A STEP CLOSER TO UNDERSTANDING IMPLEMENTATION OF BUSINESS INTELLIGENCE IN THE ORGANIZATIONAL OPERATIONS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

The development of business intelligence was marked by several key moments, in particular the development of the Internet and new technologies. The wide distribution of technology and the easier possibility to use it led to the finding of a solution for the tools used by organizations to be a good ratio of quality and invested financial resources, and the increase in digitalization give the opportunity for organization's business intelligence to involve more stakeholders. The purpose of this paper is to identify the prerequisites, importance and value of implementing business intelligence in the organizational operations. The analyzed sample is limited to the period from year 2020, given that this period noted the biggest changes in terms of technologies, and therefore transitions in the business of organizations. Based on a systematic literature review on two major scientific databases Web of Science and Scopus, there was found 2051 articles that were initially narrowed down to 65 papers connected to business intelligence directly and finally, to a total number of 10 relevant articles through a methodical approach, and which are connected to the topic of business intelligence in organizational context. Selected papers were analyzed using desk-based research method. This result represents a paper compilation of research results as cooperation of authors, achieved through the student-mentor relationship during the preparation of postgraduate specialist thesis. After conducting the research using text analysis technique, two main groups were determined based on subject of research: papers focused on organizational prerequisites and importance for the successful implementation of BI in the organization's operations and papers focused on the value of implementing BI in the organization's operations. From the analyzed papers, the conclusion is that a trend of studying business intelligence in organizations is visible, and it ranged from the study of organizational prerequisites for the successful implementation of BI during 2020 and the beginning of 2021 and moved towards the analysis of the value that BI has for organizations, mainly in 2021 and 2022.

KEYWORDS

Business Intelligence, Implementation, Innovation, Organizational Operations, Literature Review

1. INTRODUCTION

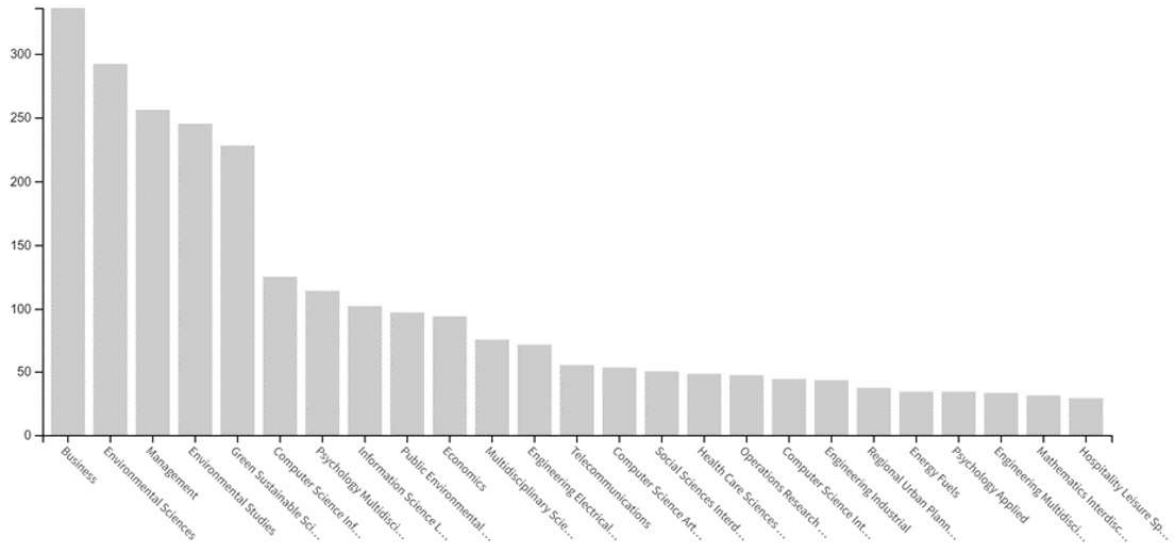
The term business intelligence (BI) is a ubiquitous and widely represented concept that can be viewed from different aspects, and thus there is no single definition of it. (Babic, 2022) The growth of companies and processes, and thus the amount of information and facts, has brought new challenges to the leaders of organizations in terms of processing this information and its successful management for the purpose of making strategic decisions and improving business processes. Precisely because of this, a new imperative was set before organizations - to become intelligent, which primarily meant making better decisions and being faster than the competition. For this purpose, and by means of data transformed into information and by deriving this information into intelligence, today it is possible to create collective organizational intelligence that enables insights into certain business processes and drawing conclusions based on which further business decisions are made. (Liautaud, Hammond, 2006:3) Today, business intelligence is viewed as "a technology-driven process for analyzing data and delivering actionable information that helps executives, managers and workers make informed business decisions." (Stedman, 2020) The concept of knowledge management is most often associated with the concept of business intelligence whereas business intelligence studies the hidden and relevant contexts in a large set of business and economic data, while knowledge management enables organizations to learn and understand based on their own experiences. (Ravlic, 2015) Business intelligence is

