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MORE EFFICIENT CONTROLLING THROUGH ERP AND BI SYSTEMS EDUCATION

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ABSTRACT

It is undeniable that technological progress, especially the amount, availability, and speed of information acquisition, has an impact on people, their habits, behavior, decision-making, management style; in a word – their lives. The main driver is “Big Data”, and as a result, business intelligence is advancing rapidly, transforming an ever-growing amount of data into meaningful and useful information for effective management. The number of Croatian companies using business intelligence in some form is increasing, and more and more are using it for controlling purposes. The time needed to collect and process data is shortening, so the role and tasks of the controller are changing in favor of activities with higher added value. However, there is a gap between existing and required skills, which imposes the need for additional IT knowledge in order to create a new profession necessary for more efficient and successful businesses. The aim of this paper is to investigate the state and application of information systems, i.e. ERP and BI systems, and the impact of education on their usefulness

in controlling. Considering the relatively low representation of controlling in Croatian companies, 44 controllers from large and medium-sized companies in the Republic of Croatia participated in the survey. The results show the increasing independence of the controlling department compared to its previous connection with finance and accounting. Although sophisticated information systems are experiencing growth, the number of those using advanced business intelligence capabilities is still low, indicating the need for additional investment in the development or acquisition of information systems, as well as in education. Faster, simpler and more detailed analysis is an advantage of using business intelligence, but it requires additional education, usually independent, to better understand and apply information solutions in controlling. Using the scientific research method, it was confirmed that the application of ERP and BI systems and related education play a significant role in the performance of controller activities aimed primarily at effective reporting.

Key words: *controlling, business intelligence, ERP, education*

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1. INTRODUCTION

Digitization brings great changes for the economy as business processes are being accelerated, new business models are emerging, and new expert profiles are being created, but at the same time there is a growing fear of the unknown and the possible. This results in an increasing need for continuous monitoring, rapid response and action, which is the role of controlling as one of the functions of the management system. Digitization offers new opportunities for controllers as they can use large amounts of data and information quickly and relatively reliably. At the same time, it requires a higher level of education with modern knowledge in the field of informatics, i.e. computer science, and statistics, thus it is expected that the application of sophisticated methods and techniques enhance the creativity of controllers and their efficiency. The controller is no longer just a financial expert, but a comprehensive economic expert and advisor, i.e., a business partner of management (Schäffer, 2019; Schäffer and Brückner, 2019; Oesterreich et al., 2019), which implies mutual respect, trust, and responsibility. The role of the controller is also related to various software programs and information systems such as BI (Business Intelligence) and ERP (Enterprise Resource Planning), which automate, facilitate, and connect many processes, unify business systems, and enable a faster process of analyzing collected business data and sharing it. Both BI and ERP bring about a better data supply as a basis for the activity of controllers, whose

task is to inform, analyze and advise in an accurate and timely manner in order to improve operations and implement strategy.

This work aims to confirm that ERP and BI systems and the education related play an important role in the performance of controller activities. Therefore, the aim of the paper is to investigate the level of application of ERP and BI systems within the controlling department in the Republic of Croatia and to emphasize the importance of investing in the education of controllers regarding the application of these systems.

The paper is divided into four chapters. The first chapter is an introduction. The second chapter presents the importance of information systems in controlling through an overview of previous research. The third chapter contains a description of the methodology and results of the conducted empirical study, while the fourth chapter contains the conclusion.

2. CONTROLLING AND INFORMATION SYSTEMS

In today's digital society, where a numerically large availability of information in real time is not unknown, there is a need for the increasingly sought-after function of controlling and the profile of controller - an expert with strong analytical skills. Recognizing crisis situations, analyzing and monitoring business results, planning and determining deviations, forecasting and reporting are the basic functions of controlling that are being realized more efficiently through digitization. Controlling as a function provides adequate information through data analysis and advises the management, thereby contributing to more effective decision-making and ultimately to better business success.

