Primljeno/Submitted: 19.3.2024.
Prihvaćeno/Accepted: 24.7.2024.

Izvorni znanstveni rad
Original scientific paper

JEL Classification: *L86, M15, O33*

CURRENT DEGREE OF DIGITALIZATION OF COMPANIES IN BOSNIA AND HERZEGOVINA: COMPARISON BETWEEN SMALL, MEDIUM AND LARGE COMPANIES

TRENUTNI STUPANJ DIGITALIZACIJE PODUZEĆA U BOSNI I HERCEGOVINI: USPOREDBA IZMEĐU MALIH, SREDNJIH I VELIKIH PODUZEĆA

Silvio Vuković*
Darijo Jerković**

ABSTRACT

The digitalization of business has become a trend that has engaged the entire business world. The advancement of digital, communication, and information technologies has influenced all aspects of modern life and work. In this environment, digitalization of business is no longer a luxury but a necessity, if one wants to survive in today's market. The European Union recognized digitalization as necessary process for maintaining and improving competitiveness, and sets establishment of a single market, innovation, and digitalization as the first strategic goals in its strategic framework and development programs for the period 2021-2027. Today, companies face the challenge of effectively transforming and digitalizing their businesses. In Bosnia and Herzegovina, it is important to ask how much companies from this market are aware of the need for digitalization, and how far they have come in the process of digitalizing their business. Does this need affect only large companies, or similar processes also have to take place in the SME sector? The authors aim to determine whether there are significant differences in perceptions and the degree of digitalization between small, medium, and large companies in the market of Bosnia and Herzegovina. The authors analyzed the answers of 82 managers or owners of BiH companies, examining three key indicators of the current level of digitalization of business: (1) attitudes about digitalization processes in their own business, (2) the level of application of modern software solutions and applications (ERP, CRM, DMS, WMS, eCommerce) and their impact on business, and (3) technical aspects of digitalization, i.e. improvement of the digital environment in which companies operate. These aspects of digitalization are not directly controlled by companies but can significantly impact their business, including electronic seal and signature, EDI application possibilities, application of barcodes, and artificial intelligence (AI).

* PhD student, University of Mostar, Mostar, Bosnia and Herzegovina

** Associate professor, University »VITEZ«, Travnik, Bosnia and Herzegovina, email: darijo.jerkovic@unvi.edu.ba

Keywords: digitalization of business, indicators of digitalization, degree of digitalization

SAŽETAK

Digitalizacija poslovanja postala je trend koji je obuhvatio cijeli poslovni svijet. Napredak digitalnih, komunikacijskih i informacijskih tehnologija utjecao je na sve aspekte modernog života i rada. U takvom okruženju, digitalizacija poslovanja više nije luksuz već nužnost, ako se želi opstati na današnjem tržištu. Europska unija prepoznala je digitalizaciju kao nužan proces za održavanje i unapređenje konkurentnosti, te postavlja uspostavu jedinstvenog tržišta, inovacije i digitalizaciju kao prve strateške ciljeve u svom strateškom okviru i programima razvoja za razdoblje 2021.-2027. Danas se poduzeća suočavaju s izazovom učinkovite transformacije i digitalizacije svog poslovanja. U Bosni i Hercegovini važno je pitati se koliko su poduzeća s ovog tržišta svjesna potrebe za digitalizacijom i koliko su daleko došla u procesu digitalizacije svog poslovanja. Da li ova potreba pogađa samo velika poduzeća ili se slični procesi moraju odvijati i u sektoru malih i srednjih poduzeća? Autori imaju za cilj utvrditi postoje li značajne razlike u percepcijama i stupnju digitalizacije između malih, srednjih i velikih poduzeća na tržištu Bosne i Hercegovine. Autori su analizirali odgovore 82 menadžera ili vlasnika bh. poduzeća, ispitujući tri ključna pokazatelja trenutne razine digitalizacije poslovanja: (1) stavovi o procesima digitalizacije u vlastitom poslovanju, (2) razina primjene suvremenih softverskih rješenja i aplikacija (ERP, CRM, DMS, WMS, eCommerce) i njihov utjecaj na poslovanje, i (3) tehnički aspekti digitalizacije, tj. unapređenje digitalnog okruženja u kojem poduzeća djeluju. Ovi aspekti digitalizacije nisu izravno kontrolirani od strane poduzeća, ali mogu značajno utjecati na njihovo poslovanje, uključujući elektronički pečat i potpis, mogućnosti primjene EDI-a, primjenu bar kodova i umjetnu inteligenciju (AI).

Ključne riječi: digitalizacija poslovanja, pokazatelji digitalizacije, stupanj digitalizacije

1. INTRODUCTION

1.1. Conceptual definition and significance of digital transformation

In today's globalized world, digital transformation becomes a crucial factor for the survival and competitiveness of organizations. Considering the increasingly rapid technological changes and dynamic business environment, digital transformation is not only desirable but necessary for organizations that wish to remain relevant and successful. In this introduction, we will explore the concept of digital transformation, its significance, the activities of the European Union in promoting digital transformation, the obstacles organizations face, and the specific challenges Bosnia and Herzegovina may have in this context. The digital transformation of enterprises represents the process of adopting digital technologies to improve business performance and create added value for all stakeholders, including customers, partners and employees (Kirchmer, 2020). This process involves the implementation of new technological tools but also extends to changes in organizational culture, business processes, and strategies to

align with the demands of the digital age. Digital transformation represents "the use of new digital technologies (social media, mobile devices, analytics, or embedded devices) to enable significant improvements in business, such as enhancing user experience, streamlining operations, or creating new business models" (Warner and Wäger, 2019). In more recent times, advances in cloud technology, mobile devices, artificial intelligence, and the Internet of Things (IoT) have transformed businesses, allowing organizations to become more agile, efficient, and customer-oriented (Behrendt et al., 2021).