a circular activity, with a cycle that has several fundamental phases. The business intelligence model as well as individual phases of the model direct the organization that uses business intelligence to move more easily between phases and determine the priorities and goals of each phase in order to fulfill the final goal of each such process, which is to obtain the necessary information for decision-making. (Javorović, Bilandžić, 2007:206-207) The development of business intelligence was marked by several key moments, and in particular the development of the Internet and new technologies contributed to this, which accelerated this process, i.e. enabled the processes and ideas behind the concept of business intelligence to take place smoothly, quickly and easily. (Heinze, 2014) The evolution of business intelligence has clearly shown that technology has successfully followed the demands imposed on it by the rapidly increasing amount of data and information, and it was necessary to organize it better and faster. (Chen et al. 2012) From everything above it can be concluded that in the coming period, an even greater increase in the development of business intelligence and the opportunities that the same provides is expected. (Costello, Rimol, 2021) For the purpose of a more detailed insight into the scientific perspective and research questions related to the concept of business intelligence and its role in the organizational context, below is a review of the literature on the mentioned topic using relevant scientific bases and a methodology adapted to everything mentioned. The focus of the research when creating the literature review was to determine the role, context and significance of the tools and concepts of business intelligence for the organization within which it is applied.

2. METHODOLOGY

The research analysis was carried out during June 2022 through the two largest citation databases, Web of Science and Scopus. The research is limited to the search of papers published between year 2020 and year 2022, and given the fact that this period records a significant development of information and communication technologies, which had to be followed by greater implementations of organizational changes in advance. At that time, business processes were experiencing the greatest transformations and were in the phase of the most intense changes. The term used in the search was: business intelligence. The criteria that were additionally set and according to which the research was further narrowed down were the following: only papers in English are included in the search and with regard to the scientific field, papers from the Social Sciences Citation Index (SSCI) category, and the papers from the field of social sciences in the Scopus database were observed.

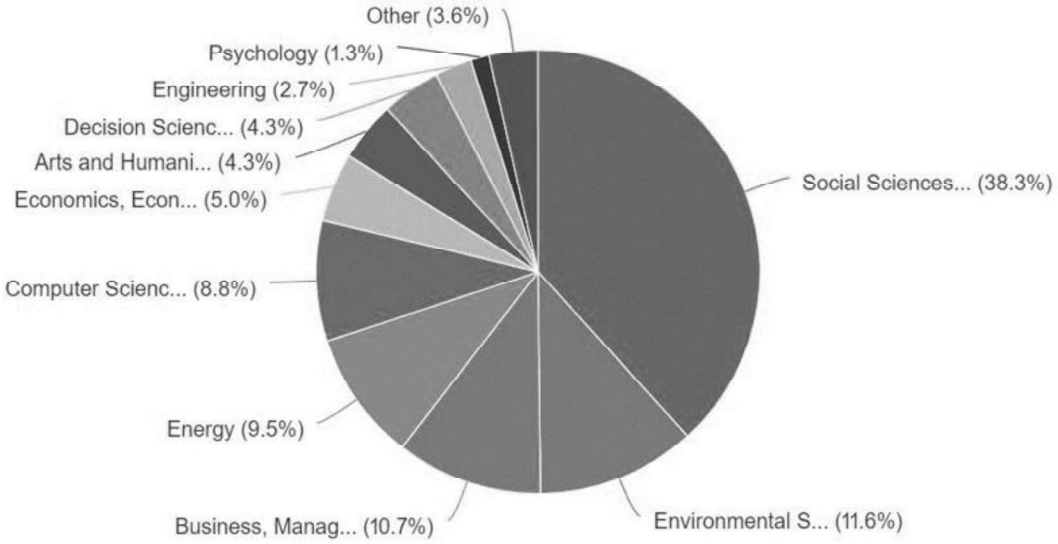
After the given criteria, a total of 1,707 papers classified according to certain categories were found in the Web of Science database, of which the most papers were found in the Business category as shown in Figure 1.



