerks, providing better services for the customers, increased labor productivity, better decision making, better control, lower operating costs, increasing the circulating money by reducing the inventory, faster billing, a better revenue and payments forecast.

Tilea then presents a list of possible costs and benefits of an electronic portal design taking into account the possible risks of such a project. The costs could be as follows:

- Internal investment required for the transition from traditional to electronic services;
- The costs needed for creating the electronic portal;
- Management and maintenance.” (Tilea, 2011: 66)

The benefits would be:

- Benefits for the institution;
- Benefits for the citizens (or other beneficiaries);
- General benefits.” (Tilea, 2011: 66)

And the risks that could affect the benefits are:

- The political risk;
- The organizational risk;
- The lack-of-utilization risk;
- The technological risk;
- The suppliers’ risk;
- The execution risk.” (Tilea, 2011: 66)

Each of these items has sub-items in order to cover all the costs, benefits and risks in detail. The author recommends taking into account all the details, determining the criteria of success for the projects, evaluating the project both during its implementation and after its completion, and trying to decrease the costs and increase the benefits during the implementation and operation of the project.

3. Evaluating smart government

As reviewed in the last section, when a government digitalizes its activities and tries to use Internet as well as information and communication technologies (ICT) for making service delivery more simplified and efficient, it moves to an e-government status. But smartness as a higher level needs some initiatives

for improving the quality of service delivery in close interaction with all stakeholders including citizens and private sector. Indeed, the electronic status of a government deals with using electronic and networking facilities (digitalization), while the smart status of the government refers to a higher interaction between all the beneficiaries in order to better and more intelligently use the existed electronic infrastructure (smartness). The status of e-government and smart government – in a better way – could help better functioning of society in different aspects by improving democracy (e-voting), environment, services, quality of life, etc.

Evaluation of a government performance could contain: 1) the measurement of its development and the impacts of its performance on some selected indicators during short, medium or long term; or 2) the evaluation of the success of an especial project. Both these types of evaluation could be carried out for a project of smart government. On the one hand, we can study and compare the effect of government performance before and after the implementation of smart government on some economic indicators such as economic growth. On the other hand, it is possible to verify the costs and benefits of the government for such a project in order to evaluate whether the project is success and achieve predetermined goals. Both ways of evaluation are useful and important, however, in this paper, we focus on the cost-benefit analysis that can benchmark the success of a project, but also taking into account some indicators and verifying their relation with the project, can somehow meet another abovementioned way of evaluation.

For the cost-benefit analysis, we need to find all related costs, benefits and risks (dealing with probability) as well as the indicators affecting on or affected by the project. These items for an e-government or a smart government project are discussed in the last section reviewing previous studies in this domain and we do not aim at repeating here the items of possible costs, benefits, risks and indicators. Here, we underline three possible ways to analyze the success of an e-government or a smart government implementation project.

- A main aspect of smart government evaluation is related to measuring the satisfaction of stakeholders including mainly citizens (citizen-centricity) but also authorities and other beneficiaries. Many studies try to investigate this aspect and verify the level of users' satisfaction in order to use it as criteria for evaluating the success of e-government or smart government. Such studies normally use field researches based on interviews and questionnaires.
- Another aspect of smart government process can be referred to its costs and benefits for government body or private sector active in this domain. We should take into consideration that an important goal of a smart government project can be to reduce government expenditures and this goal is expected to be met. Generally, with a move from traditional system to e-government and smart-government, administration costs (variable costs) are deemed to decrease, while software and hardware costs

(fixed costs) are expected to increase. The measurement of such cost and benefits could be carried out using classical methods of cost-benefit analyses. It should also be indicated that although cost decreasing can be considered as benefit, there are other benefits (e.g. security augmentation, delinquency reducing, etc.) which could be evaluated as people satisfaction.

- As another alternative, a comprehensive research can cover both aforementioned aspects; studying visible cost and benefits for government and/or private sector as well as more abstract cost and benefits measured by field research and interviews and comparing them in the framework of a cost-benefit analysis.

The criteria for evaluating a project should be determined at the beginning when we plan it. But these criteria can also change during the project in order to adapt to changing circumstances; this is necessary to have a sustainable project. The evaluation should also be done during both the launch and the implementation of the project in order to modify the evaluation of results at different stages.

When planning for a project, we should keep in mind the importance of private sector. Public projects could have public and/or private financing; in case of the elimination of private sector from the project – that leads to reducing the benefits of this sector –, the costs of public sector may also increase. In fact, the importance of the decentralization and its role in reducing project costs should be taken into consideration.

Finally, we should point to the smart cities' position. Smart city as a major and important part of smart government could be in the center of attention; analyses could be based on its process and success, while smart government covers a broader range. Since there are many studies and literature about smart cities, for analyzing smart government, we can study smart city as a base and then extend our study to other issues covered by smart government. This way could be highlighted when studying the case of a local government.

4. Conclusions

Reviewing literature, we can define *e-government* as digitalized government using Internet, network services and information and communication technologies (ICT) for simplifying and improving the quality of service delivery, while *smart government* as next stage in this way, deals with intelligence that means finding and implementing some initiatives such as upgrading existing infrastructure and using new management approaches in order to set up closer interactions between all beneficiaries and use their capacity to improve the quality of service delivery in a better way.

We may say that for instance and in general, e-government is a *need*, while smart government is a *choice*. On the one hand, regarding current globalized digitalization and the expansion of Internet, smart phones and other ICT tools

in the world, an electronic government for meeting current needs is necessary, while on the other hand, making the government smarter to achieve more intelligent goals may not appear necessary for instance for some governments but a choice to move to a better future. However, this distinction expressed by the terms *need* and *choice* may vary in different regions and countries regarding their conditions and development levels and might also change in the future. Smart government would be a need in the future as well; therefore, governments should pay attention to it for their future planning.

A movement from e-government to smart government is known as a project and therefore, should be evaluated in order to know whether it is success and meet the promised goals. We can analyze the effects of such a project on some indicators using econometric methods or carry out a cost-benefit analysis; this second one could also cover some part of the first analysis taking into consideration some indicators (especially microeconomic indicators) and verifying their relations with project's costs and benefits.

The cost-benefit analysis is very useful, but it is important to know how to use it in the most accurate and efficient manner for an optimal resources allocation; we need to recognize all kinds of benefits, costs and risks; direct and indirect, For example, the cost-benefit analysis is important for the decision of dividends to invest, but the government should also consider the social benefits and the possible effects on the environment.

However, we can focus on one part of the whole movement and analyze a special part of the smart government project, for example, analyzing government benefits and costs for a specific service.

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CHAPTER 10

RECOVERY IN EU AFTER COVID-19 CRISIS - TIME FOR NEW FISCAL POLICY MEASURES

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Abstract

A decade after the last financial and economic crisis, Europe is now confronted with a new one, more severe, more costly and still unpredictable. COVID-19 is a serious threat to EU citizens' public health and a major economic shock that was hard to anticipate. The confinement measures imposed since its outbreak led to significant losses in revenues for most businesses, potentially higher rates of unemployment and increasing demand for loans. To address these challenges, EU and the Member States have taken a number of firefighting measures to ensure basic income of households, maintain employment, and protect businesses, as well as to support the financial system in order to prevent the current crisis turning into a financial one. However, this posed a significant pressure on Member States' spending, especially in countries with less fiscal capacity, causing a severe temporary deterioration in their fiscal deficit and public debt. The COVID-19 crisis will have uneven effects on Member States and may deepen their divergence. As a basis of EU recovery, new and creative fiscal policy measures to support investments in digital transformation, green transition and innovations will be needed. In this article, authors are analysing and describing the impact and broader consequences of the COVID-19 crisis on public finances, the fiscal capacity of EU Member States to fight the crisis and new fiscal policy measures needed for quick and smart recovery and sustainable economic growth.

Key words: COVID-19 crisis, recovery, new fiscal policy, investments, sustainable economic growth

JEL classification: JEL_A10, JEL_E62, JEL_E69

1. Introduction

More than ten years have passed since the global financial crisis in 2008, which had a profound impact on the economies of the European Union (EU) and took several years to recover from. Turning into a banking and sovereign debt crisis in Europe by 2010, it led to a massive state aid intervention and the worst recession in the EU since its establishment. According to the Commission Economic

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Autumn forecast of 2016³, potential growth in the euro area fell from 1.9% in 2000 – 2008 to 0.5% in 2009 – 2014, and total investment in the EU decreased by about 20% in 2008 – 2013, failing to reach the pre-crisis levels up until today. EU-27 public debt level increased from 64.9% in 2008 to a record-high 86.6% of EU-27 growth domestic product (GDP) in 2014.

In response to the crisis, the EU embarked on an intensive reform agenda to address its weaknesses in the financial, supervisory, banking and fiscal sector, which included, for example, establishment of the European System of Financial Supervision, creation of the Single Supervisory Mechanism and Single Resolution Mechanism within the Banking Union (BU), strengthening of the crisis management for banks, regulatory reforms for the non-banking sector, setup of the State aid framework, and much more.

The EU fiscal policy underwent significant changes as well. As Member States reached record high excessive deficits and debts in the outbreak of the crisis, EU turned to fiscal sustainability and introduced the so-called “austerity”. From 2011, the Stability and Growth Pact (SGP) has been reformed with the aim of strengthening fiscal discipline by the “Six-Pack” (2011), “Two-Pack” (2013) and the inter-governmental Treaty on Stability, Coordination and Governance in the Economic and Monetary Union (TSCG, 2013).

Among other, the “Six-Pack” changed voting rules on sanctions to ease their imposing when needed, incorporated the levels of public debt in the Excessive Deficit Procedure (EDP), rather than only focusing on deficit levels, and introduced the Macroeconomic Imbalance Procedure (MIP). The “Two-Pack” and TSCG pushed for centralization of fiscal coordination by prescribing, for example, establishment of independent fiscal bodies at the national level and use of macroeconomic forecasts produced or endorsed by independent bodies. However, by mostly encompassing cuts in spending and tax increases, austerity eventually resulted in fall in investment, increase in unemployment (especially of young people), salary cuts, large emigration flows of qualified workers, as well as worsening of social services, to which EU had to respond.

As of 2015, the EU made a shift from austerity to structural reforms, single market and investment, focusing more on social protection. By means of structural reforms mostly in labour market, taxation and public administration, most Member States reduced their budget deficit, public debt and unemployment, and boosted their investments by 2019.

Institutional and regulatory measures introduced in the period 2011 - 2019, together with significant financial and economic support to banks, private sector and Member States in difficulty, created a robust and more resilient EU system. However, despite the significant progress made, some challenges remain, such as low profitability of banks, high level of non-performing loans (NPLs), sovereign exposures, completion of the BU and development of the Capital Markets Union.

³ European Commission, “Economic Forecast Autumn 2016: Modest growth in challenging times”, p. 64, November 2016.

As regards the EU fiscal policy, these mainly concern complex rules on economic coordination, lack of compliance by Member States and challenges with enforcement of measures.

On top of remaining challenges, which are still work in progress, the EU is currently facing a new crisis caused by the COVID-19 pandemic. COVID-19 is a serious threat to EU citizens' public health, as well as a major economic shock to the EU. Since the beginning of the year, the virus has spread to all EU Member States. Together with the subsequent containment policies, it has caused unprecedented disruptions in key sectors and led to unemployment risks and unprecedented public support programmes to the real economy.

As a basis of EU recovery, new and creative fiscal policy measures to support investments in digital transformation, green transition and innovations will be needed. After years of the austerity measures and investment policies in the course of and after the previous financial and sovereign crisis, EU and the Member States will have to find a new way forward. The purpose of this article is to present lessons learnt from the previous crisis and to, based on the analysis of impact and broader consequences of the COVID-19 crisis on public finances and Member States' fiscal capacity to fight the crisis, present new fiscal policy measures crucial for quick and smart recovery and sustainable economic growth.

2. Literature review

After a decade, the EU is once again confronted with a severe crisis, a one that was hard to anticipate. Coming from the health sector, COVID-19 has caused unprecedented shocks and costs for the EU and the Member States, urging them to quickly respond in order to save the economy. Scholars and academics are focused on defining the most appropriate instruments for overcoming the crisis, and the answers are most often found in analysing the impact and EU response to the 2008 – 2012 crisis.

The last financial and sovereign debt crisis revealed all the weaknesses of the EU fiscal policy: common supranational fiscal coordination was not established (Cabral and García Díaz, 2015), the regulatory framework did not provide sufficient incentives for the build-up of buffers during good times, public debt levels were not appropriately monitored, enforcement of measures was weak and fiscal policy and macroeconomic surveillance were not well coordinated (Arroyo, 2011). To address these weaknesses, the EU turned to austerity policies focused on lowering excessive deficits and debts. However, they proved unsustainable as, apart from investment halt and sovereign debt increase, they led to severe deteriorations in the labour market and worsening of social services (Hespanha and Serapioni, 2019).

As of 2015, the EU fiscal policy shifted to structural reforms, single market and investments. Member States started to implement reforms in sectors such as labour market, taxation and production, which yield the largest output effects in the short to medium term (Roeger, Varga and in 't Veld, 2015). By 2019, the EU has partially recovered, marking a decrease in deficit, public debt and unemployment, and approaching the pre-crisis investments level.

At the beginning of the year, COVID-19 struck Europe. By end March, it had spread to all EU Member States. The International Monetary Fund (IMF) and the European Commission projected record high drops in annual GDP and investments in the EU this year, as well as severe increases in deficit, debt and unemployment. Economists agree that containment measures imposed in response to the crisis can have severe economic effects, which might lead to a historical economic decline (for example, Bofinger et al., 2020). In addition, the new crisis is expected to generate larger costs than the crisis 2008 – 2012, as confirmed by the European Court of Auditors and Haroutunian, Hauptmeier and Leiner-Killingert (2020).

Numerous actions have been undertaken at both the EU and the national level in the past months. Fire-fighting measures to save businesses, workers, households and banks resulted in large fiscal expenditure, while the containment measures are still slowing down the economy. In order to support the recovery, the EU proposed the Next Generation EU instrument with the Recovery and Resilience Facility being its largest component.

In order to serve its purpose of supporting reforms and investments and green and digital recovery, the Facility will have to be well coordinated with and complement other EU and national instruments sharing the same objective, as highlighted by the European Court of Auditors: “Any support under the Recovery and Resilience Facility to finance reform and investment projects should be additional to other Union funds and programmes and should not cover the same costs. The objectives of the Recovery and Resilience Facility are common to other EU programmes, which has advantages in terms of complementarity and synergy. However, it increases the risk of double funding and competition (...)”. In addition, funds within the Facility will have to be immediately available and quickly disbursed according to Member States’ needs (Pisani-Ferry, 2020). Which results it will generate in the following years, remains to be seen.

3. Methodology/Method/Model/Conception of analysis

This paper was prepared by collecting and analysing available data on the subject of EU responses to the last financial and sovereign debt crisis and the current COVID-19 crisis. Our descriptive research aims to summarize the impact and changes that the EU economy has undergone in the last decade in order to recover from the crisis and build resilience for a new one. We aim to describe various aspects of those developments, while focusing on the fiscal policy, especially outlining the shifts in EU policy on the path to sustainable EU recovery.

Eurostat data were used to prepare an economic outlook for detail analysis of macroeconomic indicators per EU Member State during and after the crises, and they accompany the descriptive analysis.

4. Empirical data (documentation background) and analysis

4.1. EU fiscal policy between the two crises: from austerity to structural reforms, single market and investments

4.1.1. Austerity as initial exit strategy 2009 – 2014

The financial and sovereign debt crisis of 2008 – 2012 had long-term impact on fiscal stability and consolidation in the EU. After the EU economy contracted for the fifth consecutive quarter in the second quarter of 2008, the deficit sharply increased due to higher social spending addressing rising unemployment and financing of banks' bailouts with public money. The operation of automatic fiscal stabilisers and the counter-cyclical fiscal measures adopted in response to the crisis led to an increase of EU deficit from 2.0% of GDP in 2008 to 6.0% of GDP in 2009 and 2010.

In addition, the loss of substantial tax income, massive amounts of state aid measures required to support banks, as well as the cost of automatic stabilisers (such as unemployment benefits) and fiscal stimulus spending, had a significant impact on the level of public debt, but helped stabilise the economy in the early phase of the crisis. After being rather stable in the pre-crisis period, varying between 60.0% and 70.0% of GDP, the EU-27 public debt skyrocketed to 80.2% in 2009 and further increased to 85.8% by end 2010.

The global financial crisis 2007 – 2008 was not the only reason behind these fiscal deteriorations, but it has certainly worsened Member States' fiscal capacity and capability to resist and overcome the adverse impacts of the financial and sovereign debt crisis in the EU. In this period, the European Monetary Union was widely criticised for being based on a single central bank and Member States' national fiscal policies. According to Cabral and García Díaz (2015), in that kind of monetary union fiscal instruments could be chosen in a way to benefit some at the expense of other Member States, which might result in inefficient outcomes. The lack of common supranational fiscal coordination became even more evident in the turmoil of the Greek crisis⁴, when the EU was not able to provide a timely and mutual response.

4 The European Court of Auditors has audited the European Commission's management of the three Economic Adjustment Programmes for Greece in the special report 17/2017: "The Commission's intervention in the Greek financial crisis", available at: <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=43184>.

Furthermore, according to Arroyo (2011), several main fiscal policy weaknesses were exposed at the time:

- The SGP⁵ as reformed in 2005 did not provide sufficient incentives for the build-up of buffers during good times;
- Public debt levels were not given enough attention as they were not included in the EDP⁶, contrary to the deficit levels and dynamics;
- The EDP faced weak governance and enforcement, and the focus on procedural and formal deficit limits was too narrow;
- Statistical reporting was not adequate; and
- The fiscal policy was insufficiently covered within the macroeconomic surveillance in general.

In response, from late 2009, the EU made a shift in its economic policy to ensure a rapid return to sound and sustainable budgetary positions. The main priority was to address record high excessive deficits and debts reached in most Member States, primarily by cuts in spending and tax increases (the so-called austerity policies). In line with that, the SGP has been reformed by the “Six-Pack”⁷, “Two-Pack”⁸ and the TSCG. Table 1 provides an overview of main reforms embedded in the two packages and the Treaty.

In addition, the “Six-Pack” introduced the MIP for identifying, preventing and eventually addressing EU Member States’ macroeconomic imbalances that may affect not only the economic stability of the Member States in question, but also the euro area or the EU as a whole. However, despite all these changes, the centrality of the 3%-deficit-threshold and the importance of the EDP procedure has remained intact.

5 The Stability and Growth Pact (SGP) is a set of rules in force since 1997 that essentially addresses sustainability of Member States’ fiscal policies by setting the threshold for national public deficit (3% of GDP) and public debt (60% of GDP), the so-called “Maastricht criteria”.

6 The SGP consists of two arms: preventive and corrective. On one hand, the preventive arm ensures that Member States conduct their fiscal policy in a sustainable manner by reaching their medium-term budgetary objective (MTO). On the other, the corrective arm applies in the event that Member States’ public debt or budget deficit becomes excessive according to the Maastricht criteria.

7 Regulations (EU) No 1173/2011, 1174/2011, 1175/2011, 1176/2011, 1177/2011 and Directive 2011/85/EU.

8 Regulation (EU) No 472/2013 and Regulation (EU) No 473/2013.

Table 1: SGP reform 2011 – 2013

Legislation	Main novelties
Six-Pack and Two-Pack	<p>Introduction of an expenditure benchmark for the annual increase in a Member State's expenditure;</p> <p>Establishment of the European Semester cycle for annual coordination and monitoring of Member States' fiscal and economic policies;</p> <p>Introduction of the possibility to open the EDP solely on the basis of the debt criterion (60% of GDP);</p> <p>Introduction of new sanctioning mechanisms in both the preventive and corrective arm of the SGP (deposit / fine of up to 0.5% GDP of a Member State);</p> <p>Introduction of a common budgetary timeline and common budgetary rules for correction of excessive deficits for euro area Member States; and</p> <p>Introduction of new rules for enhancing surveillance for Member States experiencing financial stability difficulties, benefiting from financial assistance under a macroeconomic adjustment programme or emerging from adjustment programmes under post programme surveillance.</p>
TSCG	<p>Mandatory introduction of a balanced budget rule;</p> <p>Automatically triggered correction mechanism at the national level; and</p> <p>Strengthening of the automaticity of launching the EDP in the event that a euro area Member State breaches the deficit criterion.</p>

Source: Prepared by authors based on European Commission, European Parliament and European Central Bank

In general, this new fiscal policy surveillance system has largely contributed to the consolidation of public finances in the EU. Most countries have met their medium-term budgetary objective (MTO) as set in the SGP, and the number of countries under the EDP decreased from 18 in 2009 to 10 by end 2014 (see Table 2). In the period of austerity, Latvia, for example, marked a rebound in economic growth, while some countries (for example, Portugal and Ireland) made a significant progress in recovering the confidence of markets and investors.

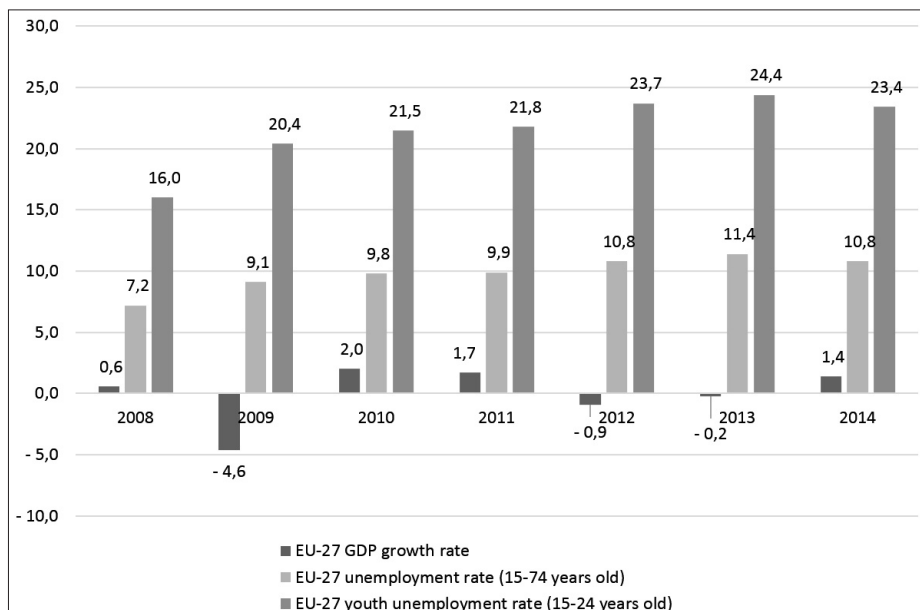
However, despite all these efforts, austerity policies eventually proved as inefficient recovery instrument. In 2014, the EU's GDP barely exceeded the level of pre-austerity 2008. According to Hespánha and Serapioni (2019), damages caused by austerity policies showed in different forms in Member States. Apart from investment halt and sovereign debt increase, this severe decrease in GDP was mainly a result of social consequences such as increase in unemployment (especially of young people), salary cuts, large emigration flows of qualified workers, as well as worsening of social services (especially in the health sector). According to the European Commission, between 2008 and 2013, about 6.7 million jobs were lost in the EU (see Figure 1). The EU had to change its economic course in order to address this new reality.

Table 2: EDPs launched until today

Launch of EDP	2002	2003	2004	2005	2009	2010	2013	2014	2015	2020
Member States in the EDP (closure of EDP)	PT (2004)	DE (2007) FR (2007)	CZ (2008) CY (2006) EL (2007) HU (2013) MT (2007) NL (2005) PL (2008) SK (2008)	IT (2008)	AT (2014) BE (2014) CZ (2014) DE (2012) EL (2017) ES (2019) FR (2018) IE (2016) IT (2013) LT (2013) LV (2013) MT (2012) NL (2014) PL (2015) PT (2017) RO (2013) SI (2016) SK (2014)	BG (2012) CY (2016) DK (2014) FI (2011) LU* (2010)	MT (2015)	HR (2017)	BE* (2015)	RO (ongoing)

*The European Commission issued an Article 126(3) report that did not give rise to a Council decision.
Source: European Commission

Figure 1: EU-27 real GDP growth (% change on previous year), EU-28 unemployment rate (% of active population, 15-74) and EU-28 youth unemployment rate (% of active population, 15-24), 2008-2014



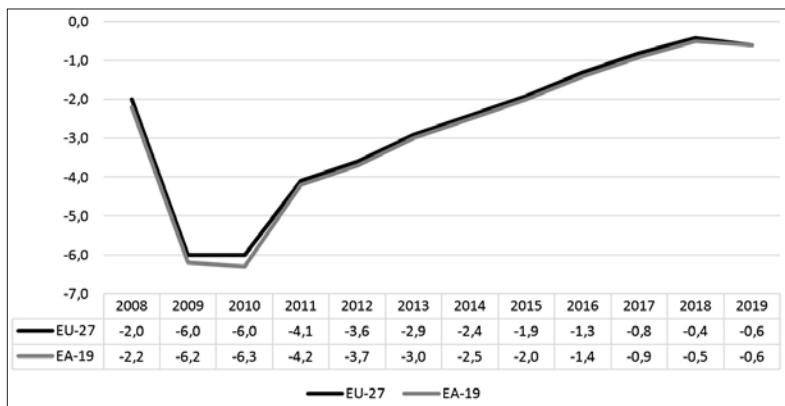
Source: Eurostat, tec00115 and [une_rt_a], accessed on 28 August 2020

4.1.2. EU shifts to structural reforms and investments 2015 – 2019

As of 2015, the EU fiscal policy shifted from austerity to structural reforms, single market and investments, with measures to increase social protection becoming more common. While deficits have mainly been reduced by virtue of improving macroeconomic conditions (see Figure 2), which generated additional revenues and lowered unemployment expenditure (see Figure 3), highly indebted Member States started to implement reforms in labour and product markets (see Figure 4), and boost investments (see Figure 5).

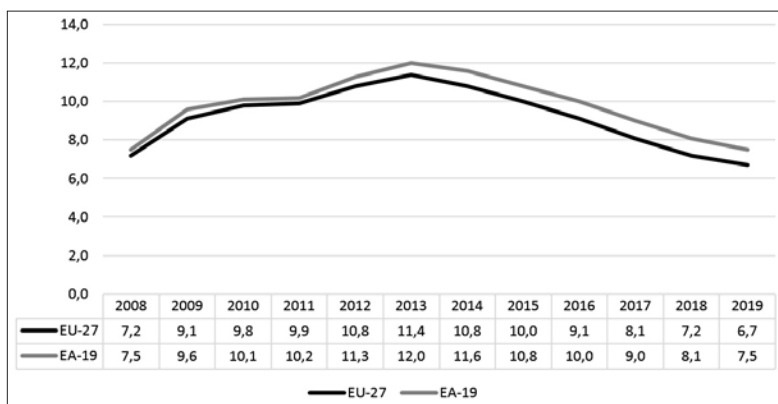
According to Roeger, Varga and in 't Veld (2015), labour market reforms, and in particular reforms that raise labour force participation, yield the largest output effects in the short to medium run, followed by tax reforms and reforms increasing competition in product markets. For example, Greece, Ireland and Portugal introduced active labour market policies, product market and public sector reforms focused on efficiency, numerous tax reforms, reforms in pensions, as well as reforms in the financial sector. Italy underwent a number of reforms as well, such as labour market reform, simplification of public administration and several tax reforms, similar to Spain that in addition reformed its unemployment benefits, pensions and employment protection legislation. These efforts resulted in number of Member States in the EDP decreasing from 11 in 2015 to only one today (see Table 2 above).

Figure 2: EU-27 and EU-19 surplus (+) or deficit (-), general government (% of GDP, 2008 – 2019)



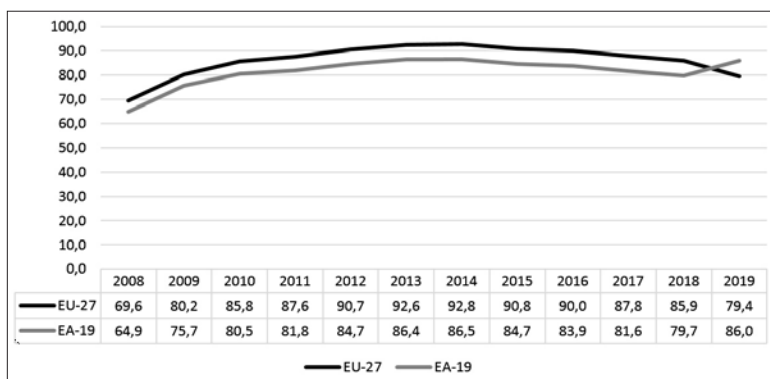
Source: Eurostat, [tec00127], accessed on 7 July 2020

Figure 3: Unemployment rate (number of unemployed as % of total labour force aged 15 – 74, 2008 – 2019)



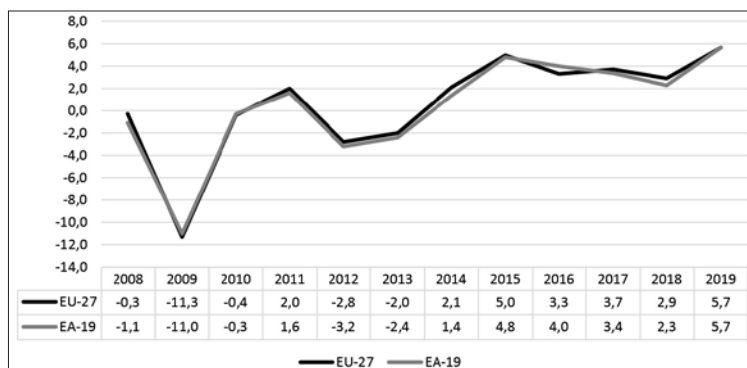
Source: Eurostat, [une_rt_a], accessed on 7 July 2020

Figure 4: Gross debt, general government (% of GDP, 2008 - 2019)



Source: Eurostat, [teina225], accessed on 7 July 2020

Figure 5: Gross fixed capital formation (chain linked volumes, percentage change on previous period, 2008-2019)



Source: Eurostat, [nama_10_gdp], accessed on 7 July 2020

4.2. COVID-19: EU faces a new crisis before completely recovering from the previous one

4.2.1. Expected economic impact of COVID-19

Progress made since the last financial and sovereign debt crisis 2008 – 2012 resulted in a financial system that serves the EU economy better, a more resilient and robust banking system and closer supervision and coordination of national budgets. As regards the latter, the introduction of the European Semester that encompasses the revised SGP, the MIP and the Europe 2020 Strategy for growth and jobs allowed for broad coordination of economic policies across the EU, while paying greater attention to debt levels.

Since the financial and sovereign debt crisis, the EU has developed an intensive regulatory response to address its causes and new risks that have since emerged. However, the EU regulatory framework is still evolving. On top of this, the EU found itself in a new, more severe crisis of COVID-19.

COVID-19 pandemic came as a major economic shock. By end March, it had spread to all EU Member States. The IMF⁹ expects a 10.2% drop in annual GDP in the euro area in 2020, under the key assumptions that the pandemic fades in the second half of 2020 and containment measures get gradually relaxed. Economists agree as well that quarantine measures can have severe economic effects – one week during which a country runs at 50% of capacity amounts to a loss of yearly GDP of up to one percent (Bofinger et al., 2020).

According to the Commission Economic Spring Forecast of 2020¹⁰, the EU-27 GDP is forecast to contract by 7.4% this year, far deeper than during the global financial crisis of 2008 – 2009, and to rebound by 6.1% in 2021. The euro area will contract even more – by 7.7% in 2020 and by 6.3% in 2021.

⁹ International Monetary Fund, World Economic Outlook Update: “A Crisis Like No Other, An Uncertain Recovery”, p.1 and 7, June 2020

¹⁰ European Commission, “A deep and uneven recession, an uncertain recovery”, p.1, May 2020.

The EU is expected to reach record high levels in the last decades by several parameters, mostly due to the confinement measures implemented in response (see Table 3):

- *GDP* - EU real GDP should reduce by 2.5 percentage points in 2020 (falling to about -1,0% of GDP). According to the latest Eurostat data¹¹, seasonally adjusted GDP decreased by 12.1% in the euro area and by 11.7% in the EU in the second quarter of 2020 (compared to first quarter of 2020). These were the sharpest declines observed since 1995. According to an analysis performed by the Commission's Joint Research Centre¹², the GDP losses in European regions are highly correlated with drops in employment rates, while regions that rely on tourism being hit the hardest;
- *Budget deficit* - due to containment measures imposed in the Member States over the last few months, economic activity in Europe has dropped at fast speed. According to the Commission, the aggregate general government deficit is expected to surge from 0.6% of GDP in 2019 to 8.3% of EU-27 GDP this year, which reflects the work of automatic stabilisers and discretionary fiscal measures. Under the assumption that the economic activity rebounds and most of the temporary measures adopted in response to the COVID-19 crisis get relaxed, the deficit is forecast to decline to 3.6% of GDP in 2021;
- *Public debt* - as the crisis led to a rise in aggregate public debt in most Member States, it has in general left the EU with less margin of manoeuvre to absorb a future crisis. After reaching its peak in 2014, EU gross debt is projected to reach a new peak of 95.1% of GDP in 2020, increasing from 79.4 in 2019. In 2021, EU-27 gross debt is expected to decrease to 92.0%, based on a no-policy-change assumption;
- *Unemployment rate* - EU unemployment rate is expected to increase from 6.7% in 2019, its lowest level in the last two decades, to about 9.0% this year. In 2021, it is projected to decrease to 7.9%, remaining above the pre-financial crisis level. Despite the fact that differences in unemployment levels across the Member States have narrowed in the period from 2013 onwards, unemployment rates are expected to rise very differently across the EU due to pre-existing vulnerabilities, such as high share of temporary contracts or dependency on tourism; and
- *Investments* – according to the Commission, investments are likely to take a very severe hit due to COVID-19 reflecting a combination of demand, supply and financial factors. Uncertainty about the future sales, weakened equity positions, potentially more difficult access to credit and

11 Eurostat, "GDP and employment flash estimates for the second quarter of 2020", p.1, 14 August 2020.

12 See more: <https://ec.europa.eu/jrc/en/news/jrc-analyses-covid-19-impact-economy-and-labour-markets-help-guide-eu-response> (accessed on 5 August 2020).

the current disruption of international supply chains are likely to force firms to postpone or even cancel their investment plans. EU-27 gross fixed capital formation is expected to plummet by 13.2% in 2020, and to recover by 9.7% in 2021. The expected downturns and upswings will be extreme compared to the financial and sovereign debt crisis. In total, the shortfall of investment is estimated at around €850 billion in 2020 and 2021.

Table 3: Overview: European Commission projections 2019 – 2021 for EU-27, by chosen economic indicators

Indicator	Real GDP			Budget deficit			Public debt			Unemployment rate			Investments		
	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
EU-27	1,5	-7,4	6,1	-0,6	-8,3	-3,6	79,4	95,1	92,0	6,7	9,0	7,9	5,7	-13,2	9,7
EA-19	1,2	-7,7	6,3	-0,6	-8,5	-3,5	86,0	102,7	98,8	7,5	9,6	8,6	5,7	-13,3	10,2

Source: Prepared by authors based on European Commission

To address this new economic reality, the EU has provided fiscal and economic support to Member States through different budgetary instruments to enhance their recovery and restore their growth.

