

DIGITAL TRANSFORMATION IN BOSNIA AND HERZEGOVINA COMPANIES: ANALYSIS OF THE DEGREE OF INTEGRATION AND IMPACT ON BUSINESS

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Abstract: *This study investigates the digital transformation within companies in Bosnia and Herzegovina, aiming to assess the level of digital integration and its impact on business operations across manufacturing, trade, and services sectors. Employing a quantitative analysis of responses from 82 managers or owners, the research focused on attitudes towards digitalization, the adoption of software solutions (ERP, CRM, DMS, WMS, eCommerce), and the impact of digitalization technical aspects. The findings reveal significant disparities in digitalization levels across sectors, reflecting a diverse digital landscape within the Bosnian economy. Despite the initiation of digital transformation efforts, a considerable gap remains between recognizing its importance and its practical implementation. The study underscores the urgent need for continued efforts towards embracing digital transformation to enhance operational efficiency, competitiveness, and adaptability to changing market demands and consumer expectations, highlighting the critical role of digital transformation in securing a competitive edge and ensuring responsiveness to market and consumer dynamics.*

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

JEL Classification: *M15, M21.*

INTRODUCTION

Digital transformation has become imperative for companies around the world, enabling them to improve efficiency, innovation, and competitiveness in an increasingly digital business environment. (Mia, Hossain, & Sangwan, 2024) high-

light that digitalization allows companies to leverage advanced technologies to enhance business processes, products, and services, thereby achieving significant improvements in operational performance. According to (Jaganjac & Lukić Nikolić, *Organizaciono ponašanje: Izazovi digitalnog doba*, 2023), organizations aim to achieve increased operational efficiency, reduced costs, and improved user experience through digital transformation. (Adeoye & al., 2024) emphasize the importance of integrating digital technologies into all aspects of business, enabling companies to respond to rapidly changing market demands and consumer expectations. Research by (Zangiacomi & al., 2020) points to the significant role of digital transformation in achieving sustainable growth and development, especially in the context of global economic and ecological uncertainty. (Adam, Badia, & 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. In this paper, the specific challenges and opportunities of digital transformation within the context of Bosnian companies are investigated, analyzing how theoretical concepts are applied in practice. Based on a detailed analysis of recent literature, the goal is to offer a comprehensive overview of the current state of digital transformation, identifying key success factors and recommendations for companies striving for digital excellence. The development of digital technologies is crucial for enhancing business operations in Bosnia and Herzegovina, and adapting to the digital environment becomes a fundamental prerequisite for market survival. The research shows that companies from different sectors (manufacturing, trade, services) perceive the need and degree of digitalization of their business operations differently (Zangiacomi & al., 2020). Although some companies have already recognized the importance and have begun the process of digital transformation, there is a gap between this awareness and the actual application of digital technologies in business. Given the specificities of the Bosnian market, challenges include adapting corporate culture, organizational structures, and business models to new digital trends.

The integration of digital technologies into business represents a transformational change, crucial for improving operational efficiency and competitive advantage in today's dynamic market environment (Vaz, 2021). The impact of digitalization components such as ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), DMS (Document Management Systems), WMS (Warehouse Management Systems), and e-commerce platforms on company efficiency attracts significant attention in recent research. For example, (Godbole, 2023) highlighted the critical role of ERP systems in streamlining business processes and improving data accuracy, significantly contributing to operational efficiency. Similarly, (Guerola-Navarro & al., 2022) emphasize how CRM systems enhance customer relationships, boosting sales and customer loyalty. Additional studies by (Khan & Ayesha, 2024) are focused on the transformative potential of AI and machine learning, highlighting their ability to predict consumer behavior and optimize inventory management, ultimately improving business outcomes. This research aims to provide a comprehensive overview of the current level of digitalization and the challenges companies face, contributing to a deeper understanding of the needs and opportunities for digital transformation in the Bosnian market.

LITERATURE REVIEW

Foundations of digital transformation

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 & Wäger, 2019). This reimagined approach to business in the digital age assists organizations in leveraging technology not only to improve existing business processes but also to introduce new business models and strategies that can provide a competitive advantage and sustainable growth. The history of digital transformation began with the advent of the first computers and the internet, enabling digital processing and data storage (Gong & Ribiere, 2023). The development of web technologies during the 1990s and early 2000s further accelerated this process, enabling online business and e-commerce (Kenney & Curry, 2000). 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, de Boer, Kasah, & Koerber, 2021). 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). It is fundamental in promoting innovation, improving efficiency, and increasing competitive advantage (Azeem, Ahmed, & Sajjad, 2021). As (Schneider & Kokshagina, 2021) point out, the development of digital transformation follows the evolution of technologies such as the internet, mobile devices, cloud computing, big data, and artificial intelligence, which are key drivers of changes in business models, corporate culture, and market strategies. This process enables organizations to be more agile, efficient, and customer-focused, adapting to rapidly changing market conditions. Digital transformation is not just a technological change but also a strategic transformation that requires a new way of thinking. Key technologies such as artificial intelligence, the Internet of Things (IoT), blockchain, and big data analytics enable organizations to analyze market trends in real-time, improve decision-making, and personalize the customer experience (Rane, 2023). The development and application of these technologies foster innovation, opening new opportunities for growth and development in a competitive market (Chesbrough, 2003). Digital transformation, therefore, represents a crucial step towards achieving long-term sustainability and success in the digital age (Minh-Nhat, Nguyen, & Mondal, 2022).

Digital technologies such as artificial intelligence, cloud computing, and the Internet of Things (IoT) offer numerous advantages to organizations, including improved agility that enables faster adaptation to market changes, greater scalability that facilitates growth without significant additional costs, and fostering innovation through new opportunities for product and service development. For example, research by (Bencheva, Mihova, & Manevski, 2019) shows how digital transformation can increase business efficiency and open up new market opportunities. Furthermore, the application of these technologies can significantly improve operational efficiency through process automation and resource optimization, leading to a reduction in operational costs and an increase in productivity, as documented in the work of (Schiafone, 2017). However, on the flip side, data security becomes increasingly important as reliance on digital

systems grows. With the rise of cyber threats, organizations must invest in advanced security measures and protocols to protect their data and infrastructure, as emphasized in the report by Cybersecurity Ventures 2020, which predicts that global cybersecurity costs will reach 6 trillion dollars by 2021.