(Source: creation of the authors via the Web of Science database)

Figure 1. Display of the number of papers by individual categories within the search criteria

A total of 344 results were found in the Scopus database according to the given parameters, which is 38.3% of the total number of papers found within the mentioned parameters and at the same time the category that contains the largest number of papers about business intelligence as shown in Figure 2.



(Source: creation of the author via the Scopus database)

Figure 2. Presentation of papers according to the most frequently appearing categories

After reviewing the titles and abstracts of all papers in the Web of Science database, only papers containing the word business intelligence in the title or abstract were included in the further analysis. There was a total of 41 such papers, namely 16 papers from 2020, 19 papers from 2021 and 6 papers from 2022. One of the papers from 2021 was subsequently excluded from the research due to language barrier, so in 2021 there were 18 papers at the end, and a total of 40 papers classified by different categories within the searched term.

After reviewing the titles and summaries of all papers in the Scopus database, only papers that contained the word business intelligence in the title or were in some way related to the mentioned term were included in the further analysis. There was a total of 27 such papers, namely 6 papers from 2020, 11 papers from 2021 and 10 papers from 2022. One of the papers from 2021 and one from 2022 were subsequently excluded from further research due to limited access, leaving 10 in 2021, 9 in 2022, and a total of 25 papers classified by different categories.

Documents	Citations	<2020	2020	2021	2022	Subtotal	>2022	Total
	Total	0	2	36	32	70	0	70
Business intelligence: business evolution after industry 4.0	2021			7	5	12		12
Elucidating the determinants of business intelligence adopti...	2020		2	6	2	10		10
A business intelligence & analytics framework for clean ...	2021			4	5	9		9
IoT data visualization for business intelligence in corporat...	2022				7	7		7
A business intelligence framework for analyzing educational ...	2020			6	1	7		7

(Source: creation of the author via the Scopus database)

Figure 3. Presentation of the 5 most cited papers under the term business intelligence RESULTS

The next phase included the review of all remaining papers. After the analysis of a total of 65 papers, namely 40 papers from the scientific database Web of Science and 25 papers from the scientific database Scopus, 48 of them were excluded because they were related to a specific activity or industry or closely related to technology or a certain studied procedure, 1 paper was excluded because it was not available in full form, and a total of 6 papers were detected that were included in the analysis, and are in both databases. The final analysis was made on a total of 10 papers that are related to the topic of the concept of business intelligence in the organizational context. The mentioned papers were included in further processing in such a way that they were analyzed according to the following criteria and as furtherly shown in Table 1.

Table 1. A summary of the research according to the analyzed criteria (Source: creation of the author)

Authors	Year	Country	Target group	Research method	Research instruments
Bhatiasevi, V.; Naglis, M.	2020	Thailand	Small and medium enterprises in Bangkok, BI experts from various sectors	Quantitative and qualitative	Questionnaire, interview
Suša Vugec, D.; Bosilj Vukšić, V.; Pejić Bach, M.; Jaklić, J.; Indihar Štemberger M.	2020	Croatia and Slovenia	Top management and/or employees in charge of BI and BPM in Croatian and Slovenian organizations with more than 50 employees	Quantitative	Questionnaire
Chen,X.; Siau, K.	2020	USA	US company leaders using BI in their business	Quantitative	Questionnaire
Skyrius, R.; Valentukevičė, J.	2020	-	-	Desk-based research	Literature review/available research papers
Hortovanyi, L.; Szabo, R. Z.; Fuzes, P.	2021	Hungary	Fortune 500 company	Qualitative	Case study, semi-structured interview
Tavera Romero, C.A.; Ortiz, J.H.; Khalaf, O.I.; Ríos Prado, A.	2021	-	-	Desk-based research	Literature review
Huang, Z.; Savita, K.S.; Zhong-jie, J.	2021		Directors and experts of startup companies	Quantitative	Questionnaire
Paradza, D.; Daramola, O	2021	-	-	Desk-based research	Literature review
Darwiesh, A.; Alghamdi, M. I; El-Baz, A. H.; Elhoseny, M.	2022	-	-	Desk-based research	Literature review
Nazari, F.; Taghavi, S.S.; Valizadeh, E.	2022	Iran	Relevant experts and managers in 150 startup companies	Quantitative	Questionnaire

The conducted research generated articles that can be divided into 2 main groups: a) Research papers focused on organizational prerequisites and importance for the successful implementation of BI in the organization's operations; b) Research papers focused on the value of implementing BI in the organization's operations. Below is a summary of each previously described group.