4.2.2. Initial fiscal measures taken in response to the COVID-19 crisis

Since the outbreak of COVID-19, Member States undertook a number of measures with the priority of ensuring basic income of households, maintaining employment and protecting businesses from bankruptcy:

- For households this means replacing lost income (for example, by means of sickness benefits, deferral of rental and utility payments, social security benefits, reinforced partial unemployment system, support for unemployed, suspension of tax payments, moratorium and deferral of loans);
- For employees this means maintaining employment (for example, by introducing short-time work model, special care leave, state wage compensation up to a certain percentage in the affected sectors, relief measures for employees subject to salary cut, sickness allowance, tax support and relief measures for self-employed, limitations in termination of employment contracts, support and extension of right for temporarily laid off workers); and
- For businesses this means ensuring liquidity (for example, by credit guarantees, bridging loans, tax deferrals and extension of deadlines for tax payments, reduction of advance tax payments, waivers on tax payments, waivers on social security contributions, support for self-employed individuals and family businesses).

In addition, national authorities provided support for banks in order to increase their capacity to lend to the real economy. According to Haroutunian, Hauptmeier and Leiner-Killingert (2020), the discretionary fiscal measures taken in response to COVID-19 amount to 3.25% of GDP at the aggregate euro area level, while the state guarantees for loans to firms and other liquidity support measures amount to around 20% of euro area GDP. According to the European Fiscal Monitor, most Member States will increase their spending by around 3.1% of GDP on average and give tax relief for another 1.1% of GDP within their fiscal response. All of this is to achieve the overarching goal of supporting the financial system in order to prevent the current crisis turning into a financial one.

On the EU level, some of the instruments agreed under the EU fiscal policy have been used for the first time ever:

- Activation of the general escape clause under the SGP – allowing Member States to implement immediate fiscal policies in face of exceptional circumstances by deviating from the preventive arm (i.e. MTO or the appropriate adjustment path towards it) and the corrective arm of the SGP (i.e. extension of the deadline for Member States for correcting excessive deficits under the EDP, provided that they take effective action as recommended by the Council in the last country specific recommendations);
- Activation of national escape clauses by the Member States – allowing Member States to suspend national budgetary restrictions in case of severe economic downturns and other exceptional circumstances. According to the latest European Fiscal Monitor¹³, 20 Member States have triggered national escape clauses to suspend national budgetary restrictions; and
- New Commission guidelines for the 2020 Stability and Convergence Programmes (SCPs) within the European Semester – streamlining the SCPs in the current 2020 cycle. Following the new guidelines, Member States submitted their SCPs, which focused on short-term budgetary measures to address the crisis and contained less forecast figures compared to previous years. According to the European Fiscal Monitor, due to the extraordinary circumstances and in order to free up resources for estimating the budgetary and economic impacts of the crisis and government measures, many national Independent Fiscal Institutions were not involved in production or endorsement of underlying forecast figures of this year's SCPs as they usually are.

In addition, the EU temporarily suspended state aid rules¹⁴, as well as envisaged new budgetary instruments to support the recovery of Member States and to protect the EU internal market and the stability of the euro (see Figure 6):

¹³ EU Independent Fiscal Institutions, "European Fiscal Monitor", p. 1, June 2020.

¹⁴ European Commission, "Temporary Framework for State aid measures to support the economy in the current COVID-19 outbreak", C(2020) 1863 final and European Commission, "Amendment to the Temporary Framework for State aid measures to support the economy in the current COVID-19 outbreak", C(2020) 2215 final.

- Next Generation EU 2021 – 2023 – on 27 May 2020, the Commission put forward its proposal¹⁵ for a new temporary fund within the new multiannual financial framework (MFF) for supporting recovery and growth, amounting to €750 billion that will be spent across three pillars:
 - Supporting Member States to recover, repair and strengthen by setting up a new Recovery and Resilience Facility, Recovery Assistance for Cohesion and the Territories of Europe - REACT-EU, Reinforced rural development programmes and Reinforced Just Transition Mechanism;
 - Kick-starting the economy and private investment by strengthening InvestEU, creating a new Strategic Investment Facility and proposing a new Solvency Instrument; and
 - Learning lessons of the crisis by strengthening programmes such as RescEU or Horizon Europe, by creating a new Health Programme and by strengthening EU instruments for Neighbourhood, Development and International Cooperation and for pre-accession assistance;
- Reinforced MFF 2021 – 2027, worth €1074.3 billion¹⁶;
- Safety nets – on 23 April, the European Council agreed on three safety nets¹⁷ of in total €540 billion for workers (temporary Support to mitigate Unemployment Risks in an Emergency, SURE), businesses (emergency liquidity support package by the European Investment Bank for hard-hit small and medium-sized enterprises) and sovereigns (European Stability Mechanism support for medical costs).

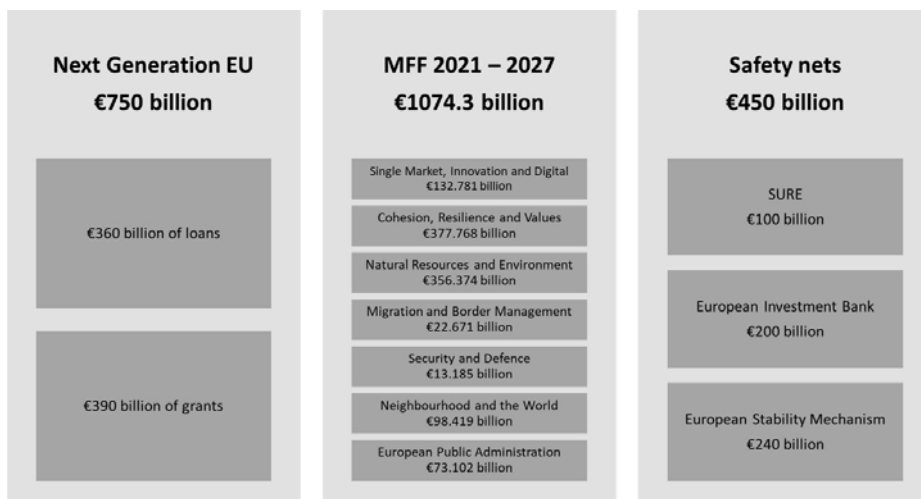
However, employment support measures, increased social benefits and credit guarantees to support businesses that are borne by both Member States and the EU through various instruments including the EU budget can turn into large fiscal expenditure in the medium term. It emerges that more courage at EU level to use the full set of step-up and enforcement procedures would reinforce credibility in commitments for reform and public confidence in economic governance. It would also increase the chance for introducing new forms of EU fiscal stabilization instruments and support for those Member States that are committed to rapid and sound structural reforms.

¹⁵ European Commission, “Europe’s moment: Repair and Prepare for the Next Generation”, May 2020, COM(2020) 456 final.

¹⁶ As agreed in the European Council on 21 July. See European Council conclusion EUCO 10/2020 available at <https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf>.

¹⁷ European Council, Video conference of the members, 23 April 2020.

Figure 6: New EU budgetary instruments in response to COVID-19



Source: Prepared by authors based on European Commission, European Parliament, European Stability Mechanism and IMF

5. Digitalisation and green transformation in the heart of new recovery policies

On 26 March, Members of the European Council adopted a Joint Statement¹⁸, calling for a coordinated exit strategy, a comprehensive recovery plan and unprecedented investments. Based on this mandate, President of the European Council and the President of the Commission presented, as a first step, a Joint European Roadmap towards lifting COVID-19 containment measures¹⁹ on 15 April.

The Roadmap calls for the EU to be more efficient and effective, requiring further development of its executive capacity for managing crises in a coordinated manner. In addition, it calls for a reflection of EU rules and ways of functioning in the light of the experience gained during the crisis.

The Roadmap highlights four main principles on recovery:

- Recovery should be symmetric, meaning that the EU recovery plan must be based on solidarity, cohesion and convergence to ensure a level playing field for all;
- Recovery must be flexible and agile and will need to evolve over time;
- Recovery must be inclusive and co-owned by the EU and the Member States;
- Recovery must adhere to fundamental EU values and rights.

¹⁸ European Council, see: <https://www.consilium.europa.eu/media/43076/26-vc-euco-statement-en.pdf>.

¹⁹ European Commission and European Council, “A roadmap for recovery: towards a more resilient, sustainable and fair Europe”, 15 April 2020.

On 27 May 2020, the European Commission presented its proposal for a major EU recovery plan against the coronavirus crisis. The backbone of this new plan is the Next generation EU instrument, of which the new Recovery and Resilience Facility will disburse more than €600 billion. The objectives of the Facility are to support Member States depending on the extent of damage they have suffered due to the crisis, to recover quickly and to ensure cohesion, i.e. to prevent the increase of disparities in development between Member States. It will serve to support reforms and investments with €334.95 billion in grants and €267.95 billion in loans²⁰, while focusing on sustainable recovery and green and digital transitions. The Facility will contribute to reaching the overall target of 25% of the EU budget expenditures supporting climate objectives.

According to the European court of auditors²¹, the Facility represents a sufficient and strong response to the crisis for the moment. It will allow for a rapid deployment of additional funds that will be disbursed in a short period. According to Pisani-Ferry (2020), in case EU recovery falters, a vicious circle of precautionary savings and worsening expectations could ensue, possibly leading to a double-dip recession. The appropriate strategy is therefore to ensure that budgetary support follows the pace of the recovery, meaning that the funds should be immediately available and disbursed quickly in case of need.

However, having in mind numerous other recovery instruments that are either proposed or already agreed on at the EU level, such as the cohesion envelope, SURE programme or the EU budget itself, the Facility is only a part of the overall EU response to the crisis and cannot be examined in isolation. In this respect, good coordination, complementarity and synergy between the different EU and national instruments will be key.

In order to use funds from the Facility, each Member State will have to prepare a Recovery and Resilience Plan as part of its National Reform Programme within the European Semester cycle. In this Plan, a Member State will outline reforms that it intends to implement as well as objectives and results it aims to achieve, together with a detailed description of individual activities and their costs. These reforms may cover a wide range of areas, such as economic, social and territorial cohesion, green and digital transitions, health, research and innovation; and may be implemented in different sectors, such as the public sector, judiciary, education and science.

In more general terms, the Facility aims to support transformation and modernisation of public and private sector in Member States by digitalisation and green technology and energy solutions resulting in productivity and competitiveness increase. This time the future needs such as digitalisation and green transformation are in the heart of EU fiscal policy. Compared to austerity that resulted

²⁰ In current prices, based on the Commission's RRF proposal COM(2020) 408. In 2018 prices, the amounts are €310.0 billion in grants and €250.0 billion in loans.

²¹ European Court of Auditors, Opinion No 6/2020 concerning the proposal for a regulation of the European Parliament and of the Council establishing a Recovery and Resilience Facility, September 2020.

in deteriorations in the labour market, social services and severe decrease in GDP across the EU, and the structural reforms that showed as insufficient in coping with another crisis, the EU has now shifted to both ensuring stable public debts and deficit and supporting structural reforms and investments, all under the auspices of green and digital transition.

Within its new fiscal policy, the EU offers a significant financial support and it is up to the Member States to be quick and efficient in using the new funds for digital and green transformation, modernisation of private and public sector and increase of productivity and competitiveness. All Member States are invited to be creative and to present their own sets of actions according to their national needs. It remains to be seen what results this policy direction will generate in the following years.

6. Conclusions

Progress made since the financial and sovereign debt crisis resulted in better fiscal position of Member States and increase in investments. To overcome the vulnerabilities exposed during the crisis, the EU turned to austerity in 2009 – 2014 and shifted to structural reforms and investments in 2015 – 2019. A whole set of fiscal, structural and macro-economic rules and coordination mechanisms have been put in place in the last decade, such as the SGP with its preventive and corrective arm, the “Six-Pack” and “Two-Pack” regulations, the TSCG, the MIP and the European Semester with its Broad Economic Policy and Employment Guidelines and annual country specific recommendations.

Both the austerity and structural reforms, single market and investments policies largely contributed to consolidation of public finances in the EU. However, they did not ensure a sustainable economic growth. On one hand, austerity led to fall in investment, increase in unemployment, salary cuts, large emigration flows of qualified workers and worsening of social services, and on the other structural reforms and investments only provided for a partial EU recovery. On top of this, the EU was struck by COVID-19 at the beginning of the year.

The new COVID-19 crisis came from the health sector and put a high pressure on public finances. It caused the economy going into a lockdown, while hitting strongly the production, consumption and supply chains. As the confinement measures led to a significant loss in revenues for most businesses, the pandemic caused an increase in demand for loans as well as businesses defaulting. The extent of defaults will depend on numerous factors, in particular the level of public support. In addition, potentially higher rates of unemployment will lead to private loans and mortgage defaults and potentially affect real estate prices. Consequently, over the next years, banks will be exposed to a higher stock of NPLs and losses from necessary debt restructuring.

The suspension of SGP rules at the EU level allowed all Member States to implement immediate fire-fighting fiscal policies in the outbreak of the new crisis.

However, countries that entered the crisis with already high levels of public debt may face unsustainable debt financing or a debt crisis unless timely recovery reforms are implemented. In addition, as the COVID-19 pandemic has and will further increase the budget deficit and public debt levels in all Member States, the EU will need to reassess Member States' fiscal positions and set new MTOs under the SGP once the uncertainty of effects of the pandemic loosens and the SGP escape clause is deactivated. The evolution of macroeconomic imbalances should also be closely monitored, as the assessment undertaken by the Commission within the Country Reports for 2020 will not fully reflect the post-pandemic situation.

The EU has taken significant action in response to COVID-19. The Joint Statement of the Members of the European Council adopted on 26 March called for a coordinated exit strategy, a comprehensive recovery plan and unprecedented investment, which was presented in mid-April. The Roadmap calls for the EU to be more efficient and effective, requiring further development of its executive capacity for managing crises in a coordinated manner. It also calls for a reflection of EU rules and ways of functioning in the light of the experience gained during the crisis.

The adoption of the Roadmap was followed by a number of other measures to mitigate the impact of the crisis, i.e. the three pillars of EU recovery: Next Generation EU, new MFF and three safety nets. Among these, the greatest support will be provided within the new Recovery and Resilience Facility that counts for more than a half of the newly proposed MFF 2021 – 2027. Focusing on reforms and investments crucial for overcoming the current crisis, while complementing the EU Green Deal and Digital Agenda, the Facility is expected to lead the EU path to recovery and resilience.

However, according to the Commission Economic Spring Forecast of 2020, the COVID-19 crisis may lead to a further widening of economic divergences in the EU. While the pandemic is a symmetric shock, the impacts differ across Member States, reflecting the severity of the pandemic and stringency of related containment measures, different exposures due e.g. to the size of the tourism sector, and the available space for discretionary fiscal policy responses. This could distort the internal market and ultimately threaten the stability of the euro area.

Together with the cohesion policy, the Facility, if accompanied by effective and efficient Member States' fiscal policies based on reforms and new investment agenda, will be key to ensuring that the EU recovers symmetrically, based on cohesion and convergence, in a level playing field.

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CHAPTER 11

MINIMUM REQUIREMENT FOR OWN FUNDS AND ELIGIBLE LIABILITIES (MREL) POLICY AND REGULATION

Boris Vujčić¹, Sanja Gongeta²

Abstract

Effective bank resolution can be feasible and credible if adequate internal financial resources are available to an institution to absorb losses and for recapitalisation purposes without affecting certain liabilities. The latest financial crises highlighted the limitations of the that time existing regulatory framework to handle a bank failure without public money. New legislation for bank crisis management in European Union was designed: The Bank Recovery and Resolution Directive (BRRD) and the Single Resolution Mechanism Regulation (SRMR). The BRRD sets the key criteria for Minimum Requirement for own funds and Eligible Liabilities (MREL). MREL represents one of the key tools in enhancing banks' resolvability. It is developed by The Single Resolution Board to ensure that a bank maintains at all times sufficient eligible instruments to facilitate the implementation of the preferred and, where applicable, variant resolution strategies. For big, systemically important banks, the robust and transparent Minimum Requirement for on funds and Eligible Liabilities (MREL) framework is of utmost importance. This paper analyses the structure and the ultimate objectives of the MREL policy. Also it analyses the latest revisions of the regulatory framework for MREL policy under the Banking package (BRRD2/SRMR2).

Key words: Minimum Requirement for Own Funds and Eligible Liabilities (MREL), The Single Resolution Board (SRB), The Banking Union, the Single Resolution Mechanism Regulation (SRMR),

JEL classification: G21, G28

1. Introduction

Since the financial crisis of the year 2008 comprehensive regulatory initiatives and reforms relating to financial services regulating and stabilizing global financial markets were undertaken in multiple stages. The last one was during 2019 when European Council adopted a comprehensive legislative package in order to reduce risks in the banking sector and further reinforce banks' ability to withstand potential shocks.

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The revised banking package implements further material elements of the Basel III framework, which was finalised at the end of 2017, at the European level by way of amendments to the CRR (CRR II) and CRD (CRDV). It amends and augments the new resolution regime introduced in the European Union at the start of 2015 by implementing the total loss-absorbing capacity (TLAC) requirement developed by the Financial Stability Board (FSB) for global systemically important institutions only. Also, it adjusts the minimum requirements for own funds and eligible liabilities (MREL) for all European banks.

The establishment of the Minimum Requirement for own funds and Eligible Liabilities (MREL) was one of the new core elements of the Union legal framework seeking to ensure that credit institutions have loss absorbing capacity sufficient to achieve their orderly resolution in case they become unviable. (Maragopoulos, 2016:5)

Minimum Requirement for Own Funds and Eligible Liabilities (MREL) must be set in line with the provisions of the No. 2 Order, the Bank Recovery and Resolution Directive (BRRD) and the European Commission Delegated Regulation (EU) 2016/1450 (the MREL RTS).

The new rules include more risk-sensitive capital requirements, particularly with regard to market risk, and the introduction of a binding leverage ratio and a binding net stable funding ratio.

In this paper we set out the Single Resolution Board's (SRB's) Minimum Requirement for Own Funds and Eligible Liabilities MREL policy in the light of the revised Banking Package. The paper is organized as follows. Chapter two analyses after crisis regulatory reform in European Union, emphasising the most important parts of it. Chapter three defines the revised provisions for Minimum Requirement for Own Funds and Eligible Liabilities (MREL) and points out its role in financial regulatory framework. The last section provides some concluding remarks.

2. After financial crisis regulatory reform in European Union

Existing national regulations to prevent the insolvency of credit institutions have proven to be insufficient in times of financial crisis, and a single regulatory framework at European level was more than needed. (Vujčić; Gongeta, 2016:961) Authors like Viñals and Narain (2020:3) explain how “the regulatory revolution that has taken place since the crisis has not just been necessary but has been essential to underscore the safety of the global financial system and for reviving a sustainable global economy over the medium and long term.”

The process of establishing bank crisis management legislation has been truly global, reform has covered many areas of financial activity and at last the regulatory reform has been deep, with very fundamental changes in how the financial system is now regulated compared to the past. (Kellerman et al., 2020) While the reform has rendered the financial system more stable and resilient against

many types of possible future shocks and crises, authors like Tröger (2019) think that it did not address all identified problems and that it “won’t help much”.

That reform was largely based on international standards agreed in 2010 by the Basel Committee on Banking Supervision (BCBS), known as the Basel III framework. Among its many measures, the reform package included the adoption of Regulation (EU) No 575/2013 of the European Parliament and of the Council³ and Directive 2013/36/EU of the European Parliament and of the Council⁴, which strengthened the prudential requirements for credit institutions and investment firms (institutions). (p. 1 Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013 as regards the leverage ratio, the net stable funding ratio, requirements for own funds and eligible liabilities, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures, reporting and disclosure requirements, and Regulation (EU) No 648/2012.)

European institutions agreed to unify European supervisory and resolution systems by establishing a Banking Union. The Banking Union consists of three pillars:

- the Single Supervisory Mechanism (SSM), headed by the ECB as the central prudential supervisor of banks in the Euro area;
- the SRM, established by the Single Resolution Mechanism Regulation and headed by the Single Resolution Board (SRB) as central resolution authority;
- European Deposit Insurance Scheme.

As early as 2013, first elements of the Basel III standards were transposed into European law. The legislative package consisted of two parts: the Capital Requirements Directive (CRDIV)⁵ and the Capital Requirements Regulation (CRR).⁶ (Laboureix; Decroocq, 2016:117; Kellermann; Timmerman Thijssen, 2020:10) Haselman et al (2019) published empirical evidence on how this measures have been effective in changing investors’ expectations and reduced the perceived probability of future bank bail-outs considerably.

3 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 (OJ L 173, 12.6.2014).

4 Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 (OJ L 176, 27.6.2013).

5 governing the access to deposit-taking activities and providing for principles on prudential supervision.

6 setting out detailed prudential requirements for banks and investment firms.

2.1. European supervisory and resolution framework

The EU resolution framework consists of the BRRD and SRM Regulation. In order to establish market discipline for banks and to avoid bail-outs using taxpayers' money, a new bank resolution regime, the Bank Recovery and Resolution Directive (BRRD), has been enacted.

The BRRD establishes common resolution rules and tools, including the bail-in tool, and it provides for the establishment of national resolution authorities and national resolution funds. (Kellermann; Timmerman Thijssen, 2020:14; Maragopoulos, 2016:5) The BRRD gives the resolution authorities detailed guidance for setting out these requirements for individual banks, while also allowing them discretion on the minimum level on MREL and on the composition and the quality of MREL eligible items.

The SRM Regulation builds on the BRRD by enabling more effective cross-border resolution.

Resolution decision-making is centralized within the SRB, in coordination with the NRAs. (Kellermann; Timmerman Thijssen, 2020:14)

The Single Resolution Board (SRB) is the central resolution authority within the Banking Union. The SRB was established in 2015 and functions within the framework of the Single Resolution Mechanism (SRM), together with the national resolution authorities within the Eurozone (NRAs), the Council of the European Union, the European Commission, and the European Central Bank (ECB). (Kellermann; Timmerman Thijssen, 2020:10)

The role of the SRB is not limited to crisis situations but is forward looking and primarily focused on preparatory and proactive measures, such as drawing up resolution plans, setting appropriate levels of minimum requirements for own funds and eligible liabilities (MREL), and addressing impediments to resolvability. (Kellermann; Timmerman Thijssen, 2020:10)

In 2019 the Single Resolution Board (SRB)⁷ updated its policy on minimum requirement for own funds and eligible liabilities (MREL) in light of the publication of the Banking Package in the Official Journal of the EU on 7 June 2019.

3. Minimum Requirement for Own Funds and Eligible Liabilities (MREL)

The Bank Recovery and Resolution Directive (BRRD), which has been transposed in all participating Member States in the Banking Union, requires banks to meet MREL targets so as to be able to absorb losses and restore their capital

⁷ together with the national resolution authorities it forms the Single Resolution Mechanism. The SRB works closely with the European Commission, the European Central Bank, the European Banking Authority and national authorities. Its mission is to ensure an orderly resolution of failing banks, protecting the taxpayer from state bail-outs, which is promoting financial stability.

position, allowing them to continuously perform their critical economic functions during and after a crisis.

The minimum requirement for own funds and eligible liabilities (MREL) is defined as set by resolution authorities to ensure that a bank maintains at all times sufficient eligible instruments to facilitate the implementation of the preferred and, where applicable, variant resolution strategies.⁸ In other words, it represents one of the key tools in enhancing banks' resolvability. The setting of a Minimum Requirement of own funds and Eligible Liabilities (MREL) to bail-in was a priority for the resolution authorities in the EU.

The Minimum Requirement of own funds and Eligible Liabilities (MREL) applies to all banks. The requirement also has to be set specifically for each institution by the resolution authority, without a default statutory minimum requirement. In order to effectively make use of the bail-in tool, banks will be required to always meet the MREL, which will be determined for each entity during the resolution planning process.

Meeting the MREL implies that an unsound credit institution can be recapitalised in an orderly manner through the write-down or conversion of its capital instruments and eligible liabilities avoiding a need for bail-out with public funds and without limited recourse of financial means of resolution financing arrangements. (Maragopoulos, 2016:17)

As mentioned, Minimum Requirement for Own Funds and Eligible Liabilities (MREL) must be set in line with the provisions of the No. 2 Order, the Bank Recovery and Resolution Directive (BRRD).

The No. 2 Order requires the Bank to set MREL on the basis of the following criteria, which are further specified in the MREL RTS:

- the need to ensure that the institution can be resolved by the application of the stabilisation powers including, where appropriate, the bail-in tool, in a way that meets the resolution objectives;
- the need to ensure, in appropriate cases, that the institution has sufficient eligible liabilities to ensure that, if the bail-in tool were to be applied, losses could be absorbed and the common equity Tier 1 (CET1) ratio of the institution could be restored to a level necessary to enable it to continue to comply with the conditions for authorisation and to continue to carry out the activities for which it is authorised under the Capital Requirements Directive 2013/36/EU (CRD4) or the Markets in Financial Instruments Directive 2014/65/EU (MiFID2) and to sustain sufficient market confidence in the institution or entity;
- the need to ensure that, if the resolution plan anticipates that certain classes of eligible liabilities might be excluded from bail-in under article 44(3) of the BRRD or that certain classes of eligible liabilities might be transferred to a recipient in full under a partial transfer, the institution has

⁸ https://srb.europa.eu/sites/srbsite/files/srb_mrel_policy_2020.pdf 27.8.2020.

sufficient other eligible liabilities to ensure that losses could be absorbed and the CET1 ratio of the institution could be restored to a level necessary to enable it to continue to comply with the conditions for authorisation and to continue to carry out the activities for which it is authorised under CRD4 or MiFID2;

- the size, the business model, the funding model and the risk profile of the institution;
- the extent to which the Deposit Guarantee Scheme could contribute to the financing of resolution in accordance with article 109 of the BRRD;
- the extent to which the failure of the institution would have adverse effects on financial stability, including due to its interconnectedness with other institutions or with the rest of the financial system, through contagion to other institutions.

3.1. Revised Minimum Requirement for Own Funds and Eligible Liabilities (MREL) rules

3.1.1 Calibration

During 2019 the regulatory framework for Minimum Requirement for Own Funds and Eligible Liabilities (MREL) has been revised through amendments to the EU Bank Recovery and Resolution Directive 2014/59/EU (BRRD); Regulation 806/2014/EU establishing a Single Resolution Mechanism (SRMR); and the Capital Requirements Regulation (CRR) and Capital Requirements Directive (CRD) (1)⁹.

The revised provisions aim to be effective, efficient and proportionate and will help ensure that MREL is set in the context of fully feasible and credible resolution plans, for all types of banks. (Single Resolution Board: 4)

The SRB modified and extended its approach to MREL calibration in accordance with the new framework as follows.

- “From 2021, CRR requires institutions to comply with a prudential leverage ratio requirement at all times¹⁰ acting as a backstop to risk-based own funds requirements. Taking this into account, the revised BRRD introduces an MREL requirement based on the Leverage Ratio Exposure Measure (LRE)¹¹ to complement the risk-based MREL expressed as a percentage of the total risk exposure amount (TREA) (Article 92(3) CRR)). The parallel requirement is calibrated at a level commensurate to recapitalising a failing bank in order to restore compliance with the leverage ratio requirement.¹²

⁹ so called “the Banking Package”

¹⁰ Point (d) of Article 92(1) CRR

¹¹ Articles 429 and 429a CRR

¹² Point (b) of Article 12d (3) SRMR

- In continuity with the principles already established under the previous legal framework, MREL is composed of a loss-absorption amount (LAA) and a recapitalisation amount (RCA).¹³ New provisions define conditions under which the RCA may be adjusted upwards or downwards. For example, a market confidence charge (MCC) is applied where warranted to ensure that a bank sustains market confidence post-resolution.
- The Banking Package introduced the total loss-absorbing capacity (TLAC) minimum requirement for global systemically important institutions (G-SIIs), from the global standards set by the Financial Stability Board (FSB), and adapted the current MREL framework accordingly.
- MREL for banking groups with a Multiple Point of Entry (MPE) approach to resolution has been further refined. If MPE is the preferred resolution strategy, the MREs for the different resolution groups (i.e. the points of entry) should be set in such a way that each can be resolved independently without causing immediate shortfalls in other resolution groups.” (MREL: SRB Policy Under the Banking Package, 2020:5)

The calibration parameters are based on two variables: a risk-based ratio based on risk-weighted assets (RWAs), and the non-risk-based ratio based on the leverage ratio exposure (LRE), which represents a hard floor.

3.1.2. Subordination for resolution entities

The SRB sets subordination requirements in accordance with the new framework, as well as defining a methodology to determine and quantify NCWO risk. Specifically:

- “The first group of banks – collectively “Pillar 1 Banks” – includes: (1) resolution entities of G-SIIs and material subsidiaries of non-EU G-SIIs; (2) banks with total assets exceeding EUR 100bn at the level of the resolution group (Top Tier Banks); and (3) other banks chosen by the respective national resolution authority (NRA) which are not Top Tier Banks but are assessed as likely to pose a systemic risk in the event of failure (Other Pillar 1 Banks). Pillar 1 Banks will be subject to subordination requirements composed of a non-adjustable Pillar 1 MREL requirement¹⁴ that must be met with own funds instruments and eligible liabilities that are subordinated to all claims arising from excluded liabilities¹⁵ However, the resolution authority may permit G-SIIs to count senior liabilities as eligible liability instruments against TLAC requirements up to an aggregate amount that does not exceed 3.5% of the TREA calculated in accordance with Article 92(3) and (4) CRR(10).

¹³ Article 12d (2) SRMR

¹⁴ Articles 92a and 92b CRR (reflecting the international TLAC standard for G-SIIs); Articles 12d (4) and 12d (5) SRMR.

¹⁵ Article 72b (2)(d) CRR for G-SIIs and Articles 12d (4) and 12d (5) SRMR for Top Tier banks and Other Pillar 1 banks

- Concurrently with the Pillar 1 subordinated MREL requirements, the Pillar 1 Banks' resolution authority must also ensure that the subordinated MREL resources of Pillar 1 Banks are equal to at least 8% of total liabilities and own funds (TLOF).¹⁶
- A second group of banks (non Pillar 1 banks) will be subject to a subordination requirement only upon the decision of the resolution authority to avoid a breach of the NCWO principle, following a bank-specific assessment carried out as part of resolution planning.¹⁷
- The SRB has developed a valuation-based tool to quantify possible NCWO risk. Assessing the need for subordination depends on projections of the size and distribution of losses for different classes of creditors under different strategies and conditions. The quantitative tool provides such projections by combining accounting and historical market data.” (MREL: SRB Policy Under the Banking Package, 2020:5,6)

3.1.3 Internal MREL for non-resolution entities

As it is announced, “The SRB will progressively expand the scope of non-resolution entities for which it will adopt internal MREL decisions. The SRB may waive subsidiary institutions qualifying as non-resolution entities from internal MREL, for example, where free transferability of funds is assured and, among other conditions, the respective subsidiary and its parent are established in the same Member State. The SRMR grants the SRB the possibility to permit the use of guarantees to meet the internal MREL within the Member State of the resolution entity; the paper defines criteria for granting such permission.” (MREL: SRB Policy Under the Banking Package, 2020:6)

3.1.4. MREL for cooperative groups

The Banking Package introduces provisions specifically designed to tailor MREL requirements for cooperative networks¹⁸, including a dedicated definition of the term resolution group that reflects the “inverse” ownership structure typical for cooperative groups. The determination of the external and internal MREL must be fully aligned with the specific resolution strategy in a way that supports the implementation of resolution action. (MREL: SRB Policy Under the Banking Package, 2020:7)

The major elements of the new MREL framework, other than the TLAC requirement, will become applicable on 28 December 2020. Until then, MREL decisions issued by the SRB, including any applicable transition periods, will be based on the current legal framework of SRMR1/BRRD (Regulation (EU) 2014/806 (SRMR1); Directive (EU) 2014/59 (BRRD1)

¹⁶ Article 12c (4) SRMR

¹⁷ Article 12c (5) SRMR.

¹⁸ Point 24b of Article 3(1) SRMR

Table 1: Overview of MREL

OVERVIEW of MREL			
	G- SII	“Top- tier” banks (> €100 billion total assets and “fishing” option)	Other banks subject to resolution ¹
From entry into force of banking package	16% of RWAs 6% of LRE Higher institution- specific requirement as appropriate ²	Institution- specific Requirement ²	Institution- specific Requirement ²
From 2022	18% of RWAs 6.75% of LRE Higher institution-specific requirement as appropriate ²	13.5% of RWAs 5% of LRE Higher institution specific requirement as appropriate ²	Institution- specific Requirement ²
From 2024	See above, additionally 8% of TLO	See above, additionally, 8% of TLOF ³ (but not more than 27% of RWAs)	Institution- specific requirement ² additionally 8% of TLOF ³ at discretion of resolution authority
Subordination requirement ⁴	In principle, yes ⁵	Case- by- case decision (assessment based on “no creditor worse off” principle)	

1 For banks subject to insolvency proceedings, the resolution authority will set MREL at the level of the loss absorption amount (= minimum capital requirements). 2 Starting formula for calculating the institution- specific requirement: $2 * P1 + 2 * P2 + CBR + \text{market confidence charge}$ or $2 * LRE$. 3 Total liabilities and own funds. 4 The subordination requirement is capped by law; the resolution authority can only demand fulfilment of the institution- specific MREL requirement using subordinated instruments up to a maximum of 8%

Source: The European banking package - revised rules in EU banking regulation – Deutsche Bundesbank Monthly Report, June 2019 Bundesbank:44

As it can be seen, the revision of the BRRD will also entail more specific rules for setting MREL. MREL consists of a loss absorption amount and a recapitalisation amount, both of which are calibrated on the basis of RWAs and LRE. Thus, both a risk based ratio and a non-risk-based ratio variable are taken into account for the calibration of MREL. Such calibration rules were previously located in the delegated regulation on MREL. They will now be amended and prospectively transferred to the BRRD. (The European banking package - revised rules in EU banking regulation, 2019:47)

For the calibration of MREL based on RWAs, both the loss absorption amount and the recapitalisation amount components are based on own funds requirements. Above and beyond this amount, the resolution authority can impose

an additional buffer (market confidence buffer) to absorb potential additional losses or restore market confidence. (The European banking package - revised rules in EU banking regulation, 2019:47)

For calibrating MREL on the basis of the LRE, the loss absorption amount and the recapitalisation amount will each be subject to a requirement of 3% of LRE, or a total of 6% of LRE. The LRE-based MREL does not include a market confidence buffer. When setting an institution-specific MREL, the resolution authority can take into account not only the two above-mentioned metrics but also the 8% TLOF requirement,³⁷ thereby ensuring a level of MREL that might allow access to the SRF which could potentially be necessary in a resolution case. (The European banking package - revised rules in EU banking regulation, 2019:47).

4. Conclusions

An effective and resilient banking system ensures sustainable economic growth and financial stability. The last financial crisis highlighted the limitations of the regulatory framework to handle a bank failure without public money. Many authors find that the tightening of capital regulation have all resulted in a deleveraging of the banking sector and have, thus, contributed to enhanced financial stability. We agree with the above cited authors who find "the regulatory revolution that has taken place since the crisis has not just been necessary but has been essential to underscore the safety of the global financial system and for reviving a sustainable global economy over the medium and long term." The major elements of the new MREL framework, other than the TLAC requirement, will become applicable on 28 December 2020. Although the entry into force of the European Union banking package represents the end of the process of revising European banking regulation, banking resolution remains a complex process and in modern financial times, only transparent, predictable and applicable regulatory framework can make it effective and successful in its further development.