Nowadays, developed information systems (IS) have a significant impact on the functioning of controlling, which has more time to interpret data, provide advice and propose strategic and operational plans in real time (Vitezić and Lebefromm, 2019). The fact that information systems play an important role in the controller's partner role in the business decision-making process has been proven in numerous studies by analysing the impact of various forms of information systems and tools such as ERP, BI, MAS (Management Accounting Systems), BA (Business Analytics), etc. Yigitbasioglu (2017) confirmed that flexibility as an essential feature of IS has a positive impact on the adaptability of controlling and its effectiveness. The influence of information systems on controlling was confirmed by Weißenberger and Angelkort (2011), that is, Weißenberger et al. (2012). The research confirmed that the level of MAS integration has an indirect effect on the quality of the controller's outputs and consequently on making business decisions. According to Vinšalek Stipić and Gambiroža (2021), the integrated of IS' in controlling are one of the success

factors in terms of business profitability. Pervan and Dropulić (2019), using a sample of Croatian companies, confirm that the quality of implementation of IS has a significant impact on the method of data collection and thus on internal reporting. Also Goretzki et al. (2013), Gullkvist (2013) and Abbasi et al. (2014) confirm the importance of ERP as a source of internal data for the activity of controllers. As for the impact of using BI tools in controlling, for now, it is possible to highlight the research conducted by Gullkvist (2013), which confirms the positive impact of BI on data quality and controllers' tasks. Regarding BA, there are more and more studies that aim to investigate and confirm the importance of the use of these tools and their close connection with the competence gap that they put in front of the controller, that is, specific to the data scientist (Nielsen, 2018; Oesterreich and Teuteberg, 2019; etc.). Considering that a research in the Republic of Croatia in 2021 confirmed a relatively low level of application of BA tools (Vitezić and Petrlić, 2021), this research focuses on the analysis of the application of BI tools and ERP systems as a basis for internal data, and focuses on the role of education in relation to their level of application and the benefits they provide. Although there is a paucity of research linking education and the use of these tools and their impact on controlling, some research has confirmed that investing in employees through education generally plays an important role in enhancing their innovation and work performance (Sung and Choi, 2014; Diamantidis and Chatzoglou, 2019; Guan and Frenke, 2019). For example, research conducted by Chang et al. (2011) confirmed that investment in ERP education after its' implementation has an impact on usage level and employee productivity. The same can be connected with the use of BI tools in controlling, the use of which has become increasingly prominent in the professional literature in recent years (Mališ, 2017; Crnković, 2022).

3. EMPIRICAL RESEARCH

In order to achieve the objective of this work, namely to investigate the state and level of application of ERP and BI systems and the influence of education on their usefulness in controlling, an empirical study was conducted on a sample of large and medium-sized companies in the Republic of Croatia that employ controllers.

In accordance with the objective, the following working hypothesis was established: *ERP and BI systems and education about their application play a significant role in the performance of controllers' activities.*

3.1. RESEARCH METHODOLOGY

To confirm the established hypotheses, a questionnaire was created consisting of nominal and ordinal measures, thus, multiple-choice, short-answer, and open-ended questions. Regarding the Likert scale, i.e. the display of all average values (\bar{x}) of the controllers' attitudes, values from 1 (strongly disagree) to 5 (strongly agree) were used. Google forms was used to create and conduct the survey. The questionnaire consisted of a total of 21 questions divided into 5 sections: socio-demographic characteristics of the respondents, general characteristics of the company and controlling, characteristics of the information system, and the influence of education. The average time to complete the questionnaire was 10 minutes.

The target population of the study were controllers in the Republic of Croatia employed in large and medium-sized companies. The survey was conducted in April 2022 via a post on the social network LinkedIn. The questionnaire was also sent by email to individual companies known to have a controlling department. A total of 44 controllers completed the survey. Although the sample is relatively small, it can be considered significant considering the fact that there is no register of controllers in the Republic of Croatia and thus is in line with previous studies.

Table 1: Sociodemographic characteristics of controllers and companies (n=44)

Variable	Category	n	%
<i>Controller characteristics</i>			
Gender	Male	11	25
	Female	33	75
Age (in years)	<28	1	2
	28-37	17	39
	38-47	20	45
	48-57	4	9
	58-68	2	5
	>69	0	0
Education	High school	3	7
	Bachelor's degree	6	14
	Master' degree	23	52
	MBA	5	11
	Master of Science	6	14
	Doctor of Science	1	2
Work experience in controlling and similar jobs (in years)	1-10	21	48
	11-20	18	41
	21-30	4	9
	31-40	1	2