The substantial investments required for the implementation and maintenance of advanced technologies can be a barrier for some organizations, especially for small and medium-sized enterprises that may not have the necessary financial resources. This issue was explored in the study by (Koumas, Dossou, & Didier, 2021) which thoroughly examines the financial and operational challenges faced by SMEs during digital transformation. Additionally, the risk of skill obsolescence requires continuous education and adaptation of the workforce (Caratozzolo, Sirkis, Piloto, & Correa, 2020). Given the rapid development of technology, there is a need for ongoing training of employees to ensure they possess the relevant skills needed to work in a digitally transformed environment (Colbert, Yee, & George, 2016). This also includes cultivating a culture of innovation within the organization, where experimentation and embracing new technologies are encouraged (Nuryanto, Basrowi, Quraysin, Pratiwi, & Utami, 2024). Balancing these positive aspects and challenges is crucial for maximizing the potential of digital transformation. Organizations can explore strategies such as partnerships with technology firms, utilizing cloud services to reduce infrastructural costs, and implementing lifelong learning policies for employees (Chen & Popovich, 2003). Additionally, it is important to develop a comprehensive approach to risk management that encompasses both cybersecurity and business continuity (Kure, Islam, & Abdur, 2018). Through a strategic approach that includes investing in technology, training employees, and adopting advanced security measures (Zhu & Ahamat, 2023), organizations can not only overcome challenges associated with digital transformation but also fully leverage its benefits to achieve long-term success and market competitiveness (Brunetti, i dr., 2020).

Role and impact of digitalization on business processes

The digitalization of business processes is key to enhancing the operational efficiency of companies (Mendling, Pentland, & Recker, 2020). 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, Wamba, Kamdjoug, & Wanko, 2020). This shift is not just technological, but also cultural. Companies that have successfully integrated digital tools into their business tend to develop more agile and innovative work environments (Maja, Oreški, & Tominc, 2023). However, (Karimi, Somers, & Bhattacharjee, 2007) provide a somewhat different perspective. While they agree that integrated ERP systems play an important role in automating operational processes, they emphasize that successful implementation of such systems requires significant investments and time resources. (Reimann, Schilke, & Thomas, 2010) highlight the importance of CRM systems in facilitating the management of critical resources. Their research underscores how CRM systems contribute to better coordination between different departments within a company, resulting in increased productivity and reduced costs.

However, other authors, like (Jami Pour & Hosseinzadeh, 2021), suggest that the application of CRM systems can face challenges, such as difficulties in integrating

with existing systems or employee resistance to changes. It's important to explore other significant aspects of digitalizing business processes, including the implementation of cloud-based tools for collaboration. (Jami Pour & Hosseinzadeh, 2021) highlight that the use of these tools can improve internal and external communication flows within the company. According to their findings, these tools enable faster information exchange and collaboration among teams, resulting in accelerated business processes. On the other hand, (Soveizi, Turkmen, & Karastoyanova, 2023) suggest that transitioning to cloud-based tools can create challenges regarding data security and integration with existing systems. According to their findings, it is necessary to carefully consider potential risks and implement appropriate security measures to ensure the protection of sensitive data. Therefore, while cloud-based collaboration tools can offer numerous benefits in terms of speeding up business processes, it's crucial to carefully consider all aspects before making a decision on implementation.

User experience is a key area where the digitalization of business processes plays an important role. Some authors emphasize how personalized interactions through CRM systems enable companies to improve customer experience (Chen & Popovich, 2003). Through customized services and products, companies can create deeper connections with customers, which can result in customer loyalty and long-term relationships. However, other authors present a different perspective. (Lee & Lee, 2020) argue that digitalization provides tools for a better understanding of customer needs, but they highlight that merely collecting data is not enough. According to their research, companies must carefully analyze this data and implement strategies that will provide relevant and valuable services to customers. On the contrary, (Zouari & Abdelhedi, 2021) suggest that while digitalization can provide a better understanding of customer needs, it does not automatically guarantee an increase in customer satisfaction. According to their findings, it's important to ensure consistent quality of service and communication with customers to ensure their satisfaction. Therefore, although there is a general consensus on how digitalization can improve customer experience, different authors emphasize different aspects and challenges in this process. By critically examining these perspectives, companies can make informed decisions on the implementation of digital strategies that will best suit their needs and objectives. (Jerković & Arnaut, *E-COMMERCE: Nova paradigma trgovine i održivog razvoja u Bosni i Hercegovini*, , 2024) state that there is no doubt that in the next decade, companies that are not online with their products and services will have significantly less chance of successful business operations. One of the reasons for this statement is also the trend of customer digitalization. New generations of customers live with digital technology and accept it as a usual mode of communication, information, and a wide range of its applications in everyday life. As (Jerković, *Digitalni marketing*, 2022) points out, such e-customers have relatively higher expectations than traditional customers. Resource management is a key component in the business operations of companies, and digitalization through ERP systems plays a significant role in this context. (Zheng, Yen, & Tarn, 2000) highlight that ERP systems enable companies to better manage resources such as human resources, finances, and the supply chain.

The integration of these systems allows for centralized monitoring and management of different business aspects, resulting in resource optimization and cost reduction. Similarly, (Lubis, Tasia, Lubis, & Al-Khowarizmi, 2021) emphasize that inte-

grated ERP systems facilitate real-time tracking and management of inventories. This real-time analytics enables companies to have a more accurate insight into their inventories, resulting in better supply chain management and reduction of losses. However, (Morrisson, 2020) suggests that while ERP systems provide tools for efficient resource management, their implementation can be challenging. According to their findings, introducing new ERP systems may require significant changes in business processes and company culture, which can be challenging for some organizations. Although ERP systems offer numerous benefits in terms of resource management, it's important to consider the challenges that companies may face during their implementation. Through comprehensive analysis, companies can make informed decisions on the application of ERP systems that best suit their business needs and objectives.