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CHAPTER 12

DEVELOPMENT POTENTIAL OF PUBLIC INVESTMENT PROJECTS FINANCED PARTLY BY EU FINANCIAL INSTRUMENTS

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Abstract

According to EU rules in terms of novel financing approaches, and like other any other beneficiary county receiving EU funding, Croatia is permitted to use a considerable part of allocated funds not only from grants but also from financial instruments. This includes financial instrument like equity, debt and guarantees for financing public and private investment projects. Restrictions imposed by contracting authorities (public clients) on long-term borrowing for public investment projects and a general lack of budgetary sources for funding, as well as increasing demands from taxpayers for modern public infrastructure based on better cost-quality considerations for public services, impose on public authorities the imperative to combine grants and financial instruments with alternative procurement models. The aim to achieve best value for money and lower whole life costs by combining (blending) different sources of funding, financing and procurement. In developed countries, this practice is common. This topic is of particular importance for contracting authorities in the Republic of Croatia, given the announced restrictions on the new EU financial perspective 2021-2027 and the need to devise new models for procurement and financing of financial gaps resulting from larger national components in the EU grant scheme. The paper presents an analysis of past experiences in applying financial instruments and alternative procurement models for public investment projects and also proposes procedures and actions for more efficient use to quicken further development.

Key words: financial instruments, European Union, alternative procurement models

JEL classification: G38, H80.

1. Introduction

The Republic of Croatia currently finds itself in the period immediately prior to the programming of financial instruments provided by the European Structural and Investment Funds (ESIF) in public and private sectors for the European Union's financial period of 2021-2027. ESIF financial instruments were available in the seven-year financial period of 2014-2020, in which initial experience in programming and execution of the instruments was acquired.

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This experience articulated the lessons learnt, and accordingly created preliminary conditions for more efficiently programming the next program period. The primary messages coming from the previous program period are that: (i) programming and applying financial instruments (three years after commencement of the period) was somewhat delayed, (ii) too much time was needed to adjust utilisation of financial instruments, (iii) the private sector is significantly more effective in utilising financial instruments than the public sector, (iv) the public sector lacks creativity and is rigid in creating various types of financial instruments, (v) the traditional procurement model by default does not provide a wide range of financial instruments in the public sector.

Based on theoretical and practical familiarity with blending grants and alternative procurement models (Juričić, Kušljčić, 2014) and lessons learnt locally in applying financial instruments in the previous period, as well as from lessons learnt in applying alternative procurement models including local practice and lessons learnt in efficiently applying public-private partnership models in the country (Juričić, Marenjak, 2016) and the world, the conclusion is that combining or blending grants and financial instruments with alternative procurement models may become an important instrument in achieving: (i) better allocation of project risks, especially in the post COVID-19 period, (ii) better multiplier effects from public and private sources of financing, (iii) greater growth rate of gross domestic product, (iv) job growth, (v) a better relationship between quality and price of public services (especially healthcare services).

2. Financial instruments in the Republic of Croatia

At the end of 2015, the European Investment Bank (EIB, 2015a) conducted a so-called ex-ante assessment of market failures of businesses operated by private enterprises, where based on specifically identify market failures, the aim was to identify types of financial instruments and combine or blend them in various ways with grants. The results indicated that small and medium-sized enterprises have a need for loans, guarantees and capital (equity) sources for financing. The estimation showed that total investments valued at 1.018 billion euros should be financed from public and private sources, of which the public contribution would amount to 904.6 million euros and 226.2 million euros from private sources. Approximately half of that amount relates to private financial intermediaries, and half to instrument beneficiaries. In terms of public sources, the contribution from European Structural and Investment Funds amounts to 299 million euros, of which national public sources should be included, amounting to 45 million euros. Based on the conclusions from these analyses, financial instruments for small and medium-sized enterprises were devised. Table 1 shows the specific financial instruments.

Table 1: The structure of financial instruments directed towards small and medium-sized enterprises in the Republic of Croatia on 31/12/2019 for the 2014-2020 program period

No	Financial instrument	Provider	Year	Used (kn)	Cumulative (kn)	Maturity (mjeseci)	Quota	Cumulative (%)	Users	Cumulative (users)
1.	ESIF micro loan for investment	HAMAG BICRO	2016.	975.472	975.472	78			26	26
			2017.	19.320.876	20.296.349	71			575	601
			2018.	15.453.854	35.750.203	74			594	1195
			2019.	13.205.564	48.955.766	75			535	1730
2.	ESIF investment loan for rural development	HAMAG BICRO	2018.	6.365.399	6.365.399	71			19	19
			2019.	119.065.050	125.430.449	70			398	417
3.	ESIF loan for working capital	HAMAG BICRO	2016.	7.412.747	7.412.747	78			26	26
			2017.	157.641.935	165.054.682	71			575	601
			2018.	171.035.975	336.090.656	74			594	1195
			2019.	151.646.007	487.736.664	75			535	1730
4.	ESIF loan for working capital - rural development	HAMAG BICRO	2018.	6.365.399	6.365.399	71			19	19
			2019.	119.065.050	125.430.449	70			398	417
5.	ESIF national guarantees	HAMAG BICRO	2017.	161.432.828	161.432.828				108	108
			2018.	97.301.562	258.734.390				65	173
6.	ESIF individual guarantees (with interest subsidies)	HAMAG BICRO	2016.	10.012.289	10.012.289	144			2	2
			2017.	163.464.120	173.476.408	110			41	43
			2018.	418.261.731	591.738.140	120			86	129
			2019.	332.651.648	924.389.788	104			73	202
7.	ESIF individual guarantees (without interest subsidies)	HAMAG BICRO	2017.	29.246.615	29.246.615	88			7	7
			2018.	96.360.784	125.607.399	98			21	28
			2019.	178.745.714	304.353.113	98			44	72
8.	ESIF guarantees for rural development	HAMAG BICRO	2019.	11.175.485		116			3	
9.	ESIF lonas for growth and developmen	HBOR	2018.				1.618.880.000			
			2019.	518.440.000	518.440.000	144		32,02%	88	
10.	ESIF loans for energy efficiency for entrepreneurs	HBOR	2020.				515.000.000			

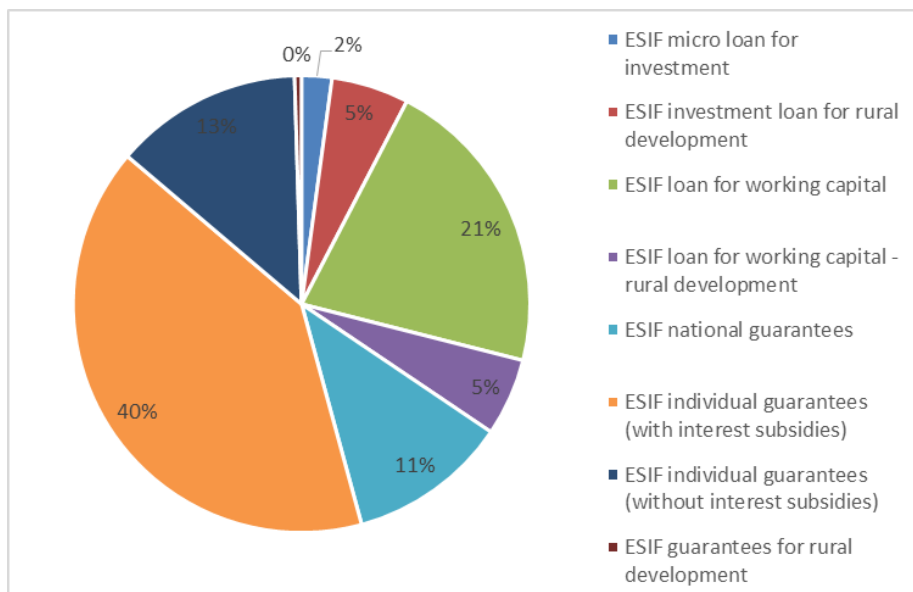
Source: Websites belonging to Croatian Agency for SMEs, Innovations and Investments (HAMAG-BICRO) and the Croatian Bank for Reconstruction and Development (HBOR).

In all, 4744 enterprises in the period from 2016 to 2019 utilised one or more benefits from sources of financing categorised into eight programs. The programs were directed towards investments and working capital regardless of the type of business and industry in rural development. Furthermore, as for type of assistance, the instruments are divided into:

- a) Loans with an average maturity period of six years and guarantees with an average maturity period of 10 years (guarantees with subsidised interest), and
- b) Guarantees with an average maturity period of eight years (guarantees without subsidised interest).

The total utilised financial instruments from HAMAG-BICRO as the grantor amounted to 2.286 billion kuna, the structure of which is shown in Graph 1 below.

Graph 1: Structure of utilised financial instruments from HAMAG-BICRO as the grantor



Source: Chart created by the authors based on data from Table 1

Based on analysis of the above presented data, the conclusion is that, in terms of the nominal value of financial instruments in the observed period, entrepreneurs were most interested in particular guarantees for subsidised interest rates which accounted for 40% or close to 924 million kuna in the structure of financial instruments. Next, entrepreneurs expressed an interest in financial instruments for working capital (loans) which accounted for 21% and amounting to approx. 488 million kuna. This was followed by guarantees without subsidised interest rates accounting for 13% and amounting to approx. 304 million kuna. The total value of allocated financial instruments in the 2016-2019 period amounted to approx. 2.286 billion kuna. The Croatian Bank for Reconstruction and Development was the issuer of financial instruments in terms of the growth and development program and energy efficient program for entrepreneurs. The former program was commenced in 2018 and over a two-year period a total of 518 million kuna or 32% from a total allocation of 1.618 million kuna was granted. The latter program was commenced in 2020 with a total allocation of 515 million kuna.

The second ex-ante assessment (EID, 2015b) focused on investment requirements in promoting energy efficiency and utilisation of renewal energy sources in production processes and incentivising energy efficiency, smart energy management and utilisation of renewable energy sources in public infrastructure, including public building and the housing sector, for which a total of 504 million euros was earmarked as necessary investments for energy renovation of public buildings. Given that the number of existing financial institutions is insufficient

for settling these demands for sources of financing, the recommendation is that part of the gap be settled from grants and financial instruments from European Structural and Investment Funds. Furthermore, insufficient experience and know-how in financing these types of projects has led to too slow development and application of alternative procurement models, of which the EPC and ESCO models are best known. The Summary of the preliminary analysis (Ministry of Regional Development and EU Funds, EIB 2015) points out that financial instruments in the sustainable urban development sector can ensure significant added value and can be in the form of:

- i) loans (medium- and long-term) to secure financing subject to affordable conditions and thereby support financial sustainability of projects,
- ii) equity for investing in projects involving public-private partnerships (PPPs) or special purpose investment mechanisms in order to attract additional funds and share operational risks, and
- iii) equity capital for ESCO enterprises in the public lighting sector in order to ensure financial sustainability of projects and attract additional funds.

The types of financial instruments in the public sector is shown in Table 2.

Table 2: Types of financial instruments intended for the public sector in the Republic of Croatia on 31/12/2019 for the 2014-2020 program period

No	Financial instrument	Provider	Year	Used (kn)	Cumulative (kn)	Maturity (mjeseci)	Quota	Cumulative (%)	Users	Cumulative (users)
1.	ESIF loans for public streetlighting	HBOR	2019.	33.940.000		120,00	152.000.000	22,33%	8	8
2.	ESIF loans for energy efficiency in public sector	HBOR	2018.	187.530.000	187.530.000	168,00	190.000.000	46,56%		
			2019.	99.164.800	286.694.800	168,00	212.800.000	71,18%	58	58

Source: Websites belonging to Croatian Agency for SMEs, Innovations and Investments (HAMAG-BICRO) and the Croatian Bank for Reconstruction and Development (HBOR).

Of the 152 million kuna from total amount of loans for public lighting in 2019, the sum of 34 million kuna or 22% of the total amount was utilised. The sum translates into loans given to approved local self-government units for energy renewal of public lighting systems, i.e., replacing energy inefficient lighting with energy efficient devices (LEDs). Users of these loans have recognised the benefits in the fact that these sources financed the capital value of the project in full, while it is also a disadvantage for the financial instrument issuer given that no multiplier effect was achieved nor did the instrument contribute to reducing dependency on non-returnable capital assistance, i.e., grants. On the other hand, loans for energy efficiency in the public sector financed projects for energy renovation of public buildings. The limit of 190 million kuna in 2018 was almost entirely utilised, hence the limit in 2019 was increased to 212 million kuna of which 47% was utilised in that year or cumulatively, 71% of the entire program for energy renovation of public sector buildings.

In comparing Tables 1 and 2, it becomes clear that there is a greater difference in utilisation of financial instruments in the private sector than in the public sector. Narrowing financial instruments in the public sector solely to loans

significantly reduces the opportunity for public management to achieve greater efficiency and effectiveness in procedures for delivering effective public services. The consequences of a reduced variety of financial instruments also leads to reduced affordability, and also higher prices for public services, and consequently less value for taxpayer money.

3. The role of financial instruments in supporting development of public infrastructure

Based on the European Union's interpretation, the basic purpose of financial instruments is to encourage investments that generate income and achieve certain savings. Increases in investments are directly related to increases in economic activity, not only in the country beneficiary but also generally in the European Union. The fundamental presumptions to achieve this purpose is aided by the following mechanisms (*fi-compass*, 2015) is the: (i) sharing of risks, (ii) multiplier effect, and (iii) renewability of sources.

In terms of sharing risks, it should be noted that the financial instruments enable some of the project risks, which otherwise commercial sources of financing are not inclined to assume, are transferred to the issues of the financial instrument, i.e., the European Union. This enables other sources of financing from the private sector to participate in project development. The multiplier effect refers to the relationship between public and private sources of financing a project. The aim is for a proportion of the private (commercial) sources of financing to gradually increase. Renewability of sources refers to so-called "recycling" of sources, i.e., multiple use of the same source for a number of projects.

However, our attention is drawn to the question of more intensive use of financial instruments for developing public investment projects and the impact of financial instruments on public debt, public expenditures, increasing public investment projects for private entrepreneurship, the effect on the possibility of achieving better value for money and reducing risks posed by public projects.

3.1. Importance of financial instruments in reducing public debt

According to Eurostat (European Commission, Eurostat, 2013; 2019; Eurostat, EIB, 2016), one of the most important criteria for off-balance-sheet allocation of liabilities of a public project in the public sector is the transfer of a major part of the project risk outside the sector to which the public authority belongs. For an enterprise to assume project risks, which are primarily those which it manages more efficiently than the public authority, its risk-weighted earnings must be acceptable. Financial instruments can help in such transactions where risks that negatively impact on risk-conforming earnings for private entrepreneurship are assumed from all other forecasted risks intended for transfer to the private sector. They can be guaranteed financial instruments that contribute to increasing the share of commercial debt financing sources or equity instruments with a smaller anticipated rate of return.

3.2. Importance of financial instruments in reducing whole-life costs

Based on accepted norms that define whole-life costs, costs of financing and costs of risks are an integral part of it. Debt financial instruments can reduce financing costs, whereas guarantee instruments (surety) can assume some of the project risks which would otherwise be assumed by the public authority during execution of the public investment project. These two measures reduce whole-life costs and consequently increase affordability of the public project for the contracting authority. Financial guarantee instruments can have a positive effect on mitigating project risks when applying the public-private partnership model by assume some of the risk relating to the fee which the public partner remunerates the private partner in exchange for the delivered service involving availability of facilities.

3.3. Importance of financial instruments in increasing competitiveness of local private entrepreneurship by participating in public infrastructure

Alternative models for procuring public investment projects such as public-private partnerships, energy performance contract, concessions, construction rights or sale and leaseback, imply the inclusion of entrepreneurship in some project functions such as design, building, maintenance, financing or management. Transferring these functions to a private entrepreneur also transfers risks along with transferred functions. Over the last decade, these procurement models have been increasingly applied. Their use includes entrepreneurship and increases their competitive advantage. Moreover, including private entrepreneurship in applying project financing techniques implies engaging equity. However, a generally known fact is that Croatian private entrepreneurship has insufficient equity. This deficit prevents them in submitting bids in public procurement procedures, acquiring concessions or providing energy services. This fact neutralises the competitive advantage for local entrepreneurs with respect to those interested entrepreneurs from countries with more intensive use of alternative procurement models. Financial instruments, especially forms of equity, may very well significantly lead to increasing the competitive advantage of local entrepreneurs, but also increase the multiplier outcome.

3.4. Importance of financial instruments in improving value for money

Value for money, in the widest possible sense, is the relationship between benefit and cost of purchased or utilised assets. Value for money in public projects is covered when selecting investment options for greater efficiency and effectiveness in processing involving preparation, procurement and utilisation of public buildings or services across the whole life and which also includes a system for measuring project outputs. The approach to deciding on the manner of procuring a certain asset requires that a private investor calculate the effects of the procurement as opposed to leasing (Orsag, 1992). A similar analysis is

undertaken by public management (Skelcher, 2005) when determining whether it is more useful to purchase a public building (in-house, traditional model) or purchase the service for availability of the building or premises (alternative model – PPP). Value for money is also defined as the optimal utilisation of available resources with the aim of achieving certain goals, such as the optimal combination of whole-life costs and quality of service with the aim of achieving satisfaction of end users (ACFID, 2012). The value for money concept is also used in the analysis, i.e., comparing benefits and costs of different technical and technological investment options as well as the project procurement model (NAO, 2001). Given that the (quantitative) value for money represents the difference in present value of whole-life costs for technological options of procurement or options of the procurement model, financial instruments may also have a positive effect on reducing whole-life costs. The availability of different types of financial instruments, which are more at the disposal of the contracting authority when applying alternative procurement models, means that cost reductions can also lead to better value for money.

4. Recommendations to management bodies in applying financial instruments for development of public infrastructure

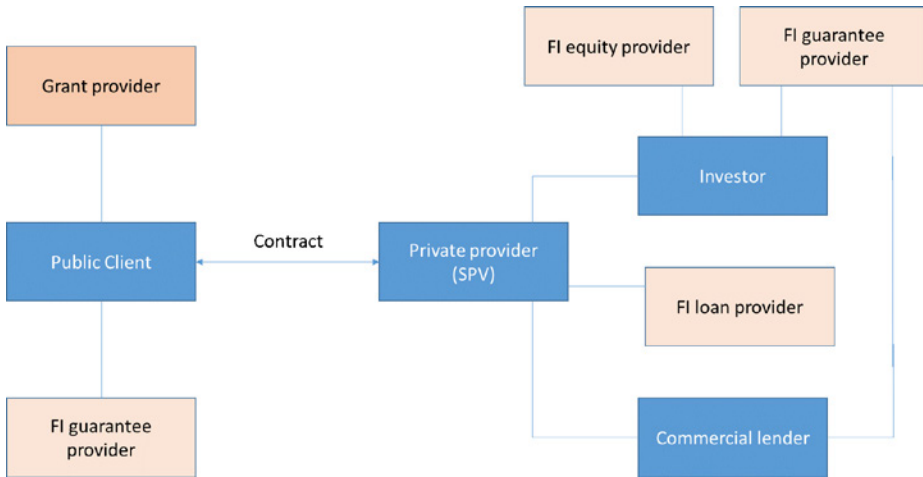
The pace of preparations, smaller number of procurements within a single project, smaller whole-life costs, essentially simple accounting records of transactions for the contracting authority, greater value for money and relatively smaller public debt are indeed factors due to which alternative procurement models are increasingly gaining traction with contracting authorities in Croatia. However, processes involving traditional project procurement are simple (involving one loan agreement including a possible grant), whereas processes in alternative procurement models in establishing financing sources are significantly more complex. This is inherently understandable given that the basic intention of utilising the alternative procurement model is to transfer a major part of total risks arising from public projects to private sector subjects (for ESCO model – onto the energy service provider, for the PPP model – onto the private partner, for concessions – onto the concessionaire, for construction rights – onto the entrepreneur). Creditors do not finance projects in traditional forms of procurement, but instead only the budget as the source of financing, whereas when applying the alternative procurement model, not only are creditors but also all financing sources finance the project where the risk to a large extent depends on the quality of the investor or consortium. Therefore, sources of financing will also conduct a more complex risks analysis and adapt financing instruments to specific risks which are assumed in respective financing process.

Based on what has been said, what will happen, and has already happened in Croatia on a number of occasions, are situations in which particular sources of financing are not linked to risk assumed in the financing process. Hence, in some situations, equity are insufficient, whereas in other situations,

the repayment period for a higher priority loan is too short; and lastly in some cases, certain sources of debt financing were inadequate.

To overcome this situation and encourage application of the alternative procurement model, what is important is to direct greater attention to programming those financing instruments which are absent from the Croatian market. The spectrum of possible financial instruments which may be used when applying alternative procurement models for public projects is shown in Figure 1.

Figure 1: Applying financial instruments for alternatively procured public projects



Sources: Authors of this paper.

Though any programming of financial instruments requires a prior detailed ex-ante assessment of market failure, the possibilities of applying financial instruments to public projects procured using the models referred to as PPP, ESCO, concession or construction rights are shown here. In applying the PPP or ESCO procurement model, the public partner or contracting authority for energy services pays the private partner or energy service provider a fee either for availability of premises (PPP) or energy savings (ESCO). Given that the fee is income for the private partner from which, after taking into account operating costs, settles sources of financing, guarantees for payment of fee (in Figure 1: FI guarantee provider – unitary charge) lead to significantly reducing any risks in the ability to pay the contracting authority. Lessening this risk directly affects a change in the structure of total sources of financing for the special purpose vehicle (SPV).

A guarantee in favour of the issuer of lower priority sources of financing (Figure 1: FI guarantee provider) would provide greater security for investing these sources of financing which assumes those risks for which commercial lenders are not inclined to assume. Furthermore, the instrument which is probably more needed on this market is the instrument referred to equity (Figure 1: FI equity provider). Specifically, this source of financing is obtained by investors,

those (e.g., a consortium) who are selected in the public procurement process as the best bidder. This source represents ordinarily 10% to 30% of all sources of financing depending on the degree of risk posed by the project. In international practice involving types of equity, the smaller proportion of equity is provided by investors – selected bidders, whereas the larger proportion is settled by equity funds. Given that interest from equity funds begins only for a large number of smaller projects, i.e., pipelines, or a smaller number of larger projects, this instrument may very well receive particular importance especially in the earlier stage of development and growth of this market. Naturally, in addition to the mentioned instruments, long-term loan instruments may also be used. These are loans with a longer repayment period which are more suited to amortisation of specific project assets and/or contract maturity.

5. Conclusion

The time has come for public management in Croatia to get involved in programming financial instruments for application in private and public sector businesses. The conducted analysis leads to the conclusion that the current practice of applying financial instruments in the EU is significantly more prevalent in the private than in the public sector. While debt and guarantee financial instruments are used in the private sector, the public sector uses solely debt instruments. Though the private sector has been applying the said instruments in different areas, the public sector has done so solely as a cheaper source of financing in order to cover capital values of public investment projects. However, the analysis has shown that a wider range of financial instruments can be achieved in applying the alternative procurement model by including private entrepreneurship in the delivery of public social and economic infrastructure. Equity and guarantee financial instruments blended with alternative procurement models and grant aid may very well have a manifold effect on reducing grant aid per investment unit, less whole-life costs, better allocation of risks posed by public projects, greater affordability for contracting authorities and better value for money provided by taxpayers.

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CHAPTER 13

ACCOUNTING MODEL FOR MONITORING CAPITAL PROJECTS FINANCED THROUGH BLENDING PUBLIC-PRIVATE PARTNERSHIPS WITH EU FUNDS IN CROATIA¹

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Abstract

In the absence of one's own financing resources and due to limited borrowing opportunities, both public and private investors are increasingly questioning opportunities and economic justification in using modern approaches to financing capital projects. For a long time, this has been the public-private partnership model, especially private finance initiative. A particularly attractive and desirable form of financing are grants from EU funds, but which are progressively making way for financial instruments. Accounting tracking of capital projects when using modern forms of financing, and the blending of these forms, requires identifying new and appropriate accounting models to conform to scientific and legal frameworks established at the international and national level. To create such models, a systematic qualitative analysis is required of the traditional project financing model, the public project financing model using ESIF grants, basic forms of PPPs and financial instruments. By combining or blending these models, a hybrid accounting model for processing blended projects can be defined. The analysis is based on current and recent legal as well as professional frameworks given in the International Financial Reporting Standards for entrepreneurs (IFRS) and the public sector (IPSAS), statistical requirements for asset and public debt classification, and recognition of income and expenses (ESA 2010), EU legislation and national legislation (Croatian Accounting Act/Croatian Standards of Financial Reporting), the Croatian Budget Act and the respective subordinate legislation, including tax regulations, EU Regulations). This paper presents the results of a qualitative analysis, on the basis of which the authors propose an accounting model for these financially complex investment activities.

Key words: capital projects, public-private partnership, funding sources, EU funds

JEL classification: G30

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1. Introduction

Accounting as a scientific field of economics has the task of finding accounting solutions for optimal information processing of modern business events which are the result of international integrations, new economic financial relationships and public sector reforms within a national and global framework. These also include the development of numerous different models of public-private partnerships (PPP) and imply the need for identifying new accounting models which reflect the basis of a contractual relationship between public and private partnerships.

It involves entities for whom accounting is based on various accounting concepts. When these business relationships also include heterogeneous sources of financing, new accounting solutions must be devised. This paper presents the results of scientific research into the actual problem covering accounting tracking of investment activities using the PPP model in addition to financing using funds from European Structural and Investment Funds (ESIF).

Accounting analysis is focused on the private finance initiative (PFI) model for PPP and blended finance in line with the relevant procedure for blending PPP and ESI funds. Besides analysing particular accounting models used by stakeholders in implementing projects, the tax implications of typical business events which are immanent are also investigated. The analysis is based on actual and recent professional and legal foundations contained in the International Financial Reporting Standards (IFRS) for entrepreneurs and the public sector (IPSAS), statistical requirements of classifying assets and public debt as well as recognition of revenue and expenditure (ESA 2010), EU legislation and national legislation.

2. Accounting for financing projects using EU funds

Upon entering the European Union and becoming a fully-fledged member state, the Republic of Croatia participates in implementing the European Cohesion Policy which implies the possibility of utilising European Structural and Investment Funds (ESI funds), and since 2014 the country has been operating within the Common Strategic Framework. In line with the Act on Establishment of the Institutional Framework for Implementing the European Structural and Investments Funds in the Republic of Croatia for the 2014-2020 Period (Croatian Parliament, 2014), they include: the European Regional Development Fund (ERDF), European Social Fund (ESF) and the Cohesion Fund (CF), as well as the European Agriculture Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF).

ESI funds have mutually complementary goals and are the main source of investments at the EU level for assisting member states in increasing their growth and ensuring a greater number of jobs, while at the same time ensuring sustainable growth in line with the goals of the Europa 2020 strategy.

The system for implementing EU programs and projects is based on fundamental processes, such as planning, execution, accounting monitoring and controls. During realisation of projects, beneficiaries of ESI funds are obliged to ensure a reliable audit trace which enables effective supervision and auditing of the implementation of an accepted project (Maletić, 2016).

Accordingly, project accounting faces complex requirements and bears great accountability.

The accounting system must ensure that all acceptable project costs are identified and recorded in reliable accounting records. Beneficiaries of EU funds who apply an accounting budget system for monitoring realisation of projects are able to apply the Ordinance (Ministry of Finance, 2013) for stipulated budget classifications. A crucial question in the realisation projects is accounting recognition of only those costs that are anticipated in the project and accepted under accountability. The general acceptability of costs is defined in the European Commission's regulations, and additional rules linked to acceptability of costs are cited in program documents and instructions aimed at beneficiaries for each particular project (Ministry of Rural Development and EU Funds, 2014). Accounting information on the realisation and outcomes of projects are also expressed by beneficiaries in terms of the stipulated national system of external financial reporting. Beneficiaries of funds, operating in terms of the general budgetary system are required to apply the Ordinance on Financial Reporting in Budgetary Accounting (OG, no. 3/15, 93/15 and 135/15). The content of elements from fundamental financial reports is determined using accounting rules which are operationalised by the Ordinance on Budgetary Accounting and Chart of Accounts (OG, no. 124/14, 115/15 and 87/16). The budget classification of the financing source is also adapted to tracking the utilisation of grants from EU funds (Croatian Ministry of Finance, n.d.).

For the purpose of this paper, accounting procedures for transferring grants from ESI funds are relevant in a modality where beneficiaries are a budgetary entity acting in the role of public partner in PPP projects. Grants from ESI funds are part of the financial structure for specific PPP projects based on the private finance initiative (PFI) model. Considering that funds in PPP projects are directed by the budgetary entity to the private partner which exists outside of the general budgetary system, their accounting records are classified and conducted as capital assistance from EU sources.

3. Project accounting based on the PPP model

The accounting process of tracking projects is determined using a specific form of PPP and PPP agreement which regulates mutual rights and obligations between public and private partners. This paper presents the fundamentals of accounting for tracking PPP projects based on the modality of the private finance initiative (PFI), given that it is the only permitted modality in Croatia. The essence of contracted PPP models is the delivery of complex services which to

a significant extent include assets (infrastructure and other properties) necessary for their provision. Proper accounting processing of PPP models requires analysing specific agreements and asserting whether they contain leasing elements. In PPP models, leasing must be excluded. Accordingly, it is important to take into consideration the provisions of IFRS 16 – Leases.

3.1. Features and modalities of PPP

The concept of a public-private partnership (PPP) is understood in various ways in different countries. The definitions are many, but they are essentially narrowed to the following: “a public-private partnership (PPP) is a form of cooperation between the public and private sector, with the aim of improving realisation of investments in infrastructural projects and other types of operations, providing public services by sharing risks, combining expertise from the private sector or other sources of capital.” PPP modalities are also numerous, but basically include two fundamental types: the so called pure contractual model and the institutional model. A partnership is contractually based solely on the pure contractual model.

Institutionalised PPP models include the incorporation of bodies which are managed in common by the public and private partner. In the PPP contractual model, the act of awarding a PPP contract to the selected private partner is deemed a public contract. Two of the most important contractual models (Aviani, 2015, p. 8, 9) are BOT (Build-Operate-Transfer) and PFI (Private Finance Initiative).

In the BOT model, the private partner, under the control of the public partner, provides services to the public instead of the public partner. The private partner is financed through levies imposed on users of services with the possibility of receiving subsidies from the public body. In fact, this is a concessionary model applicable to so-called commercial projects (residential units for certain categories of the population, water supply systems, roads, railways, etc.).

In PFI models, the private partner builds and/or manages the infrastructure for the public partner and charges the public partner a fee or remuneration for services provided. This type of model is applicable for so-called non-commercial projects (schools, faculties, hospitals, courts, prisons, facilities used by firefighting department, the military, police). Remuneration paid by the public partner covers the costs of construction and maintenance, costs of assuming risks, financing costs and earnings for the private partner. The remuneration paid by the public body to the private partner stems from the most economically advantageous tender and must represent the so-called value for money principle. After expiration of the deadline for the contracted PPP, regardless of whether it involves the BOT or PFI model, the facility is generally transferred into the public partner's ownership. An institutionalised public-private partnership is a PPP model based on membership between the public partner and private partner within a common commercial company which is the vehicle for implementing a PPP project.

3.2. Accounting for PPPs in Croatia – the PFI model

Compared to a majority of other countries in which there is not single and precise definition of a PPP, the term has been legally defined (Croatian Parliament, 2014) in the Republic of Croatia as: “A public-private partnership is a long-term contractual relationship between a public and private partner, the subject of which is the construction and/or reconstruction and maintenance of public facilities, for the purpose of providing public services within the scope of the public partner, where in implementing the PPP project, the private partner assumes from the public partner obligations and risks relating to the construction process, and at least one of the following two risks: risk of availability of the public facility and risk of demand.” This definition under the term PPP emphasises a form of cooperation determined by the following aspects:

- A PPP is a long-term relationship.
- The private partner supplies a service for availability of premises and services.
- The private partner does not carry out works but services.
- The private partner shall bear the risks of financing, construction and maintenance,
- A public project must be within the scope of the public partner, i.e., it must involve a public service.

These defined features point out that the PPP model is the procurement of a public project, the subject of which is procurement of a service for availability of a public facility. This definition distances the PPP model from a whole series of other models applied in practice and the subject of which is the procurement of works. Moreover, the transferred obligation to construct and maintain means the public partner compensates the private partner in the form of PPP remuneration. The model also excludes leasing and concession within the relationship between the public and private partner. Key stakeholders and concepts of this model are defined further on in this paper.

A public contracting authority becomes a public partner upon concluding a PPP agreement. The public partner orders availability services. The private partner is a legal entity from the private sector who has concluded a PPP agreement, and based upon which an availability service is delivered to the public partner who is in turn compensated in the form of PPP remuneration. The private partner is a newly incorporated legal entity – special purpose vehicle (SPV) – founded by the most economically advantageous tenderer selected in the public procurement procedure.

A proper understanding of a PPP requires differentiating the procurement of goods from the procurement of services. Procurement of works is the value procured in a public procurement procedure for the (re)construction of a public facility. It does not include maintenance of the (re)constructed public facility

during its lifetime. On the other hand, the procurement of services is the procurement of “availability services” for the public facility. This means that besides (re)construction by the private partner, the functioning of the public facility is procured at a contracted level of standard for the entire contractual period.

According to Marenjak and Juričić (2016, p. 583), the key aspect of procuring an “availability service” in the PPP model is achieving the “value for money” criterion, meaning that the model must also achieve economic advantage over the traditional procurement model. This condition is proven using a methodologically defined by calculating the so-called whole-life cost comparator for the project.

Long-term obligations stemming from the PPP agreement for the public partner, in accordance with the EUROSTAT economic classification, is not considered borrowing and is not subject to legal restrictions of long-term indebtedness (Croatian Parliament, 2015, Art. 87-89). This gives the PPP models an added advantage over traditional models of public investments.

Realisation of a PPP project begins upon concluding the agreement between the public contracting authority and the SPV, i.e., the private partner. For the purpose of executing the agreement on the provision of availability services for the public facility, the SPV commences the process of acquiring or commencing the investment in constructing a new facility (or reconstructing an existing facility owned by the public contracting authority).

The legal presumptions for the model is that (re)construction of the facility is based on the right to build (or other contracted right) which has been established between the public partner (as the real owner of the construction plot or existing facility) and the SPV as the investor in the (re)construction project. In accordance with the Private-Public Partnership Act, the public partner may allow the establishment of construction rights in favour of the private partner, without the need to pay a fee. All issues relating to establishing or transferring construction rights and the granting of a concession, including issues relating to remuneration and fees, are regulated contractually between the public partner and private partner. The fundamental legal framework for construction of a facility based on construction rights is the Act on Ownership and Other Real Rights.

3.2.1. Accounting for the private partner

The accounting procedure for the private partner commences with (re)construction of a facility which is the subject of the PPP agreement. The private partner – entrepreneur, in constructing the new facility, will apply the Accounting Act, or specifically IAS 16 – Property, Plant and Equipment, given that the facility fulfils conditions for recognition of assets in the balance sheet. Throughout the duration of the PPP agreement, the private partner is the legal and economic owner of a newly built facility. Its accounting policy for depreciation of the newly built facility (and separately depreciated units), will be devised by the private partner in line with the useful life of the facility and required functionality

which is determined in the content of the PPP agreement and throughout its duration. Accordingly, during the useful life, the depreciation cost is recognised successively. Accumulated depreciation at the end of useful life is equivalent to the total capitalised cost incurred in acquiring the facility. In the event of reconstruction or extension to the existing facility in legal ownership of the public partner, the private partner will recognise its intangible assets – right based on investments into someone else’s assets for the right of use. These assets also meet the requirements for recognition of assets in line with IAS 38 Intangible Assets, because it is measurable, serves in achieving their economic use and stems from contractual as well as other legal rights. Accounting policies for depreciation of intangible assets will also be adjusted by the private partner to meet the conditions in the PPP agreement, as already mentioned for depreciation of fixed tangible assets.