Digital transformation is not just a technological change; it is a change that affects all aspects of an organization. This includes changing employees mindsets, adapting business processes, and developing new business models based on digital technologies. Implementing digital transformation enables organizations to be more flexible, competitive, and agile in a rapidly changing business environment. Digital transformation encompasses the integration of digital technologies into all aspects of business, resulting in fundamental changes in the way organizations operate and deliver value to their customers (Vial, 2021). As Jerković (2022) points out, such e-customers have relatively higher expectations than traditional customers. The significance of digital transformation is primarily reflected in the fact that it represents a key factor for the long-term success and sustainability of organizations in today's digital economy. Organizations that successfully implement digital transformation achieve greater competitiveness, innovation, and profitability (Bughin, Catlin, Hirt, Willmott, 2018). Digital transformation enables organizations to leverage the benefits of digital technologies to transform their business, optimize business processes, and create new value for their stakeholders. Companies that have adopted digital technologies into their business processes have recorded significant improvements in operational efficiency, resulting in reduced costs and increased profits (Wamba-Taguimdje, et al., 2020).

Implementing digital transformation enables organizations to be more agile and adaptable, which is crucial in a dynamic business environment. Digital transformation allows organizations to react more quickly to changes in the market, identify new opportunities for growth and development, and improve their competitive position. Adam, Badia, and Yuliani (2024) note that digital transformation is not just a technological shift but also requires profound changes in corporate culture, organizational structures, and business models. However, investing in technology to digitize existing functions and processes is simply not enough to truly transform an enterprise or an industrial sector. Investment is necessary, but not sufficient on its own, because digital transformation requires revolutionary changes in key competitive corporate processes (Siebel, 2019).

1.2. EU activities in promoting digital transformation

The European Union has recognized the importance of digital transformation for the economic growth and competitiveness of Europe, and has initiated a series of initiatives and programs aimed at supporting digital development (European Commission, Digital Europe, 2020). Programs such as Digital Europe, focus on strengthening digital skills, developing digital infrastructure, and supporting innovative digital projects across the region.

Digital transformation is a key theme in European Union policies, with EU programs and initiatives providing financial support, expert assistance, and consulting to organizations seeking to implement digital transformation. The European Union has identified digitalization, or digital transformation of economies, industrial sectors, and enterprises in its member states, as one of its major strategic objectives. Maintaining the competitiveness of companies in the European Union in a global environment characterized by rapid technological progress and an expansive degree of innovation, is a primary focus of EU leadership. The conflict in Ukraine, migration pressure towards the EU, labor shortages, and financial pressures are just some of the challenges that member states have faced in recent years. However, the focus remains on the digital transformation of economies and increasing competitiveness (European Commission, 2023). Establishing a single market, innovation, and digital transformation are top priorities in EU strategic and development programs for the period 2021-2027.

Furthermore, support for digital transformation has not been confined solely within the EU borders. The escalating geopolitical situation in Europe and the world could not pass without additional challenges for the countries of the Western Balkans. This region has become a place where numerous political influences collide in recent years, and a stage where global conflicts are reflected. On one hand, there is significant pressure from China, which through its political-financial initiative, the Digital Silk Road, as part of the Belt and Road Initiative, injects substantial funds into Western Balkan countries, primarily Serbia, while simultaneously increasing its political influence in the region. Digital transformation has been recognized by the EU as one of the key defenses against negative influences on the Western Balkan countries. It has become evident that the strategic importance of the digital economy cannot be overstated (European DIGITAL SME Alliance, 2023).

Despite the potential benefits, many small and medium-sized enterprises (SMEs) face challenges in the process of digital transformation. Lack of financial resources, shortage of experts in digital technologies, and resistance to change are often the main obstacles SMEs encounter (European DIGITAL SME Alliance, 2020). Additionally, a lack of clear strategy and reliance on traditional business models can hinder the adoption of digital innovations.

1.3. Bosnia and Herzegovina in digital age

In the context of Bosnia and Herzegovina, digital transformation represents a challenging yet crucial initiative that can contribute to the development of the economy, improvement of the business environment, and increased competitiveness of organizations. Digitalization in Bosnia and Herzegovina faces a number of specific challenges, including a lack of developed digital infrastructure, limited access to financial resources for investment in digital technologies, and regulatory constraints. Key aspects that affect this process include the lack of skilled labor, adaptation of corporate culture, and access to European Union markets, as well as aspects of financial constraints, legal-regulatory framework, and the development of digital education (Salkić, et al., 2023; Domljan & Domljan, 2020). The lack of skilled labor represents one of the key challenges for digital transformation in BiH. The shortage of highly qualified IT professionals, as Korjenić (2022) points out, complicates the process of implementing and maintaining digital solutions.

Available data on the use of digital technologies in businesses in Bosnia and Herzegovina indicate that 99.9% of businesses have access to the internet, 75.1% of businesses provide portable devices that enable mobile internet connection for business purposes, and 36.7% of businesses conduct online internet meetings in their daily operations (Agency for Statistics of BiH, 2023). When it comes to the prevalence of e-commerce, 27% of businesses have conducted sales through websites, mobile applications, or EDI data transfers, while only 6.5% of businesses have utilized some form of Big Data analysis from any data source. Many small and medium-sized enterprises (SMEs) in Bosnia and Herzegovina face a lack of financial resources for investing in digital technologies. Financing digital transformation can be challenging due to a lack of capital, high interest rates, and limited access to loans and other forms of financing. In Bosnia and Herzegovina, there is no clear strategy for the digitalization of businesses that would be implemented by state bodies. The primary motivation lies in the individual desire of companies, driven by competitive pressure from foreign markets in which they operate, to enter the process of digital transformation (Čatić et al., 2020). Regulatory constraints can also pose barriers to digital transformation in Bosnia and Herzegovina. Complex and fragmented legislation, bureaucracy, and administrative procedures can slow down the process of digitalization and make it difficult for organizations to leverage the benefits of digital technologies. Improving the business environment and reducing administrative barriers are key steps towards creating a conducive environment for digital transformation.