Challenges and opportunities of digital transformation in the context of Bosnia and Herzegovina

The implementation of digital transformation in the business sector of Bosnia and Herzegovina (BiH) represents a challenge that requires a fundamental analysis of specific barriers, but it also provides significant opportunities for development and progress. 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, Omerović, Salkić, & Kvasina, 2023). 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. Adapting corporate culture becomes key to successfully implementing digital transformation in BiH, and it is necessary to ensure that companies are ready for the innovations and changes brought by the digital era. According to (Playán, i dr., 2024), many companies in BiH still prefer conservative approaches to business and are not ready for the innovations and changes brought by digital transformation. This fact indicates the need for fundamental changes in corporate culture to facilitate the adoption of new technologies and practices. On the other hand, opportunities for adapting corporate culture in BiH can be viewed through the development of technological startups and innovative companies (Głowacki, 2021). The presence of these entities in the country creates potential for collaboration and the development of new technological products and services. This collaboration can encourage changes in corporate culture, opening the door to more innovative approaches to business and greater readiness for digital transformation. Additionally, adapting corporate culture represents an additional challenge, as many companies prefer traditional approaches to business and are not prepared for the innovations and changes brought by digital transformation (Playán, i dr., 2024). Despite these challenges, there are numerous opportunities offered by the introduction of digital transformation.

The growing technological ecosystem in BiH provides significant possibilities for implementing digital solutions, while BiH's membership in the European Union opens doors to access EU markets and increase the export of digital products and services. Additional opportunities include the digitalization of the public sector (Demir, 2019) which paves the way for more efficient administration and better citizen user experience, and the development of e-commerce which offers the possibility to expand

the market and increase sales through digital channels (Jaganjac, Obhodaš, & Jerković, Forecast of e-commerce growth in Bosnia and Hercegovina, 2020). The lack of resources for investing in infrastructure and staff education represents a key challenge for companies in BiH when implementing digital technologies. Limited financial resources can slow down the digital transformation process (Gavrić, Mlakić, & Ćosić, 2021). The misalignment of domestic legal regulations with European standards is an additional challenge that can complicate digital transformation. An adapted legal-regulatory framework is crucial for facilitating the implementation of digital innovations (Minich, 2023). On the other hand, digital transformation opens the doors to global markets, allowing companies in BiH to expand their business beyond national borders. Through online platforms and digital channels, companies can reach a wider consumer base around the world.

The development of technological startups and innovative companies in BiH provides opportunities for collaboration and the development of new technological products and services. Partnerships with local innovators enable established companies to exploit the market's innovation potential, as highlighted by (Domljan & Domljan, 2020). Considering the specific challenges and opportunities, it's important to emphasize that successful digital transformation in Bosnia and Herzegovina is not just a matter of economic development, but also a key factor in ensuring competitiveness in the global market. Creating a conducive environment for the development of digital technologies, supporting innovations, and the continuous education of the workforce will be key elements of success in this process. Successful digital transformation in BiH requires collaboration among all relevant stakeholders to overcome challenges and seize the opportunities that digitalization brings. It's crucial to recognize these challenges and opportunities and develop strategies that will enable successful digital transformation and long-term prosperity for the country.

RESEARCH METHODOLOGY

Sample and research description

During the period of November-December 2023, a survey of managers and owners of BiH companies was conducted on a sample of 82 companies, members of BUM – Business Union of Managers. This union gathers successful managers and company owners from across Bosnia and Herzegovina. The survey used a questionnaire with questions covering several areas:

- Characteristics of the companies participating in the survey (type of activity, number of employees, total annual revenue in the last fiscal year, number of years the company has been in existence, and the position of the respondent in the company's management or ownership);
- Companies' views on the importance of digital transformation (13 questions);
- Companies' views on the technical aspects of digitalization (6 questions with corresponding sub-questions);
- Companies' views on software indicators of the degree of digitalization implementation (5 questions with corresponding sub-questions);
- Companies' views on the effects of digitalization of business operations (14 questions).

As a basis for classifying the size of companies, the criteria of the new Law on Accounting and Auditing of the Federation of BiH from the year 2021 („Official Gazette of FBiH number 15/2021“) were used, according to which micro, small, medium, and large enterprises are categorized as follows:

Table 1. Criteria for categorizing the size of enterprises in the Federation of BiH

Category	Number of Employees	Annual Revenue in KM	Average Value of Business Assets in KM
Micro Enterprises	Below 9	Below 700,000	Below 350,000
Small Enterprises	10-49	700,000-8,000,000	350,000-4,000,000
Medium Enterprises	50-249	8,000,000-40,000,000	4,000,000-20,000,000
Large Enterprises	Over 250	Over 40,000,000	Over 20,000,000

Source: Article 5 (Classification of Legal Entities) of the Law on Accounting and Auditing of the Federation of Bosnia and Herzegovina (“Official Gazette of FBiH No. 15/2021” dated 24.02.2021).

According to the provisions of the mentioned law, for an enterprise to be classified into one of the listed categories, it must meet at least two of the three specified conditions. Types of activities covered the broadest sense: (a) manufacturing, (b) trade, and (c) services. The fourth option (d) other refers to all other activities that respondents believe do not belong to the three fundamental types. The survey showed that out of a total of 82 companies, only two declared themselves to belong to other types of activities beyond the three fundamental ones. Furthermore, companies reported on the number of years of operation, which included the following classes: (a) up to two years of operation, (b) 2-10 years of operation, (c) 10-25 years of operation, and (d) over 25 years of operation. This criterion is necessary to determine the correlation between the age of companies and the degree of their digitalization. The survey showed that in the first class of up to two years of operation, none of the surveyed companies were included. The last criterion in this part of the research is the function of the respondent within the company, where three key options were offered: (a) professional manager, (b) owner senior, and (c) owner successor. The fourth option (d) other functions, includes all those positions that respondents could not recognize in the first three key groups of respondents. An overview of respondents from different types of activities, by all the mentioned criteria, is given in Table 2. From the table, it’s apparent that the representation of different activities in the total sample is approximately equal: manufacturing 31.7%, trade 36.6%, and services 29.3%. Other activities, with 2.4% participation, are not relevant for the research. The equal representation of the fundamental types of activities justifies further research and verification of respondents’ attitudes from different industries. Medium-sized companies dominate the sample.