In the procedure for acquiring tangible assets, the private partner as the entrepreneur and VAT obligor does not include VAT in the purchase value of the assets, given that VAT charged by the supplier is a deductible tax for the entrepreneur.

This also applies for recognition of intangible fixed assets – rights, where the private partner is only the economic and not the real owner of the property, given that the investment in reconstruction was undertaken on someone else’s assets with the aim of enabling the private partner to achieve economic benefit.

The private partner generates revenue by providing a service for the availability of the facility throughout the duration of the PPP agreement. Accordingly, the provisions of IFRS 15, Revenue from Contracts with Customers, will apply. In implementing the PPP agreement, the private partner will consistently charge the public partner VAT on the value of its deliverables of availability services.

3.2.2. Accounting for the public partner

The accounting procedure for the public partner commences upon approval of building rights and when the public partner records the liability of its property stemming from building rights in its analytical and off-balance sheet records. The balance sheet statement of the property constructed and based on given construction rights and/or increase in value of the reconstructed facility occurs upon expiration of the PPP agreement in line with legislative and/or contractual provisions on acquiring ownership rights. The residual or estimated value of the facility passing into the private partner’s lawful ownership without remuneration will be recognised in the appropriate account for fixed tangible assets while at the same time increasing its own sources of ownership (public capital). In effectuating the project, the public partner receives continually generated business revenue based on the received service for availability of the facility throughout the PPP agreement. In addition, remuneration will be charged including the associated VAT which is added to this income.

4. Accounting for projects financed by blending the PPP model and EU funds

The aggregated concept of “EU sources” implies essentially two different groups of sources. It includes non-refundable sources or grants (capital assistance, subsidies) and refundable sources or financial instruments (sureties, loan guarantees). The process of blending these two groups of EU sources with PPP is essential different not just in relation to beneficiaries, but also in terms of the application procedure and contracting, usage, payments and accounting tracking.

4.1. Blended finance using grants

Blended finance for PPP projects is the use of grants in the form of subsidies or capital assistance. The fundamental presumption of this blended finance model is contracting the private partner’s interest at a fixed relative amount or a fixed rate of return for investing one’s own funds into a PPP project. It involves including a grant for the public partner who, successively or as a lump sum, transfers it to the private partner in the form of capital assistance.

Thereafter, the public partner is able to contractually reduce the financial burden and stake of the private partner in the value of capital investment which is the subject of the PPP agreement. The consequence of this payment is a decrease in PPP remuneration, and increase in public partners payment ability. On the other hand, the private partner’s interest expressed as a contracted rate of return for investing its own funds remains unchanged, while its financial risks of utilising its own funds is reduced.

Blending EU sources with a PPP can be considered at two levels. The first level is conceptualising harmonisation of two independent processes with the aim of combining the same or similar procedures to achieve a synergetic outcome not just for simplification but also to accelerate the process. The other level is operational implementation of an approved EU source, i.e., defining the payment process, recording such accounts into the partner’s business ledgers, selecting an optimal manner of harmonising PPP remuneration based on the amount of the approved grant.

This analysis focuses on the accounting when implementing blended projects and is based on the procedure defined by the Agency for Investments and Competitiveness. In that context, capital assistance (subsidies, grants) is defined as a cash amount received by the public partner for the purpose of increasing “affordability” in procuring the project (Agency for Investments and Competitiveness, 2015). Capital assistance is awarded to public partners for the purpose of reducing capital expenditures with the aim assisting the public partner to settle future obligations resulting from total lifetime costs. EU rules permit beneficiaries of capital assistance to be public and private partners (EIB, 2016, p. 33), and based on the analysis, the beneficiary of capital assistance

is the public partner and such schemes have an economically neutral effect on the private partner. Payment of capital assistance is the process where the public partner pays the private partner and the process of harmonising the JPP remuneration as a consequence of the payment under the condition that the role of the private partner does not change in relation to its tender. The Agency for Investments and Competitiveness proposed the procedure of blending the PPP with ESI funds which shows in detail the blending of the PPP with grants through twenty-two steps, starting from determining where the project is acceptable for financing, and finally payment of the grant after finalising the construction phase (Agency for Investments and Competitiveness, 2015).

A brief presentation of the accounting procedure and tax implications for such projects in accounting undertaken by the public partner and private partner is given further on.

4.1.1. Accounting for the public partner

Accounting for blended finance of a PPP project commences for the public partner at the moment cash flows occur or upon completing construction subject to given conditions, when based on the conducted procedure, the public partner receives (or assigns) payment of the cash monies, i.e., a grant from EU sources intended for transfer to the private partner. The public partner recognises the received funds from the EU source as its own revenue. The role of the public partner is relevant in defining the nature of expenditures during the phase of realising the JPP project. Given that in the specific model of blended finance for a project, the public partner does not appear in a role as acquirer of non-financial assets (rights and/or properties), costs in realising the project are incurred at the moment of paying the received grant to the private partner. Given that funds in the PPP project are directed by the public partner to the private partner, it is recognised in accounting as capital assistance from EU funds.

During effectuation of the project by the public partner, continual expenditures stemming from remuneration for a service for availability of the facility will occur, which is paid to the private partner in accordance with the concluded PPP agreement. Accordingly, the associated VAT will be charged on the remuneration which in turn increases expenditure. Consequently, it becomes clear that the public partner in this project does not recognise assets nor debts in its balance sheet, given that the public partner assumes a role as user of the service for availability of the facility as provided by the private partner. Upon expiration of the PPP agreement, the facility becomes its lawful and economic ownership resulting in the entering of its estimated value into the balance sheet while at the same time increasing public capital. Accordingly, the public partner, as the acquirer of the facility, bears the associated property sales tax in line with current laws.

4.1.2. Accounting for the private partner

The private partner who was selected in the procedure for realising the PPP project, invests in the property with the aim of utilising it for generating its revenue and where the required conditions in the PPP agreement are fulfilled. The relevant facts are as follows:

- The private partner assumes the financing risk construction risk and functionality of the facility in full,
- The facility is owned by the private partner,
- The duration of the PPP agreement determines the rate of its full depreciation,
- Upon expiration of the agreement, the facility becomes the ownership of the public partner,
- The private partner is the obligor for income tax and VAT,
- The public partner forwards the received grant only upon fulfilling conditions for construction of the facility,
- The received grant funds for the private partner are by nature state support which has a neutral affect on its financial result and tax obligations.

The accounting procedure for receiving grants for the purpose of realising a PPP project by a private partner i.e., entrepreneur, is based on applying IAS 20 Accounting for Government Grants and Disclosure of Government Assistance. The fundamental accounting procedure is the recognition of government grants in profit and loss on a systemic basis throughout the period in which the entity recognises respective costs as expenditures for which the assistance is intended to cover.

Specifically, assistance relating to depreciative tangible assets are ordinarily not recognised in profit or loss in the periods nor in the ratio in which the cost of depreciation and assets are recognised. This approach ensures neutrality of government grants against the receiver's financial result and tax liabilities because the generated income is time delineated into a number of periods and is opposed to revenue from realisation of the project at the systemic level.

The private partner will apply IAS 16 Property, Plant and Equipment in the process of acquire and utilising assets which are the subject of a PPP agreement. Initial recognition in the balance sheet includes purchasing costs and lending costs. Depreciation of the facility commences when ready for use, i.e., the conditions necessary for its use exist, and ceases after expiration of the PPP agreement.

The private partner, as the entrepreneur and VAT obligor, in acquiring fixed assets and during its effectuation has the right to deduct tax charged by the supplier. Funds received in the form of government grants are not subject to VAT because they do not represent prepayment for future deliveries of services,

but represent the redemption value of ownership share in the facility (assets) which is the subject of the agreement, and in essence does not represent either subsidies directly related to remuneration/prices because PPP remuneration is contracted at a fixed relative amount or as a rate of return on one's own invested resources. While effectuating assets, the private partner, as the entrepreneur and VAT obligor, is obliged to consistently charge the associated VAT on its deliveries of the service for availability of the facility.

4.2. Blended finance using financial instruments

The utilisation of funds from EU sources in a more recent financial strategy for 2021-2027, has meant that financial instruments are becoming more prevalent as a substitute for grants. In this context, financial instruments represent assistance by providers of instruments to public or private partners for which there exists the obligation to return the instruments. A series of basic usable financial instruments have been determined.

These include loans or credits at favourable interest rates with a longer repayment period, as well as guarantees or surety instruments, equity or quasi-equity financing (Ehlert, Y., n.d.). Contracting financial instruments is a series of processes relating to concluding an agreement mainly implemented by the private partner and provides financial instruments to increase feasibility of a specific public project.

The procedure behind innovative financial instruments (blending) for a PPP does not require a particular accounting and tax analysis, given that it does not result in specific outcomes with direct implications on recognition of elements in financial statements belonging to stakeholders in a PPP project. The accounting procedure in tracking loans and credits commences with recognising the obligations of their users at the moment of receiving the approved funds.

As a rule, interest which the user pays to the provider financially represents operating expenditure. An exception is interest capitalised or included in the purchase price of a facility under conditions defined in IAS 23 Borrowing Costs. Guarantees and surety instruments are recorded in the receiver's off-balance sheet records.

5. Conclusion

In the absence of equity financing and limited possibilities of borrowing, public and private investors are increasingly questioning the possibilities and economic justification of using modern forms of financing capital projects. In developed EU countries, and also recently in the Republic of Croatia, this has been case for a while with public-private partnerships, especially the private finance initiative (PFI) model. An exceptionally attractive and desirable source of financing are grants from EU sources which prospectively are increasingly gaining

momentum over financial instruments. EU regulations and national legislation do not prevent the use of the mentioned sources of financing, and when combined or blended achieve positive synergetic outcomes.

For public entities, positive outcomes from the construction of infrastructural facilities by applying the PPP model, and which achieves “value for money”, is further increased by including grants from EU sources. Accordingly, the inclusion of grants in financing PPP projects reduces PPP remuneration and consequently increases their ability to make payments and long-term affordability of services for availability of infrastructure necessary for such operations. For private entities, i.e., entrepreneurs, the inclusion of grants from EU sources, increases their financial ability to become involved in PPP projects, mitigates financial risks associated with long-term investments in PPP projects, and at the same time provides a neutral impact on the rate of return from investing their own resources.

Blended finance models for PPP projects using grants from EU sources requires establishing appropriate accounting models for tracking. The basis of the devised accounting models is blended accounting of contractual provisions in the realisation of PPP projects and accounting tracking of the utilisation of EU grants. Accordingly, the models should be established separately for public and private partners, given that their accounting and tax status, as well as role in the project in essence, is different. In Croatia, a contractual form of PPPs may be applied based on the private finance initiative.

In such circumstances, accounting models are based on the presumption that the public partner is a beneficiary of the EU grant which may be used to participate in financing an infrastructural facility based on the PPP model. Accordingly, the remuneration for the private partner is contracted at a relative amount in line with the internal rate of return for using one's own sources of financing. The tax aspect of a blended project within the VAT system is comprehensively and essentially defined in the content of a PPP agreement.

The mentioned private finance initiative model for PPPs considered in the context of blended finance implies that the private partner delivers while the public partner consumes services for utilisation of a functional facility based on an agreement defined by features and quality standards. The subject of the PPP agreement is the delivery of a service for availability of a facility by the private partner to the public partner, and not the provision of goods and/or works. This fundamental fact of the PPP agreement defines not only accounting but also the tax status of stakeholders.

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CHAPTER 14

PROCESS STRUCTURE MATURITY AND FINANCIAL PERFORMANCE IN THE CROATIAN CORPORATE SECTOR

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Abstract

In this paper, we analyze the relationship between the maturity of the process-based organizational structures and financial performance of the companies, belonging to the Croatian corporate sector. Firstly, we review the previous empirical studies, related to the financial effects of business process orientation, as well as financial effects of other advanced managerial concepts and their implementation in the Croatian corporate sector. Based on the previous research results, we hypothesize that the benefits of process-based organizational structure maturity are not visible in the immediate financial performance in the analyzed Croatian companies. Methodological and practical explanations of this phenomenon are offered, including the analysis of the previous empirical studies.

Key words: Process-based organization, Maturity, Financial performance, Empirical relationship

JEL classification: L23, L25

1. Introduction

Intense competition across the world, demanding customers, career oriented employees, shrinking product life cycles and shortening response times are forcing companies, especially in dynamic industries, to re-focus from hierarchical and functionally based mindsets to more flexible, faster in responding, collaborative, horizontal and process-centered ways of thinking and organizing business (Bryne, 1993; Brooks, 1995; Buxbaum, 1995; Hammer, 1999; Lockamy III and McCromack, 2004). That contributed to considering processes as firm's strategic assets and shifted attention in managing organizations from supporting narrow (specialized) functional areas to coordinating complex combinations of cross-functional, outcome-based activities, usually referred to as the business processes.

Process view of the organization, as opposed to traditional hierarchies, requires an intervention in organizational design, as to empower traditional organization

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with organizational agility, which is characteristic to flat or less-hierarchical organizations (in terms of cross-functional coordination and cooperation, transparency across functional areas, etc.).

The process maturity concept proposes that processes can be improved over time, achieving growth in capability, richness and consistency across the entire organization (Dorfman and Thayer, 1997). Thus, shifting to process orientation requires investments in process development, since it can be expected that performance is improved in stages, as the processes mature. In other words, the overall performance of process-centered organization is highly related to the process maturity stage.

In this study, we are focused on the relationship between process organization maturity and the financial performance of medium and large firms in Croatia. We propose a process organization maturity model, as a combination of relevant elements of well-established business process maturity models (BPOMM and PEMM models) and test the effects of process organization maturity stages on financial performance of a firm.

The tested dimensions of financial performance include the management perception of financial performance and the actual financial performance, relative to the process organization maturity stage. Moreover, we compare the effects of business organization maturity level on perception of financial success and on actual financial success measured in return on assets (ROA), return on equity (ROE), operative margin, inventory debt cycle and revenue per employee.

The paper consists of six sections: introduction; discussion of the business process orientation concept; theoretical analysis of the business process maturity model, its application in business organizations and the expected performance outcomes; the methods section; statistical analysis of empirical results and conclusion/discussion.

2. Business process orientation

At the end of the 20th century, the process-centred concept of organizational design started to attract attention from academia and business. The idea of process orientation was introduced to the management and organization literature by Porter (1985) and his work on value chains. Deming (in Walton, 1986) analyzed identification of activities and connections across the firm, which can be linked and described as a *process*, going from the customers to the suppliers, Davenport and Short (1990) discussed the business process redesign from the information technology perspective. Later on, Hammer and Champy (1993) introduced the concept of business process reengineering, with the focus on delivering value to customers, through orientation on core business activities in process-based organizations. The common denominator to all these approaches is restructuring organizations, by managing processes, defined as customer-oriented and value-creating groups of interconnected activities.

Business process orientation represents a business philosophy, emphasizing the process-based activities, cross-functional co-operation, a holistic/systemic view of the company and orientation on producing value for customers and stakeholders (McCormack and Johnson, 2001). Davenport (1993) defines process orientation, as involving dimensions, related to: structure, focus, measurement, ownership and customers. Thus, a business process-oriented organization emphasizes processes, as opposed to hierarchies, and puts a special emphasis to outcomes and customer satisfaction (McCormack and Johnson, 2001).

3. Business process maturity, application to process organization and expected performance outcomes

Process-oriented view perceives organizations in terms of cross-functional process groups. The level of organizational efficiency depends on the organizational capability to identify, understand, stabilize, improve and integrate its processes, which requires development and investment in processes. Maturity models are frameworks for assessing the extent to which processes are defined, managed, measured and controlled (Lockamy III and McCromack, 2004). They, typically, include a sequence of levels, indicating an anticipated, desired, or a logical path, from an initial state, to full maturity, by following a prescribed lifecycle pattern, based on the phase-based progress.

The maturity concept provides a useful framework for guiding process improvement, since it enables process benchmarking, provides assessment criteria and describes improvement strategies, to be implemented, according to the maturity stage (Gardner, 2004).

The process maturity concept can be applied to the individual process level (how well the process is defined, measured, managed and controlled, i.e. assessing the range, depth and quality of activities, leading to a specific outcome), or to the organizational level (how well the strategy, policies and organizational structure support the process orientation, i.e. assessing the spectrum of all activities, related to business process management).

One of the first and best-known maturity models is the Capability Maturity Model (CMM), initially used in the IT industry for the improvement of the software development processes. Later on, it was developed into a generic maturity model, applicable to many different fields. The maturity models developed up to such a point, that Champlin (in Spany, 2004) has identified more than 150 process maturity models in contemporary business practice and research. Most of them consist of four to six maturity stages and describe similar aspects of a transition from the traditional approach to process-based thinking and management. According to Van Looy et al. (2014), there are 69 business process maturity models, including popular frameworks, such as: the Process and Enterprise Maturity model - PEMM (Hammer, 2007) and Business Process Orientation Maturity model - BPOMM (McCormack and Johnson, 2001; Lockamy III and McCromack, 2004; McCormack et al., 2009). In PEMM, process maturity is

assessed separately from organizational maturity, although a higher level of organizational maturity implies a higher level of process maturity, as well. The BPOMM model (McCormack et al., 2009) suggests four stages of process orientation maturity: ad hoc (unstructured and ill-defined processes, no process measures, jobs and organizational structure based on traditional functions); defined (basic processes are defined and documented, formal process procedure is in place, jobs and organizational structure include the process aspect, function managers have regular coordination meetings); linked (strategic process management, process measurement exists, process jobs and structure are clearly defined), and integrated (cooperation within company, suppliers and vendors coordinated on the process level, jobs and organizational structure based on processes, process measures and management systems deeply embedded in the organizational system).

By understanding business flow and managing the processes accordingly, organization gradually adopts more process-based organization structure. Given different stages of process organization maturity, process structure can be found as additional organization structure implemented only in one or several business areas of a firm (for example, for new product development). Thus, elements of process-based organization structure can be found in firms with dominant traditional (functional or divisional) organizational structure. Thus, the organization can reach a certain degree of business process orientation maturity without formally being organized horizontally.

As processes mature, their capability, competence, consistency and organizational visibility increase. They become institutionalized through strategy, policies, standards and organizational structure (Gardner, 2004). The entire organization becomes flat/horizontal, with blurred lines between specialized units, although the management complexity increases, as decisions are made by diverse profiles of specialists in cross-functional teams. The maturity concepts implies that the entire process organizations develops in stages, as well, as the processes mature. The same applies to hybrid organizations, in which processes are used as one of the dimensions of the organizational design.

Therefore, the *purpose of the paper is to determine the potential influence of business process organization maturity to financial performance of medium and large companies in Croatia*. Thus, the research hypothesis has been formulated as follows:

Hypothesis: There is a positive relationship between the maturity of the process-based organizational structure and financial performance of the companies.

It is expected that the process organization maturity stage will have a statistically significant and positive effect on financial performance of medium and large Croatian companies.

4. Methods

Our proposition is that the higher level of business process organizations maturity will improve their financial performance, especially in medium and large firms. To test the proposition, we developed process organization maturity measurement framework, which was operationalized into a survey. The survey instrument consisted of three parts: items, related to the general description of a company, items related to the business process organization maturity stage and items, related to the financial performance assessment.

General items included questions on respondents' position within a company, industry, company's age, market, type of organizational structure, as well as a set of items, related to business process management tools and practice.

The *process organization maturity measurement* was based on elements of previously validated surveys, examining business process orientation. We used the PEMM (Hammer, 2007) and BPOMM (McCormack and Johnson, 2001; McCormack et al., 2009) maturity models, since they analyze all dimensions, relevant for maturity assessment. The main capability areas in these models are organizational structure and organizational culture, which we adopted, along with the considerations of the number of maturity stages. The use of these models can be considered as relevant, since they take into account both the current maturity of the business processes, as well as preconditions for the development of a process-based organization (Roglinger et al., 2012). The resulting maturity assessment model (see Appendix), consists of the following seven dimensions:

- 1) Leadership (engagement of top management);
- 2) Management (process approach to customers, suppliers and daily operations);
- 3) People and knowledge (knowledge and skills related to business process management, project management and change management);
- 4) Process view (documenting processes and understanding process management approach);
- 5) Jobs and tasks (job complexity, responsibility related to processes);
- 6) Organizational culture (values and beliefs oriented towards customers' satisfaction, teamwork, willingness for change, personal involvement and motivation);
- 7) Process management and measurement (process performance measurement, process inputs management, process result responsibility).

We also used four items, introduced by Škrinjar et al. (2008), in their study on financial and non-financial performance of business process orientation.

All items were measured on a standard, five-point Likert scale.

The instrument was tested for internal consistency by using the traditional Cronbach alpha measure. The model dimensions, related to Management and Organizational culture had low consistency (Cronbach alpha value below 0.6) and were, thus, excluded from further analysis. The five remaining dimensions, with 20 items, has the overall Cronbach alpha value 0.93, which was considered as relevant for further research.

The research has been conducted in 2018, in a form of an online questionnaire, distributed to top management executives (members of the corporate boards and company directors). Financial performance of the responding companies has been obtained on the basis of the executives' subjective assessment, as well as from publicly available financial reports.

The research population consisted of the entire cohort of mid-sized and large companies, registered in Croatia (there were registered 999 active companies in total on a given date). Response rate was 12% of the total population (119 surveys). Returned valid questionnaires were entered into the SPSS software for statistical analysis.

5. Results of the empirical research

The study is conducted on a sample of 119 Croatian medium-sized and large companies, with 66.7% of large and 31.7% are middle-sized companies. In terms of ownership, 76.7% are privately owned, 13.3% are public companies and 7.5% have a mixed ownership. Regarding the legal form of ownership, 45% are joint-stock companies and 53% are limited liability companies. In terms of market complexity, 32.2% are non-diversified, 39.2% diversified in up to four industries, and 21.7% in five or more industries. For 73.3% of respondents, the most important is the domestic market. Over 62% claimed they have a leadership position on the market. Most respondents belong to the wholesale and retail sector (24,2%), followed by finance and insurance (23.3%) and manufacturing (20%).

The majority of responding companies reported to have in place the functional organizational structure (77.5%), followed the divisional organizational structure. While 45% companies reported to have implemented more than a single organizational structure, only 9.2% have reported the process organizational structure to be in place. Although the functional does not automatically prevent business process management to be instituted, nor it makes impossible to achieve high a level of process maturity, it certainly does belong to the group of traditional, hierarchical structure, often not easily adaptable to cross-unit cooperation (Galbraith, 2014).

Descriptive statistics, computed according to the final maturity assessment model, are presented in Table 1. According to top managers' perception, highest scores are achieved in dimensions Leadership, Jobs and tasks, Management and Process view.

Table 1: Business process organization maturity dimensions – descriptive statistics

Dimensions	N	Min.	Max.	Avg.	Stdev.
Leadership	119	1.00	5.00	4.0420	.83762
Human resource & knowledge	119	1.00	5.00	3.5378	.89053
Process view	119	1.33	4.83	3.6246	.64703
Jobs & tasks	119	2.25	5.00	3.7479	.58176
Business process management & measurement	119	1.38	5.00	3.5200	.73321

Source: Research results

The overall indicator of the business process organization maturity construct is computed as a mean of the individual dimensions and equals 3.69, with the standard deviation of 0.6 (as measured on the standard, five-point Likert scale). The value indicates that the responding top managers perceive business process organization as well established in their companies, although there is still significant space left for improvements to the stage of systematic process management and beyond.

Financial performance is assessed in two ways: through top management perception and by using the actual financial data. Financial indicators used in a survey are ROA, ROE, operating margin, debt cash conversion cycle, average time of inventory turnover and income per employee. These are standard indicators, used in many studies, as to assess the financial performance of a firm, and they are, also, commonly used in studies related to assessing performance of business process oriented business systems (Kaplan and Norton, 1996; Kohlbacher and Reijers, 2013; Škrinjar et al., 2008; Ravesteyn et al., 2012; Tarhan et al., 2015). Means for all the six financial performance indicators, as measured per top managers' perception, are presented in Table 2. According to top managers' perception, means for all the indicators are between the values of 3.68 and 3.80, indicating their view of their companies as fairly successful financially.

Table 2: Financial performance (top management perspective) – descriptive statistics

Financial performance – top management perception	N	Average	Standard deviation
ROA	119	3.68	0.853
ROE	119	3.74	0.887
Operating margin	119	3.80	0.798
Debt cash conversion cycle	119	3.77	0.838
Average time of inventory turnover	119	3.72	0.791
Income per employee	119	3.75	0.750

Source: Research results

Results of the empirical research, according to the top management perception of financial performance of a company, were mainly aligned with our hypothesis. Correlation coefficients, indicating significant correlation ($p < 1\%$, $N = 119$), between process organization maturity stage and perception of financial performance (except for the average time of inventory turnover indicator) are presented in Table 3.

Table 3: Correlation matrix with the financial performance (as perceived by top managers)

Financial performance – top management perception	Business process organization maturity	ROA	ROE	Operating margin	Debt cash conversion cycle	Average time of inventory turnover	Income per employee
Business process organization maturity	1	0.478**	0.392**	0.449**	0.180	0.255**	0.425**
ROA		1	0.852**	0.651**	0.479**	0.508**	0.681**
ROE			1	0.619**	0.467**	0.488**	0.715**
Operating margin				1	0.362**	0.394**	0.636**
Debt cash conversion cycle					1	0.671**	0.407**
Average time of inventory turnover						1	0.467**
Income per employee							1

**Significant at the 0.01 level

Source: Research results

Companies with high values of the business process organization maturity showed better financial performance, for all financial indicators, except the debt cash conversion cycle, with a high statistical significance ($p < 0.01$). For all those indicators, a valid linear regression model could be produced, meeting all the statistical preconditions. Table 4 provides an overview of the statistical significance and the predictive power (R^2) for each of the models. It is evident that, according to their top management perception, companies with high values of business process organization maturity tend to have better ROA, ROE, operating margin, average time of inventory turnover and higher income per employee.

When the management perception of financial is replaced with financial data from financial reports, using the same indicators, correlation coefficients turn to be insignificant for each and indicator, indicating there is no correlation between process organization maturity stage and performance (see Table 5).

Table 4: Selected statistical parameters of the models of linear regression between the business process organization maturity and performance (as perceived by top managers)

Financial performance – top management perspective	ROA	ROE	Operating margin	Average time of inventory turnover	Income per employee
Sig. for the Beta coefficient	.000**	.000**	.000**	.005*	.000**
Sig. for the entire model	.000**	.000**	.000**	.005*	.000**
R ²	0.229	0.154	0.202	0.065	0.181

**Significant at the 0.01 level

*Significant at the 0.05 level

Source: Research results

Table 5: Correlation matrix with the financial performance (from financial reports)

Financial performance – financial data	Business process organization maturity	ROA	ROE	Operating margin	Debt cash conversion cycle	Average time of inventory turnover	Income per employee
Business process organization maturity	1	0,037	0,036	0,065	0,151	-0,072	0,106
ROA		1	0,058	0,728**	0,054	0,009	0,09
ROE			1	-0,135	0,009	-0,001	0,053
Operating margin				1	0,17	-0,08	0,146
Debt cash conversion cycle					1	0,013	0,254**
Average time of inventory turnover						1	0,055
Income per employee							1

Source: Research results

6. Discussion and conclusion

Our empirical results can be summarized as follows:

- *There is a statistically significant, strong and positive relationship between maturity of process organization and perception of financial performance;*
- *There is no statistically significant relationship between maturity of process organization and the achieved financial performance;*
- *Therefore, the proposed hypothesis on the process-based maturity and financial performance cannot be empirically supported.*

These results are *aligned with the previous empirical studies*. Namely, they do show that companies, at a higher business process maturity stage, consistently outperform those at lower levels (McCormack and Johnson, 2001; Škrinjar et al., 2006, Škrinjar, et al., 2010; Ravesteyn et al., 2011; Kohlbacher and Gruenwald, 2011; Kohlbacher and Reijers, 2013). For instance, McCormack (2001) conducted an empirical study to explore the relationship between business process orientation and enhanced business performance. His findings emphasize importance of business process orientation in reducing conflict and encouraging greater connectedness within an organization, while improving overall business performance. Kohlbacher's (2009) findings supports the thesis that business process orientation is positively associated with customer satisfaction, product quality, delivery speed and time-to-market speed.

However, most of the evidence indicates that business process orientation is directly related to non-financial performance of a company, usually measured by top management perception/assessment. The empirical evidence of relationship between business process orientation and financial performance remains inconclusive. There is mixed evidence, regarding relationship to corporate financial performance, as well as the lack of empirical studies concentrating on the structural aspect of the business process orientation (process-based organization).

For instance, Škrinjar et al. (2008) also conclude that Business Process Orientation contributes directly to non-financial performance but cannot establish a direct link to financial performance.

They suggest there is only an indirect link of BPO to financial, via non-financial performance. A similar result is achieved by Peronja (2015), who establishes the direct link between Critical Success Factors (CSFs) of Business Process Management and non-financial performance, but establishes no link between BPM CSFs & financial performance.

These results can be illustrated by similar studies, analyzing the financial outcomes of other complex management tools, such as knowledge management. For instance, Hajdić (2015) establishes a relationship between Knowledge Management (KM) development & non-financial performance but establishes no relationship with financial performance, while Vidović (2010) presents limited evidence on the KM's influence to financial results.

At one hand, several objective reasons could be found, for such a consistent pattern of empirical studies, which fail to find conclusive evidence for the financial outcomes of complex management tools. Those could be related to the specific Croatian, or – in general, post-transition business environment, which limit the transfer of non-financial to financial performance effects. In general, there might be a time-lag effect or a critical threshold for conversion of non-financial to financial performance (Ittner & Larcker, 1998), or other important contingency factors in this relationship (Venkatraman & Ramanujam, 1987), which are currently not recognized in empirical research in Croatian economy.

It would be important to identify those factors, if they do exist. To address potential methodological issues, problems of data availability and longitudinal research should be addressed (due to the potential data lag).

At the other hand, highly correlated results for maturity – perceived performance and lack of any correlation for the maturity – realized performance relationships *might suggest a high level of managerial bias, when assessing the impact of complex managerial tools*. Potential answers to this question require future empirical research, with the special emphasis on meta-studies of complex business management tools and their performance effects. In addition, studies on the contribution of business process-based and other complex management tools to overall (financial) performance of a firm, which are based on management perception, should be considered with caution.

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Appendix: Operationalized research model.

Process organization maturity			
Dimension	Item	Maturity model	
LEADERSHIP	The senior executive team sees its own work in process terms.	Hammer's PEPM model	
MANAGEMENT	The senior executive team has extended its process model to connect with those of customers and suppliers.		
LEADERSHIP	Managers are focused on achieving business process results and improving the overall business, instead of thinking about their business functions (organizational units).		
PEOPLE AND KNOWLEDGE	Substantial numbers of people with skills in process redesign and implementation, project management and change management are present across the organization.		
ORGANIZATIONAL CULTURE	Employees are committed to working with customers and suppliers and improving results.		
ORGANIZATIONAL CULTURE	Employees are prepared for significant change in how work and business is performed.		
PROCESS VIEW	The average employee views the business as a series of linked processes.	McCormack's EPOMM model	
PROCESS VIEW	Process terms such as input, output, process, and process owners are used in conversation in the organization.		
PROCESS VIEW	Processes within the organization are defined and documented using inputs and outputs to and from our customers.		
PROCESS VIEW	The business processes are sufficiently defined so that most people in the organization know how they work.		
JOBS AND TASKS	Jobs are usually multidimensional and not just simple tasks.		
JOBS AND TASKS	Jobs include frequent problem solving.		
JOBS AND TASKS	People are constantly learning new things on the job.		
PROCESS MANAGEMENT AND MEASUREMENT	Process performance is measured in the organization.		
PROCESS MANAGEMENT AND MEASUREMENT	Process measurements are defined.		
PROCESS MANAGEMENT AND MEASUREMENT	Resources are allocated based on process.		
PROCESS MANAGEMENT AND MEASUREMENT	Specific process performance goals are in place.		
PROCESS MANAGEMENT AND MEASUREMENT	Process outcomes are measured.		
PROCESS VIEW	In an existing organizational structure, business processes are effectively managed by multiple departments or organizational units.		Srinjar et al. (2008) study
PROCESS VIEW	Employees work in teams from different organizational departments / organizational units.		
PROCESS MANAGEMENT AND MEASUREMENT	Persons responsible for business process are members of the management board or managers directly under top management.		
PROCESS MANAGEMENT AND MEASUREMENT	Persons responsible for the functioning of the business process are at the same hierarchical level as the managers of functional organizational units (departments, sectors).		

Hypothesis

FINANCIAL PERFORMANCE		
Dimension	Item	Model
FINANCE	ROA	ISC
FINANCE	ROE	
FINANCE	Operating margin	
FINANCE	Debt cash conversion cycle	
FINANCE	Average time if inventory turnover	
FINANCE	Income per employee	

CHAPTER 15

PREDICTING COVID-19 SPREAD USING MACHINE LEARNING ALGORITHMS

Berislav Žmuk¹, Hrvoje Jošić²

Abstract

COVID-19 was declared as a world health emergency in January 2020. Since then it has affected all aspects of our lives. Countries closed their borders, put their population in self-quarantine and closed businesses and schools. As of March 31, the infection sickened more than 770,000 people all around the world with thousands of fatalities. There is a little consensus how long will the infection last and what the number of infected will be. Therefore, it is essential to implement suitable methods for COVID-19 spread prediction which is the goal of this paper. An open source machine learning software Weka and its algorithms (Linear regression, Gaussian Processes, SMOreg and neural network Multilayer Perceptron) have been used to predict the number of cases and fatalities of COVID-19 disease for 10 days in the future. The accuracy of the forecasts is measured using MAPE and RMSE error metrics. The results of the analysis have shown that Weka and its algorithms can be successfully used for prediction of COVID-19 spread in the world. The results of the analysis indicated that the Gaussian processes and Multilayer perceptron neural network are the most precise algorithms for the prediction of new and total cases of COVID-19 disease on a global scale and on an individual country level. The values of MAPE criterion for 12 selected countries, in majority of cases, have shown a highly accurate or good forecasting ability. The results obtained from this analysis can be important for global community and especially for economic and health policy makers in order to guide COVID-19 surveillance and implement public health policy measures.

Key words: COVID-19, machine learning, disease spread prediction.

JEL classification: C53, I19

1. Introduction

The World Health Organization (WHO) first declared COVID-19 a world health emergency in January 2020, Congressional Research Service (2020). Since then the virus has affected all aspects of our lives. According to Boissay and Rungcharoenkitkul (2020) the Covid-19 pandemic is not only the most serious global health crisis since the 1918 Great Influenza (Spanish flu), but is set to become one of the most economically costly pandemics in recent history.

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Countries closed their borders, put their population in self-quarantine and closed businesses and schools. As of March 31, the infection sickened more than 770,000 people all around the world with thousands of fatalities. There is little consensus how long will infection last and what the number of cases of infection overall will be. Therefore, it is essential to implement suitable methods for COVID-19 spread prediction. For that purpose the use of artificial intelligence and machine learning algorithms can be very useful. Few authors have investigated the use of artificial intelligence in Covid-19 forecasting, Hu et al (2020) in the case of China, Mosavi et al (2020) investigated the Covid-19 outbreak prediction with machine learning while Luo (2020) essayed on predictive monitoring of Covid-19.