<i>Company characteristics</i>					
Size	Large			32	73
	Medium			12	27
Nomenclature of Economic Activities (NACE code)*	A	-	Agriculture, forestry and fishing	1	2
	B	-	Mining and quarrying	1	2
	C	-	Manufacturing	6	14
	D	-	Electricity, gas, steam and air conditioning supply	1	2
	F	-	Construction	2	5
	G	-	Wholesale and retail trade; repair of motor vehicles and motorcycles	4	9
	H	-	Transportation and storage	1	2
	I	-	Accommodation and food service activities	1	2
	J	-	Information and communication	6	14
	K	-	Financial and insurance activities	13	30
	M	-	Professional, scientific and technical activities	3	7
	P	-	Education	1	2
	Q	-	Human health and social work activities	1	2
	S	-	Other service activities	3	7

**Note: only economic Bactivities that appear in the sample are shown
Source: author's*

Of the total number of respondents, 75 per cent are women and 25 per cent are men. Most of the respondents are between 38 and 47 years old, while the fewest respondents are under 28 years old. It can be concluded that significantly more women between the ages of 38 and 47 participated in the survey. In terms of educational level, 23 respondents have a Master' degree, 5 are university specialists (MBA), 6 have a Master of Science degree, while only one respondent has a PhD degree. The majority of the respondents have 1-10 and 11-20 years of work experience in controlling and similar jobs. That is, most of the respondents who participated in the survey work in large companies (73%), while the rest work in medium-sized companies (27%). Three sectors of the economy account for the largest share in the sample, namely financial and insurance activities (30%), information and communications (14%), and manufacturing (14%).

Descriptive statistics were used to process the results of the empirical research, that is, the results are presented in graphic and tabular form. Excel was used for data processing and analysis.

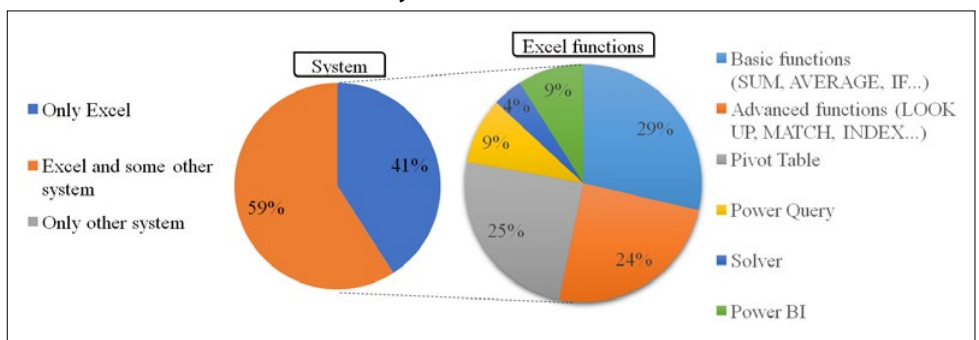
3.2. RESULTS OF EMPIRICAL RESEARCH

According to previous research (Špac, 2006; Osmanagić Bedenik, 2007; Osmanagić Bedenik, 2015; Vitezić and Petrić, 2021, etc.), in recent years, controlling has increasingly become an independent function in the Republic of Croatia, organized as a department. This is also confirmed by the results of the present research. Of the total number of respondents, 59 per cent work

in the controlling department, while in other cases the controlling function is performed as part of the department of finance and/or accounting. In this context, and considering the fact that 77 per cent of respondents believe that the environment of the company in which they work is dynamic and complex, the results confirm the growing importance of controlling through the assessment of the importance of the controller's tasks. Namely, respondents gave the highest average rating to the preparation of accurate and timely monthly reports ($\bar{x}=4.8$) and analytical processing of data and information ($\bar{x}=4.5$). In addition, controllers play an important role in creating and monitoring the realization of plans ($\bar{x}=4.3$) and budgets ($\bar{x}=4.1$), forecasting ($\bar{x}=4.0$), and developing planning and reporting systems. Of course, in today's digital age information systems play an important role in carrying out these activities. More specifically, in the field of controlling ERP systems as a source of data and BI systems as tools for easier and more efficient execution of tasks, but also education in their proper use. Therefore, this work also focuses on examining their importance in controlling.