2. RESEARCH METHODOLOGY

2.1. Sample description and research methodology

During November 2023, a survey of the attitudes of managers and owners of companies in Bosnia and Herzegovina was conducted on a sample of 82 companies, members of BUM - Business Union of Managers. This union gathers successful managers and company owners from the entire area of Bosnia and Herzegovina. During the survey, a questionnaire was used covering several areas:

- Characteristics of the participating companies (type of activity, number of employees, total annual revenue in the last year of operation, number of years the company has been in business, and the position of respondents in management or ownership of the company).
- Company attitudes towards the importance of digital transformation (13 questions).
- Company attitudes towards the technical aspects of digitalization (6 questions with accompanying sub-questions).
- Company attitudes towards software indicators of the degree of digitalization implementation (5 questions with accompanying sub-questions).
- Company attitudes towards the effects of business digitalization (14 questions).

The criteria of the new Law on Accounting and Audit of the Federation of Bosnia and Herzegovina from 2021 were used for the classification of company size. According to this law, micro, small, medium, and large enterprises are classified as follows:

Table 1: Criteria for categorizing company size in the Federation of Bosnia and Herzegovina

Characteristics:	Number of employes	Annual turnover in KM	Average value of business assets in KM
Micro companies	below 10	below 700.000	below 350.000
Small companies	10-49	700.000-8.000.000	350.000-4.000.000
Medium companies	50-249	8.000.000-40.000.000	4.000.000-20.000.000
Large companies	over 250	over 40.000.000	over 20.000.000

Source: Article 5 (Classification of Legal Entities) of the Law on Accounting and Audit of the Federation of Bosnia and Herzegovina ("Official Gazette of the FBiH 15/2021" dated 24.02.2021).

According to the provisions of the aforementioned law, for a company to be classified into one of the categories mentioned above, it must meet at least two of the three conditions. For the purposes of this research, the conditions of the number of employees and annual revenue from the last business year were used. In addition, companies were asked about the number of years in business, which included the following categories: (a) up to two years in business, (b) 2-10 years in business, (c) 10-25 years in business, and (d) over 25 years in business. This criterion is necessary to determine the correlation between the age of companies and the level of their digitalization. The research showed that in the first category of up to two years in business, none of the surveyed companies were present. The distribution of respondents according to these criteria is shown in Table 2.

Table 2: Overview of characteristics of surveyed companies

Company size	number	share	Industry		Year in business		Position of respondents	
Small	24	29,3%	manufactury	3	over 25y	4	Prof. manager	3
			trade	6	10-25y	11	Founder	10
			service	15	2-10y	9	2nd gen. owner	6
					below 2y	0	other	5
Medium	41	50,0%	manufactury	15	over 25y	17	Prof. manager	16
			trade	17	10-25y	24	Founder	2
			service	9	2-10y	0	2nd gen. owner	14
					below 2y	0	other	9
Large	17	20,7%	manufactury	8	over 25y	12	Prof. manager	6
			trade	7	10-25y	5	Founder	4
			service	2	2-10y	0	2nd gen. owner	7
					below 2y	0	other	0
TOTAL	82	100,0%	manufactury	26	over 25y	33	Prof. manager	25
			trade	30	10-25y	40	Founder	16
			service	26	2-10y	9	2nd gen. owner	27
					below 2y	0	other	14

Source: Author's elaboration

From the table, it can be seen that the representation of different sectors in the total sample is approximately equal: 31.7% in manufacturing (26 companies), 36.6% in trade (30 companies), and 29.3% in services (26 companies). The distribution of sectors justifies further research and examination of respondents perspectives across different sectors, which is beneficial for generalizing attitudes for the entire economy. Medium-sized companies dominate the sample, accounting for exactly 50% of all respondents. They represent 46.3% in terms of

the number of employees and an even larger share, 51.2%, in terms of total revenue. Small companies constitute 29.3% of the surveyed companies, while large companies contribute one-fifth of the total number (20.7%). These shares of different-sized companies ensure the representativeness of the sample in the conducted research. Regarding the length of operation, the highest participation comes from companies present in the market for 10 to 25 years, comprising almost half (48.8%). Significantly, companies with over 25 years of market presence account for 40.2%. Together, these two groups make up 89% of all surveyed companies. Based on this, it can be concluded that the research predominantly includes companies operating for more than 10 years in the market of Bosnia and Herzegovina. The distribution of functions performed by respondents is relatively equal: 32.9% are younger owners (successors), 30.5% are professional managers who are not related to the owners, and 19.5% are older owners. All other functions, besides these three key roles, account for 17.1%. From the provided data, it can be concluded that the structure of the surveyed companies, observed according to various criteria, is adequate for researching attitudes and opinions regarding the significance and effects of business digitalization in Bosnia and Herzegovina.

2.2. Research objectives and research hypotheses

The primary objective of the research is to determine the level of digitalization of companies in Bosnia and Herzegovina (BiH) through the processes of digitalization within the companies, changes in the digital business environment, and the business applications used by the companies. This level will be examined in companies of different sizes (large, medium, and small) to generalize attitudes for the overall economy based on the results from different-sized companies. Therefore, the main research hypothesis is:

- H.0: The degree of digital transformation in BiH companies varies significantly depending on their size.