Goal of this paper is predict the COVID-19 spread using an open source machine learning software Weka and its algorithms (Linear regression, Gaussian Processes, SMOreg and neural network Multilayer Perceptron), University of Waikato (2020). WEKA has been used for time series forecasting and financial stock market prediction, Kannan et al (2010), Kulkarni and More (2016). Other applications of WEKA related to disease prediction are for dengue disease prediction, Shakil, Anis and Alam (2015), classification and prediction of diabetics, Selvi et al (2018) and for heart diseases prediction, Saad Mohamed (2020). In the paper the machine learning algorithms and MAPE and RMSE metrics for measuring the accuracy of forecasts will be used. It is expected that WEKA's machine learning tools will have good to excellent predictive ability in forecasting total cases and fatalities due to COVID-19 infection.

Paper is structured in five chapters. After the introduction, short literature review elaborates on the use of artificial intelligence, machine learning specifically in COVID-19 spread prediction. In the methodology and data section descriptive statistics of data are presented and methodology of the paper is explained. In the results and discussion section the main results of the analysis are displayed. Firstly on a global level of 69 countries in the World and after that on an individual countries level detailly analysing 12 countries with the most cases of COVID-19 infection. Final chapter presents concluding remarks.

2. Short literature review

In this chapter short literature review will be presented elaborating on the use of artificial intelligence and machine learning in COVID-19 spread prediction. Among the wide range of machine learning models investigated, multi-layered perceptron and adaptive network-based fuzzy inference system showed most promising results in predicting the COVID-19 outbreak, Mosavi et al (2020). During the COVID-19 pandemic various models and methods have been developed and adopted to forecast infection cases and deaths with some of them influencing the policies in some countries, Luo (2020). The prediction of future is uncertain by nature and no model or data can accurately predict the pandemic spread. Hu et al (2020) developed a modified stacked auto-encoder for

modeling and forecasting the transmission dynamics of the Covid-19 epidemics applied on the confirmed cases of disease across China. The accuracy of the artificial intelligence based methods for forecasting the trajectory of Covid-19 was high. It was predicted that the epidemics of Covid-19 will be over by the middle of April. Gu et al predicted the trend of the COVID-19 epidemic in the whole of China except Hubei based on the existing data using five mathematical models for regression and simulation (cubic, quadratic, exponential, logarithmic and power models). They found that the inflection point about the COVID-19 may have passed. Zhang, Renjun and Lin (2020) predicted turning points, duration and attack rate of COVID-19 outbreaks in major Western countries by employing a segmented Poisson model. The analysis allowed them to identify and predict the turning point, spread, the duration and the final size of the outbreak of COVID-19 in countries studied. Li et al (2020) undergo propagation analysis and prediction of the COVID-19. It was found that imposing controls would have important impact on the epidemic. Big data integration and analytics played a key role to successfully prevent COVID-19 hospital outbreaks in Taiwan, Chen, F-M. et al. (2020). Cássaro and Pires (2020) tackled the question can the occurrence of COVID-19 cases be predicted. Simulations based on a simple model of growth and initial COVID-19 cases (for 1st 2nd and 3rd weeks) showed that it is almost impossible to predict how the pandemic will evolve. In this paper the open source machine learning software Weka and its algorithms will be used to predict the COVID-19 spread for 69 countries in the world and 12 chosen countries in details. Weka has already been used for dengue disease prediction, Shakil, Anis and Alam (2015), classification and prediction of diabetics, Selvi et al (2018) and for heart diseases prediction, Saad Mohamed (2020).

3. Methodology and data

In this paper the COVID-19 spread in 69 countries in the world will be inspected by using Weka machine learning algorithms. Data which will be observed are the new cases and deaths, total cases and total deaths due to the COVID-19 disease. The daily values of these four variables will be observed in the period from December 31, 2019 to March 31, 2020. The countries which will be inspected are the ones that had 100 or more cases of COVID-19 infection and 20 or more deaths in the observed period. The list of the observed countries is the following: Albania, Algeria, Andorra, Argentina, Australia, Austria, Bangladesh, Belgium, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Canada, Chile, China, Colombia, Croatia, Czechia, Democratic Republic of the Congo, Denmark, Dominican Republic, Ecuador, Egypt, Estonia, Finland, France, Germany, Greece, Honduras, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Luxembourg, Malaysia, Mexico, Moldova, Morocco, Netherlands, North Macedonia, Norway, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Puerto Rico, Romania, Russia, San Marino, Saudi Arabia, Serbia, Slovenia, South Korea, Spain, Sweden, Switzerland, Thailand, Tunisia, Turkey,

Ukraine, United Kingdom and United States of America. As a data source the EU Open Data Portal (2020) was used.

In order to forecast values of the four observed variables for each country separately and for the world overall, four forecasting approaches or algorithms are used: Gaussian processes, Linear regression, Multilayer perceptron and SMOreg. More information about WEKA's forecasting algorithms can be found in Popescu et al (2009), Rasmussen and Williams (2006) and Smola and Schölkopf (2004). For all four forecasting approaches default settings in Weka, statistical software which was used to calculate the forecasts, will be applied. In this way the results and forecasting levels of precision between countries can be directly compared. The actual data from December 31, 2019 to March 31, 2020 were used to forecast values of the four observed variables for 10 days in the future. More precisely, the forecasts for the period from April 1 to April 10, 2020 were calculated. After that the forecast values from those 10 days are compared with the actual values and the differences are measured by calculating selected forecasting errors. Weka's interface offers various statistical error measures for evaluation of aforementioned algorithms. In order to determine forecast precision levels two forecast errors were used: mean absolute percentage error (MAPE) and root mean squared error (RMSE). They were chosen as the most common error measures used for performance analysis. The formulas for calculation of MAPE and RMSE metrics are displayed in equations 1 and 2.

$$MAPE = \frac{1}{N} \sum_{t=1}^N \left| \frac{\bar{Y}_i - Y_i}{\bar{Y}_i} \right| \quad (1)$$

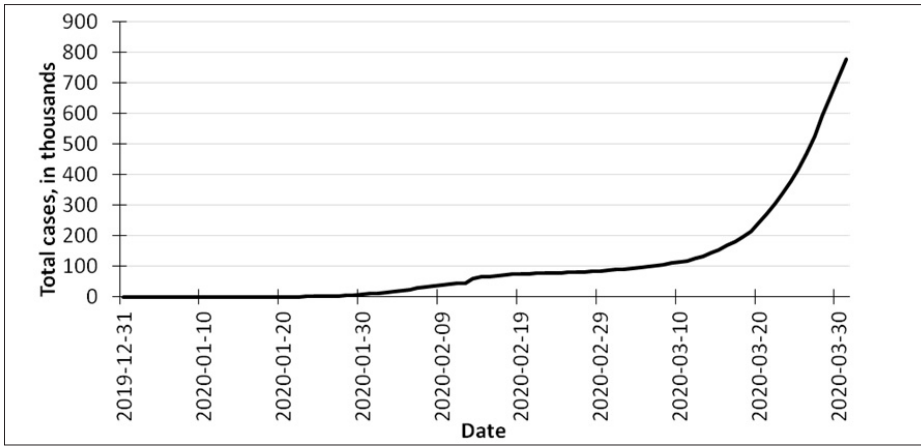
$$RMSE = \sqrt{\frac{1}{N} \sum_{i=1}^N (\bar{Y}_i - Y_i)^2} \quad (2)$$

where \bar{Y}_i is the predicted value and Y_i is the observed value for the number of observations.

There were only 27 cases of COVID-19 in the World on December 31, 2019. All 27 cases were confirmed in China. Three months later (March 31, 2020) the total number of COVID-19 cases of disease increased to 777,133. The total number of COVID-19 cases in the World in the period from December 31, 2019 to March 31, 2020 is shown in the Figure 1.

According to the Figure 1, three phases in development of total number of COVID-19 cases can be detected in the observed period. In the period from December 31, 2019 to January 23, 2020 there was a slight increase in the total number of cases in the World. From January 23, 2020 positive linear trend is present until March 10, 2020. In period from March 10, 2020 to March 20, 2020, slight positive linear trend rapidly increased its slope. Because of that the slope of linear trend is much higher for period after March 20, 2020 than in the period before.

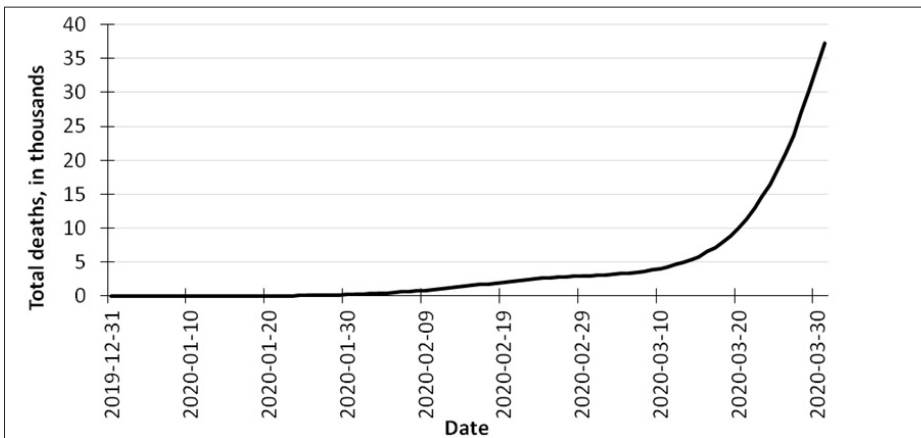
Figure 1: Total number of COVID-19 cases of disease in the period from December 31, 2019 to March 31, 2020



Source: EU Open Data Portal (2020), authors.

The number of total deaths due to COVID-19 in the World in the period from December 31, 2019 to March 31, 2020 is presented in Figure 2. The shape of curve for total deaths due to COVID-19 (Figure 2) follows almost perfectly the shape of curve for total cases (Figure 1). Again, after March 10, 2020 the huge increase in the daily number of deaths due to the COVID-19 appeared.

Figure 2: Total deaths in the World in the period from December 31, 2019 to March 31, 2020



Source: EU Open Data Portal (2020), authors.

Table 1: Top 10 countries and the World according to the total cases of the COVID-19, situation on March 31, 2020

Country	Total cases	Share of cases in total cases in the World (%)	Share of cases in total population (%)
United States of America	164,620	21.2%	0.050%
Italy	101,739	13.1%	0.168%
Spain	85,195	11.0%	0.182%
China	82,241	10.6%	0.006%
Germany	61,913	8.0%	0.075%
France	44,550	5.7%	0.067%
Iran	41,495	5.3%	0.051%
United Kingdom	22,141	2.8%	0.033%
Switzerland	15,412	2.0%	0.181%
Belgium	11,899	1.5%	0.104%
World	777,133	100.0%	0.010%

Note: population data related to 2018.

Source: EU Open Data Portal (2020), authors.

In Table 1 the top 10 countries in the World according to the number of total cases on March 31, 2020 are listed. The country with the most cases is the United States of America in which the 21.2% of total cases of infection in the World appeared. In the top four countries (the United States of America, Italy, Spain, China) more than 50% (to be precise 55.8%) of total cases in the World was found. If the share of cases in total population is observed, from the 10 listed countries, the highest shares have Spain (0.182%), Switzerland (0.181%) and Italy (0.168%).

Table 2: Top 10 countries and the World according to the total deaths due to the COVID-19, March 31, 2020

Country	Total deaths	Share of deaths in total cases (%)	Share of deaths in total population (%)
Italy	11,591	11.39%	0.0192%
Spain	7,340	8.62%	0.0157%
China	3,309	4.02%	0.0002%
United States of America	3,170	1.93%	0.0010%
France	3,024	6.79%	0.0045%
Iran	2,757	6.64%	0.0034%
United Kingdom	1,408	6.36%	0.0021%
Netherlands	864	7.35%	0.0050%
Germany	583	0.94%	0.0007%
Belgium	513	4.31%	0.0045%
World	37,272	4.80%	0.0005%

Note: population data related to 2018.

Source: EU Open Data Portal (2020), authors.

Table 2 is focused on the number of total deaths due to the COVID-19 on March 31, 2020. According to the data from Table 2 the most deaths due to the COVID-19 appeared in Italy (11,591 deaths). About 31% of deaths in the total number of deaths due to COVID-19 happened in Italy. In addition, among 10 listed countries, Italy has the highest share of deaths in total cases of 11.39%.

4. Results and discussion

In Table 3 the best forecasting approaches, among the four observed, for forecasting new cases, new deaths, total cases and total deaths for 69 countries and the World as a whole is shown.

Table 3: The number of cases for the best forecasting approach according to MAPE and RMSE criteria, daily data from December 31, 2019 to March 31, 2020, forecasting period is from April 1 to April 10, 2020, sample of 69 countries and the World as a whole

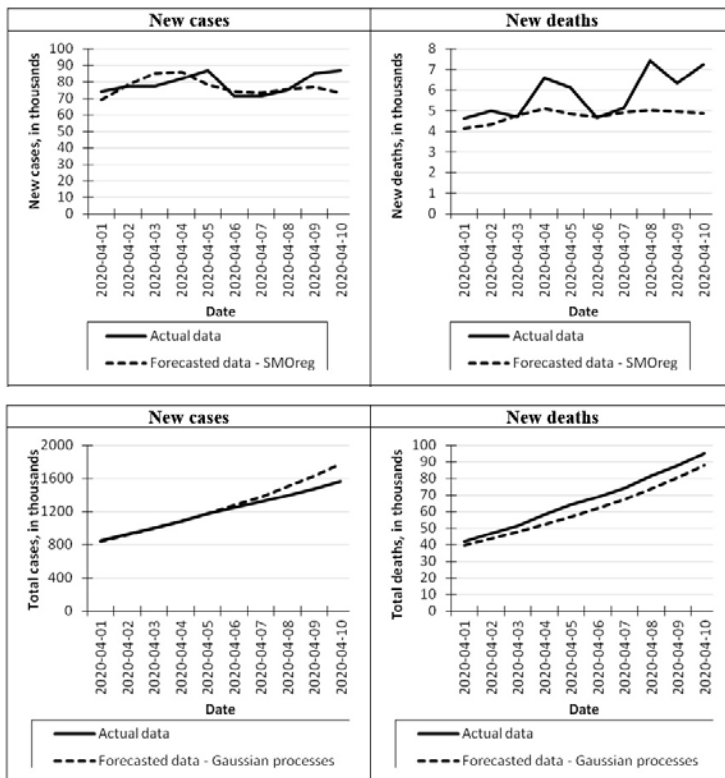
Variable	Forecasting approach	Forecasting error	
		Mean absolute percentage error (MAPE)	Root mean squared error (RMSE)
New cases	Gaussian processes	18	24
	Linear regression	5	3
	Multilayer perceptron	38	36
	SMOreg	9	7
	Total	70	70
New deaths	Gaussian processes	23	30
	Linear regression	1	1
	Multilayer perceptron	41	33
	SMOreg	5	6
	Total	70	70
Total cases	Gaussian processes	34	32
	Linear regression	4	4
	Multilayer perceptron	17	22
	SMOreg	15	12
	Total	70	70
Total deaths	Gaussian processes	38	41
	Linear regression	4	3
	Multilayer perceptron	13	16
	SMOreg	15	10
	Total	70	70

Note: population data related to 2018.

Source: EU Open Data Portal (2020), authors.

The best forecasting approach is selected by applying the two criteria separately. Obviously, in dependence which criteria is observed, minimum mean absolute percentage error or minimum root mean squared error, the best forecasting approach could be different. However, some general conclusions can be brought. When individual changes are observed, like new cases and new deaths, it has been shown that in the most cases the most successful forecasting approach was multilayer perceptron (according to both forecasting error criteria). After multilayer perceptron, very successful in forecasting new cases and new deaths was the Gaussian processes forecasting approach. In addition, the Gaussian processes forecasting process was the most precise in the most cases when the number of total cases and total deaths is observed. The linear regression forecasting approach has shown to be the most precise in the least number of cases. If the mean absolute percentage error criterion is observed, to forecast new cases and new deaths for the World the most precise forecast approach turned out to be SMOreg. On the other hand, to forecast total cases and total deaths for the World the most precise forecast approach is Gaussian processes. In Figure 3 the actual values of the observed variables and forecasted values by using the most precise forecasting approaches (SMOreg or Gaussian processes) for the World is displayed.

Figure 3: Actual and forecasted values of the observed variables for the World in the period from April 1, 2020 to April 10, 2020



Source: EU Open Data Portal (2020), authors.

According to Figure 3 it can be concluded that chosen forecasting approaches can quite precisely forecast values of the observed variables for the World. However, the new cases and the total cases seem to be better forecasted than the new deaths and the total deaths in period from April 1, 2020 to April 10, 2020. Namely, the forecasting approaches underestimated number of the new deaths and the total deaths.

Table 4: The best forecasting approach for selected 12 countries, according to MAPE, forecasting conducted based on daily actual data from December 31, 2019 to March 31, 2020, forecasting period from April 1 to April 10, 2020

Country	Total cases		Total deaths	
	Forecasting approach	MAPE	Forecasting approach	MAPE
Belgium	Multilayer perceptron	10%	Gaussian processes	18%
China	Multilayer perceptron	31%	Multilayer perceptron	1%
Croatia	Multilayer perceptron	8%	Multilayer perceptron	42%
France	Gaussian processes	10%	Gaussian processes	18%
Germany	Gaussian processes	53%	Gaussian processes	6%
Iran	Linear regression	8%	Linear regression	6%
Italy	Gaussian processes	18%	Gaussian processes	10%
Netherlands	Gaussian processes	37%	Gaussian processes	5%
Spain	Gaussian processes	37%	Gaussian processes	7%
Switzerland	SMOreg	12%	Multilayer perceptron	41%
United Kingdom	SMOreg	48%	SMOreg	12%
United States of America	Gaussian processes	20%	Gaussian processes	12%

Source: EU Open Data Portal (2020), authors.

In Table 4 the best forecasting approaches according the MAPE criterion for 12 countries for total cases and total deaths variables are shown. The 12 countries are selected from the list of 10 countries with the most total cases and the list of the 10 countries with the most total deaths. Because 9 countries can be found on both lists (see Table 1 and Table 2), overall 11 countries are observed from those two lists. In addition, Croatia is observed as well. In Table 4, next to the most precise forecasting approach, the values of MAPE indicator are given. It can be noticed that most MAPE values have acceptable low level of errors. However, it can be found some MAPE values with value higher than 40%. Therefore, the highly accurate forecasting (the value of MAPE lower than 10) was found for the variable total cases in Croatia using Multilayer perceptron algorithm and Iran using Linear regression. The interpretation of MAPE values according to the range of observed errors can be found in Lewis (1982). For the variable total deaths the highly accurate forecasting (the value of MAPE lower than 10) was evident in China, Germany, Iran, Netherlands and Spain.

On the other side, inaccurate forecasting (the value of MAPE higher than 50) was found only in Germany for total cases variable and Gaussian processes algorithm. In Figure A1 in Appendix the actual and forecasted values of total cases and total deaths for the 12 observed countries are presented. Forecasted values are calculated by using forecasting approach which resulted in the lowest MAPE value in the forecasting period from April 1, 2020 to April 10, 2020. Again, it can be noticed that the Gaussian processes and Multilayer perceptron neural network are the most successful forecasting algorithms for the prediction of COVID-19 spread.

5. Conclusions

Goal of this paper was predict the COVID-19 spread using an open source machine learning software Weka and its algorithms (Gaussian processes, Linear regression, Multilayer perceptron and SMOreg). The precision of aforementioned algorithms was observed using MAPE and RMSE error criterions. Results of the analysis have shown WEKA and its algorithms can be used for prediction of COVID-19 spread in the World. The results of the analysis indicated that Gaussian processes and Multilayer perceptron neural network were the most precise algorithms for the prediction of new and total cases of COVID-19 disease. The values of MAPE criterion for 12 selected countries, in majority of cases, have shown a highly accurate or good forecasting ability.

Limitations of the paper are related to the observation using sample of 69 countries. The whole population of countries could not be included due to insufficient number of confirmed cases and fatalities due to COVID-19 disease. Also, the reported number of cases of disease and fatalities could be lower than the real number due to lack of medical equipment, insufficient testing with many suspected cases remained to be confirmed because some people showing symptoms may not even be counted as suspected cases yet. Recommendations for future research in this important field of artificial intelligence and machine learning application in COVID-19 spread prediction can relate to prediction of COVID-19 spread in other time period and analysing in details an individual country cases. The results obtained from this analysis can be important for global community and especially for economic and health policy makers.

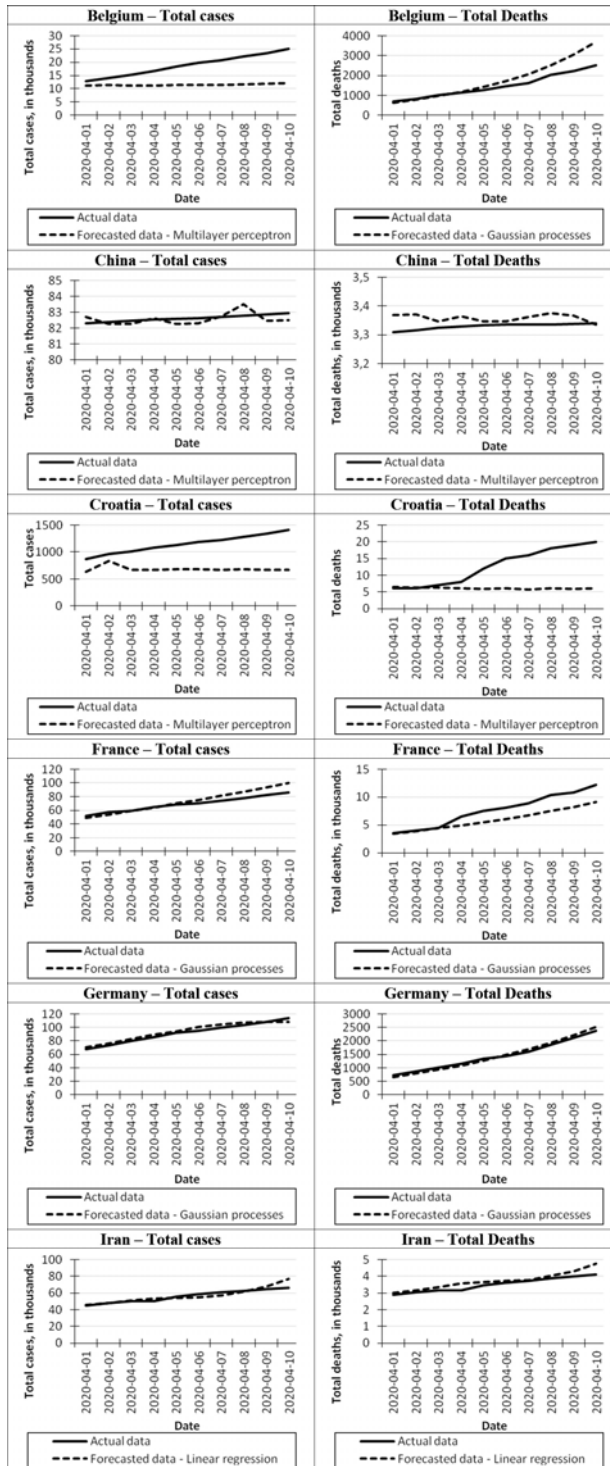
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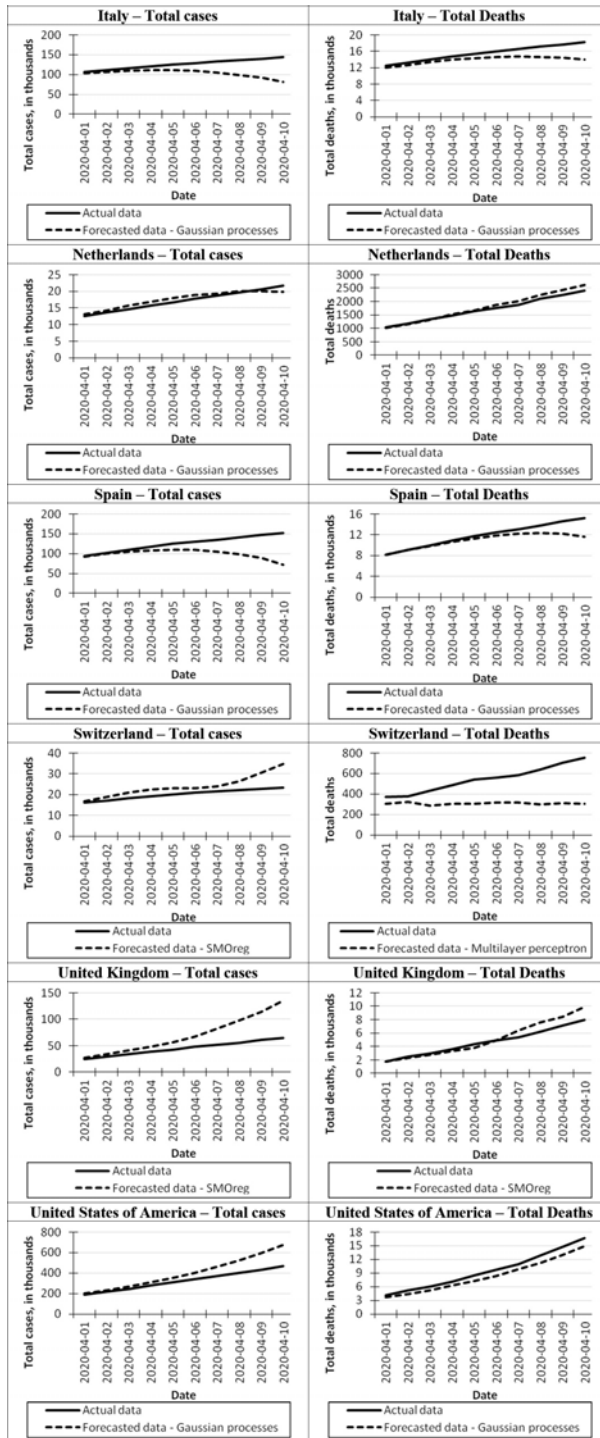
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APPENDIX

Figure A1: Actual and forecasted values of the observed variables for the selected 12 countries in the period from April 1, 2020 to April 10, 2020





Source: EU Open Data Portal (2020), authors.

CHAPTER 16

THE WORLD TRADE ORGANIZATION REFORM: A MAKE-OR-BREAK MOMENT

Nina Lara Bajec¹

Abstract

This paper contributes to debate about the WTO reform by overseeing main challenges that the organization faces. Presented challenges clearly indicate the seriousness of the situation and the urge for the WTO reform in order to maintain the benefits of a rule-based trading system. Failure to reform the WTO would mean undermining of already weak foundations of the post 2nd World War multi-layered trading system. Different possible solutions for WTO crisis and Members' views on key reform issues are discussed in the paper. The paper finds a large gap in the negotiating positions of the Member States on several key issues, e.g. revitalization of the dispute settlement system, "special and differential treatment" provision which gives developing countries special rights, and update of rules on subsidies and countervailing measures. Members are most likely to reach an agreement on procedural areas, such as improving the work of committees and empowering of the Secretariat.

Key words: WTO reform; dispute settlement; global trade governance; multilateralism; new protectionism

JEL classification: F02, F13

1. Introduction

The global trading system is in the midst of a tectonic shift. The World Trade Organization (WTO), which governs global trade rules, faces its deepest crisis since its foundation. Therefore, it is important to understand why the WTO faces a make-or-break moment. The aim of this paper is to explain the reasons behind the WTO crisis and evaluate possible solutions that could reinvigorate the WTO.

Today's global events make the topic extremely relevant. On 14 May 2020 current director general of the WTO Roberto Azevedo informed the public that he will step down on 31 August 2020 (Baschuk & Leonard, 2020). Mr. Azevedo's term would otherwise expire on 31 August 2021 and his decision to resign before his term ends means nothing good for the WTO, which already struggles to operate successfully. Current coronavirus pandemic has caused an unprecedented disruption to the international trading system and to the global economy.

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Consequently, the WTO has to properly respond to global trade flows disturbances, imposed export bans on medical products and other trade restrictions that were used by members to protect their own country from the virus (Evenett, 2020). Additionally, investigation into the origins of covid-19 virus is producing a new source of tension between the US and China.

International relations between the US and China have been tense already before the coronavirus pandemic started since both countries compete for the dominant role in the world economy. A trade war between the US and China produced tremendous damage to the economies of each country and has decreased the welfare of many people (Armstrong, 2019). Furthermore, it has brought into question the benefits of trade liberalization and globalization because more open international trade creates winners and losers. Rising income inequality connected to international trade liberalization is hotly debated in many countries. As a consequence, trade-distorting policies are becoming more popular all around the world and protectionism is on the rise in countries that have enormous power and influence on the global economy. Accordingly, the WTO has struggled to keep its crucial role in maintaining a rule-based trading system because global events are undermining the WTO's credibility and many seem to have forgotten the fact that the WTO has brought substantial achievements to the world and has helped to increase overall welfare.

Global trading system can be best described as a multi-layered international trading system where different trading regimes interplay. Therefore, it is important to have an organization like the WTO present in order to coordinate this complex global trading system. Coordination is much needed in order to curb negative spill-over effects that can result as a consequence of poor cooperation between countries. The role of the WTO is to help countries maintain a certain degree of cooperation among them even in hard times when occurrence of broad protectionist measures is most likely to happen. Throughout the 2008 global financial crisis this multilateral trading system helped to preserve trade policy cooperation between members and it is crucial that WTO members maintain cooperating now when consequences of coronavirus pandemic will enormously damage the global economy.

New global economic order is likely to emerge as current coronavirus pandemic shifts public opinion away from globalisation, questions the benefits of internationally fragmented production and significantly influences the future of international trade (The Economist, 2020). The global trading system that was set up after World War II was to a large degree formed by the US (Gebremariam, 2017). At that time the US had a leading role in establishing different international institutions and creating the rules for cross-border exchange of goods, services and capital. However, today the US under Mr. Trump seems to forgot its historic role as the chief architect of the rule-based trading system (Alden, 2019). Consequently, current global trading system is left without a strong leadership that would support further liberalization of trade and would make an effort to cooperate on a multilateral level with other countries in order to promote

peaceful international relations. In a member-driven organization like the WTO such coordinated leadership effort is crucially needed if the organization aims to deliver valuable results for international trade.

The WTO is the fundamental pillar in the international economic order because it represents the only multilateral forum for global trade rule-making based on non-discriminatory principle. Therefore, the WTO is supposed to provide the foundation on which to build complex multilateral trading system. Without the existence of WTO rules and principles, which aim to achieve a non-discriminatory, more open, fair, stable and predictable trade, global trade flows would hardly function in a welfare improving way.

By analysing the role of the WTO one can better understand why the world needs such an international institution and that global trade without the WTO would severely damage the global economy. However, only when the WTO is fully operational can the promised benefits of its existence be achieved. Therefore, it is important to improve and strengthen the role of the WTO in order to preserve its relevance and effectiveness. Especially now, when technology is growing at a rapid rate, while environmental concerns remain ever present, when the United Nations' sustainable development goals must be achieved by 2030, and when the current coronavirus pandemic makes electronic commerce even more important, it is extremely important that the WTO remains active and adapts to new challenges.

Adapting to new 21st century challenges means accepting new trade rules and updating the rules that were negotiated in the 20th century. Because decisions at the WTO are traditionally made by consensus, it is important to figure out if that working practice is making the WTO efficient or is a source of the current stagnation. Moreover, it is crucial to realize that negotiated trade agreements are not worth much without a fully operational WTO dispute settlement system where rules can be enforced. From 11 December 2019 the WTO lost its ability to provide a fully operational dispute settlement system and rules can no longer be enforced. Consequently, the whole system is endangered, and the effectiveness of the WTO is called into question.

To better understand why the WTO reform is needed or why the WTO is not publicly perceived as relevant, effective, fully operational or credible the following research questions were formed: "What are the main challenges faced by the WTO that block the organization's progress?", "What are possible solutions that could help to solve the current WTO crisis?" and finally, "How should the WTO be reinvigorated from the point of view of WTO members?". The goal of this paper is to find answers to these questions and to provide required information in order to better understand the discussed topic.

Paper is organized in the following order. Firstly, different challenges faced by the WTO are explained in order to better understand why the WTO reform is so crucially needed. Secondly, possible solutions are provided that could help to solve the current WTO crisis. Finally, WTO members' points of view on the reform are discussed.

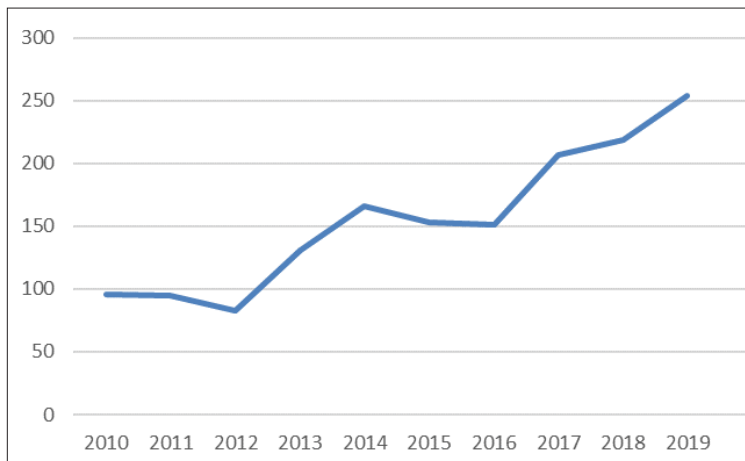
2. The need for the WTO reform

When the WTO was established in 1995 the world was different compared to 2020 in particular with respect to the dominance of the supply chain trade. Consequently, new rules are needed in previously unimportant areas or in areas that previously did not exist. Furthermore, some agreements need to be updated, expanded and better explained in order to close loopholes that have become evident over the years. As the global economy changes, the international trading system must follow and adjust as new issues are discovered. After 25 years of the WTO's existence the organization faces many challenges. Some of the main challenges faced by the WTO are connected to rising protectionist measures and economic nationalism, dysfunctional dispute settlement system, deadlock in multilateral negotiations and finding the balance between multilateralism and regionalism. They are discussed in this section.

2.1 Rising protectionist measures and economic nationalism

According to the Global Trade Alert the number of trade-distorting policies has faced an upward trend over the last 10 years (see graph 1). Trade war between the US and China, the United Kingdom leaving the European Union (hereinafter: EU), rising power of far-right political parties and similar world events seem to match this upward trend of new harmful barriers to trade. Current coronavirus pandemic has additionally produced new trade restrictions. Because the aim of the WTO is to foster trade liberalization and to reduce barriers that cause distortion to trade such an upward trend is a challenge for the WTO.

Graph 1: Number of trade-distorting global policies from 2010-2019



Source: Adapted from Global Trade Alert (2020)

Trade-distorting policies break the important WTO principle of non-discriminatory trade and that is why such actions put pressure on the WTO's credibility.

The WTO's credibility is also being undermined by aggressive negotiation tactics of Trump's administration for the US influence in international organisations and by Mr. Trump's unilateral trade actions. By viewing the international trade system as a zero-sum game, Mr. Trump questions the benefits of multilateral rule-based cooperation and consequently harms seven decades of remarkable trade achievements (Alden, 2019). Because he is the president of the world's largest economy, his public statements have a huge influence on the global economy and on the international trading system. Therefore, by calling the WTO unfair and the worst trade deal ever made, he damages the reputation of the organization and points out areas that need to be improved at the WTO in order to preserve the belief that WTO is important for the world trade regime (Armstrong, 2019).