As for the application of the ERP system, the research results of this paper have shown that the majority of companies, 59 per cent, use the world famous system SAP. 22 per cent of them use Microsoft Dynamics, while the other 19 per cent mentioned the use of other systems such as Pantheon, Korwin, IPIS, Hyperion Planning and NETIS. The strong presence of SAP has also been confirmed by other studies in the Republic of Croatia (Pervan and Dropulić, 2019) and worldwide (Pang et al., 2021; Archana et al., 2022). Considering that Excel is still one of the main tools in the field of controlling and that Microsoft, i.e. Power BI, has been a leader in the field of BI tools for many years (Kronz et al., 2022), the research aimed to gain insight into the application level of Excel and its functions compared to other BI tools.

Chart 1: Use of Excel and other BI systems

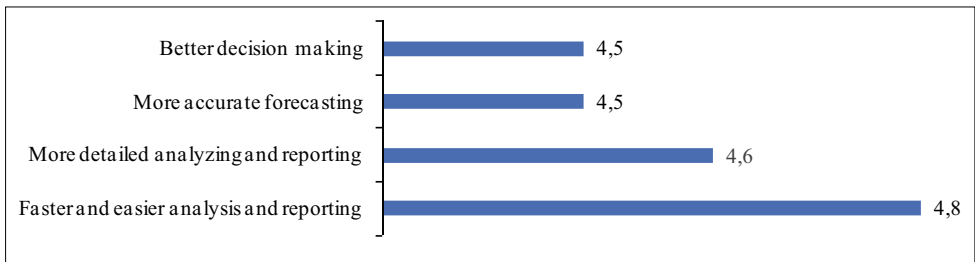


Source: author's

The results show (Chart 1) that controllers in the Republic of Croatia perform their tasks mainly with Excel or using an additional BI system, among which SAP Business Objects, MicroStrategy, OLAP, Sales Force, SAP Business Warehouse, SAS, QlikView, Qlik Sense, Virga, Oracle BI and Cognos BI stand out. Regarding Excel, basic and advanced functions and Pivot Tables are predominantly used, while Power BI and Power Query are used by only 9 per cent of respondents. This can be attributed to the fact that the Power BI and Query functions are relatively new and education in these functions requires additional investment. As many as 70 per cent of controllers believe that additional investment is needed in information systems development or procurement. On average, the controllers in this research believe that the companies in which they work do not invest enough in education in information systems in the controlling department ($\bar{x}=3.3$), although the controllers have a great desire for further education in the use of these solutions ($\bar{x}=4.2$), thus, they cannot afford them themselves due to too high prices ($\bar{x}=3.9$). The research also showed that, on average, self-study (e.g., via YouTube channel) has the highest importance in the education of controllers in using Excel ($\bar{x}=4.3$), i.e., ERP and BI ($\bar{x}=3.9$), followed by employer-paid education and self-financed education and literature (e.g., books).

Although the application of information systems and education are at different levels, from the point of view of controllers, the application of ERP and BI systems plays a significant role in the performance of their activities, i.e. in decision making in large and medium-sized companies in the Republic of Croatia (Chart 2). This can also be related to the research conducted by Pilipczuk (2020) which, by analysing job advertisements for controllers in various countries around the world, confirmed the importance of having skills in various ERP and BI systems, including SAP and Excel, i.e. Power Query and Power BI. For example, the research shows that almost 50 per cent of jobs in Poland require advanced Excel skills, while in Ukraine Excel is one of the two most commonly used software in controlling.

Chart 2: Benefits from ERP and BI systems use

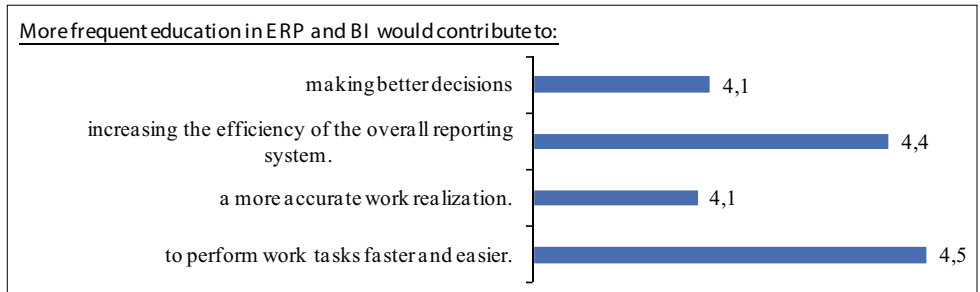


Note: average values are displayed (Likert 1-5)

Source: author's

Controllers believe that education plays a significant role in realizing benefits, that is, more frequent education contributes primarily to increasing the efficiency of overall reporting and to faster and easier performance of the controller's work tasks (Chart 3).