The first aim of this study is related to the processes of digital transformation. This transformation of business operations is recognized as a necessity in every company's business. For example, it is one of the strategic development directions of the European Union until 2030, where digital business transformation is identified as one of the four areas. This is confirmed by the key areas of the EU's digital strategy policies until 2030. (EU program "A Digital Decade"). "Key areas of policies related to the EU's digital strategy, promoting digital transformation: (1) The Digital Decade, (2) The European Declaration on Digital Rights and Principles, (3) Digital Services, (4) Data Economy, (5) Taxation of the Digital Economy, (6) Artificial Intelligence, (7) Connectivity, (8) Cybersecurity, (9) European Digital Identity (eID), (10) Digitalization of Justice, and (11) Digital Information Exchange." (EU program "A Digital Decade"). The research aimed to determine respondents' own assessment of the current level of business digital transformation and their attitudes toward the significance of this transformation for their business. Additional research hypotheses related to this aim are:

- A.H.1: Although BiH companies are aware of the importance of digital transformation, there is a gap between this awareness and the actual implementation of digital technologies in business.
- A.H.2: BiH companies have a positive perception of the necessity and significance of digital transformation for their business, regardless of their size.

Business digitalization can encompass various areas of a company's operations. The first indicator of digitalization is the level of application of various software or applications in operations, ranging from essential ERP systems to specialized business software used in certain business segments. Given this, one of the objectives of this study is to assess the level of application of several basic applications, such as ERP, CRM, DMS, VMS, and e-commerce, which can be used by almost all companies regardless of size. The fundamental research assumption is that a higher degree of digitalization of BiH companies is directly correlated with a higher level of application of these key business software applications, regardless of the company's size. The choice and extent of use of the mentioned applications primarily depend on the company's industry, size, and development strategy.

Considering the above, one of the objectives of this study is to assess the level of implementation of several basic applications, which, according to their purpose, can be used by almost all companies regardless of size. These include ERP as fundamental software, followed by CRM (software representing a central customer database where all collaboration-related data is interconnected, providing organized information about the complete customer interaction, available in one place and at any time), DMS (document management software, facilitating paperless operations by tracking documents from creation on computers, through sharing with colleagues, customers, or clients, to processing and digital archiving), VMS (warehouse management software enabling management of various logistical parameters: receiving, moving, packing, picking, shipping of goods, etc.), and e-commerce (software for presenting and selling products and services online). Respondents were asked to indicate whether they use each of the mentioned applications, how long they have been using them, and what benefits or advantages their implementation has brought to their business. The fundamental research assumption is that a higher degree of digitalization in Bosnian companies is directly correlated with a higher level of application of these mentioned applications, regardless of the company's size. The auxiliary research hypothesis for this objective is as follows:

- A.H.3: Regardless of size, Bosnian companies heavily use key business software applications, which are indicators of significant business digitalization.

The third aim of the research pertains to the technical aspects of digitalization, specifically the improvement of the digital environment in which companies operate. The study examines aspects of digitalization that are not directly within the companies' control but can have varying impacts on their business. Respondents were asked to express their views on electronic seals and signatures, the possibilities of EDI (or Electronic Data Interchange), the application of barcodes, and artificial intelligence (AI). The research hypothesis is that advancements in the digital environment of companies have different implications for their operations, regardless of the company's size. In other words, the aim of the research is to determine whether changes in the digital business environment manifest differently across different-sized companies. An auxiliary research hypothesis for this aim is:

- A.H.4: BiH companies have positive perceptions regarding changes in business conditions in the digital environment.

By analyzing the three stated research aims and testing all related auxiliary hypotheses, key arguments will be developed for testing the main hypothesis and achieving the fundamental objective of the research for the overall economy of BiH. The processing of respondents' attitudes will be conducted using the statistical program SPSS 21, including descriptive

statistics for each company size and ANOVA one-way test (Engl. ANalysis Of Variance), T-test, and Chi-square test to determine statistically significant differences between specific groups. If the ANOVA test results show homogeneity in the responses of these groups, conclusions can be generalized for all companies and the overall economy. If there is no homogeneity, the T-test (testing the mean) and the Chi-square test (testing variance) will determine between which pairs of groups significant differences exist.

3. RESEARCH RESULTS

As already mentioned, the level of digital transformation of companies can be examined through three dimensions: (a) subjective attitudes of company management regarding the need for business digitalization and its impact assessment on operations; (b) levels of application of modern software and applications in this field, and (c) the impact of changes in the digital environment of companies.

Analyzing the first dimension, respondents were asked two direct questions related to digital transformation. The questions, as well as respondents' answers, are provided in Table 3. Large companies with an average response value of 1.59 are closer to the response "YES" indicating that they have implemented digital transformation to a greater extent. On the other hand, medium-sized companies (average value of 1.46) and small companies (average value of 1.33) are closer to the statement that they have not implemented digital transformation to a greater extent. Additionally, it is evident that as the size of the company decreases, the ratings for the implementation of digital transformation decrease. Small companies show the lowest degree of implemented transformation.

Evaluating the current level of business digitalization, most companies believe that minor or major improvements are needed. The average value of all responses is 2.50, which is exactly halfway between "minor improvements" and "major improvements." Large companies are closer to the assessment that minor improvements are needed. Medium-sized companies, the largest group in the sample (50%), are divided between the need for "minor" and "major" improvements in the current level of digitalization. The average rating is 2.48. Small companies, as with the previous question, believe that major improvements in business digitalization are necessary.