One complaint that is not unique to Mr. Trump, but is shared by other members is that at the WTO there is no agreed upon definition of a developing country versus developed country for members. As a consequence, countries that claim to be developing receive beneficial treatment and are exempt from some obligations that, on the other hand, advanced economies must follow (Caporal & Gerstel, 2018). The country being criticized the most for taking advantage of its developing status is China. Attention is drawn to the fact that China's position changed from 2001, when China became a member of the WTO, until now when it is the world's second largest economy. As such, China is capable of taking on fuller agreement obligations and should stop identifying itself as a developing country (Wemer, 2019).

Another challenge for the WTO is brought by China's unique economic system, because the existing WTO rules are unable to effectively deal with non-market trade practices (Bown, 2020). Members perceive China's system with its usage of government subsidies and support for state-owned enterprises (hereinafter: SOEs) as an unfair practice that puts Chinese companies at a competitive advantage compared to foreign market players (Tran, 2019). The Chinese solar panel industry is an example of such practices. Because of the government's direct investment, cheap loans and other incentives, Chinese solar panel producers came to dominate the international market in a relatively short time (Haley & Haley, 2013). Such subsidies are problematic because they lead to overcapacity, increases in exports, and depressed worldwide prices, which can force others (for example, non-subsidized producers in the field) out of the market. The task of the WTO's rules-based system is to find a solution for these protectionist Chinese trade policies that harm global trade.

Some trade experts believe that Mr. Trump started imposing unilateral tariffs on imports from China because of the WTO's inability to properly address China's abusive trade practices (Bacchus, Lester & Zhu, 2018). America's trading partners believe the rules of the WTO have been broken and undermined by Mr. Trump's unilateral tariff imposition. However, Mr. Trump justifies his actions by using Article XXI of the WTO treaty. This article stresses the importance of national security and allows any member to raise tariff rates if such actions will

protect essential security interests. Nonetheless, Mr. Trump's national security justification is questionable (Armstrong, 2019). Therefore, the challenge the WTO faces is how to effectively prevent members from cheating or sidestepping the rules.

International trade rules exist for the purpose of preventing countries to end up in a suboptimal Nash equilibrium because of the Prisoner's dilemma. Large countries know that they are likely to gain in short-run by imposing a unilateral tariff because their terms of trade will improve. However, because the terms of trade for the targeted country will get worse it is expected that the targeted country will retaliate and both countries will be left worse off in the long run. The role of the WTO is to help countries maintain a higher welfare by cooperating. Such cooperation can be achieved and sustained if there is a binding trade agreement that includes a sufficiently strong punishment against a deviator, because a punishment demotivates a country from breaking the rules. Therefore, a rule-based international trading system cannot operate successfully without a mechanism, which ensures that rules will be enforced.

2.2 Dispute settlement system

WTO's dispute settlement mechanism provides a crucial place where members can address and solve their conflicts. Without a system that allows members to settle disputes there would be less stability in the global economy and the effectiveness of the international rules-based system would be undermined since rules could not be enforced (WTO, 2020). One of the reasons why the WTO faces the greatest crisis of its 25-year existence is the fact that new appeals can no longer be heard, because the WTO's Appellate Body (hereinafter: AB) no longer meets the required 3- member quorum (Tirkey, 2020).

The dissolution of the AB, which acts as the supreme court for world trade, is a huge challenge for the WTO. With the paralysis of the AB, ongoing trade conflicts may be left pending forever because the losing party can prevent a panel report from becoming legally binding by appealing the panel decision (Nakagawa, 2020). Why would members negotiate new trade agreements and obey the rules of international trade if rules cannot be enforced? Without a fully operational dispute settlement mechanism the whole rule-based multilateral trading system is endangered. Binding commitments between members need to rest on an effective dispute resolution mechanism in order to prevent members from breaking the rules and ending up in a suboptimal Nash equilibrium. There is a threat of an outbreak of tit-for-tat tariff wars if members feel that obligations cannot be enforced and that the spirit of cooperation is lost.

Trade war between the US and China already reflects the alarming global situation. Instead of trusting and using the established international system for settling trade disputes, and discussing problems, members acted unilaterally by imposing tariffs towards each other. Ignoring the WTO rules and obligations poses a big threat to the credibility of the WTO.

The US modus operandi to express dissatisfaction with the functioning of the AB was to block appointments of new judges resulting in the demise of the WTO's dispute settlement system (Tirkey, 2020). Because decision at the WTO are traditionally made by consensus the US used its veto right to prevent the majority from moving forward and filling up AB vacancies. This working practice of consensus is currently a source of inefficiency at the WTO and impedes the organization's progress. Furthermore, it can explain why multilateral negotiations at the WTO remain locked in a stalemate.

2.3 Multilateral negotiations and the balance between multilateralism and regionalism

One of the WTO's roles is to serve as a forum for negotiations on trade subjects. Over the past 73 years, 8 multilateral trade rounds were successfully concluded (Bagwell, Bown & Staiger, 2015). These rounds (trade negotiations) were crucial for producing new trade agreements among members that helped to liberalize trade and spread prosperity throughout the world. However, the 9th round since 1947 but the first round held under the aegis of the WTO known as Doha Round failed to be concluded.

More than 160 WTO members were involved in trade talks on the Doha Development Agenda. Reaching an agreement between all of them seems like mission impossible because countries differ in their income levels, goals, culture, economic systems (for example, state capitalism versus market economies) and historic development. As some members in the system gain influence and power globally (for example, China) disagreements between rising powers and major developed members grow and further prevent progress from being made multilaterally at the WTO (Zeneli & Czinkota, 2019).

The inability to finish the latest round has had serious consequences for the WTO. Successful negotiations are needed to get new agreements and new rules that deal with new challenges the WTO faces. Without that the organization becomes outdated and it is unable to satisfy the growing needs of a global trading system. Only when the WTO is relevant and suitable to deal with complex 21st century challenges will the countries use the established rule-based trading system.

As multilateral trade talks remain locked in a stalemate, WTO members have tried to tackle issues by using alternative negotiation approaches. As a result, incentives for WTO members to negotiate regional trade agreements (hereinafter: RTAs) have grown. The WTO uses the RTA designation for any type and form of economic integration between two or more members (thus, a limited number of participants), even where the countries do not necessarily belong to the same region (Hrovatin et al., 2017). Thus, the RTA designation can be misleading because it includes regional and non-regional agreements and also agreements that go beyond trade (like in the case of the EU).

Throughout the years the number of RTAs has risen; there are currently 303 RTAs in force compared to around 50 in 1995 (WTO, 2020).

The challenge the WTO faces is how to reconcile regionalism with multilateralism, since many more RTAs are in the making and the trend towards negotiating RTAs has not seemed to slow down but rather is further increasing. RTAs break the WTO rule, which prohibits discrimination between trading partners (WTO, 2020). Therefore, RTAs are an exception to the most-favoured-nation treatment because only signatories of the agreement receive more favourable market access.

RTAs are signed between those parties that want to engage in deeper integration and that believe this integration can be achieved more effectively through limited participation compared to multilateral setting (Adlung & Mamdouh, 2017). Therefore, RTAs go further behind the border with the liberalization process and include rules dealing with the domestic regulation of services, foreign direct investment, electronic commerce (hereinafter: e-commerce), the environment, labour standards, gender equality, participation of micro, small and medium-sized enterprises (hereinafter: MSMEs), the competition policy, artificial intelligence, cross-border data flows, data storage, and other issues that are not or are only partially covered by the WTO (Fabry, 2019). These ambitious regional agreements have drawn attention to new 21st century challenges and have helped demonstrate issues that the WTO needs to address more broadly.

The 2015 Nairobi Ministerial Declaration stressed that RTAs must complement multilateral trading system and not be a substitute for it. Therefore, RTAs could work as a catalyst for greater integration through consolidation (allowing additional countries to join in later to gradually expand membership), and could be used as precedents for multilateral deals. On the other hand, RTAs hasten the fragmentation of the global trading system into many trading zones with overlapping memberships and trade coverage causing potential harm to trade flows as the trading system gets more complex and traders struggle to abide by multiple trade rules (Tran, 2020). Because RTAs can also contain policy areas that are not yet regulated multilaterally, the likelihood of inconsistencies among different agreements increases. Furthermore, by negotiating policies in clubs (meaning within RTAs) attention can be drawn away from issues that require a multilateral approach. As a result, the challenge for the WTO is how to find a balance between multilateralism and regionalism in a rule-based international trading system.

3. Key aspects of WTO modernization

Organizational effectiveness cannot be achieved if the organization itself is not capable of adapting its rules in line with new challenges that emerge in the markets and require a different, updated and pragmatic modus operandi. Over the years the WTO's system has helped many countries by reducing poverty, contributing to peace and stability, raising general welfare, promoting economic

growth, employment and overall the WTO has brought prosperity to the world (Deere-Birkbeck & Monagle, 2009). Therefore, its value to the international trading system should not be questioned. However, as the world evolved and the original 1995 framework was no longer able to deal with new issues, WTO members have begun to identify areas that need to be updated and discussed.

At the 2018 Group of Twenty (hereinafter: G20) summit leaders reconfirmed the necessity of WTO reform (Borger, 2018). While numerous proposals for improving the WTO system were raised almost from the beginning of the WTO's existence they have never been so crucially required as today when the WTO faces its deepest crisis since its inception. Only when the system is relevant to the current global trading needs will it be used. With three primary WTO functions (arbitrating trade disputes, serving as a forum to negotiate and supervising trade policies) in trouble or unable to deliver valuable outcomes, WTO members question the effectiveness of the system (Caporal & Gerstel, 2018). Proposals for the WTO reform mostly focus on its legislative, executive and judicial functions (Hoekman, 2010). For the purpose of making the WTO more relevant, effective and credible trade rules need to be updated, dispute settlement system needs to be revitalized and finally, some of the WTO's regular working practices need to be improved in order to make the WTO more functional.

3.1. Updating trade rules

The trading system has traditionally formulated the rules of the game and defined national obligations through broad negotiation rounds (Hoekman, 2010). Because the Doha Round failed to be concluded a much needed, wide-ranging update of the WTO rulebook has not been realised. As a consequence, large-scale rules negotiated under the Uruguay Round, which were based on an agenda set in 1986, are still governing today's trade (Baldwin & Nakatomi, 2015). The nature of global trade has become much more complex compared to the 20th century and these old rules cannot deal with 21st century challenges. Therefore, a detailed review of the existing WTO rulebook is crucial in order to modernize rules and make them suitable for today's trading needs.

Rule connected to special and differential treatment (hereinafter: SDT) is available to those that claim to be developing countries (WTO, 2020). Many developed members believe that some countries should not be classified as developing because they are in no need for privileges and they harm those that really need SDT. Therefore, SDT could be improved throughout a system of graduation, which would encourage members to eventually opt-out of SDT. In the transitional period members would make a plan specifying when they expect to be able to fulfil all obligations of the WTO agreement (European Commission, 2018). Furthermore, by establishing a definition that would clearly describe under what conditions a member can and cannot claim developing status would help to identify whether or not a member can take on full obligations. For example, if a country belongs to the G20 it cannot claim to be developing and it should take on full obligations (Suneja, 2019).

The agreement on subsidies and countervailing measures (hereinafter: ASCM) is used by WTO members to evaluate whether a subsidy granted was legitimate or not (WTO, 2020). However, many countries emphasize that there are several loopholes and ambiguities in the ASCM which have led to the abuse and misuse of rules and have prevented the system from achieving its goal of fair competition on the market (Wemer, 2019). Because one of the WTO principle is to promote fair international competition this agreement needs to be updated in order to curtail certain harmful practices and improve the effectiveness of the ASCM. The aim is to update the ASCM in such a way that will level the playing field.

Firstly, Article 3.1 of the ASCM should expand the list of unconditionally prohibited subsidies to additionally include subsidies given to insolvent entities or to entities that are unable to get independent financing, unlimited guarantees and certain direct debt forgiveness (Hogan, 2020). Secondly, in order to stimulate countries to fully notify their subsidies to the WTO, Article 25 of the ASCM should include a general refutable presumption according to which if a subsidy is not reported or is counter-notified, it would be assumed to be a subsidy and repeated non-compliance would be sanctioned (European Commission, 2020). Of course, a distinction needs to be made between those members that miss deadlines to prepare notifications because of limited resources and those that intentionally fail to report their subsidies. Thirdly, more attention should be given to recognizing SOEs and to detecting subsidies that avoid the application of the ASCM because they are granted by private companies that are in reality subject to heavy state influence and are thus not so private (Hogan, 2020). Finally, Article 1 of the ASCM should better clarify what falls under public body, because subsidies must be granted by a government or any public body to be captured by the ASCM, and without a thorough definition of a public body many enterprises avoid proper classification (Baschuk, 2018).

Unilaterally imposed tariffs on steel and aluminium by the US based on a national security justification demonstrated that Article XXI of the WTO treaty can endanger the whole rule-based global trading system. Members can end up in a suboptimal Nash trading equilibrium and the spirit for cooperation can be lost if members unwisely invoke Article XXI. Accordingly, this rule needs to be strengthened in a way that a member can invoke Article XXI only under condition that the WTO approves such action (WTO, 2019). Therefore, members could no longer invoke this article without getting a prior approval from the WTO. Moreover, by reviewing whether a member's proposal to invoke Article XXI is justifiable or not the phrase "other emergency" mentioned in the GATT 1947 could be better defined since the rule does not mention which emergencies (besides war) justify national security concerns. Additionally, prompt and effective remedies should be allowed for members that are being negatively affected by other member's usage of Article XXI (WTO, 2019).

In order to make the WTO more relevant old rules should be improved and completely new rules must be established to regulate important areas that are

not yet being regulated in a multilateral framework (Fabry, 2019). The WTO should aim to negotiate an e-commerce agreement, an agreement on fisheries subsidies (supporting sustainable development goals), an environment goods agreement and a trade in services agreement. Furthermore, it should discuss other important areas where the lack of regulation causes discriminatory treatment and impediments to market access. The WTO provisions in trade-related investment measures, trade-related intellectual property rights, general agreement on trade-in-services and the general agreement on tariffs and trade, are not sufficient to address problems like forced technology transfers, joint venture requirements, foreign equity limitations, foreign direct investments, disclosure of source code requirements and other practices that produce unfair market conditions (Kaukab, 2016). Therefore, new rules are crucially needed to address distortive practices that are currently decreasing overall welfare.

3.2. Revitalizing the dispute settlement system

The relevance of the WTO's rule-based trading system and its credibility are being undermined as new appeals can no longer be heard by the AB. Consequently, safeguarding and strengthening the dispute settlement mechanism should be a priority area in the WTO reform.

The main issues that have caused the current AB paralysis and would need to be improved are connected to the AB's lack of adherence to the 90-day timeframe for appellate review, the AB engaging in interpretations of rules that go beyond its mandate and thus extending the amount of judicial overreach, continued service by AB members even though their term of appointment has expired, treating AB reports as precedent (case-law practice) and concerns regarding the AB's review of facts and findings about the meaning of domestic legislation (Van den Bossche, 2019).

The problem the WTO faces is how to settle a dispute in timeframe required by rules (Reich, 2017). Settling disputes promptly and according to the specified timeframe is crucial for the stability and predictability of the system. If disputes are not solved according to the WTO planned timeline (which in most cases happens) uncertainty increases as members wait for the rulings to be announced since the outcome will have an impact on their economy (WTO, 2020). Therefore, it is important to strengthen rules that deal with the duration of the dispute settlement process.

If there is an appeal of the panel's report, Article 17.5 of the Dispute Settlement Understanding (hereinafter: DSU) requires that the AB provides its final report within a period that should never exceed 90 days. However, in practice the AB rarely delivers a final report within 90-day deadline (Reich, 2017). Therefore, Article 17.5 of the DSU should be changed in a way that additionally specifies that only when parties agree to extend the required 90-day period could the proceeding take longer otherwise not. In order to make sure that the report is presented within 90 days the AB should ask parties to limit the number of pages

in the paper they submit or that the parties voluntarily narrow the scope of the appeal (European Commission, 2018). Furthermore, the publication of the report could be done only in the language of the appeal so that time is not wasted translating the report into other languages. Translation would then happen at a later date.

The US has criticized the practice wherein AB members finish the appeal even though their term has expired and they do so without getting prior approval from the DSB (Gruszczynski, 2019). According to the US this goes against Article 17.2 of the DSU where only the DSB should have the right to decide if an AB member, whose term in office has expired, should continue serving and that rule 15 (transitional rule for outgoing AB members that gives the AB authority to allow someone who ceases to be a member of the AB the right to continue to be a member of the AB) was not approved by WTO members (Hillman, 2020). Therefore, the issue regarding the inconsistency between Article 17.2 of the DSU and Rule 15 of working procedures for Appellate Review could be solved by changing Article 17.2 of the DSU to additionally specify that an outgoing AB member shall finish the disposition of a pending appeal in which the oral hearing has already happened (WTO, 2018). Article 17.2 of the DSU should also indicate that outgoing AB members should continue with their work until they have been replaced by new members but for no longer than two years after their term has expired (WTO, 2018).

WTO members have expressed concern regarding the AB review of facts in the panel report. Some members claim that the AB adjusts and modifies the analysis of the facts instead of just sticking to the issues of law covered in the panel report (Stewart, 2019). The US pointed out concerns regarding the tendency of the AB to make findings on issues that are not needed to resolve a conflict and its tendency to make conclusions beyond panel factual findings, especially with regard to interpreting domestic legislation (Gruszczynski, 2019). Therefore, Article 17.12 of the DSU should additionally stress that the AB should address each of the issues raised on appeal only to the degree needed to settle a dispute. Furthermore, Article 17.6 of the DSU should clarify that it is not the role of panels or the AB to interpret a member's domestic law as such, but to include legal characterisation of the domestic measures under WTO law (WTO, 2018).

Work of the AB members is currently not reaching its full potential (Caporal & Gerstel, 2018). For the purpose of improving the work of the AB some changes must be made in the DSU rule. Firstly, membership in the AB should become a full time job instead of a part-time occupation. Secondly, the AB Secretariat should be given more resources. Thirdly, the number of AB members should increase from 7 (Article 17.1 of the DSU) to 9 members. Finally, there should be one single but longer term for AB members instead of a four-year term with an option of being reappointed once. Without the possibility of members being reappointed the AB would strengthen its independence and there would be certainty about the duration of one's term (WTO, 2018). These changes could increase the efficiency of the AB and would have a positive effect on the

timeframes of appellate reviews. Furthermore, WTO members emphasized that the AB judges use 20th century rules to solve 21st century issues and this imbalance between legislation and litigation needs to be addressed with a reform that goes beyond the dispute settlement mechanism (Baldwin & Nakatomi, 2015). Therefore, comprehensive rule-updating is crucial in order to prevent WTO system failure.

The WTO oversees many trade agreements and each agreement contains its own set of complex rules and explanations. For example, the provision to judge whether or not product dumping is occurring is more than 1400 words long (Tireky, 2020). Consequently, it can be hard to correctly interpret every single agreement that exists under the aegis of the WTO. Some members (especially the US) have accused the AB of judicial overreach by interpreting the WTO rules in a way that adds to or diminishes the rights and obligations of WTO members (Walker, 2019). Article 3.2 of the DSU prohibits creating liabilities for WTO members that go beyond the text of agreements (Hillman, 2020). Many AB judges have admitted that it can be a real struggle to decide on the proper interpretation or application of the relevant WTO provisions in a particular case (Van den Bossche, 2019). Thus, WTO members stress the importance of communication and cooperation between the AB and WTO members to address ambiguities in the agreements.

To get an opportunity to point out systemic issues, comment on trends in the jurisprudence and debate AB approaches that are causing concerns, a totally new rule should be established that would make meetings between AB members and WTO members compulsory (WTO, 2018). By creating new Article 17.15 of the DSU a platform for open and candid discussion would be provided where problems of correct interpretation and the issue of treating the AB reports as precedent could be addressed. Meetings between the AB and WTO members would require adequate transparency and some basic rules so that any potential pressure on AB members would be avoided and the independence of the AB safeguarded (WTO, 2018).

3.3. Strengthening the WTO's regular working practices

Improving regular working practices at the WTO is important in order to make the organization more operational and effective. Day-to-day activities are undertaken by different WTO bodies. The WTO's councils and committees play a vital role in performing regular work and by assessing on a committee-by-committee level how their daily functions could be made more efficient would help to reinvigate the WTO.

3.3.1. Consensus

The reason the AB is unable to fill its vacancies is the WTO practice of consensus. This practice of consensus is deeply ingrained in the WTO system and

provides an equal opportunity for all members to express their point of view (Bertelsmann Stiftung, 2018). This practice ensures that no WTO member can be forced into accepting decisions that may be detrimental to their interests (Hoekman, 2010). Whereas developing countries strongly support this working practice given the large asymmetries in power and size across WTO members, many developed countries warn that this practice is making the WTO inefficient, because consensus is not only used in negotiations but also applies to the normal operations of the WTO (Bertelsmann Stiftung, 2018). Therefore, the WTO could operate more successfully if consensus practice would be replaced by some new decision making process.

One proposed solution to the problem of a small minority blocking the majority from moving forward is to request written explanations from the opposing members of the reasons behind their decision to prevent progress (Sutherland et al., 2004). Furthermore, opposing members should present desired changes to the deal and show their readiness to stop the impasse if amendments are made (Torres, 2017). This requirement could help to solve the current AB crisis because the US has explained its reasons for blocking the appointment of new AB members but it has not submitted acceptable solutions to stop the blockage and which could indicate the willingness of the US to overcome the problem. Therefore, members could no longer block the progress without proposing acceptable solutions under which they would stop blocking the majority from moving forward.

Problems connected to the practice of consensus could potentially be solved by adopting a plurality criterion or by creating an executive board or committee (Elsig & Cottier, 2011). In the case of a plurality measure, the minority could not block the adoption of a proposal when some critical mass of countries (e.g. an overwhelming majority of countries) supports the change (Hoekman, 2010). The reason for establishing a board could be to emulate the International Monetary Fund or World Bank model, where 20 to 30 officials make decisions, or to use the board as a consultative body which helps with possible solutions when WTO councils or committees fail to agree (Steger, 2009). Developing countries strongly oppose the idea of creating an executive board and most developed countries are also against this suggestion (Sutherland et al., 2004). The critical mass approach and the approach of asking members to explain the reasons for blocking the deal and to propose possible solutions are more acceptable to members (Hoekman, 2010). However, the practice of consensus increases the legitimacy of agreements reached and because this practice is a part of the WTO culture many countries aim to preserve consensus and work on the interpretation of it (Torres, 2017).

The working practice at the WTO is to understand consensus as a universal right to veto that allows any member to block even exploratory discussions on some proposed trade policy-related matter. Blocking substantive deliberation is harmful to the collegial spirit that should exist in international cooperation. Because this is making the system dysfunctional, consensus should be viewed as

a right that entails the obligation to strive for collegial interests (Torres, 2017). Therefore, consensus should not be used to stop subsets of WTO members from discussing issues of common interest.

It appears as though the outcome of the 11th Ministerial Conference (hereinafter: MC11) in Buenos Aires confirms countries' efforts to stop the use of consensus as a constraint to prevent others entering into talks, because at MC11 different groups of WTO members launched discussions on e-commerce, investment facilitation, MSMEs and domestic regulation in services (Hannah, Wilkinson & Scott, 2018). Moreover, at the 2019 World Economic Forum in Davos, 76 WTO members agreed to start negotiations on rules that govern e-commerce and cross-border data flows (Foroohar, 2019). These actions demonstrate that some progress is already being made to improve the WTO working practices.

The WTO could become more functional if new mechanism of open plurilateral agreements (hereinafter: OPAs) would be established. OPAs are a form of critical mass agreements. In addition to critical mass agreements, a group of WTO members can collaborate on a policy area under the aegis of the WTO via Plurilateral Agreements (hereinafter: PAs) under Article II:3 WTO (Hoekman & Sabel, 2019). While both PAs and OPAs are domain-specific, the difference between PAs and OPAs is that PAs are applied on a discriminatory basis but OPAs are not and that is why OPAs do not require the approval of all WTO members to be incorporated into the WTO (Bertelsmann Stiftung, 2020). Therefore, the probability of achieving new PAs is very low since consensus allows any member to block the incorporation of the new agreement.

OPAs would provide an opportunity for WTO members to freely debate different topics, to address regulatory differences for the purpose of reducing trade costs, to examine spill-over effects, to address coordination failures, to encourage mutual review, to talk about recent trade tensions, to support learning from each other, and most importantly OPAs create a platform for open cooperation (Hoekman & Sabel, 2019). Recognizing OPAs as WTO-conforming would demonstrate that the WTO is no longer a hostage to the consensus of its members but rather a partner in articulating it (Bertelsmann Stiftung, 2020).

The final result of four joint initiatives that were launched at MC11 and are now being pursued at the WTO will be important for the future of the OPA model and for the way the WTO operates. These initiatives resemble OPAs among a group of WTO members and show the opportunity for the gradual multilateralization of OPAs through the provision of technical support to candidate members (Hoekman & Sabel, 2020). Furthermore, actions under the OPA type do not match the practice of a single undertaking (package deal) approach to trade negotiations (Bertelsmann Stiftung, 2020). Because negotiating comprehensive trade deals (like the attempt at the Doha Round) has failed, the WTO could become more operational if the organization moves away from package deals and instead works on achieving OPAs that focus on specific areas (WTO, 2020).

3.3.2. Monitoring function and transparency

Having a transparent rule-based trading system where relevant information can be found is extremely important if the WTO wants to perform its work effectively. By improving the WTO's monitoring function, enhancing transparency and strengthening notification rules under WTO agreements the quality of WTO's work would increase.

WTO councils and committees regularly monitor the implementation of WTO agreements by reviewing countries trade policies and practices (WTO, 2020). For the purpose of improving current trade policy reviews the work of committees needs to be carried out more effectively (WTO, 2018). Firstly, committees should learn from each other because some are more successful in generating relevant information compared to other committees (Elsig, 2016). Therefore, conducting more workshops and informal discussions at the committee level would boost cross-committee coordination and help to identify good working practices (WTO, 2018). Secondly, committees should require members to provide substantive replies within specific timeframes to written questions for the purpose of clarifying different concerns (WTO, 2018). Prompt and adequate answers from members would give committees the information they need and could help to improve trade policy reviews. Finally, committees should collaborate more with the Secretariat and with the Institute for Training and Technical Cooperation (ITTC) in order to produce useful recommendations for countries that struggle to achieve notification obligations (WTO, 2018).

Significant resources already exist at the WTO to help those that experience capacity constraints and consequently fail to comply with notifications requirements (WTO, 2018). However, some members fail to do so out of unjustifiable reasons. Therefore, members should face a new obligation to explain reasons for delays in preparing notifications because under the current system members face no consequences if they fail to meet deadlines (WTO, 2018). Furthermore, if a member fails to deliver a complete notification within one year from the deadline and it has not requested help from the Secretariat, then under new rules that member would suffer the consequences (TWN, 2019).

New proposed sanctions include the inability to preside over WTO bodies, larger contributions to the WTO budget, exposure and criticism in meetings and in written reports, non-compliant member questions during trade policy peer reviews would not have to be answered and delinquent members could be marked as inactive WTO members, which would hurt that member's public reputation (WTO, 2018). Such sanctions aim to stimulate countries to submit full notifications on time and ask for assistance if they experience difficulties while preparing notifications. Committees monitoring function cannot be successfully performed if WTO members do not make their trade policies transparent by complying with notification obligations and that is why it is so important that members do comply with notification requirements.

The WTO trade policy review mechanism could be made more efficient if the structure of the report submitted by the Secretariat would additionally include a section on members' notification performance. For each review on a member's trade policies and practices two documents must be prepared at the WTO and one of them is written independently by the WTO Secretariat (Zahrnt, 2009). The report by the Secretariat currently includes four main sections (economic environment, trade and investment regimes, trade policies and practices by measure, trade policies by sector) that do not evaluate the completeness and timeliness of the member's notifications (WTO, 2020). Therefore, a new chapter should be included in the Secretariat's report where information on notifications could be found. This new chapter would show how the member's notification performance has evolved since the last review, which helps to expose best practices and create peer pressure (WTO, 2018).

3.3.3. The role of the WTO Secretariat

The Secretariat is given very little formal power because the WTO is seen as a member-driven organization where all decisions are made by members (Lamy, 2013a). However, this member-driven process should not prevent the Secretariat from obtaining a more active role in the system. Currently the role of the Secretariat is to support the members, to give developing countries technical assistance, to prepare different documentation, to organize some meetings, to oversee developments in world trade, to advise governments that want to join the WTO and to provide information to the public (WTO, 2020).

Revitalizing the role of the Secretariat could make the WTO system more functional (Elsig, 2016). Permitting the Secretariat to have a more proactive role by undertaking policy analysis, tabling proposals, conducting more research on trade issues, having a role in rules reform, identifying potential violations by evaluating members' policy compliance with WTO rules and taking the lead when the membership is unable or reluctant to move forward would help to reinvigorate the WTO from the inside out (Toohey, 2014).

Empowering the Secretariat to conduct all or some of the above-mentioned activities would facilitate the work of WTO members (Lamy, 2013b). Members require relevant and up-to-date information in order to have effective deliberations and using the Secretariat more proactively by allowing it to collect more information itself or to collaborate more with other international organizations would produce knowledge that is needed (Bertelsmann Stiftung, 2018). Knowledge and analysis are especially important for the proposed OPA type of cooperation (Hoekman & Sabel, 2020). Therefore, the Secretariat could provide intellectual leadership and close the remaining gaps. Preparing guidelines on how to potentially bolster the role of the Secretariat while ensuring its neutrality and independence could help to address some concerns of WTO members about granting the Secretariat wider opportunities to support the work of the WTO (Bertelsmann Stiftung, 2018).

4. How far apart are members' views on key reform issues

Whereas there is full agreement that the WTO must be revitalized, there are different opinions about how this should be done (Martinez, 2019). Disagreements seem the greatest between developed and developing countries. Under current rules the WTO reform cannot be successfully achieved if members fail to agree on the process of modernizing the organization. The situation looks extremely dangerous because the only noticeable agreement between all 164 WTO members is that organization must be reinvigorated if it wants to operate successfully in the future.

WTO members do agree that trade rules need to be updated, that dysfunctional dispute settlement system is a very serious problem for the organization and that there are some regular WTO's practices that are preventing the WTO to function more effectively. However, when some concrete solutions to the mentioned challenges are presented it becomes obvious that members' points of view on the WTO reform tremendously differ and that it will be extremely difficult to find a workable solution out of the current WTO crisis.

One of the most problematic area at the WTO is connected to the special and differential treatment (SDT) rule. The fact that members self-identify their status as a developed or developing is producing a lot of frustration between members, because belonging to the developing group means receiving beneficial treatment. Developed members such as the US and the EU have proposed to change the SDT rule in order to end the practice of self-classification (Suneja, 2019). On the other hand, developing members like Venezuela, India, China and South Africa refuse to change this rule in any way because self-classification best fits with WTO's objectives (Lee, 2019). Since two-thirds of the WTO's 164 members claim to be developing and only developed members have proposed to change the SDT rule it seems impossible to find a solution that would solve the issue connected to abusive use of developing status in order to get beneficial treatment even though a country could take on full obligations. China is the most problematic example here because it is unwilling to take on full obligations and change its status at the WTO (Lee, 2019).

It is important to notice that beneficial treatment of a developing member applies to every trade agreement (present and future) and therefore the SDT rule will constantly produce conflicts. Members are currently trying to achieve an agreement on fisheries subsidies and the reason why they still have not reach a deal is connected to the SDT rule (Reinsch, Caporal & Lesh, 2020). As long as members like China, the US and the EU disagree on the way the SDT rule should be changed it is unlikely that any change will happen.

Updating and changing rules in the agreement on subsidies and countervailing measures (ASCM) is also unlikely to happen because China disagrees with proposed changes by the US, the EU and Japan. China has a different economic system compared to the US, the EU and Japan. China's unique economic system was not taken into consideration when the rules were made in

the 20th century at the WTO. Consequently, market economies like the US, the EU and Japan find heavy government involvement into the economy as an unfair practice but on the other hand China is not a market economy so it will continue to grant subsidies to companies and influence private enterprises. The ASCM will hardly be changed on the subsidy side because disagreements between members are too large. However, China said it is prepared to discuss countervailing measures with the US, the EU and Japan in order to level the playing field. Therefore, countervailing duties could help to reduce tensions between non-market economies practices and market-economies practices (Tran, 2019).

Most members agree that new rules are needed in order to make the WTO suitable for 21st century challenges. However, when it comes to defining specific areas that would require multilateral regulation or proposing the scope of new agreements problems emerge as members' points of view on the matter differ. Because of the coronavirus pandemic e-commerce gain on importance and the need to achieve an e-commerce deal has increased. Developed and developing members have different opinions about how the e-commerce deal should look like. Developed members like the US and the EU propose that e-commerce agreement should also include areas connected to cross-border data flows and data localization. On the other hand, developing countries like China disagree with the proposal to set multilateral rules on data flows and storage at the WTO. Moreover, India, Indonesia and South Africa want to impose tariffs on cross-border data flows (Lee, 2019). As a result, it could take decades before members agree on an e-commerce agreement since their positions differ. However, members do agree that the WTO must stay relevant and without the organization's ability to deliver new rules on important areas the potential welfare gains might be lost forever.

The overall welfare could be further reduced if WTO members fail to agree on the AB reform. Dysfunctional dispute settlement system is producing a lot of damage to the WTO and majority of members do recognize the alarming situation and are prepared to work hard in order to solve the AB paralysis. Therefore, many developed and developing members have proposed possible solutions that could help to make the dispute settlement system operational again. Furthermore, the EU, China, Costa Rica, Panama, Australia, Canada, Switzerland, Republic of Korea, New Zealand, Norway, Singapore, Chile, Brazil, Colombia, Guatemala, Mexico and Uruguay decided to establish an ad-hoc AB that enables participants to preserve access to a binding and impartial dispute settlement system among them while the AB at the WTO lacks the required quorum to hear the appeals because appointments of new AB members are being blocked by the US (Rios, 2020).

Whereas majority of members try to find a workable solution, the US has not made any effort to explain its proposal that would make the US to stop blocking appointments of new AB judges. It seems like the US wants to go back to the pre-WTO dispute settlement system where defendants had an option to block

the establishment of a panel or to block the adoption of the panel report – an option that is considered the main weakness of the system that preceded the WTO (Schneider, 2019). Thus far, the US has rejected proposals put forward by other WTO members and it strongly disagrees with those that suggest expanding and strengthening the AB's jurisdiction (Caporal & Gerstel, 2018). Moreover, it is not clear if any reform of the current system will satisfy the US (Van de Bossche, 2019). Because the US is an extremely powerful member in the international trading system this AB paralysis is unlikely to be solved any time soon as the US is unwilling to agree with the proposed solutions.

WTO members agree that the WTO is currently not performing its work effectively and therefore some of the WTO's regular working practices must be improved in order to revitalize the organization. The most exposed practice that is producing current stagnation at the WTO is the consensus norm. Many developed countries propose to move away from this practice. On the other hand, developing countries strongly oppose the idea of making decisions at the WTO without the consensus. Therefore, members' points of view on the consensus norm seem to be too far apart to deliver any significant changes connected to the decision-making process at the WTO.

Developed and developing members agree that the work of the WTO committees could be improved if committees would learn from each other and would conduct more workshops and informal discussions in order to boost cross-committee coordination. Because committees oversee countries trade policies and practices it is important that members make their trade policies transparent by complying with notification obligations. Therefore, developed members would strengthen notification rules and would create sanctions for those that fail to comply with notification obligations out of unjustifiable reasons. On the other hand, developing members disagree with proposed sanctions because they claim that developed members do not understand how hard it can be to deliver a complete notification report when capacity constraints are present. As a result, developed and developing members agree that committees should collaborate more with the Secretariat and with the Institute for Training and Technical Cooperation (ITTC) in order to produce useful recommendations for countries that struggle to achieve notification obligations (WTO, 2018).