Chart 3: Benefits of education in information systems



Note: average values are displayed (Likert 1-5)

Source: author's

Although the level of application of ERP and BI systems, i.e. Excel (with emphasis on new functions), in the Republic of Croatia can be considered average, taking into account the research sample, it can be concluded that the application of these systems and investment in their education play a significant role in controlling. The sample size is a limitation of this work, so its expansion is a proposal for future research. In addition, since the scope of the survey may limit the sample size and in order to get a more detailed insight into the actual state of the application level of ERP and BI systems, an interview is suggested as a method. The existing research could also be extended to other countries (e.g. Slovenia, Austria, Italy), especially with regard to the question of the influence and importance of education, which is missing in scientific research in controlling.

4. CONCLUSION

Due to the technological possibilities, the role of the controller as an "information provider" is increasingly being abandoned today and the controller is slowly assuming the position of a business partner. Even though the new position of the controller is not yet fully defined and applied in the scientific literature or even in practice, digitalization is promoting and accelerating this process. IT technology is advancing and various software supporting BI and ERP inevitably affect the more efficient activity of the controller, favoring his advisory role. Organizational independence is also related to this. Thus, this research also confirms that there are more and more companies, mostly large

and medium-sized ones, which have an independently organized controlling department. The research confirmed that the majority of controllers still use the basic functions of Excel for their analyzes and reports, and that more advanced techniques require additional education, which implies investment in the acquisition of modern information solutions. The research confirmed the thesis that BI and ERP systems play a positive role in the performance of controller activities and influence the effectiveness of reporting. Equally important are the controller's knowledge and skills in operationalizing data and creating innovative solutions that support management expectations and strengthen the business partnership.

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UČINKOVITIJI KONTROLING UZ VEĆU EDUCIRANOST O ERP I BI SUSTAVIMA

SAŽETAK RADA

Neupitna je činjenica da tehnološki napredak, posebice količina, dostupnost i brzina dobivanja informacija utječu na ljude, njihove navike, ponašanje, donošenje odluka, način upravljanja, jednom riječju život. Glavni pokretač je „big data“ i uslijed toga poslovna inteligencija rapidno napreduje transformirajući sve veću količinu podataka u značajne i korisne informacije za učinkovito upravljanje. Sve je veći broj poduzeća u Hrvatskoj koja uvode neku vrstu poslovne inteligencije i sve je više onih koja ih koriste za potrebe kontrolinga. Vrijeme potrebno za prikupljanje i obradu podataka se skraćuje, pa se uloga i zadaci kontrolera mijenjaju u korist aktivnosti s većom dodanom vrijednosti. No, javlja se jaz između postojećih i potrebnih vještina što nameće potrebu za dodatnim IT znanjima u cilju stvaranja jedne nove profesije nužne za učinkovitije i uspješnije poslovanje. Cilj ovog rada je istražiti stanje i primjenu informacijskih sustava, tj. ERP i BI sustava, te utjecaj edukacije na njihovu korisnost u kontrolingu. S obzirom na relativno malu zastupljenost kontrolinga u hrvatskim poduzećima, u anketi je sudjelovalo 44 kontrolera iz velikih i srednje velikih poduzeća u RH. Rezultati ukazuju na sve veće osamostaljivanje odjela kontrolinga u odnosu na prijašnju povezanost s financijama i računovodstvom. Sofisticiraniji informacijski sustavi bilježe rast, no još uvijek je manji broj onih koji koriste napredne funkcije poslovne inteligencije, što ukazuje na potrebu za dodatnim ulaganjem u razvoj ili nabavu informacijskih sustava, ali i edukaciju. Brže, lakše i detaljnije analiziranje, prednost je korištenja poslovne inteligencije, no zahtjeva dodatno, najčešće samostalno educiranje u cilju boljeg razumijevanja i primjene informacijskih rješenja u kontrolingu. Metodom znanstvenog istraživanja je potvrđeno da primjena ERP i BI sustava i s njima povezana edukacija, imaju značajnu ulogu u obavljanju kontrolerskih aktivnosti prvenstveno usmjerenih na učinkovito izvještavanje.

Ključne riječi: *kontroling, poslovna inteligencija, ERP, edukacija*