2.1 Research Papers Focused on Organizational Prerequisites and Importance for the Successful Implementation of BI in the Organization's Operations

A total of 4 scientific papers from 2020 and 2021 were identified in the part of the research focused on organizational prerequisites and importance for the successful implementation of BI in the organization's operations. All the studies in this part were created with the aim of understanding the basic aspects of the organization's adaptation to the introduction of BI in business, two of which were conducted via a survey questionnaire on a sample of companies from Thailand and the USA, one was conducted as a case study on the example of Fortune 500 list of the most successful companies in the USA, while one study was conducted through a review of available literature sources on the mentioned topic. The authors of the first paper in the mentioned category (Bhatiasevi, Naglis, 2020) conducted quantitative and qualitative research using the scientific methods of questionnaires and interviews, and as an introduction, an overview of the literature on the topic of the paper was presented. The study proposed a comprehensive model that integrates the TOE framework with the BSC framework to identify the factors and degree of influence on BI adoption among SMEs in Thailand, as well as the factors and degree of influence on organizational performance. By testing hypotheses and factors that have an impact on the introduction of BI in business, it was determined that the factor with the highest degree of influence in the adoption of BI by Thai small and medium enterprises was precisely the support of the top management. Another study (Chen, Siau, 2020) was conducted using a questionnaire method that was sent to the leaders of companies in the USA that already use BI in their business. Research was conducted with the aim of assessing the impact of business analytics (BA) and business intelligence (BI), IT infrastructure flexibility and their interaction on organizational agility. The authors state that the mentioned study is one of the few empirical studies that investigate the importance of BA from the perspectives of its use, all with the aim of establishing that IT (information technology) and IS (information system) components can be key sources of organizational agility. Among other things, the importance of building a flexible IT infrastructure to improve organizational agility is determined. The third study (Skyrius, Valentukevičė, 2020) uses a literature review while simultaneously oriented to the agility of BI, information and organization, starting from the assumption that in ensuring organizational agility, information activities play a key role in orienting the environment towards important changes. The conclusion of the research by reviewing the available sources states that BI should play an important role in ensuring organizational agility and that the technological aspect of the introduction of BI technologies into business is much more prevalent and more often researched in relation to the human and managerial factor, i.e. the cultural aspect in the role of a means of information in construction agility competence of an organization. The last research in the mentioned category (Hortovanyi et al., 2021) presents the results of a longitudinal study on the path of a large corporation towards becoming an ambidextrous organization in the face of new technologies. The research was conducted through the principle of a case study on the example of an American Fortune 500 company using the semi-structured interview method with the aim of understanding the adaptation of business processes of large companies to market demands and changes. By exploring the interplay between top and middle management, the results show that business intelligence systems have enabled the company to pursue data-driven strategic renewal, automated and supporting rapid organizational learning.

2.2 Research Papers Focused on the Value of Implementing BI in the Organization's Operations

A total of 6 scientific papers from 2020, 2021 and 2022 were identified in the part of the research papers focused on the value of implementing BI in the organization's operations All the studies in this part were conducted with the aim of researching and questioning the value and positive aspects of the introduction of BI in the organization's operations, three of which were conducted through a survey questionnaire on a sample of companies from Croatia and Slovenia, i.e. directors, experts and relevant experts of startup companies, while