Deciding whether or not the role of the Secretariat should be changed at WTO is again producing different opinions from countries. The EU supports the idea of strengthening the role of the WTO Secretariat in favor of various negotiating processes and in the implementation and monitoring functions (WTO, 2018). The US agrees that the Secretariat should be more active when it comes to the evaluation of members' notification compliance (TWN, 2019). However, the US disagrees with the suggestion of giving the Secretariat a greater overall role at the WTO. India and many other developing countries believe that the Secretariat should not have a more proactive role because that would go against the member-driven character of the WTO (Suneja, 2019). An agreement between WTO members is that the Secretariat can never replace members but there are

different views on how strong the role of the Secretariat should be in order to make the WTO system more functional and effective (Lamy, 2013b).

WTO members' points of view greatly differ when concrete solutions are discussed. Achieving an agreement among developed and developing members seems impossible. Contradictory views on the WTO reform from powerful members like the US, the EU and China, make the chance to reach an agreement on the WTO modernization process minimal. The fact that the most problematic areas at the WTO like the AB paralysis are left without a solution that would be acceptable to all is extremely worrisome. Members are most likely to reach an agreement on areas that are not so vital for the WTO's survival (for example, improving the work of committees).

5. Concluding remarks

The need for the WTO reform has never been as urgent as now when the WTO faces its deepest crisis since its inception. The credibility of the WTO has been called into question as the system struggles to successfully deal with new challenges. Doubts about the WTO's effectiveness and relevance have been raised as a result of its current inability to move forward and deliver a meaningful outcome to the global trading system. The survival of the WTO is under threat as the AB paralysis endangers its ability to enforce rules when a member fails to comply with its obligations. Despite the fact that the WTO has brought substantial achievements to the global trading system, its value to the world can be lost if the WTO does not improve its functions and adapt to new trading needs that are quite different from the time when the WTO was established.

The WTO has not seen a wide-ranging rulebook update because the Doha Round of negotiations failed to be concluded. As a result, the WTO is to a large degree outdated. The rules negotiated in the 20th century are unable to deal with complex 21st century challenges. Consequently, new rules are needed to solve problems connected to e-commerce, to cross-border data flows, to data storage and to other areas mentioned in this paper. Furthermore, the WTO must adapt to China's economic expansion and deal with its non-market trade practices in order to preserve fairness in the system. Therefore, loopholes in the WTO rulebook must be closed in order to maintain a credible rules-based global trading system.

Current world events are additionally making the WTO less stable and threaten the system's survival. Coronavirus pandemic will have a huge negative impact on the global economy and it will change the way international trade is performed in the future. The fact that director general of the WTO will step down early produces another challenge for the organization because members have to find a new director general and they have to all agree on the proposed person.

Rising protectionism and nationalism are harming the spirit for international cooperation and curb the attempt to further liberalize trade. The Trump administration has brought a lot of uncertainty to international trade and has

undermined the WTO's reputation by starting a trade war with China. Moreover, the US used its veto to block new appointments of AB members leading to the AB's inability to hear new appeals; solving this problem is an unprecedented challenge for the WTO. Existing rules and working methods need to be updated in order to make the WTO fully operational again.

The US decision to prevent the majority from moving forward in appointing new AB members showed that the consensus practice can be a source of inefficiency and stalemate in the WTO. Therefore, proposals have been made to change the practice of using consensus as an absolute right to veto into viewing consensus as an obligation to strive for collegial interests. As a result, members should work together more actively to discuss and analyse problems, and to find possible solutions, and substantive deliberations could no longer be blocked by others. Thus, proposed OPAs can produce a platform for cooperation and can reduce the need for members to negotiate RTAs. The number of RTAs has increased over the years and challenged the WTO to harmonize regionalism with multilateralism.

Harmonization is also required between members' points of view on the way the WTO should be reinvigorated. Tensions and disagreements on the WTO reform proposals seem to be the strongest between developed and developing countries. Developing countries can claim exemptions to obligations and this is one of the main reasons why tensions between WTO members occur since nothing defines when a member is considered to be developed or developing and members self-identify their status. Developed countries proposed a new rule that would define when (under what conditions) a member can claim developing status and that the goal for a developing member would be to eventually opt-out of this status. This proposal tries to address the issue of a rising China that still claims to be a developing member even though its power and role in the world has changed dramatically since it entered the WTO in 2001.

Achieving an agreement between major trading countries seems like mission impossible. Collaboration between two incompatible economic systems (market economy vs state capitalism) is extremely difficult. Members will have to find a workable solution so that the coexistence of two different economic systems stops endangering the WTO. It is time for other members to take the initiative to prevent WTO from becoming a prisoner of the US-China conflict. The EU could play a constructive role.

The future of the WTO looks dark if the process of reinvigoration fails because new global challenges will only get more complex and if the WTO wants to solve new problems it must become fully operational, adaptive, relevant and effective again. This will only be possible when members show willingness to cooperate, talk and make an effort to find a workable solution together out of the current WTO crisis.

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CHAPTER 17

FISCAL DECENTRALISATION IN THE EU MEMBER STATES¹

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Abstract

The fiscal decentralisation process in the EU member states has been developing unequally. Although there are clear tendencies towards a higher degree of decentralisation in the European Union, no mandatory regulatory framework of a fiscal decentralisation system per individual member state has been set. However, the European Charter of Local Self-Government contains the guidelines for the implementation of fiscal decentralisation. Although decentralisation has numerous advantages, it should be borne in mind that a too excessive decentralisation process can lead to a loss of economies of scale and control over limited resources of the central government. The goal of the paper is to compare the degree of fiscal decentralisation between the old and new member states. This comparison of the level of fiscal decentralisation will be based on the share of revenues / expenditures of local and general government. In addition to the common indicators, the research presents other decentralisation indicators such as tax revenues, expenditures for employees, and share of tax revenues in total revenues of local governments. The process of decentralisation differs depending on the level of development of a certain country and depends on its economic and political structure. The research results show that, on average, new EU member states are less decentralised than the old member states.

Key words: fiscal decentralisation, fiscal inequalities, local government units, redistribution of income, European Union

JEL classification: E62, H71, H72, H76

*“Fiscal decentralization has much to offer,
but it is a complicated enterprise.”*

(Oates, 1994:1)

1. Introduction

The process of integration of the EU member states inherently reflects the need to unify and integrate legal, economic, and social aspects of life. The diversity that is otherwise desirable in certain activities (e.g. culture, language, etc.) does not have many supporters when it comes to economic benefits of mergers

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and market standardisation and the administrative function of the countries. Literature from the field of fiscal decentralisation does not reflect a common consensus on how to standardise different fiscal decentralisation systems. Despite the fact that no consensus has been reached so far on the standardisation of fiscal systems at the EU level, the European Charter on Local Self-Government (hereinafter: Charter), adopted by the Council of Europe back in 1985, is also addressing this issue. The Charter, as the only multilateral legal instrument, guides the EU member states to a common direction of establishing an effective fiscal decentralisation system based on defined guidelines for developing lower levels of government. This means that a system of lower levels of government should be designed with the aim of achieving the maximum level of basic principles of the Charter, which basically implies greater efficiency in the functioning of local self-government. This is also confirmed by certain findings of authors like De Mello and Barenstein (2001) and Tanzi et al. (2008). The research carried out by these authors relate to optimal vertical and horizontal fiscal structure with an appropriate level of fiscal autonomy. Furthermore, they stress the link between revenues and costs resulting from the performance of tasks falling under the competence of lower levels of government. The aim is to ensure maximum efficiency of revenues made available to lower levels of government, while maintaining an adequate level of autonomy. The solution could be the case by case approach, where each country needs to have its way of accepting the globalization process. The approach depends on the country's development stage, social, and political background. One approach could be an evolutionary way for developing and least developed countries, while the other approach could be a faster way of the acceptance of the globalization process for developed countries (Kostić and Radulović, 2020).

Each EU member state has a more-less specific own system of financing lower levels of government. There are great differences between fiscal decentralisation systems in terms of the structure of local self-government, their associated competences as well as in terms of allocation of fiscal power and autonomy of financing between the central (state) level of government and lower levels of government. Due to this system diversity, it is difficult to compare them and determine which system is more efficient, which is why this paper is focused on comparing the level of fiscal decentralisation on the basis of selected indicators, and the assessment of its effectiveness will be subject of future research. The following are the indicators that best show the level of decentralisation of a given country, which will enable comparison of the new EU member states with the old EU member states. The selected indicators are the share of local revenues in general government and the share of local expenditures in general government. In addition to the usual indicators, the research was complemented by other decentralisation indicators such as the share of local tax revenues in general government, the share of tax revenues in total local revenues, and the share of expenditures for employees in local and general government. Within this framework, a working hypothesis was formulated:

H: On average, new EU member states are less decentralised than the old ones.

The above indicators and the analysis of the formulated hypothesis will enable a clear overview of the degree of fiscal decentralisation in the EU member states. Research results will answer the question of whether new EU member states are more or less decentralised than the old members and will be a basis for further research in this area.

The paper consists of five chapters. After the introduction, the second part presents a brief summary of the theoretical background. This is followed by a description of the methodology and data. The fourth chapter is dedicated to a comparative analysis of fiscal decentralisation in the EU, and the final part is conclusion.

2. Literature review

Literature provides a general definition of the fiscal decentralisation concept, which is that it represents a transfer of competences, responsibilities, and financial resources from the central (state) level to lower levels of government. Its initial purpose is to establish effective financing of local self-government, exercise competences of decentralised functions and function with the aim to meet the needs of the local population. Such a traditional understanding of the concept of fiscal decentralisation is evident in the works of the first generation of the of fiscal federalism theory such as Tiebout (1956), Musgrave (1959), Buchanan (1965), Olson (1969), and Oates (1972). Considering the Theory of Public Finance that was applied at the time, a legitimate decentralised government would provide a solution to the conceptual public choice issue. The central issue of public choice was related to the ability to effectively transfer competences, responsibilities, and financial resources from central to lower levels of government with the presence of local population that is diverse and heterogeneous world-wide. It was assumed that lower levels of government in a certain country could only function effectively if they had adequate competences and were provided with sufficient financial resources as well as access to financial resources they could freely allocate (Boex, 2009). The first fundamental understanding of fiscal decentralisation was established by Tiebout (1956) in his model, called the Tiebout's fiscal decentralisation model. In his discussion, he states that, given the high level of mobility, individuals will choose an environment for their place of residence that best suits their personal needs in terms of taxes and the supply of public goods. On the other hand, in the event of a complete lack of mobility, we cannot assume that decentralisation does not bring a network of increasing common benefits. For example, Samuelson's condition of equalising the sum of the marginal rates of substitution and marginal costs implies that common benefits differ from one unit to another (Brezovnik and Oplotnik, 2003).

According to Tiebout (1956), Musgrave, who wrote the “Theory of Public Finance” (Musgrave, 1959) carried out further research in this area and presented the three most important functions of public finance, i.e. stabilisation, redistribution, and allocation. While the first function, stabilisation, is primarily characteristic for the central level of government, the other two alternate between central and lower levels of government in a particular country depending on the appropriateness of implementation of certain activities and supplying public goods. Furthermore, Olson (1969) presented the principle of fiscal equivalence in his work “The Principle of Fiscal Equivalence: The Division of Responsibilities among Different Levels of Government”, and Oates (1972) presented the principle of correspondence in his work “Fiscal Federalism”. According to them, every public good should be provided by the level of government that can best ensure it, along with an important factor; that this is the level at which the need arose. Next generation representatives include authors such as Proud’homme (1995), Tanzi (1996), Qian (1997), Oates (2005), and Weingast (1997 and 2008). In the research of modern authors in the field of fiscal decentralisation, there is greater awareness of the need to discuss fiscal decentralisation in a broader sense. Recent literature in the field of fiscal decentralisation compared to the traditional, or literature of the first- generation leaders does not only focus on the general definition of the term fiscal decentralisation but emphasises the important role of citizens. Citizens can influence decision-making concerning their living environment.

Many authors explored the advantages and disadvantages of fiscal decentralisation. In terms of the benefits of decentralisation, it is usually mentioned first that the needs of the local population are met according to their preferences. Since voters’ preferences are different and local authorities are responsible for providing the services that do not have major external effects, potential advantages include better public service, better accountability of local officials, greater willingness to pay for services and development from below. Some of the other benefits include revenue mobilisation, innovation in economic activities, responsibility of elected officials, and participation in governance (Bahl, 1999).

Oates (2006) lists four main reasons that clearly indicate the benefits of fiscal decentralisation: (1) regional and local self-government units can adjust the supply of public goods according to the declared preferences of citizens living in these sub-national units as opposed to the central government, which typically delivers a single supply of public goods across the territory, (2) in cases of full mobility, consumers choose those sub-national units that offer public goods that match their preferences and thus increase potential gains from decentralised supply of public goods (3) sub-national units face competition from other units that also offer certain combinations of public goods in order to attract inhabitants (consumers/voters) to their jurisdiction – such competition limits the growth of budget expenditures and provides an efficient supply of public goods and services, and (4) decentralisation encourages innovation and experimenting in the area of shaping and implementing new public policies, thus becoming a kind of a laboratory for conducting different fiscal experiments.

In addition to the positive impact of decentralisation on the more efficient provision of local public goods and services, recent literature points (Prud'homme, 1995) to regional disparities and the inability to address them without an adequate role of the central level of government, while emphasising the possible problem of macroeconomic instability in more decentralised policies, as well as highlighting problems related to certain policy sectors dealing with greater susceptibility to corruption (Fisman, Gatti, 2002). Prud'homme's work opened a new chapter in the discussions on fiscal federalism. He stressed the negative side of decentralisation – that decentralisation can undermine allocation efficiency, reduce production efficiency, increase the level of corruption, and threaten stability (due to the fact that local and regional authorities have little incentive to ensure stabilisation policies).

However, Prud'homme's work sparked a series of disputed reactions that can be summarised in the following commentary written by Charles McLure. He pointed out that “the benefits usually attributed to decentralisation include the degree of control that citizens have over decisions that affect them and react to asymmetries of information at the local and national level” (McLure, 1995).

3. Methods and Data

Although scientific literature covers various fiscal decentralization measures, there are in fact no reference values of indicators on the basis of which a certain country could be characterised as fiscally decentralised or centralised. However, a comparison with other countries may serve as a good orientation point. Before describing the method for comparison of fiscal decentralisation systems, an overview of the research covering the measurement of fiscal decentralisation and its impact on different macroeconomic variables is given below.

According to Panizza (1999), the World Bank (2001), Afonso and Hauptmeier (2009), Martinez-Vazquez, and Canavire-Bacarreza (2012), Horváthová et al. (2012) and many others who are interested in investigating fiscal decentralisation, decentralisation of expenditures and revenues, often use indicators. However, tax decentralisation and dependence on transfer, the indicators proposed by Stegarescu (2004) or OECD, eliminate their formality. Stegarescu (2005) uses tax autonomy and revenue decentralisation measures to conduct a public sector assessment based on revenue decentralisation, while according to Rodríguez-Pose and Krøijer (2009), transfers can actually create negative incentives for lower levels of government to mobilise their own revenues. Aristovnik (2012) calculates the fiscal decentralisation index based on measuring fiscal autonomy and fiscal significance of the local level of government. According to the relevant literature, fiscal decentralisation can be determined by several variables. In general, according to the Wagner's Law (Wagner, 1876), GDP growth is related to the demand for public expenditures which leads to the expansion of decentralisation of the public sector. This expectation was supported by Bodman et al. (2009) with the exception of low-income countries,

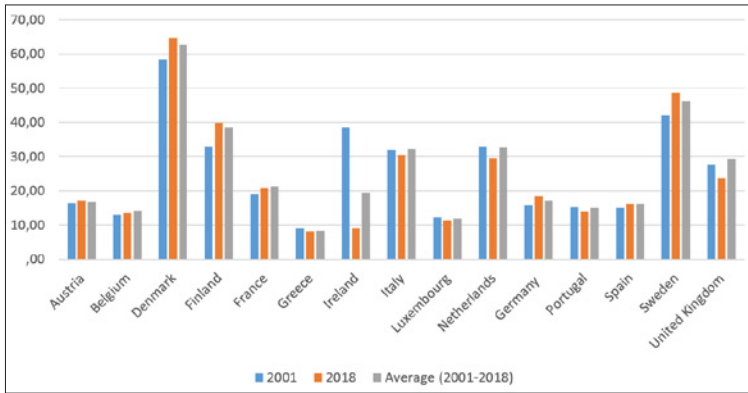
Martinez-Vazquez, and Canavire-Bacarreza (2012), Blume and Voigt (2008) or Panizza (1999). The relationship between the unemployment rate and fiscal decentralisation was investigated by Stegarescu (2004), who studied the decline in central government revenues from taxes and social contributions at a time of rising unemployment (a case of income decentralisation). Bodman et al. (2009) fulfilled expectations regarding the negative impact of economic openness on fiscal decentralisation contrary to Stegarescu (2004). According to Bodman et al. (2009), population density does not have a clear impact on fiscal decentralisation, but its significant presence is evident in the assessment. Blume and Voigt (2008) investigated the correlation between fiscal decentralisation and total government expenditure (negative correlation). In the case of Bodman et al. (2009), no positive effect of revenues in the event of cost decentralisation is expected. Assumptions about the inflation rate and the relationship between the public debt and fiscal decentralisation follow the needs of central decisions at the macroeconomic level as mentioned by Oates (2005). In the period of their increase, the future development of the economy may deteriorate (Siničáková et al., 2017; Siničáková & Gavurová, 2017) and the burden of decision-making is borne by the central level of government that is against decentralisation. Expectations of a local relationship between indebtedness and fiscal decentralisation can achieve both effects. Positive, if the increase in local debt is associated with larger local authorities (borrowing power). Negative, it relies on the need to regulate local debt at the central level in the event of its enlargement, which affects the reduction of power of the local government level. Finally, the field of variables was explored by Panizza (1999), Bodman et al. (2009) or Jílek (2015) without finding unanimous results supporting the idea of greater decentralisation in large countries.

The income ratio of local and general government and the expenditure ratio of local and general government are the most frequently used indicators of fiscal decentralisation (Enikopov and Zhuravskaya, 2007, Baskaran, 2010). The bigger these ratios, the more decentralised the country. In addition to fiscal indicators, various non-fiscal indicators are often used in literature as decentralisation measures. Stegarescu (2005) lists several such indicators such as the ratio of employees in local and general government (Arikan, 2004), the number of local units normalised by the number of inhabitants (Oates, 1985), and the number of lower levels of government.

4. Results and discussion

A comparative analysis of the fiscal decentralisation system for the EU-28 is given below, according to the ratios specified in the third part of the paper and according to the set hypothesis. Data on the EU countries were taken from the Eurostat database and cover the period 2001-2018.

Figure 1: Comparison of the revenue share of local government in general government of the old EU member states in the period 2001-2018 (%)

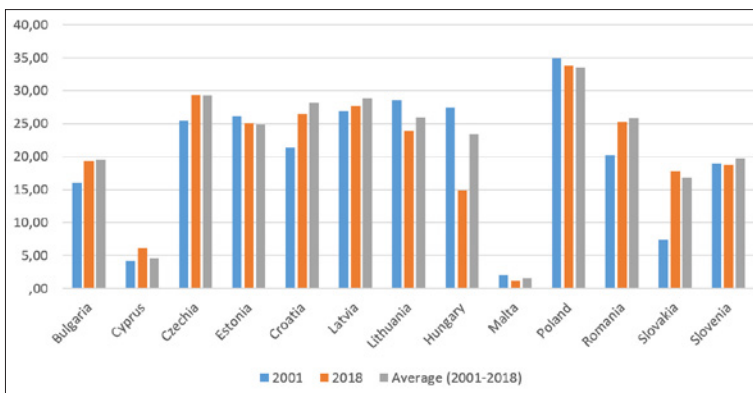


Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

Decentralisation of revenues is measured by the share of local government in the revenues of general government. The degree of revenue decentralisation in the old EU member states was averaging 25% from 2001 till the highest value of 27% in 2009 (see Appendix 1). Denmark has the highest degree of revenue decentralisation (average of 63%) and Greece the lowest (on average 8%). Of all the old EU member states, Greece is fiscally the most centralised member state. The decentralisation trend is stable in most countries, except in Ireland where there is an ongoing trend of fiscal centralisation from 2005.

Below we can observe the relationship or revenues of local and general government of the new EU member states.

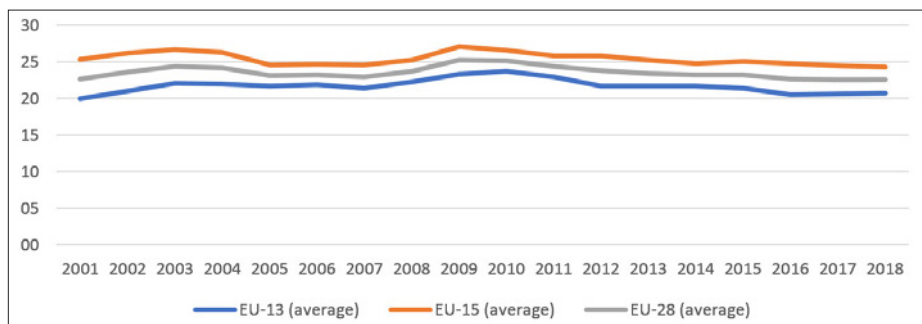
Figure 2: Comparison of the revenue share of local government in general government of the new EU member states in the period 2001-2018 (%)



Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

As can be observed, the intensity of revenue decentralisation in the new EU member states is somewhat lower than in the old ones. The degree of revenue decentralisation in the new EU member states averages 22% (see Appendix 2). Poland has the highest degree of revenue decentralisation (34% on average), and Malta the lowest (on average 2%). Malta is the most fiscally centralised country of all EU-13 members.

Figure 3: Comparison of the revenue share of local government in general government of the old and new EU member states in the period 2001-2018 (%)

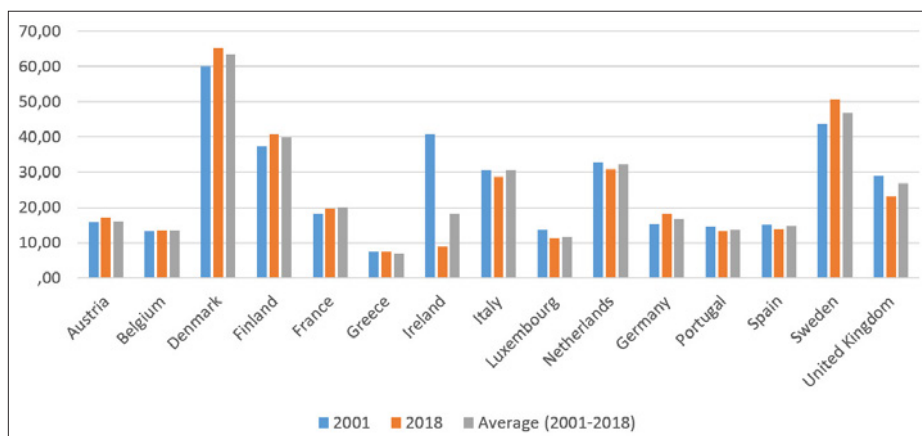


Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

The degree of revenue decentralisation in the new EU member states averages 22%, in the old Member States 25%, and in the EU-28 24% (see Appendix 3).

The degree of decentralisation measured by the share of local in general government is presented below.

Figure 4: Comparison of expenditure share of local government in general government of the old EU member states in the period 2001-2018 (%)

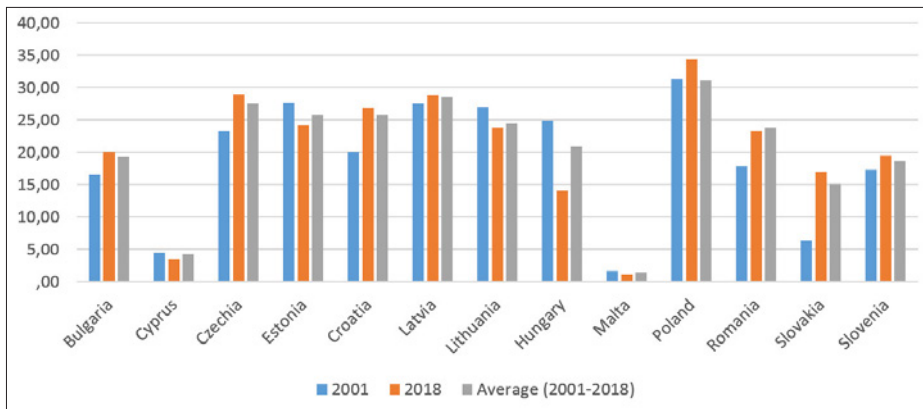


Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

Decentralisation of expenditures measured by the share of local expenditures in total expenditures of general government mainly follows the trend of revenue decentralisation. The degree of expenditure decentralisation in the old EU member states averages 25% (Appendix 4). The highest degree of expenditure decentralisation is in Denmark (average of 63%) and the lowest in Greece (average of 7%).

Considering the fact that new EU member states have more centralised public revenues than the old members, their expenditures are also decentralised, to a lesser extent.

Figure 5: Comparison of expenditure share of local government in general government of the new EU member states in the period 2001-2018 (%)



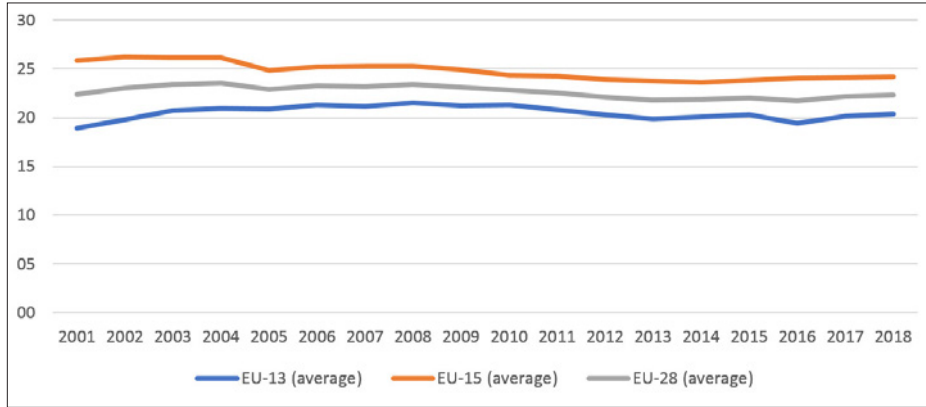
Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

New EU member states have more centralised public revenues than the old EU member states; this is also the case with expenditures.

The degree of expenditure decentralisation in the new EU member states is 20% (see Appendix 5). Poland has the highest expenditure decentralisation degree (average of 31%) and Malta the lowest (average of 1%). This follows the logic of fiscal decentralisation where it is suggested that larger countries, both in terms of territory and population, should be more decentralised.

Figure 6 leads to similar conclusions related to the degree of decentralisation determined by the dynamics of share of local government in the share of general government. We can conclude that relationships between the tiers of government do not change in the long-term period.

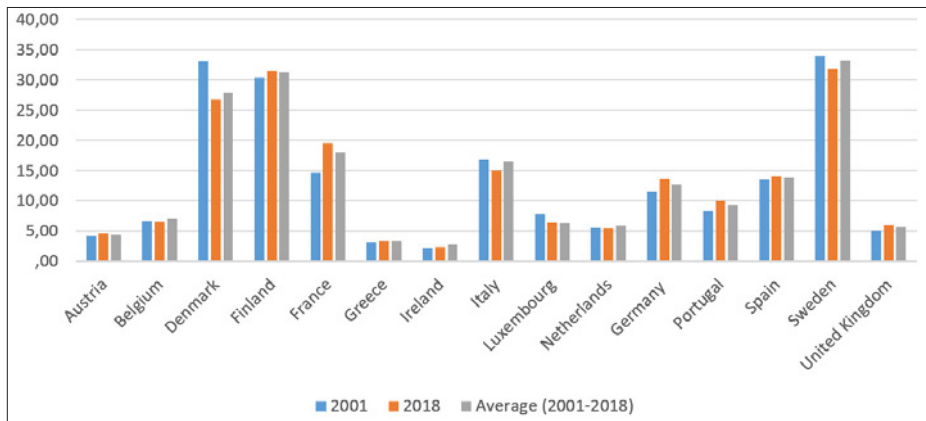
Figure 6: Comparison of expenditure share of local government in general government of the old and new EU member states in the period 2001-2018 (%)



Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

Expenditure decentralisation degree measured by the expenditure share of local government in general government in the new EU member states averages 20%, the old member states 25%, and the EU-28 23%. The averages are mostly equal to the ones in the revenue decentralisation case (see Appendix 6). In the next section, we analyse decentralisation of tax revenues in the old and new member states.

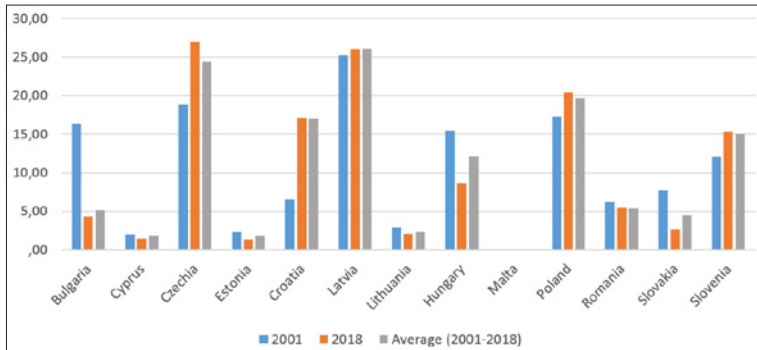
Figure 7: Comparison of tax revenue share of local government in general government of the old EU member states in the period 2001-2018 (%)



Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

Decentralisation of tax revenues of the old EU member states presented by the share of local tax revenues in total tax revenues of general government averaged 13% (see Appendix 7) in the observed period. Sweden was the most decentralised country in terms of tax revenues, averaging 33%, followed by other Nordic countries. The most centralised tax revenues are in Greece and Ireland. Their coefficient of tax revenues decentralisation is lower than 5%.

Figure 8: Comparison of the tax revenue share of local government in general government of the new EU member states in the period 2001-2018 (%)

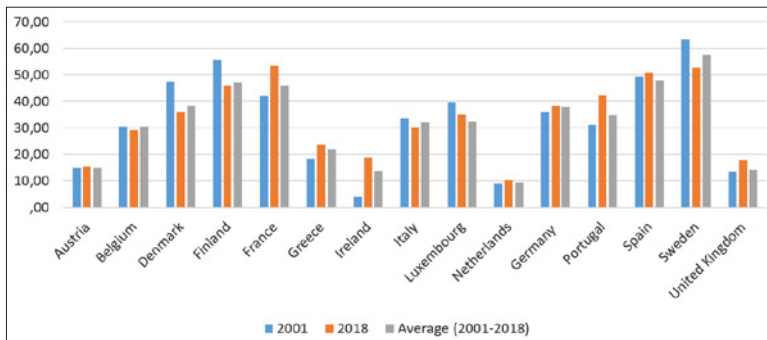


Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

Tax revenue decentralisation coefficient of the new EU member states averaged 10% (see Appendix 8). In terms of tax revenue decentralisation, Latvia is a leading country averaging 26%, and the most centralised is Cyprus with just 2%. It is important to note that there are no such data available for Malta.

Below is the analysis of the share of tax revenues in total local revenues in the old and new EU member states.

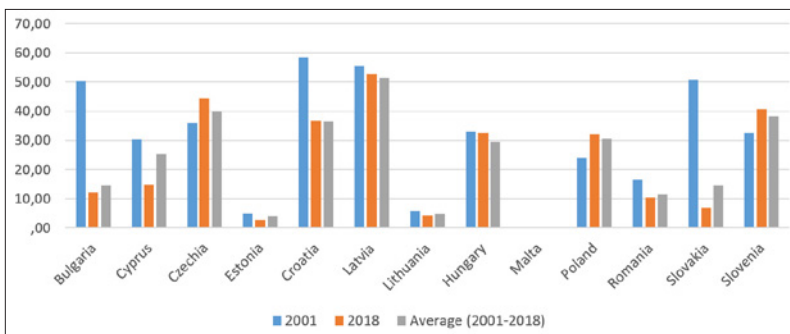
Figure 9: Comparison of the share of tax revenues in total local revenues of the old EU member states in the period 2001-2018 (%)



Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

The share of tax revenues in total local revenues of the old EU member states averaged 32% (see Appendix 9). The highest share of taxes in total revenues of the local government is in Sweden, averaging 58%, and the lowest in the Netherlands at 9%.

Figure 10: Comparison of the share of tax revenues in total local revenues of the new EU member states in the period 2001-2018 (%)

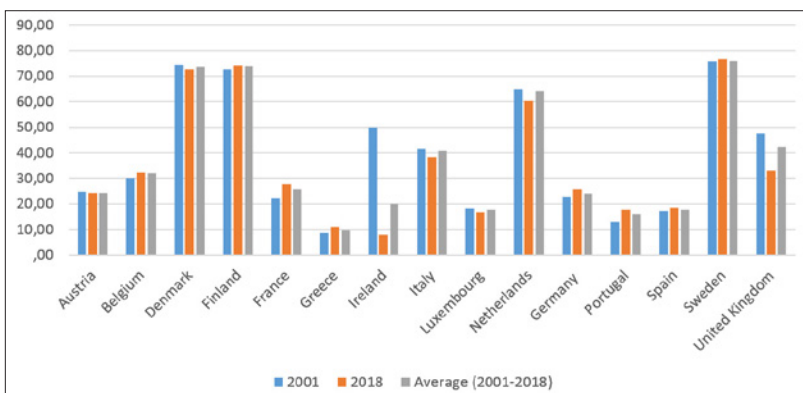


Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“ and Ministry of Finance „Godišnjak 2001“

The share of tax and total revenues of local government of the new EU member states is somewhat lower than in old member states and averages 23% (see Appendix 10). Latvia has a high share of taxes in total local government revenues, averaging 51%, and the lowest share can be found in Estonia with 4%.

One of the decentralisation indicators is public management decentralisation. This segment can be measured by the share of employees in local government and total expenditures for employees at the level of general government.

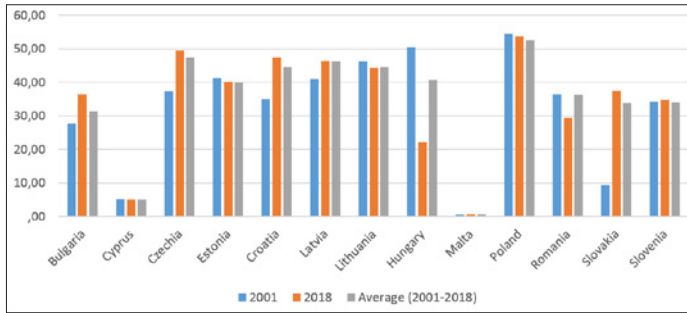
Figure 11: Comparison of the share of employee expenditures at the local and general government level of the old EU member states in the period 2001-2018 (%)



Note: The data refer to the classification of general and local government according to ESA 2010
 Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

The above-mentioned indicator averaged 37% for the group of the old EU member states (see Appendix 11). The most decentralised countries within the group of old EU member states are Sweden, Finland, and Denmark, where this indicator averaged 75%. The most centralised country is Greece, where the coefficient of employee decentralisation equalled 10%.