According to the number of employees, their participation amounts to 46.3%, and by the total revenue, their participation is even higher, amounting to 51.2%. Therefore, it can be stated that almost half of all surveyed companies fall into the group of medium-sized companies. Small companies constitute approximately $\frac{1}{4}$ of the surveyed companies (by the criterion of the number of employees 25.6%, and by the criterion of revenue size 20.7%). Large companies participate with less than $\frac{1}{5}$ of the

total number (14.6% according to the number of employees and 19.5% according to the revenue class). From the aspect of the length of operation, the largest participation is from companies that have been present in the market for 10 to 25 years (almost half, or 48.8%). A significant share also comes from those that have been on the market the longest, over 25 years (participation 40.2%). These two groups together comprise 89% of all surveyed companies. Based on this, it can be concluded that the research predominantly included companies that have been operating for more than 10 years in the BiH market.

Table 2. Overview of characteristics of surveyed companies

Criteria	Manufacturing	Trade	Services	Other	Total companies	Participation in total number	
Number of employees	Over 250	7	4	1	0	12	14.6%
	50-249	16	14	8	0	38	46.3%
	10-49	3	9	8	1	21	25.6%
	Below 9						
Total Number of Employees	26	30	24	2	82	100,0%	
Total revenue	Over 40 mil. KM	7	7	2	0	16	19.5%
	8-40 mil. KM	16	17	8	1	42	51.2%
	0.7-8 mil. KM	3	4	10	0	17	20.7%
	Below 0.7 mil. KM	0	2	4	1	7	8.5%
Total Revenue Combined	26	30	24	2	82	100,0%	
Years of existence	Over 25 years	15	11	7	0	33	40.2%
	10-25 years	10	18	11	1	40	48.8%
	2-10 years	1	1	6	1	9	11.0%
	Below 2 years	0	0	0	0	0	0.0%
Total: Years of existence	26	30	24	2	82	100,0%	
Position in company	Professional manager	7	11	7	0	25	30.5%
	Senior owner	3	5	7	1	16	19.5%
	Owner successor	12	10	5	0	27	32.9%
	Other functions	4	4	5	1	14	17.1%
Total: Positions in company	26	30	24	2	82	100,0%	
Participation in total number	31,7%	36,6%	29,3%	2,4%	100,0%		

Source: Own editing

The participation of the roles that respondents perform or have in companies is relatively equal: 32.9% are younger owners (successors), 30.5% are professional managers who are not related to the owners in any way, and 19.5% are older owners. All other roles, beyond these three key ones, participate with 17.1%. Based on the pro-

vided data, it can be concluded that the structure of the surveyed companies, observed according to different criteria, is adequate for researching attitudes and opinions on the significance and effects of digitalization of business operations in BiH. This can conditionally be projected onto the state of BiH's economy as a whole.

RESEARCH OBJECTIVES

The fundamental goal of the research is to determine the achieved level of digitalization in BiH companies through the processes of digitalization within the companies themselves, changes in the digital business environment, and business applications used by companies. This level will be investigated across different sectors (manufacturing, trade, services) so that the results from individual sectors can be generalized for the BiH economy as a whole. Therefore, the main research hypothesis states:

- P.H.0: The degree of digital transformation in BiH companies significantly varies depending on the sector.

The first objective of this work is related to the processes of digital transformation. This transformation of business is recognized as a necessity and need in the operation of every company. For illustration, it is one of the strategic development directions of the European Union by 2030, where the digital transformation of business is identified as one of four areas. This is confirmed by the key policy areas of the EU's digital strategy for 2030. "The key policy areas related to the EU's digital strategy, which encourage digital transformation, include: (1) Digital Decade, (2) European Declaration of 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 Identification (eID), (10) Digitalization of Justice, and (11) Digital Information Exchange." The research on respondents' attitudes was intended to determine their own assessment of the current stage of digital transformation of their business and their attitudes towards the significance of this transformation for their business. The auxiliary research hypotheses related to this goal are:

- P.H.1: Although companies in BiH from various sectors are aware of the importance of digital transformation, there is a gap between this awareness and the actual application of digital technologies in business.
- P.H.2: Companies in BiH have a positive perception of the necessity and significance of digital transformation for their business, regardless of the sector they operate in.

The digitalization of business can encompass various areas in the operation and management of a company. The first indicator of digitalization is the level of application of various software or applications in operation, starting from the indispensable ERP system, basic business software used by almost all companies regardless of size or number of employees, to applications used in specific business segments such as CRM (Customer Relationship Manager), DMS (Document Management System), WMS (Warehouse Management System), Ecom Platform (such as Shopify or BigCommerce), Payment, Delivery, POS, API (Application Programming Interface), KCRM (Knowledge-enabled Customer Relationship Management), and many others. Which of these applications will be used and to what extent primarily depends on the company's sector, its size, and development strategy.

Bearing in mind the above, one of the objectives of this work is to check the level of application of several basic applications, which, by their purpose, can be used by almost all companies regardless of the type of activity. These include ERP as the fundamental software, then CRM (software that represents the central customer database, where all data related to cooperation are connected. It ensures organized information about the complete interaction with the client, available in one place and at any time.), DMS (document management software, which serves to establish paperless business. DMS tracks a document from the moment of its creation on a computer, through sending and sharing with colleagues, customers, or clients, to processing and digital archiving), WMS (warehouse software that allows the management of various logistic parameters: receiving, moving, packing, picking, dispatching of goods...) and e-commerce (software for the presentation and sale of products and services over the Internet). Respondents were asked to state whether they use each of these applications, how long they have been using them, and the benefits or advantages their application has brought to the business. The fundamental research assumption is that a higher degree of digitalization of BiH companies is in direct correlation with a higher level of application of these applications, regardless of the type of activity. The auxiliary research hypothesis for this goal states:

- P.H.3: Regardless of the type of activity, BiH companies intensively use key business software applications, which are an indicator of significant digitalization of business.