the remaining three studies were conducted through a review of available literature sources on the mentioned topic. The authors of the first analyzed paper (Susa Vugec et al., 2020) conducted a questionnaire survey on organizations in Croatia and Slovenia with more than 50 employees in order to determine the compatibility of BI with Business Process Management, considering that the goal of both initiatives is to improve the performance of the organization. The research showed that business value can be generated through the use of common terminology and methodology as well as strong communication between BI and BPM experts, managers and teams. Also, the research showed the impact of BI on organizational performance, but also confirmed that BI and BPM initiatives must be coordinated in order to achieve business value. Another paper in this category (Tavera et al., 2021) analyzes the concept of Industry 4.0 as a set of technologies that organizations use to promote their innovative strategies and respond to rapid and dynamic market changes, and proposes the use of these technologies. Also, the paper talks about BI technologies and the ways in which they have had a positive impact on the organization. The research was conducted using the literature review method, and the results show that technologies serve as development pillars of companies because they support their decision-making process, forecasting and corporate economy. Also, it was shown that the support of effective leadership and training would make that development even better. The third paper (Huang et al., 2021) was created and written with the aim of assessing the impact of the BI concept on the financial performance of startup companies. Using the questionnaire method, directors and experts of startups were examined, and the statistical processing determined that the direct impact of BI technologies on financial performance is not clear, but the direct impact of BI technologies on innovation and online learning is obvious and clear, and that in turn contributes to better financial performance, which would could confirm the indirect influence of BI technologies on the financial performance of startup companies, where the mentioned technologies play an intermediary role in that process. The fourth paper (Paradza, Daramola, 2021) provides an overview of the literature on business intelligence and business value in organizations. As one of the main results of the research, the main critical factors for business value from the implementation of BI technologies are listed, namely: qualified human capital, BI infrastructure, data quality, BI application and its use/data, culture, alignment of BI with organizational goals and support top management, while the basic challenges relate to data quality and handling, data security and protection, as well as the lack of BI infrastructure and the lack of qualified human capital. The fifth paper in this category (Darwiesh et al., 2022) analyzes social networks and the importance of data on social networks to improve the competitiveness of companies in a post-pandemic world. As companies face numerous challenges after the pandemic, they are in great need to develop new methodologies and approaches. The research was carried out using the literature review method, and one of the main findings of the same is the proposed framework in which social networks and analysis of large databases are connected in order to establish BI systems. The sixth and last paper in this category (Nazari, et al., 2022) lists innovation, BI and knowledge management as important drivers of startup companies and tries to examine the impact of the BI concept on the mentioned companies using innovation and knowledge management as mediators in this process. Research was conducted on relevant experts and managers in 150 startup companies using the questionnaire method. The results of the research showed that business intelligence, innovation and knowledge management affect the performance of startup companies, and managers of startup companies are advised to take advantage of modern technologies in order to facilitate the process of innovation in their production process.

3. DISCUSSION

When talking about the concept of business intelligence, it is impossible to leave out the factor of organization as the key driver of all changes and processes. The readiness of the organization, especially the organization's leadership, as well as employee training and organizational culture, proved to be decisive factors in the successful implementation of the BI concept in business. In addition to technology, which is expected to be designed in such a way that it successfully meets all the needs of rapidly growing changes and the infrastructure required for this, the human factor is decisive in the creation of a successful BI system. Organizations at all levels should develop a culture of understanding the importance of such a concept and provide appropriate knowledge to their employees so that they are able to implement it in their work and use it in the correct way so that it contributes to the creation of business value. In this whole process, an important role is played by the

leaders and management of the organization, who should be the initiators and leaders of such changes and serve as a kind of motivator for these changes to take place.

From the aspect of the value that BI brings to the organization, the conclusions are different, but they all point to one thing, which is that the value for the organization is multiple with the correct organization of the mentioned concept. It is particularly important to mention the development of technologies and rapid changes in the market, which prove that today BI is no longer a need of only large companies for the organization of their business processes, but is also an important component and aspect of the business of small organizations, especially startups. This importance has been separately analyzed through some scientific papers, and it has been confirmed that startup companies need to implement BI systems in their business for their survival and financial stability, because they are the initiators of great innovations as well as mediators in knowledge management, which today greatly increases the competitiveness of the organization on the market.

4. CONCLUSION

Due to the large number and quantity of sources on the topic of business intelligence, and especially business intelligence in the organization, the analyzed sample is limited to the period since the beginning of the pandemic, given that the period recorded the biggest changes in terms of technologies, and therefore transitions in the business of organizations. From the analyzed papers, a trend of study and analysis is visible, which ranged from the study of organizational prerequisites for the successful introduction of BI, which are mostly papers from 2020 and the beginning of 2021, and moved towards the analysis of the value that BI has for organizations, which papers and analyzes date mainly to 2021 and 2022. In those years, it was also possible to create literature reviews and analyze the specific impact of the mentioned concept. As the market has already changed and progressed a lot since then, and considering that some surveys carried out using the questionnaire method date back to earlier periods, from before the start of the pandemic, it would certainly be useful to review and repeat the same survey after some time in order to determine the increase in the number of such papers and analyze their direction of movement. Likewise, the literature review is focused only on business organizations, and it would be interesting to compare it with other types of organizations and their understanding of the BI concepts, methods and tools.

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