Table 3: Descriptive Statistics on the Level of Digitalization of Companies Descriptives

Descriptives Descriptives for the first auxiliary hypothesis		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Do you consider that your company has implemented digital business transformation to a greater extent? Answer 1 = NO Answer 2 = YES	Small	24	1,3333	,48154	,09829	1,1300	1,5367
	Medium	41	1,4634	,50485	,07885	1,3041	1,6228
	Large	17	1,5882	,50730	,12304	1,3274	1,8491
	Total	82	1,4512	,50068	,05529	1,3412	1,5612

What is your general assessment of the current level of digitalization of your company? Answer 1 – extremely high Answer 2 – minor improvements are needed Answer 3 – major improvements are needed Answer 4 – relatively low Answer 5 – extremely low Answer 6 – we do not need digitalization	Small	24	2,6250	,96965	,19793	2,2156	3,0344
	Medium	41	2,4878	,84030	,13123	2,2226	2,7530
	Large	17	2,3529	,60634	,14706	2,0412	2,6647
	Total	82	2,5000	,83518	,09223	2,3165	2,6835

Source: Authors' elaboration

To confirm these results, an ANOVA test was conducted to test for significant statistical differences among all three groups. The results are provided in Table 4.

Table 4. Results of the ANOVA Test for AH1

ANOVA One-Way ANOVA test for first auxilary hypothesis		Sum of Squares	df	Mean Square	F	Sig.
Do you consider that your compan implemented digital business trans to a greater extent?	Between Groups	0,659	2	,329	1,325	**,272**
	Within Groups	19,646	79	,249		
	Total	20,305	81			
What is your general assessment of the current level of digitalization of your company?	Between Groups	0,749	2	,374	,530	**,590**
	Within Groups	55,751	79	,706		
	Total	56,500	81			

Source: Authors' elaboration

The results of the ANOVA test show, for both questions, that there is no statistically significant difference between the groups, considering that p (in the table, Sig. value) > 0.05. Based on this, it can be concluded that companies are closer to the assertion that they have not implemented digital transformation to a greater extent, especially small and medium-sized ones, as well as some large ones. This is confirmed by the answer to the second question, where the average value of the responses ranges between the need for minor and major improvements. As expected, large companies are leaders in this process and have higher ratings, but these differences are not much greater than the average attitudes of the other two groups.

Based on the results of the statistical tests, the first hypothesis: A.H.1: *Although Bosnian and Herzegovinian companies are aware of the importance of digital transformation, there is a gap between this awareness and the actual implementation of digital technologies in business* can be considered proven. Companies of all sizes have generally not implemented digital business transformation to a greater extent and believe that minor or major improvements are needed. This does not apply to some large companies, as the average response values of this group are not significantly different from those of small and medium-sized companies. For the purpose of testing the second auxiliary hypothesis, companies were asked to express their views

on the importance of digital transformation for future business, as well as the correlation between investment in these processes and strengthening their competitive position in the future. The average response values for all three groups are given in Table 5.

The average response values to questions about the importance of digital transformation and investment in it in the context of strengthening their own competitive position range from 4.3 to 4.8. This means that the attitudes of companies of all sizes range from "agree" (value 4) to "strongly agree" (value 5). Regardless of size, companies are aware of the importance of digital transformation and the correlation between investment in it and their own competitive position.

Table 5: Descriptive statistics on digitalization degree of companies

Descriptives		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
Questions for the second auxiliary hypothesis						Lower Bound	Upper Bound
Digital transformation is extremely important for the future success of our company.	Small	24	4,5417	,50898	,10389	4,3267	4,7566
	Medium	41	4,3902	,58643	,09159	4,2051	4,5753
	Large	17	4,8235	,39295	,09531	4,6215	5,0256
	Total	82	4,5244	,54942	,06067	4,4037	4,6451
Investments in digitalization will impact our own competitive position in the future.	Small	24	4,3333	,70196	,14329	4,0369	4,6297
	Medium	41	4,4878	,63726	,09952	4,2867	4,6889
	Large	17	4,5294	,51450	,12478	4,2649	4,7939
	Total	82	4,4512	,63153	,06974	4,3125	4,5900
Posible answers to both questions 1 – Strongly disagree 2 - disagree 3 – neither agree nor disagree 4 - agree 5 – strongly disagree	Total						

Source: Authors' elaboration, 2024

However, the results of the ANOVA test in Table 6 show that there are statistically significant differences between different sizes of companies regarding the correlation between digital transformation and future success. The p-value or Sig.(2-tailed) is 0.021, which is less than the reference value of 0.05. This means that some companies have different views on how much digital transformation will affect their future success.

Table 6. Results of the ANOVA test for AH2

ANOVA One-Way ANOVA test for second auxilary hypothesis		Sum of Squares	df	Mean Square	F	Sig.
Digital transformation is extremely important for future success of our company.	Between Groups	2,266	2	1,133	4,035	**,021**
	Within Groups	22,185	79	,281		
	Total	24,451	81			
Investments in digitalization will impact our competitive postion in the future.	Between Groups	,492	2	,246	,611	**,545**
	Within Groups	31,813	79	,403		
	Total	32,305	81			

Source: Authors' elaboration, 2024

To gain insights into the significant differences between companies, a T-test was conducted on each pair: small-medium, small-large, and medium-large (see Table 7). The results of the T-test showed statistically significant differences in attitudes between medium and large companies, as the Sig.(2-tailed) value in this case was 0.007, which is less than the reference value of 0.05.

Table 7. Results of T-test for AH2

T-test Results of T test between different size companies		Sig. (2-tailed) Small and medium size companies	Sig. (2-tailed) Small and large companies	Sig. (2-tailed) Medium and large companies
Digital transformation is extremely important for future success of our company.	Equal variances assumed	,296	,063	**,007**
	Equal variances not assumed	,279	,053	**,002**

Source: Authors' elaboration, 2024

Although the results of the T-test were sufficient to establish statistically significant differences between the two groups, a Chi-square test was also conducted for the medium-large company pair, which confirmed the results of the T-test (see Table 8), as the p-value is 0.026, which is less than the reference value of 0.05.