The third research objective relates to the technical aspects of digitalization, namely improving the digital environment in which companies operate. These are aspects of digitalization that are not directly within the companies' own purview but can have a minor or major impact on their business. Respondents were asked to express their views on electronic seals and signatures, Electronic Data Interchange (EDI) capabilities, the application of barcodes, and Artificial Intelligence (AI). The research assumption is that progress in the digital environment of companies has different implications for their business, regardless of the company's sector. In other words, the goal of the research is to determine whether changes in the digital business environment manifest differently across various types of activities. The auxiliary research hypothesis for this goal states:

- P.H.4: BiH companies from different sectors have positive perceptions towards changes in business conditions in the digital environment.

By analyzing the three stated research objectives and testing all the auxiliary hypotheses related to them, across different sectors, key arguments will be created for testing the main hypothesis and achieving the fundamental research objective at the level of the BiH economy as a whole. The processing of respondents' attitudes will be conducted in the statistical program SPSS 21, where, in addition to descriptive statistics for each of the three types of activities, ANOVA one-way test and T-test will also be used to determine statistically significant differences between individual groups. The ANOVA test is used when it is desired to test whether there is a statistically significant difference between the arithmetic means of more than two basic sets or so-called groups, and a conclusion is drawn whether the samples (groups) belong to the same population. In this specific case, the average responses of companies belonging to the "manufacturing," "trade," and "services" groups are tested. If the results of the

ANOVA test show mutual homogeneity in the responses of the mentioned groups, conclusions can be generalized for all companies and the economy as a whole. If there is no homogeneity, the T-test (which tests the arithmetic mean) will be used to determine between which pair of groups there are significant differences.

The degree of digital transformation in companies can be viewed through three dimensions: (a) subjective attitudes of company management on the need for business digitalization and its estimated impact 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. These questions and the respondents' answers are presented in Table 2. Evaluating the degree of digitalization, a large majority of respondents from all three sectors together believe that minor (42.7% of respondents) or major (41.5% of respondents) improvements are needed. A relatively small portion of companies, precisely 7 out of a total of 82 companies (or 8.5%), believe they have an exceptionally high degree of digitalization. An even smaller portion of them rate the degree as relatively small or extremely low. Based on the responses, it can be concluded that most companies have started digital transformation but disagree on the level of necessary improvements. In the manufacturing sector, the majority (15 out of 26 or 57.7%) believe that minor improvements are needed, while in service sectors, the largest share believes that major improvements are needed (12 out of 26 or 46.2%). Traders are divided with an equal share of those who believe minor improvements and those who believe major improvements are necessary (13 in each group out of a total of 30 companies).

Table 3: Respondents' answers regarding the degree of digitalization of their companies

Question	Response Option	Manu- facturing	Trade	Ser- vices	Total	Percent- age
„What is your general assessment of the current level of digitalization of your company, in your opinion?“	1 - Exceptionally high	2	3	2	7	8.5%
	2 - Minor improvements needed	15	13	7	35	42.7%
	3 - Major improvements needed	9	13	12	34	41.5%
	4 - Relatively low	0	1	4	5	6.1%
	5 - Exceptionally low	0	0	0	0	0.0%
	6 - No need for digitalization	0	0	1	1	1.2%
	Total	26	30	26	82	100,0%
“Do you believe that your company has undergone digital transformation to a large extent?“	1 – NO	13	16	16	45	54,9%
	2 – YES	13	14	10	37	45,1%
	Total	26	30	26	82	100,0%

Source: Own editing

This confirms the average values presented in Table 4. For the “manufacturing” sector, the average score is 2.27 (closest to the rating of 2 - minor improvements needed), while for the “services” sector, it is 2.85 (closest to the rating of 3 - major improvements needed). In assessing the current degree of digital transformation, 50%

of manufacturers, 46.7% of traders, and 38.5% of service providers consider that they have implemented it to a greater extent. There is a more significant discrepancy in the attitudes of manufacturers and service providers, with traders positioned in between them. This was also confirmed by the results of the ANOVA test, presented in Table 5.

Table 4: Average responses of respondents regarding the degree of digital transformation in companies

Descriptives		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean
						Lower Bound
„What is your general assessment of the current level of digitalization of your company, in your opinion?“	Manufacturing	26	2,2692	,60383	,11842	2,0253
	Trade	30	2,4000	,72397	,13218	2,1297
	Service	26	2,8462	1,04661	,20526	2,4234
	Total	82	2,5000	,83518	,09223	2,3165
„Do you believe that your company has undergone digital transformation to a large extent?“	Manufacturing	26	1,5000	,50990	,10000	1,2940
	Trade	30	1,4667	,50742	,09264	1,2772
	Service	26	1,3846	,49614	,09730	1,1842
	Total	82	1,4512	,50068	,05529	1,3412

Source: Own editing in SPSS 21

Table 5: ANOVA Test results for P.H.1

ANOVA		Sum of Squares	Df	Mean Square	F	Sig.
„What is your general assessment of the current level of digitalization of your company, in your opinion?“	Between Groups	4,800	2	2,400	3,667	,030
	Within Groups	51,700	79	,654		
	Total	56,500	81			
„Do you believe that your company has undergone digital transformation to a large extent?“	Between Groups	,184	2	,092	,362	,697
	Within Groups	20,121	79	,255		
	Total	20,305	81			

Source: Own editing in SPSS 21

Given that the significance value (Sig.) for the first claim regarding the current degree of digitalization is 0.030, which is less than 0.05, it can be concluded that there is a statistically significant difference between the groups in the general assessment of the current degree of digitalization of companies. Thus, the ANOVA test has shown that there are significant differences between the groups, primarily between manufacturers and service providers. The T-test for these two groups, “manufacturing” and “services,” confirmed the results of the ANOVA test (the p-value is $0.019 < 0.05$).