Figure 12: Comparison of the share of employee expenditures at local and general government level of the new EU member states in the period 2001-2018 (%)

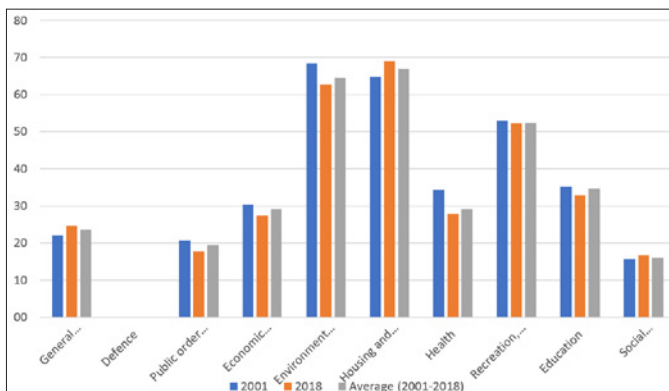


Note: The data refer to the classification of general and local government according to ESA 2010
Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

The new EU member states have somewhat lower coefficients of employee decentralisation in comparison with the old EU member states with the 35% average coefficient (Appendix 12). The most decentralised new EU member state according to this indicator is Poland, averaging 53%, and the most centralised country is Malta with the average of only 1%.

An overview of the decentralisation degree for specific public services for the new and old EU member states is provided in the following section of the paper.

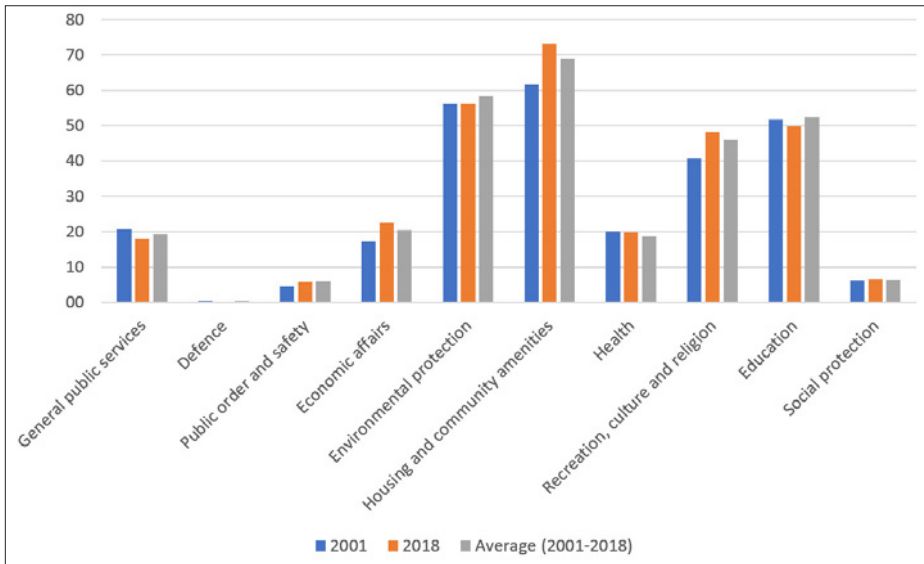
Figure 13: Average share of expenditures of specific public functions of local and general government of the old EU member states in the period 2001-2018 (%)



Note: The data refer to the classification of general and local government according to ESA 2010
Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

At the local government level of the old EU member states, the most transferred functions are the functions of environmental protection and improvement of housing and community amenities. The least decentralised functions are those of social protection. The function of defence is completely under the authority of central government.

Figure 14: Average share of expenditures of specific public functions of the local and general government of the new EU member states in the period 2001-2018 (%)



Note: The data refer to the classification of general and local government according to ESA 2010
Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

The provision of public functions in the new EU member states is mostly more centralised than in the old member states. This is not the case only with the function of education, which is more decentralised. On the other hand, public order and safety services are much more centralised in the new than in the old EU member states.

5. Conclusions

In the past thirty years, there has been a significant weakening of the central government and simultaneous strengthening of the local sector, which was contributed by the traditional theory of fiscal federalism by R. Musgrave, which set out the principle that the central government must have control over the stabilisation and distribution function, and that lower levels of government should be in charge of the allocation function of public finance. Today, lower levels of government play an increasingly important role in the development of the country, and the opinion on which activities are important in order to achieve

development goals is changing; so that increasing number of countries around the world are implementing reforms in the field of fiscal decentralisation. Due to the increased awareness of citizens and the desire to participate in decision-making on local issues, as well as the need for maximum rationalisation, effectiveness, and efficiency of public finance management, we can conclude that decentralisation is an inevitable process.

The main purpose of the paper was to compare the degree of fiscal decentralisation in the EU-28 member states and to answer the question whether the new EU member states are more centralised or decentralised in comparison with the old EU member states. Although a binding framework for the implementation of fiscal decentralisation at member state level has not been established so far in the EU, there are clear tendencies towards decentralisation. After reviewing the current literature and previous research in the field of fiscal decentralisation, five indicators were selected for the purpose of this analysis that are related to the working hypothesis. The working hypothesis leads to the conclusion that the new EU member states are on average less decentralised than the old member states.

The results of the analysis showed that there are still significant differences between the EU-28 countries in terms of fiscal power and autonomy for financing lower levels of government. Furthermore, the amount of funds allocated to local units significantly differs from country to country. The largest amount of resources allocated to local units is allocated in Denmark (averagely 63% are local government revenues in general government revenues), while the smallest amount is allocated in Greece and Malta (less than 10% are local government revenues in general government revenues).

Although aware of the limitations of this comparative analysis of the degree of fiscal decentralisation of the new (EU-13) in relation to the old member states (EU-15), it provided a realistic description of the situation in this area, while findings and data can serve as a relevant basis for further in-depth studies in this area.

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APPENDIX 1: Share of local government revenues in general government revenues of the old EU member states in the period 2001- 2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria	16.4	16.8	16.7	16.5	16.4	16.4	16.2	16.5	16.9	16.8	16.7	16.7	16.9	17.1	17.0	17.1	17.1	17.1
Belgium	13.0	13.4	14.3	14.0	14.0	14.2	14.2	14.4	15.0	14.4	14.2	13.7	13.7	13.6	13.8	14.0	13.9	13.5
Denmark	58.4	60.1	62.4	60.6	58.2	58.6	57.2	59.6	65.5	66.1	65.6	66.0	65.5	63.0	65.8	65.8	64.4	64.7
Finland	32.9	34.1	34.9	35.1	35.4	35.9	35.9	37.2	41.0	42.0	40.8	40.9	41.5	41.4	41.3	40.8	40.5	39.9
France	19.0	20.0	20.6	21.1	21.0	21.1	21.3	21.5	23.3	22.9	22.3	22.1	21.7	21.7	21.4	21.3	20.8	20.8
Greece	9.0	9.1	7.7	7.9	8.1	8.7	8.4	8.8	10.6	8.6	7.6	7.7	8.1	7.8	7.7	7.7	7.9	8.2
Ireland	38.4	41.2	41.6	40.0	18.1	18.0	17.8	19.1	18.4	16.3	13.9	12.4	10.5	8.6	9.1	9.0	9.2	9.0
Italy	31.9	31.9	32.8	33.0	33.5	32.4	32.2	33.2	35.4	33.6	32.3	32.2	31.3	31.2	31.5	31.0	30.2	30.4
Luxembourg	12.2	12.9	12.8	12.3	11.3	11.7	11.6	12.1	11.9	12.0	12.1	12.0	11.7	11.5	11.1	11.5	11.1	11.4
Netherlands	32.8	34.1	35.9	34.7	33.8	31.7	32.6	31.6	35.3	34.3	34.0	33.1	30.7	30.4	32.5	31.3	30.1	29.6
Germany	15.7	15.6	15.2	15.9	16.5	16.8	17.2	17.2	17.2	17.3	17.3	17.1	17.3	17.2	17.8	18.1	18.1	18.4
Portugal	15.3	14.9	14.9	15.2	15.1	15.5	15.4	15.6	16.5	16.2	15.8	15.8	15.1	14.3	14.4	14.3	14.1	13.9
Spain	15.1	15.1	15.0	14.8	14.7	15.2	15.0	16.3	18.8	17.8	16.7	16.6	16.8	16.9	16.8	16.9	16.9	16.2
Sweden	42.1	43.9	44.0	43.4	43.1	43.1	43.3	44.8	47.0	47.0	47.2	48.4	48.9	49.2	48.4	48.1	48.8	48.6
United Kingdom	27.6	29.8	31.3	30.2	29.6	30.7	30.2	30.4	34.1	33.4	31.2	32.1	28.4	28.4	27.4	25.2	23.9	23.6
Average (2001-2018)	25.3	26.2	26.7	26.3	24.6	24.7	24.6	25.2	27.1	26.6	25.8	25.8	25.2	24.8	25.1	24.8	24.5	24.3

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 2: Share of local government revenues in general government revenues of the new EU member states in the period 2001- 2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bulgaria	16.0	19.6	16.4	16.8	17.5	18.4	16.2	17.3	20.9	21.7	20.8	19.9	22.2	23.5	24.4	19.8	20.2	19.4
Cyprus	4.3	4.3	4.3	4.7	5.2	4.7	4.2	4.2	5.2	5.3	5.6	5.0	4.5	4.0	4.1	3.7	4.0	6.1
Czech Republic	25.5	27.2	30.5	31.5	30.5	30.4	29.5	29.6	31.7	31.3	29.7	27.7	28.2	29.1	28.8	28.0	28.5	29.3
Estonia	26.1	25.9	25.3	24.3	26.0	25.0	24.4	27.4	24.7	24.7	24.5	24.3	24.3	23.7	24.0	23.7	24.1	25.1
Croatia	21.4	29.6	31.0	29.4	29.3	29.3	28.9	29.1	29.1	29.1	28.5	28.7	28.6	29.5	27.3	25.5	25.3	26.5
Latvia	26.9	27.7	28.2	28.7	27.6	27.7	29.9	32.9	32.8	33.1	29.7	27.7	28.0	28.0	27.6	27.6	28.2	27.7
Lithuania	28.6	28.4	27.4	27.5	23.7	23.6	22.7	25.6	28.7	31.6	28.7	27.6	24.4	23.6	23.6	24.2	23.6	23.9
Hungary	27.5	28.0	30.7	29.1	29.1	28.1	25.5	25.2	25.1	26.0	27.1	20.6	21.0	19.3	16.4	13.9	14.2	14.9
Malta	2.1	1.9	1.6	1.7	1.5	1.5	1.4	1.4	1.7	1.7	1.7	1.9	1.7	1.6	1.5	1.1	1.1	1.2
Poland	34.9	32.6	31.9	33.7	32.0	32.1	31.7	33.7	35.3	35.7	34.0	33.2	33.7	34.1	33.0	34.0	33.9	33.8
Romania	20.3	19.5	21.6	21.1	21.7	26.1	26.8	26.1	29.0	28.7	28.6	27.2	28.0	28.3	29.8	29.1	29.2	25.2
Slovakia	7.4	10.2	18.9	18.9	18.5	17.8	17.5	17.6	18.2	18.3	17.8	17.6	16.7	16.4	17.5	17.8	17.1	17.8
Slovenia	18.9	18.6	18.9	18.8	18.8	19.2	18.9	19.2	21.4	21.5	21.3	21.1	20.8	21.3	20.1	18.9	18.6	18.7
Average (2001-2018)	20.0	21.1	22.1	22.0	21.7	21.8	21.4	22.3	23.3	23.7	22.9	21.7	21.7	21.7	21.4	20.6	20.6	20.7

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 3: Comparison of the share of local government revenues in general government revenues of the old and new EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EU-13 (average)	20.0	21.1	22.1	22.0	21.7	21.8	21.4	22.3	23.3	23.7	22.9	21.7	21.7	21.7	21.4	20.6	20.6	20.7
EU-15 (average)	25.3	26.2	26.7	26.3	24.6	24.7	24.6	25.2	27.1	26.6	25.8	25.8	25.2	24.8	25.1	24.8	24.5	24.3
EU-28 (average)	22.7	23.6	24.4	24.2	23.1	23.3	23.0	23.7	25.2	25.2	24.4	23.8	23.5	23.3	23.2	22.7	22.6	22.5

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 4: Comparison of the share of local government expenditures in general government expenditures of the old EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria	15.9	16.3	16.1	15.2	15.6	15.6	15.8	16.2	16.1	16.3	16.2	16.1	16.4	16.2	16.7	16.8	17.0	17.2
Belgium	13.3	13.7	13.9	13.8	13.3	14.3	13.9	13.6	13.5	13.4	13.3	13.5	13.3	13.1	13.0	13.0	13.3	13.5
Denmark	60.0	61.1	62.3	62.4	64.5	65.3	63.1	63.7	63.2	63.1	63.0	62.0	63.7	63.9	63.8	65.0	66.0	65.2
Finland	37.2	37.7	38.0	38.2	38.8	39.6	40.3	41.2	40.3	40.4	41.0	41.2	40.9	40.5	40.7	40.2	40.4	40.8
France	18.4	18.6	19.0	20.0	20.1	20.5	21.0	21.1	20.9	20.3	20.4	20.5	20.9	20.6	20.1	19.7	19.6	19.7
Greece	7.6	7.9	6.3	6.8	6.9	7.6	7.2	7.1	7.7	7.3	5.7	5.9	5.7	6.6	6.4	7.1	7.3	7.6
Ireland	40.9	41.5	41.1	41.3	18.4	19.0	18.4	16.7	13.1	8.3	10.3	10.1	8.9	7.5	7.7	8.5	8.9	8.9
Italy	30.6	31.7	31.3	32.5	32.3	31.9	31.4	31.6	32.3	31.7	30.5	29.7	29.5	29.0	29.1	29.1	28.4	28.7
Luxembourg	13.7	13.2	12.8	12.1	12.0	11.8	12.0	12.1	12.1	11.5	11.6	11.0	11.1	11.1	10.7	11.4	11.1	11.3
Netherlands	32.9	33.5	34.4	34.0	34.2	32.5	33.3	33.4	33.5	32.8	32.2	31.3	29.6	29.5	31.4	31.2	31.2	31.0
Germany	15.3	15.3	15.2	15.4	15.7	16.2	16.6	16.6	16.5	16.4	17.1	17.2	17.5	17.8	17.9	18.1	17.9	18.2
Portugal	14.5	14.8	14.1	13.9	13.9	14.3	15.0	15.6	14.8	14.3	13.6	12.7	13.2	11.5	12.2	12.7	12.8	13.4
Spain	15.0	15.2	15.5	14.8	15.3	15.8	16.5	15.7	15.4	15.5	14.9	12.3	13.0	13.5	13.8	13.7	14.3	14.0
Sweden	43.6	43.8	43.6	43.6	43.9	44.7	46.0	46.8	46.8	46.7	47.7	47.9	47.8	48.6	49.2	50.2	50.6	50.8
United Kingdom	28.8	28.9	28.9	28.8	28.3	28.8	28.6	27.6	27.9	27.2	26.6	27.3	25.1	24.5	24.6	24.0	23.5	23.0
Average (2001-2018)	25.9	26.2	26.2	26.2	24.9	25.2	25.3	25.3	24.9	24.4	24.3	23.9	23.8	23.6	23.8	24.0	24.2	24.2

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 5: Comparison of the share of local government expenditures in general government expenditures of the new EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bulgaria	16.6	18.8	16.7	16.8	19.0	18.8	17.0	19.1	20.8	19.9	19.6	19.0	20.9	20.6	25.7	19.7	20.2	20.0
Cyprus	4.4	4.1	4.0	4.6	5.1	4.7	4.7	4.5	4.6	4.8	5.0	4.3	3.6	3.2	4.0	3.7	3.8	3.5
Czech Republic	23.2	24.2	27.1	29.8	28.6	29.6	28.3	28.7	29.2	29.2	28.5	25.3	26.7	27.2	27.0	25.9	27.5	28.9
Estonia	27.6	27.7	27.5	28.0	27.9	27.7	27.7	27.1	24.5	24.3	24.8	24.5	25.8	24.1	23.5	23.1	24.3	24.2
Croatia	20.0	27.1	27.9	26.4	26.9	26.8	26.9	26.8	26.0	24.9	24.0	25.4	25.6	26.4	25.3	25.1	25.8	26.9
Latvia	27.5	28.4	27.4	28.8	27.9	28.7	31.4	32.5	29.8	27.7	28.1	27.8	28.3	27.6	25.9	27.1	28.3	28.8
Lithuania	27.0	26.9	26.4	26.0	23.6	24.5	23.1	24.1	23.8	26.3	23.5	25.9	23.4	22.9	22.5	22.9	23.3	23.8
Hungary	24.9	24.9	26.5	25.7	25.6	24.6	23.2	23.1	23.5	25.3	23.0	18.7	15.0	15.6	15.4	12.7	13.3	14.0
Malta	1.7	1.6	1.3	1.5	1.4	1.4	1.4	1.2	1.5	1.5	1.7	1.8	1.7	1.5	1.3	1.0	1.0	1.1
Poland	31.3	29.8	28.4	29.4	29.4	30.2	30.3	31.4	32.0	32.7	31.9	31.0	30.9	31.8	31.0	31.4	32.5	34.4
Romania	17.8	18.5	20.2	21.0	21.2	24.5	25.5	25.0	24.1	24.0	26.3	25.8	26.0	25.9	27.3	26.3	26.4	23.3
Slovakia	6.3	7.6	17.5	16.4	16.5	16.4	16.3	16.2	16.1	16.8	15.9	15.1	14.8	15.4	16.1	15.4	16.8	17.0
Slovenia	17.3	18.1	18.0	18.2	18.4	18.9	19.2	20.1	19.8	19.6	18.3	19.3	16.0	19.3	18.4	17.7	18.6	19.4
Average (2001-2018)	18.9	19.8	20.7	21.0	20.9	21.3	21.1	21.5	21.2	21.3	20.8	20.3	19.9	20.1	20.3	19.4	20.1	20.4

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 6: Comparison of the share of local government expenditures in general government expenditures of the old and new EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EU-13 (average)	18.9	19.8	20.7	21.0	20.9	21.3	21.1	21.5	21.2	21.3	20.8	20.3	19.9	20.1	20.3	19.4	20.1	20.4
EU-15 (average)	25.9	26.2	26.2	26.2	24.9	25.2	25.3	25.3	24.9	24.4	24.3	23.9	23.8	23.6	23.8	24.0	24.2	24.2
EU-28 (average)	22.4	23.0	23.4	23.6	22.9	23.2	23.2	23.4	23.1	22.8	22.5	22.1	21.8	21.9	22.0	21.7	22.1	22.3

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 7: Comparison of the share of tax revenues of local government in general government of the old EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria	4.2	4.3	4.4	4.4	4.4	4.4	4.3	4.3	4.5	4.5	4.5	4.5	4.4	4.4	4.3	4.5	4.5	4.7
Belgium	6.6	7.1	7.5	7.1	7.1	7.2	7.5	6.7	8.2	7.5	7.4	6.8	6.9	6.8	7.1	7.3	7.0	6.6
Denmark	33.0	33.2	33.4	32.0	30.6	30.9	23.9	24.8	25.7	26.7	26.7	26.4	26.1	24.6	26.0	26.6	26.4	26.7
Finland	30.3	29.2	28.8	28.4	28.5	29.2	29.5	30.5	33.9	34.6	32.6	32.3	32.9	33.1	33.6	32.6	32.7	31.6
France	14.6	15.1	15.6	16.5	17.2	17.2	17.8	18.0	19.8	15.9	19.5	19.5	19.1	19.3	19.5	20.0	19.8	19.5
Greece	3.1	3.1	3.3	3.4	3.4	3.3	3.4	3.5	3.4	3.6	3.4	3.5	3.7	3.4	3.4	3.4	3.5	3.4
Ireland	2.2	2.3	2.3	2.2	2.3	2.2	2.4	2.8	3.4	3.5	3.5	3.6	3.3	3.0	2.7	2.6	2.5	2.3
Italy	16.8	17.2	18.0	17.8	18.2	17.3	17.6	16.7	15.9	15.8	16.0	16.9	16.3	16.9	16.5	14.2	14.5	15.0
Luxembourg	7.8	8.5	8.3	6.9	6.2	6.1	6.1	6.3	6.4	6.1	6.5	5.6	4.9	4.6	4.9	5.4	5.7	6.4
Netherlands	5.5	5.7	6.2	6.4	6.2	5.2	5.1	5.3	5.7	5.8	6.1	6.5	6.5	6.3	6.2	6.0	5.6	5.5
Germany	11.5	11.3	11.1	12.2	12.6	13.1	12.9	13.1	12.4	12.6	12.8	12.9	13.0	12.8	13.1	13.3	13.4	13.6
Portugal	8.4	8.7	8.6	9.2	9.1	9.0	9.5	9.5	9.9	9.3	9.0	9.2	9.4	9.8	9.9	10.0	9.7	10.0
Spain	13.5	13.0	12.7	12.4	12.3	12.3	12.0	13.6	15.1	14.6	14.8	14.7	14.9	15.0	14.6	14.7	14.5	14.1
Sweden	34.0	35.2	35.7	35.2	34.2	33.7	32.3	33.1	33.2	31.6	31.9	32.9	33.1	32.5	31.8	31.8	31.8	31.7
United Kingdom	5.0	5.3	5.7	5.7	5.6	5.6	5.6	5.5	6.4	6.0	5.8	5.9	5.9	5.9	5.8	5.8	5.9	6.0
Average (2001-2018)	13.1	13.3	13.4	13.3	13.2	13.1	12.7	12.9	13.6	13.2	13.4	13.4	13.4	13.2	13.3	13.2	13.2	13.1

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 8: Comparison of the share of tax revenues of local government in general government of the new EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bulgaria	16.4	17.1	2.3	2.3	2.6	3.2	3.5	3.9	3.8	3.9	4.1	4.0	4.0	4.2	4.0	4.3	4.3	4.3
Cyprus	2.0	1.7	1.8	1.9	1.7	1.8	1.6	1.7	1.9	1.9	1.9	1.7	2.3	2.0	2.0	1.2	1.5	1.4
Czech Republic	18.9	21.4	21.5	21.7	25.7	25.4	25.0	26.0	25.4	25.0	24.4	24.0	24.9	26.0	25.2	26.2	26.2	27.0
Estonia	2.3	2.2	1.9	1.8	1.8	1.5	1.4	1.8	1.9	2.3	2.4	2.1	1.8	1.6	1.5	1.5	1.4	1.3
Croatia	6.6*	15.2	15.8	16.7	16.6	17.3	17.9	18.6	19.5	18.3	18.5	19.2	19.2	19.6	17.3	17.2	16.4	17.1
Latvia	25.2	25.4	25.4	25.4	23.5	23.7	24.9	26.5	27.5	29.2	27.8	26.9	26.3	26.6	26.2	26.0	26.7	26.0
Lithuania	2.8	3.2	2.5	2.5	2.1	1.9	1.7	1.8	2.8	3.0	2.8	2.7	2.0	2.1	2.2	2.2	2.1	2.0
Hungary	15.5	15.8	17.0	17.8	17.5	17.6	16.9	9.8	10.0	9.5	10.1	9.4	8.8	8.4	8.6	8.8	8.6	8.6
Malta																		
Poland	17.3	16.5	15.8	20.6	20.2	20.1	20.2	20.3	20.4	19.3	19.1	20.2	20.6	21.0	21.0	20.9	20.5	20.5
Romania	6.2	5.0	5.3	5.1	4.8	5.2	6.0	4.9	5.5	5.9	5.6	5.3	5.4	5.2	4.8	5.3	5.5	5.4
Slovakia	7.7	7.4	6.9	7.0	3.8	4.0	3.9	3.8	4.4	4.3	4.0	4.2	4.1	3.9	2.8	2.8	2.7	2.6
Slovenia	12.0	11.9	12.1	12.1	11.7	12.2	14.3	14.3	16.9	18.1	18.1	18.5	18.1	17.5	15.9	15.7	15.6	15.3
Average (2001-2018)	10.2	11.0	9.9	10.4	10.1	10.3	10.6	10.2	10.8	10.8	10.7	10.6	10.6	10.6	10.1	10.1	10.1	10.1

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“ and the Ministry of Finance „Godišnjak 2001“

APPENDIX 9: Comparison of the share of tax revenues in total revenues of local government of the old EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria	15.0	14.7	15.0	15.1	14.9	15.1	15.1	14.9	14.7	14.9	15.0	15.0	14.9	14.8	14.4	14.6	14.7	15.4
Belgium	30.6	31.7	31.3	31.1	30.9	31.0	32.1	27.7	31.6	30.8	30.8	29.1	29.6	29.4	30.7	31.1	30.4	29.3
Denmark	47.4	47.0	45.4	44.4	44.7	44.6	35.3	34.7	32.8	33.6	33.7	33.5	34.1	34.3	34.9	35.4	35.9	36.0
Finland	55.5	51.7	49.3	48.1	47.5	47.3	47.3	46.5	45.7	45.7	45.1	44.2	45.0	45.5	46.2	45.9	46.8	45.9
France	42.1	40.5	40.3	42.4	44.3	44.3	45.5	45.2	44.3	36.6	46.7	47.7	47.8	48.4	49.8	51.6	52.6	53.3
Greece	18.4	18.5	22.2	22.1	22.2	20.2	20.8	20.3	17.0	21.1	23.4	23.9	23.1	24.2	23.6	24.6	24.8	23.5
Ireland	4.2	4.1	4.1	4.1	9.6	9.0	9.9	10.4	12.8	14.8	16.8	20.1	21.7	24.7	21.6	20.6	19.5	18.7
Italy	33.5	34.1	34.6	33.7	33.7	34.1	34.5	31.3	27.6	28.9	30.7	33.0	32.5	33.8	32.5	28.7	29.8	30.3
Luxembourg	39.6	40.6	40.1	34.3	34.0	32.2	32.7	31.5	32.4	31.0	32.9	28.6	25.8	24.6	26.9	29.2	31.9	34.9
Netherlands	8.9	9.0	9.0	9.5	9.9	8.6	8.5	8.6	8.5	8.8	9.1	9.5	10.2	10.5	10.1	10.2	10.4	10.3
Germany	36.2	35.4	35.5	37.2	37.5	39.4	39.6	40.3	36.7	36.4	37.5	38.9	38.5	38.1	38.2	38.1	38.8	38.4
Portugal	31.3	32.9	31.7	33.0	33.5	32.7	34.9	34.2	31.4	30.7	31.5	31.5	34.7	38.6	39.6	40.4	40.4	42.2
Spain	49.3	48.2	47.3	47.9	49.1	48.2	47.7	45.3	40.4	43.6	47.0	48.1	49.3	50.1	50.3	50.4	49.7	50.6
Sweden	63.3	63.5	64.4	64.9	63.7	63.5	59.6	58.4	56.0	53.5	53.3	53.4	53.4	52.8	52.9	53.7	53.0	52.7
United Kingdom	13.3	13.2	13.3	13.6	13.5	13.1	13.2	13.0	13.0	12.8	13.3	13.0	14.3	14.5	15.0	16.2	17.1	17.9
Average (2001-2018)	32.6	32.3	32.2	32.1	32.6	32.2	31.8	30.8	29.6	29.5	31.1	31.3	31.7	32.2	32.4	32.7	33.0	33.3

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 10: Comparison of the share of tax revenues in total revenues of local government of the new EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bulgaria	50.3	42.2	7.5	7.4	8.1	10.7	13.1	13.5	10.2	10.4	11.5	11.5	10.1	9.6	9.0	13.3	12.4	12.1
Cyprus	30.3	26.4	27.1	25.8	20.7	25.2	27.8	28.4	24.0	23.1	22.2	22.6	33.6	30.7	30.1	21.2	23.2	14.7
Czech Republic	35.9	38.0	31.9	33.8	41.5	40.3	41.3	41.1	37.0	36.5	38.5	41.2	42.5	42.5	41.4	45.7	45.3	44.4
Estonia	5.0	4.6	4.2	4.2	3.8	3.4	3.2	3.6	3.9	4.6	5.0	4.4	3.8	3.8	3.5	3.5	3.2	2.8
Croatia	58.4*	27.8	28.3	31.9	32.4	34.4	36.5	37.3	38.1	36.1	37.4	38.2	39.4	38.0	35.3	37.3	36.2	36.7
Latvia	55.6	52.6	53.1	50.2	49.0	48.4	49.5	46.6	42.8	46.4	49.6	52.5	52.4	54.0	54.5	56.4	56.1	52.8
Lithuania	5.9	6.7	5.5	5.5	5.3	5.0	4.6	4.1	4.7	4.4	4.6	4.7	4.0	4.2	4.7	4.5	4.4	4.2
Hungary	33.1	33.3	33.0	36.1	34.9	35.8	38.0	22.3	22.6	20.6	19.9	24.6	22.3	23.3	27.8	35.6	34.5	32.7
Malta																		
Poland	24.0	25.2	24.7	31.4	32.4	32.9	35.3	33.9	30.9	28.8	29.5	31.0	31.0	31.3	32.4	32.5	32.1	32.1
Romania	16.5	13.5	14.0	13.5	12.4	11.2	12.1	10.3	10.2	11.1	10.9	11.0	10.8	10.3	9.1	10.1	10.0	10.4
Slovakia	50.7	35.8	18.5	19.5	10.5	11.2	11.3	10.7	10.8	10.6	10.3	10.7	10.9	10.9	7.0	7.2	7.4	7.0
Slovenia	32.6	33.2	33.7	33.9	33.1	34.2	41.1	38.7	39.2	41.9	41.9	42.4	41.7	39.8	37.7	41.3	41.4	40.7
Average (2001-2018)	30.6	26.1	21.6	22.5	21.9	22.5	24.1	22.3	21.1	21.1	21.6	22.7	23.3	22.9	22.5	23.7	23.5	22.4

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“ and the Ministry of Finance „Godišnjak 2001“

APPENDIX 11: Comparison of the share of employee expenditures of local government in general government of the old EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria	24.7	24.8	24.8	24.7	24.1	23.7	23.9	23.9	24.0	24.2	24.2	24.2	24.4	24.5	24.5	24.3	24.3	24.3
Belgium	30.0	31.3	31.4	31.3	31.7	31.9	31.9	31.9	32.2	32.6	32.7	32.7	32.7	32.1	31.9	32.1	31.7	32.1
Denmark	74.4	74.4	75.2	75.5	76.1	76.2	73.1	73.0	73.3	73.0	72.7	72.6	72.4	72.6	72.6	72.7	73.0	72.6
Finland	72.6	72.8	72.6	73.0	73.2	73.6	73.9	74.0	73.7	73.9	74.5	74.9	74.3	74.2	74.7	75.0	74.8	74.1
France	22.2	22.6	23.0	23.2	23.5	24.1	25.1	26.1	26.4	26.5	26.7	27.1	27.5	27.9	28.1	28.1	28.0	27.8
Greece	8.6	8.1	8.4	8.6	9.3	9.9	9.7	10.1	10.2	10.4	10.5	9.8	10.6	9.5	9.2	10.5	10.7	11.1
Ireland	49.9	51.0	51.8	51.6	15.5	15.2	12.6	12.7	11.9	11.1	11.3	11.3	10.9	8.4	8.0	8.1	7.7	8.0
Italy	41.4	41.2	40.1	41.5	41.3	42.3	40.6	42.2	41.4	41.8	41.6	41.2	40.8	40.5	40.3	39.4	38.8	38.4
Luxembourg	18.3	18.9	18.7	18.4	18.4	18.3	18.3	18.3	18.0	17.1	17.1	17.0	16.9	17.0	17.0	17.0	16.9	16.7
Netherlands	65.0	64.9	65.4	65.5	65.6	66.0	66.1	66.6	66.5	66.7	66.5	66.4	61.2	61.2	60.9	60.7	60.8	60.3
Germany	22.8	22.8	23.0	22.9	23.3	23.3	23.3	23.9	24.1	23.9	24.0	24.2	24.3	24.5	24.7	25.1	25.3	25.6
Portugal	12.9	13.1	13.1	13.3	13.4	15.3	15.8	16.2	16.8	16.7	17.3	17.9	18.0	17.5	17.6	17.5	17.6	17.8
Spain	17.3	17.1	17.2	17.1	17.6	17.7	17.7	17.5	17.4	17.7	17.9	17.8	18.0	18.2	18.2	18.2	18.4	18.5
Sweden	75.8	75.6	75.3	75.7	76.0	76.1	76.5	76.5	76.5	76.1	75.8	75.7	75.6	75.8	76.1	76.5	76.6	76.8
United Kingdom	47.4	46.9	45.8	45.3	45.6	45.0	45.3	45.7	45.6	45.2	43.4	41.0	39.8	37.5	36.7	35.4	34.0	33.0
Average (2001-2018)	38.9	39.0	39.0	39.2	37.0	37.2	36.9	37.2	37.2	37.1	37.1	36.9	36.5	36.1	36.0	36.0	35.9	35.8

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

APPENDIX 12: Comparison of the share of employee expenditures of local government in general government of the new EU member states in the period 2001-2018 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bulgaria	27.8	31.0	31.3	31.1	32.7	30.0	28.8	29.1	29.9	30.1	30.6	31.3	32.8	31.2	31.6	34.2	34.2	36.4
Cyprus	5.3	5.3	4.7	4.8	5.0	5.1	5.0	5.0	4.7	4.9	5.2	5.0	5.1	5.8	5.3	5.4	5.2	5.2
Czech Republic	37.4	37.3	48.3	49.1	48.2	48.1	47.5	47.7	47.5	48.4	49.6	49.2	49.0	49.0	48.8	48.9	49.0	49.6
Estonia	41.3	41.5	40.8	41.6	41.5	40.8	40.0	40.2	39.6	38.8	38.5	38.2	39.4	38.9	38.9	39.2	39.6	40.2
Croatia	34.9	42.8	44.8	45.8	44.6	43.9	42.8	43.9	43.6	44.6	44.4	44.5	45.8	46.7	47.2	47.0	47.0	47.4
Latvia	41.0	42.7	40.9	48.3	46.6	48.7	45.8	47.4	48.4	46.9	46.4	47.0	47.6	46.6	47.3	47.0	46.6	46.4
Lithuania	46.2	45.3	44.6	43.7	42.8	42.8	44.2	44.6	46.8	47.1	46.8	45.4	44.1	43.3	43.9	43.9	44.0	44.4
Hungary	50.5	49.7	51.4	51.7	51.6	51.3	49.8	48.9	49.7	50.0	47.9	38.7	23.6	24.1	24.0	23.6	22.7	22.3
Malta	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6
Poland	54.5	53.5	50.3	52.0	51.5	51.4	52.1	52.3	52.5	53.1	53.4	53.6	53.1	53.1	53.2	52.5	52.6	53.8
Romania	36.4	35.1	35.0	34.0	33.8	36.5	32.6	33.0	34.5	34.7	38.6	38.3	40.2	39.7	40.0	39.8	42.4	29.4
Slovakia	9.4	9.6	39.9	37.1	39.1	37.1	37.7	36.7	36.6	35.7	35.2	35.5	35.3	36.1	36.5	36.8	37.4	37.5
Slovenia	34.2	34.4	34.2	33.9	34.0	34.0	34.0	33.4	33.2	33.8	33.4	33.7	34.2	34.5	34.6	34.4	34.5	34.8
Average (2001-2018)	32.3	33.0	35.9	36.4	36.3	36.2	35.4	35.6	36.0	36.	36.2	35.5	34.7	34.6	34.8	34.9	35.1	34.4

Source: Author's calculation based on Eurostat's database „Annual government finance statistics (gov_10a)“

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