Table 8. Results of HI-square test for AH2

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,323[a]	2	,026
Likelihood Ratio	8,224	2	,016
Linear-by-Linear Association	6,958	1	,008
N of Valid Cases	58		

Source: Authors' elaboration, 2024

In conclusion, companies of all sizes are aware of the significant impact of digital transformation and are willing to invest in it, but there are more pronounced differences in attitudes between medium and large companies regarding the reflection of this transformation on future success. Large companies are convinced of this correlation (with an average answer value of an extremely high 4.82 out of a maximum of 5.0), while medium-sized companies are somewhat more reserved about it (with an average answer value of 4.39). Interestingly, small companies (with an average of 4.54) are more optimistic about the importance of digital transformation for future success. Based on the results of the statistical tests, the second auxiliary hypothesis: AH2: *Bosnian companies have a positive perception of the necessity and significance of digital transformation for their business, regardless of their size*, can be conditionally considered proven. Companies of different sizes have a positive perception towards digital transformation and are willing to invest in it to improve their competitive position. However, there are more significant differences in attitudes between medium and large companies regarding its impact on future success. The results of these variations may partly stem from the fact that exactly 50% of the surveyed companies (or 41) belong to the medium-sized group, while large companies are significantly less represented (only 17 companies or 20.7%). A greater discrepancy in the number of respondents in each group may partly cause significant statistical differences.

The third auxiliary hypothesis is based on the assumption that companies that have digitized their business to a greater extent or have initiated these processes actually use certain business applications and software solutions that reflect the technical aspect of digitalization. In addition to directly asking whether they use specific software, they were asked to indicate how long they have been using it. The duration of using this software is a clear indicator of the current degree of digitalization. Furthermore, it has been confirmed that companies, regardless of size, are aware of the need for digitalization. Evaluating all five software solutions, companies were asked to indicate how the implementation of each of them has affected their business. The results of the technical aspect of digitalization of companies are presented in Table 9.

Table 9. Application of Different Software and Applications in Company Operations

software	**Application of software**				**Duration of software usage**			**Impact on business**			
	Size	Using	Total No. of companies	Share of total number	over 10 years	2-10 years	below 2 years	None	Small	Large	Dont know
ERP	Small	15	24	62,5 %	5	8	2	0	0	6	9
	Medium	34	41	82,9 %	25	8	1	0	3	25	6
	Large	14	17	82,4 %	12	2	0	0	0	14	0

	Total	**63**	**82**	76,8 %	**42**	**18**	**3**	**0**	**3**	**45**	**15**
	Share	***76,8%***		Share in act	*66,7 %*	*28,6 %*	*4,8 %*	*0,0 %*	*4,8 %*	*71,4 %*	*23,8 %*
CRM	Small	7	24	29,2 %	4	0	3	0	0	7	0
	Medium	15	41	36,6 %	6	7	2	0	5	8	2
	Large	2	17	11,8 %	0	2	0	0	0	1	1
	Total	**24**	**82**	29,3 %	**10**	**9**	**5**	**0**	**5**	**16**	**3**
	Share	***29,3%***		Share in act	*41,7 %*	*37,5 %*	*20,8 %*	*0,0 %*	*20,8 %*	*66,7 %*	*12,5 %*
DMS	Small	3	24	12,5 %	1	2	0	0	0	2	1
	Medium	17	41	41,5 %	4	9	4	2	3	11	1
	Large	8	17	47,1 %	4	4	0	0	0	7	1
	Total	**28**	**82**	34,1 %	**9**	**15**	**4**	**2**	**3**	**20**	**3**
	Share	***34,1%***		Share in act	*32,1 %*	*53,6 %*	*14,3 %*	*7,1 %*	*10,7 %*	*71,4 %*	*10,7 %*
WMS	Small	4	24	16,7 %	1	2	1	0	2	1	1
	Medium	16	41	39,0 %	5	7	4	0	2	9	5
	Large	7	17	41,2 %	0	5	2	0	0	3	4
	Total	**27**	**82**	32,9 %	**6**	**14**	**7**	**0**	**4**	**13**	**10**
	Share	***32,9%***		Share in act	*22,2 %*	*51,9 %*	*25,9 %*	*0,0 %*	*14,8 %*	*48,1 %*	*37,0 %*
E-COM	Small	3	24	12,5 %	1	0	2	0	0	3	0
	Medium	16	41	39,0 %	5	8	3	0	5	7	4
	Large	6	17	35,3 %	0	3	3	0	0	4	2
	Total	**25**	**82**	30,5 %	**6**	**11**	**8**	**0**	**5**	**14**	**6**
	Share	***30,5%***		Share in act	*24,0 %*	*44,0 %*	*32,0 %*	*0,0 %*	*20,0 %*	*56,0 %*	*24,0 %*

Source: Authors' elaboration, 2024

ERP, as a fundamental software in every company, has expected results. It is used by 76.8% of all surveyed companies, mainly for over 10 years. Only small (mostly service-oriente

d) companies do not use their own ERP. The assumption is that they use outsourcing services from various agencies. The vast majority of companies (71.4%) believe that ERP has a significant impact on their business. Only those who do not use their own ERP cannot assess its impact on business (23.8%). Generally speaking, the implementation of ERP is pronounced in the majority of surveyed companies, as expected given its purpose and functions.