Table 6: T-test Results for “Manufacturing” and “Services” Groups (P.H.1)

Independent Samples Test za PH1		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
The current degree of business digitalization	Equal variances assumed	50	,019	-,57692
	Equal variances not assumed	39,983	,019	-,57692

Source: Own editing in SPSS 21

Based on the presented results, the first auxiliary hypothesis stating “*Although companies in BiH from various sectors are aware of the importance of digital transformation, there is a gap between this awareness and the actual application of digital technologies in business*” can be considered proven for the following reasons:

- All types of activities have mostly started the processes of digital transformation of business (where the current degree is neither “exceptionally high” nor “relatively low”, but improvements are needed);
- Manufacturers have gone a step further in digitalization and consider that minor improvements are necessary, while service sectors believe they need to do significantly more in this area in the future. Traders, as the third group, are evenly divided about the degree of future improvements.

In addition to assessing the current degree, it was necessary to explore respondents’ attitudes about the impact of digitalization on their future business. The results are presented in Table 7.

Table 7: Respondents’ opinions on the impact of digital transformation on Future Business

Question	Response Option	Manufacturing	Trade	Services	Total	Percentage
“Digital transformation is extremely important for the future success of our company.”	1 - I completely disagree	0	0	0	0	0,0%
	2 - I disagree	0	0	0	0	0,0%
	3 - Neither disagree nor agree	1	1	0	2	2,4%
	4 - I agree	10	12	13	35	42,7%
	5 - I absolutely agree	15	17	13	45	54,9%
	Total		26	30	26	82
“Investments in digitalization will affect our own competitive position in the future.”	1 - I completely disagree	0	0	0	0	0,0%
	2 - I disagree	0	0	0	0	0,0%
	3 - Neither disagree nor agree	1	2	3	6	7,3%
	4 - I agree	10	13	10	33	40,2%
	5 - I absolutely agree	15	15	13	43	52,4%
	Total		26	30	26	82

Source: Own editing

Average response values for all three groups of respondents are provided in Table 8. The arithmetic mean for both statements ranges between 4.38 and 4.54 for each type of industry. This indicates that companies from different sectors have very

positive attitudes towards the importance of digital transformation for future success and the necessity of investing in it.

Table 8: Respondents' opinions on the impact of digital transformation on future business

Descriptives		N	Mean	Std. De- viation	Std. Error	95% Confi- dence Interval for Mean
						Lower Bound
"Digital transformation is extremely important for the future success of our company."	Manufacturing	26	4,5385	,58177	,11410	4,3035
	Trade	30	4,5333	,57135	,10431	4,3200
	Service	26	4,5000	,50990	,10000	4,2940
	Total	82	4,5244	,54942	,06067	4,4037
„ Investments in digitalization will affect our own competitive position in the future."	Manufacturing	26	4,5385	,58177	,11410	4,3035
	Trade	30	4,4333	,62606	,11430	4,1996
	Service	26	4,3846	,69725	,13674	4,1030
	Total	82	4,4512	,63153	,06974	4,3125

Source: Own editing in SPSS 21

Similar attitudes were confirmed by the ANOVA test results (Table 9), as the p-values for both statements are greater than 0.05 (Sig. values in the last column). Given these values, there was no need to conduct T-tests between different pairs of the three types of industries.

Table 9. ANOVA Test results for P.H.2

ANOVA test for PH2		Sum of Squares	df	Mean Square	F	Sig.
"Digital transformation is extremely important for the future success of our company."	Between Groups	,023	2	,012	,037	,963
	Within Groups	24,428	79	,309		
	Total	24,451	81			
"Investments in digitalization will affect our own competitive position in the future."	Between Groups	,323	2	,161	,399	,673
	Within Groups	31,982	79	,405		
	Total	32,305	81			

Source: Own editing in SPSS 21

Based on the obtained results, it can be concluded that regardless of the type of activity, companies have very positive attitudes about the importance of digital transformation for their future business, as well as that investments in it are necessary in order to maintain or strengthen their own competitive position. This proves the second auxiliary hypothesis. The third auxiliary hypothesis: *Regardless of the type of activity, BiH companies intensively use key business software applications*, which are indicators of significant digitalization of business, is based on the assumption that companies

that have digitalized their business to a greater extent or have started these processes actually use certain business applications and software solutions that reflect the technical aspect of digitalization. In addition to the direct question of whether they use certain software, they were asked to state how long they have been using it. The duration of the use of this software is a clear indicator of the current degree of digitalization. Evaluating all five software, companies from different types of activities were asked to state how the application of each of them has impacted their business. The results of the technical aspect of companies' digitalization are presented in Table 10.

Table 10: Application of various software in different types of activities

Soft-ware	Software application				Length of software usage			Impact on business			
	Sector	Uses it	Total number of companies	Share in total number	Over 10 years	2-10 years	Under 2 years	None	Small	Large	Don't know
ERP	Manufacturing	21	26	80,8%	16	5	0	0	1	16	4
	Trade	22	30	73,3%	19	2	1	0	1	17	4
	Service	20	26	76,9%	7	11	2	0	1	12	7
	Total	63	82	76,8%	42	18	3	0	3	45	15
	Participation		76,8%	Share in assets	66,7%	28,6%	4,8%	0,0%	4,8%	71,4%	23,8%
CRM	Manufacturing	5	26	19,2%	2	2	1	0	0	4	1
	Trade	9	30	30,0%	4	3	2	0	2	6	1
	Service	10	26	38,5%	4	4	2	0	3	6	1
	Total	24	82	29,3%	10	9	5	0	5	16	3
	Participation		29,3%	Share in assets	41,7%	37,5%	20,8%	0,0%	20,8%	66,7%	12,5%
DMS	Manufacturing	10	26	38,5%	2	5	3	1	0	8	1
	Trade	9	30	30,0%	1	5	3	1	2	6	0
	Service	9	26	34,6%	2	5	2	0	1	6	2
	Total	28	82	34,1%	5	15	8	2	3	20	3
	Participation		34,1%	Share in assets	17,9%	53,6%	28,6%	7,1%	10,7%	71,4%	10,7%
WMS	Manufacturing	13	26	50,0%	2	7	4	0	1	7	5
	Trade	10	30	33,3%	3	4	3	0	1	6	3
	Service	4	26	15,4%	1	3	0	0	2	0	2
	Total	27	82	32,9%	6	14	7	0	4	13	10
	Participation		32,9%	Share in assets	22,2%	51,9%	25,9%	0,0%	14,8%	48,1%	37,0%
E-COM	Manufacturing	9	26	34,6%	1	4	4	0	1	4	4
	Trade	12	30	40,0%	3	6	3	0	3	7	2
	Service	4	26	15,4%	2	1	1	0	1	3	0
	Total	25	82	30,5%	6	11	8	0	5	14	6
	Participation		30,5%	Share in assets	24,0%	44,0%	32,0%	0,0%	20,0%	56,0%	24,0%

Source: Own editing

Unlike the other four applications, which cover specific segments of business, ERP mainly covers the basic areas of business (primarily, inventory-material and financial operations). Therefore, the results obtained for this software were expected. 76.8% of all surveyed companies use ERP. Two-thirds of all respondents have been using it for more than 10 years, and its impact on the business is mostly significant (as agreed by 71.4% of all surveyed). Similar proportions are seen across each individual sector, so it can be generalized that BiH companies largely use ERP in their operations. However, the remaining four software solutions (CRM, DMS, WMS, and E-commerce) show significantly more modest levels of implementation. The participation of those using them ranges from 29.3% to 34.1%, meaning that 1/3 of all surveyed use the mentioned applications. This indicates that they are not widely used. Taking into account the length of use, it is visible that the most common answer is a period of 2-10 years. This implies that even those who use these applications have relatively little experience working with them, namely, that they have only recently started using them. Positively, those who use these four applications consider that they mostly have a significant impact on the business.

Analyzing by individual sectors, it is evident that service industries are more focused on CRM (38.5% of respondents from this group), manufacturers on DMS (38.5%) and WMS (50.0%), and trade on e-commerce (40.0%). However, no sector records participation greater than 50% for any application, indicating insufficient application in general. Based on the obtained responses, P.H.3, which stated: *Regardless of the type of activity, BiH companies intensively use key business software applications, which are indicators of significant digitalization of business, cannot be considered proven.* The reasons for refuting this hypothesis are as follows:

- Regardless of size, companies mainly intensively 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.
- Positively, those companies that stated they use these applications have positive perceptions of their impact on their own business, although the period of application is relatively short (the period of 2-10 years dominates).

The final hypothesis, P.H.4: *Companies in BiH from different sectors have positive perceptions towards changes in business conditions in the digital environment, tests respondents' attitudes about changes in the digital environment.* The assumption is that these changes can also encourage companies to engage in digital transformation processes of their own business. The results are listed in Table 11. Analyzing attitudes towards electronic seals and signatures, which are still not applied in the BiH market, all three sectors overwhelmingly, at 93.9%, agree that their introduction will have positive implications on business and its digitalization. The lack of experience in the application of electronic signatures and seals is visible in the assessment of their impact on their business because only 42.9% - 46.8% of respondents believe that it will have a significant impact on business. One fifth believes that this impact will be small, while one third cannot assess this impact. Similar participations are evident within each individual sector. In general, companies support the introduction of electronic

signatures and seals but are uncertain about the reflections it will have on their business in the future.

Unlike electronic signatures and seals, the remaining three segments of the digital environment (use of barcodes, EDI, and artificial intelligence) have a significantly lower representation, ranging from 32.9% to 37.8% of those who apply them. Barcodes are more used by manufacturers and traders; half of them believe that barcodes have a significant impact on business, but the percentage of those who cannot assess is surprisingly high (38.7% of all respondents). There are no majorities indicating insufficient application of barcodes in business. EDI data exchange is used by 1/3 of all respondents. Its application is slightly higher among manufacturers but still below 40%. Evaluating the significance of EDI, it is visible that 51.7% of those who use it cannot assess its impact on business. As in the case of barcodes, this indicates insufficient knowledge and application of this system. Artificial intelligence has emerged recently. For these reasons, it is difficult to expect it to be widely used in business. According to survey results, service industries use it the most (38.5%), while the other two sectors are at the level of 30%. Evaluating how much AI can impact their own business, generally speaking, it is visible that assessments are quite diverse, and there is no dominant rating of impact on business. Service industries that use AI in business the most, mainly (5 out of 10 companies) consider that the impact of AI on business is relatively small, while an additional 4 cannot assess this impact. Generally, there are no dominant views on how much AI can affect business, which is a direct consequence of the fact that it has appeared in the last few years.

Table 11: Company attitudes towards the digital environment

Software	Sector	Approval and application			Impact on business			
		Approves/ uses	Total number of companies	Share in total number	None	Small	Large	Don't know
Electronic seal	Manufacturing	24	26	92,3%	0	5	11	8
	Trade	29	30	96,7%	0	7	13	9
	Service	24	26	92,3%	1	4	9	10
	Total	77	82	93,9%	1	16	33	27
	Participation		93,9%	Share in assets	1,3%	20,8%	42,9%	35,1%
Electronic signature	Manufacturing	24	26	92,3%	0	4	12	8
	Trade	29	30	96,7%	0	7	14	8
	Service	24	26	92,3%	1	3	10	10
	Total	77	82	93,9%	1	14	36	26
	Participation		93,9%	Share in assets	1,3%	18,2%	46,8%	33,8%
Barcode	Manufacturing	12	26	46,2%	0	0	7	5
	Trade	13	30	43,3%	0	2	7	4
	Service	6	26	23,1%	0	1	2	3
	Total	31	82	37,8%	0	3	16	12
	Participation		37,8%	Share in assets	0,0%	9,7%	51,6%	38,7%