However, the remaining four software solutions (CRM, DMS, WMS, and E-commerce) show significantly lower levels of implementation. The participation of those who use them ranges from 29-34%. Even large companies, as leaders in the digitalization process, show that they do not use advanced software solutions to a greater extent. Additionally, unlike ERP, the duration of implementation of all these applications mainly ranges from 2-10 years, implying the conclusion that even those companies using these solutions have relatively little experience with them. It is positive that among those who use the mentioned software solutions, the majority of them identify a significant impact of these applications on their own business. Based on the obtained answers, the third auxiliary hypothesis, which stated that: *Regardless of size, Bosnian companies heavily use key business software applications, which are indicators of significant business digitalization*, cannot be considered proven. The reasons for refuting this hypothesis are as follows:

- Regardless of size, companies mostly heavily use only ERP, which is expected given its fundamental purposes.
- The remaining four, CRM, DMS, WMS, and e-commerce, are mainly used by about one-third of the surveyed companies. There are variations in participation between small, medium, and large companies, but they are below half. The ratios are quite similar, except for CRM, where surprisingly few large companies have participated in its implementation.

It is positive that those companies that have indicated that they use these applications have positive perceptions of their impact on their own business, although the implementation period is relatively short (the dominant period of use is 2-10 years). The last, fourth auxiliary hypothesis tests respondents' attitudes toward changes in the digital environment. The assumption is that these changes can also encourage companies to engage in the processes of digital transformation of their own business. The results are presented in Table 10. Analyzing attitudes towards digital seals and signatures, which are still not widely used in the Bosnian market, all three groups of companies predominantly agree that their implementation will have positive implications for business and its digitalization. This is indicated by 93.9% of all surveyed companies. Furthermore, 43-47% of them believe that it will have a significant impact on business. One-fifth believe that the impact will be small, while one-third cannot assess this impact. Similar participation rates are evident within the groups of small, medium, and large companies.

In contrast to electronic signatures and seals, the remaining three segments of the digital environment (use of barcodes, EDI, and artificial intelligence) have significantly lower adoption rates ranging from 32.9% to 37.8% of those who use them. Large companies predominantly use barcodes and EDI, while small companies use them the least. On the other hand, small companies use artificial intelligence much more (45.8%) compared to large ones (only 17.6%). More than half of the companies using barcodes identify a significant impact on

their business. However, half of the companies using EDI and artificial intelligence cannot assess their impact on business. In summary, it is evident that large companies, due to their characteristics, use barcodes and EDI more, but smaller companies are more flexible, as indicated by the proportion of those who have experience with using artificial intelligence for business purposes.

Table 10. Companies attitudes towards the digital environment

Software	Approval and application				**Impact on business**			
	Size	Using	Total No. Of companies	Share of total number	None	Small	Large	Dont know
Digital seal	Small	22	24	91,7%	1	3	8	10
	Medium	40	41	97,6%	0	11	14	15
	Large	15	17	88,2%	0	2	11	2
	Total	**77**	**82**	93,9%	**1**	**16**	**33**	**27**
	Share	***93,9%***		Share in act	*1,3%*	*20,8%*	*42,9%*	*35,1%*
Digital signature	Small	22	24	91,7%	1	3	7	11
	Medium	40	41	97,6%	0	9	18	13
	Large	15	17	88,2%	0	2	11	2
	Total	**77**	**82**	93,9%	**1**	**14**	**36**	**26**
	Share	***93,9%***		Share in act	*1,3%*	*18,2%*	*46,8%*	*33,8%*
Barcode	Small	3	24	12,5%	0	0	1	2
	Medium	18	41	43,9%	0	3	10	5
	Large	10	17	58,8%	0	0	5	5
	Total	**31**	**82**	37,8%	**0**	**3**	**16**	**12**
	Share	***37,8%***		Share in act	*0,0%*	*9,7%*	*51,6%*	*38,7%*
EDI data exchange	Small	7	24	29,2%	0	0	1	6
	Medium	14	41	34,1%	0	3	7	4
	Large	8	17	47,1%	0	0	3	5
	Total	**29**	**82**	35,4%	**0**	**3**	**11**	**15**
	Share	***35,4%***		Share in act	*0,0%*	*10,3%*	*37,9%*	*51,7%*
AI artificial inteligence	Small	11	24	45,8%	0	2	3	6
	Medium	13	41	31,7%	0	7	2	4
	Large	3	17	17,6%	0	0	0	3
	Total	**27**	**82**	32,9%	**0**	**9**	**5**	**13**
	Share	***32,9%***		Share in act	*0,0%*	*33,3%*	*18,5%*	*48,1%*

Source: Authors' elaboration

Based on the obtained results, the fourth auxiliary hypothesis, which states that: *Bosnian companies have positive perceptions of changes in business conditions in the digital environment*, can be conditionally proven for the following reasons:

- There is almost unanimous support for the introduction of electronic seals and signatures, regardless of the size of the company.
- Although there is a positive perception of changes in business conditions regarding the use of barcodes, EDI, and artificial intelligence, there is a low participation of those who use or approve of them (their participation ranges from 33-37%). Opinions are divided on how this might impact business. Large companies have the most positive attitudes towards this, except for the application of artificial intelligence.

Analyzing the results of proving the auxiliary hypotheses:

Auxiliary hypothesis:	Result
Although Bosnian companies are aware of the importance of digital transformation, there is a gap between this awareness and the actual implementation of digital technologies in business.	Proven
Bosnian companies have a positive perception of the necessity and importance of digital transformation for their business, regardless of their size.	Conditionaly proven
Regardless of size, Bosnian companies heavily use key business software applications, which are indicators of significant business digitalization.	Not proven
Bosnian companies have positive perceptions of changes in business conditions in the digital environment.	Conditionaly proven

The main hypothesis of the study: *The degree of digital transformation in Bosnian companies varies significantly depending on their size*, cannot be proven. There are different variations between different sizes of companies, but they do not follow specific rules or regularities in the correlation between the size of the company and the degree of digitalization. Large companies have slightly more pronounced positive attitudes towards digitalization compared to others, but they also vary and lag behind in technical aspects and changes in the environment, sometimes even more (e.g., the application of artificial intelligence).