EDI (electronic data interchange)	Manufacturing	10	26	38,5%	0	1	3	6
	Trade	11	30	36,7%	0	2	5	4
	Service	8	26	30,8%	0	0	3	5
	Total	29	82	35,4%	0	3	11	15
Participation		35,4%		Share in assets	0,0%	10,3%	37,9%	51,7%
AI (artificial intelligence)	Manufacturing	8	26	30,8%	0	3	5	0
	Trade	9	30	30,0%	0	2	3	4
	Service	10	26	38,5%	0	5	1	4
	Total	27	82	32,9%	0	10	9	8
Participation		32,9%		Share in assets	0,0%	37,0%	33,3%	29,6%

Source: Own editing

Given the obtained results, P.H.4 cannot be considered proven for the following reasons:

- There is almost unanimous support for the introduction of electronic seals and electronic signatures, regardless of the type of activity, but there are variations in the assessment of their impact on one's own business.
- The research results on the application and impact on business of barcodes, EDI, and artificial intelligence show a low level of implementation in all sectors and significant variations in the assessment of their impact on business.

Summarizing the results of proving the auxiliary hypotheses:

Auxiliary Hypothesis	Results
Although companies in BiH from various sectors are aware of the importance of digital transformation, there is a gap between this awareness and the actual application of digital technologies in business.	Proven
Companies in BiH have a positive perception of the necessity and importance of digital transformation for their business, regardless of the type of activity they are involved in.	Proven
Regardless of the type of activity, BiH companies intensively use key business software applications, which are indicators of significant digitalization of business.	Not proven
Companies in BiH from different sectors have positive perceptions towards changes in business conditions in the digital environment.	Not proven

The main hypothesis of the study, which stated: *The degree of digital transformation in BiH companies varies significantly depending on the type of activity*, cannot be considered proven. Companies in BiH, regardless of the type of activity they engage in, are aware of the importance and need for digitalization of their own operations. They believe that investments in it will define their success in the future. However, all this is in the initial stage. Technical aspects expressed through the application of various software applications or physical manifestations of changes in the digital environment are at a low level of implementation. Only 1/3 of the surveyed companies have started with the implementation, regardless of the type of activity. This is equally expressed in each individual activity (with minor variations), so it can be projected onto the economy of BiH as a whole. In other words, there is a willingness among BiH companies, but the process of digitalization is at the beginning.

DISCUSSION AND CONCLUSION

Theoretical implications: This research significantly contributes to the theoretical understanding of digital transformation within the context of transitional economies, such as Bosnia and Herzegovina (BiH). By studying the degree of digital integration and its impact on business operations across different sectors in BiH, this research not only confirms existing theories related to digital transformation but also introduces nuanced insights that challenge and expand them. Firstly, the study aligns with and expands upon the Diffusion of Innovations theory by (Rogers, Singhal, & Quinlan, 2014), providing concrete examples of how digital innovations are adopted across different sectors in a post-conflict, transitional economy. The varying degrees of digital adoption and integration observed among the manufacturing, trade, and services sectors in BiH reflect a complex interplay of factors such as organizational readiness, sectoral challenges, and the socio-economic context influencing the diffusion process. This adds a valuable layer of understanding to the theory by highlighting the heterogeneity of diffusion within and between sectors in transitional economies. Moreover, by exploring organizational readiness and the environmental pressures faced by companies, this research adds depth to the Technology-Organization-Environment (TOE) framework (Lee & Mangalaraj, 2022), suggesting a nuanced role these elements play in a transitional context. Additionally, the findings align with the Resource-Based View (RBV) by illustrating digital technologies as strategic resources that can enhance competitive advantage, while simultaneously indicating the dynamic need for companies to adapt their resource base in response to technological advancements. In summary, this research paper offers significant theoretical implications by applying, testing, and expanding established theories in the context of digital transformation in BiH. It highlights the complexity of the digital transformation process in transitional economies and provides valuable insights for scholars, practitioners, and policymakers aiming to navigate and facilitate digital transformation in similar contexts.

Practical implications: From a practical standpoint, regardless of the type of activity, the research results indicate that companies in BiH are mostly at the very beginning of digital transformation. There is consensus on its importance for their business, especially for the future, but there is a current gap between positive perception and actual application. This is reflected in visible segments of digitalization, the application of specific software solutions, and the adoption of changes in the digital environment. With the exception of ERP software, which has widespread use, all others analyzed are applied in approximately 1/3 of the surveyed companies. The views on the impact of these applications on business are also debatable, which is a clear signal that even companies that apply them do not have enough experience to assess the benefits they can bring. This can partly slow down the digitalization process of business. The research results show that similar tendencies exist in all types of activities and that there are no significant deviations or differences between them. Such results confirm that these observations can be generalized to the entire economy of BiH, taking into account that there are certain limitations related to the representativeness of the sample itself. In an applicative sense, this work can serve as a basic guide for companies wishing to digitalize their business or undergo digital transformation. By examining all four segments, it is possible to assess one's current position and determine which actions need to be taken for this process to be successfully carried out.

Limitations and suggestions for future research: In the study of digital transformation in companies in Bosnia and Herzegovina (BiH), several key limitations have influenced the scope and depth of the insights gained. First, although the sample included companies from various sectors, the size and composition of the sample might not be fully representative of all BiH companies. A limited number of companies from each sector could affect the generalization of the results to the entire BiH economy. Second, the subjective nature of the responses, collected through survey questionnaires from managers and owners, could introduce bias into the data interpretation. There's a possibility that respondents, wishing to portray their companies in a better light, might have unconsciously or consciously provided more optimistic perceptions of digital transformation. Finally, the research focus on the broader picture of digital transformation might have limited the ability to delve deeper into specific challenges and technological needs within individual industries or types of companies. These limitations indicate the need for future research that would employ more diverse methodological approaches to gain more detailed insights into the dynamics of digital transformation in BiH. Future research should focus on sector-specific challenges and opportunities of digital transformation, using in-depth case studies to understand the varied needs and strategies within individual industries. Additionally, it's important to conduct longitudinal research that would track the dynamics of change and the impact of digitalization on companies' business performances over time.

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