CONCLUSION

The research conducted on digital transformation in Bosnia and Herzegovina sheds light on various aspects of how companies in the region perceive and engage with digitalization. Through the analysis of auxiliary hypotheses and the main hypothesis, several key findings have emerged, providing insights into the current state of digital transformation among Bosnian companies. Firstly, the study confirmed that Bosnian companies are indeed aware of the importance of digital transformation in today's business landscape. However, there exists a notable gap between this awareness and the actual implementation of digital technologies in their business operations. Despite recognizing the significance of digitalization, many companies have yet to fully integrate digital technologies into their day-to-day processes and strategies. This finding underscores the need for more proactive efforts to bridge the divide between awareness and implementation, ensuring that companies can leverage digital tools effectively to stay competitive in the modern market.

Secondly, the research revealed that Bosnian companies, irrespective of their size, generally hold positive perceptions regarding the necessity and importance of digital transformation for their business. This finding highlights a widespread acknowledgment among companies of all scales regarding the transformative potential of digital technologies. However, while the overall sentiment is positive, there may be nuances in how different companies perceive and prioritize digitalization initiatives based on their unique contexts and objectives.

On the other hand, the study did not provide sufficient evidence to support the hypothesis that Bosnian companies heavily utilize key business software applications indicative of significant business digitalization, regardless of their size. Despite the prevalence of certain software solutions such as ERP systems, the adoption of other critical applications like CRM, DMS, WMS, and e-commerce appears to be less widespread, particularly among smaller companies. This suggests that while some aspects of digitalization may be well-established, there are still areas where companies lag behind, potentially limiting the scope of their digital transformation efforts. In conclusion, while Bosnian companies exhibit varying degrees of awareness and engagement with digital transformation, the research underscores the complexity of digitalization dynamics within the region. The findings suggest a need for tailored strategies and interventions to support companies in overcoming barriers to digital adoption, enhancing their readiness for the digital future. By addressing the identified gaps and building upon existing strengths, Bosnian companies can position themselves more effectively in an increasingly digitalized global economy, driving innovation, competitiveness, and sustainable growth.

LITERATURE

1. Adam, M., Badia, P., & Yuliani, Y. (2024). Role of self-efficacy, knowledge sharing, mediated adaptability, and external environment change as moderators of readiness for change. Humanities and Social Sciences Letters.
2. Agency for Statistics of Bosnia and Herzegovina. (2023). Use of information and communication technologies in enterprises - first results. Retrieved from https://bhas.gov.ba/data/Publikacije/Saopstenja/2023/IKT_04_2023_Y1_1_BS.pdf (accessed 06.02.2024).
3. Behrendt, A., De Boer, E., Kasah, T., Koerber, B., Mohr, N., & Richter, G. (2021). Leveraging Industrial IoT and advanced technologies for digital transformation. McKinsey & Company, 1-75.
4. Bughin, J., Catlin, T., Hirt, M., & Willmott, P. (2018). *Why digital strategies fail*. Harvard Business Review, 96(3), 52-61.
5. Čatić, H., et al. (2020). Innovation and Digitalisation in SMEs in Bosnia and Herzegovina. Retrieved from https://b2bit.ba/wp-content/uploads/2020/04/Innovation_and_digitalisation_in_SMEs_in_BH_BASELINE_STUDY_V2.pdf (accessed 06.02.2024).
6. Domljan, I., & Domljan, V. (2020). Innovation-Led Development: The Case of Bosnia and Herzegovina. In Handbook of Research on Integrating Industry 4.0 in Business and Manufacturing (pp. 467-491). IGI Global..

7. European Commission. (2020). Digital Europe. Retrieved from https://digital-strategy.ec.europa.eu/hr/activities/digital-programme (assessed 05.02.2024).
8. European DIGITAL SME Alliance. (2023). A new digital agenda for Western Balkans. Retrieved from https://www.digitalsme.eu/digital/uploads/Western-Balkans-Position-Paper.pdf (assessed 05.02.2024).
9. EU program "A Digital Decade" (https://www.consilium.europa.eu/hr/policies/a-digital-future-for-europe/, (accessed 06.02.2024).
10. Jerković, D. (2022) Digitalni marketing, Markos Banja Luka.
11. Kirchmer, M. (2020). *High-performance digital business: A transformational approach*. CRC Press.
12. Korjenić, O. (2022). Challenges of the Labor Market in Bosnia and Herzegovina. Bosnian Studies: Journal for research of Bosnian thought and culture, 6(1), 24-48.
13. Law on Accounting and Auditing of the Federation of Bosnia and Herzegovina, "Official Gazette of FBiH 15/2021" dated 24.02.2021, (accessed 04.02.2024)
14. Salkić, H., Omerović, A., Salkić, A., & Kvasina, M. (2023). Enhancing Economic Management with Information Technology: Insights from Covid-19 in Bosnia and Herzegovina. Economics-Innovative and Economics Research Journal, 11(2), 209-223.
15. Siebel, Thomas M. (2019) *Digital transformation: Survive and thrive in an era of mass extinction.* Rosetta Books.
16. Vial, G. (2021). Understanding digital transformation: A review and a research agenda. Managing digital transformation, 13-66.
17. Wamba-Taguimdje, S. L., Fosso Wamba, S., Kala Kamdjoug, J. R., & Tchatchouang Wanko, C. E. (2020). Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects. Business Process Management Journal, 26(7), 1893-1924.
18. Warner, K. S., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. Long range planning, 52(3), 326-349.Zangiacomi, A., Pessot, E., Fornasiero, R., Bertetti, M., & Sacco, M. (2020). Moving towards digitalization: a multiple case study in manufacturing. Production Planning & Control, 31(2-3), 143-157.