

Determining the Organizational Level of Digital Maturity from the Integration of AI in the Service Sector in the Republic of Bulgaria

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Abstract — In recent years, in the context of digital transformation, the concept of "digital maturity" has been increasingly used. The purpose of this study is to determine the organizational level of digital maturity of organizations in the service sector in the Republic of Bulgaria, in the context of the integration of technologies based on artificial intelligence. The focus is on identifying the main aspects that facilitate or hinder the process of their successful integration and effective application. In connection with the set goal, an empirical study was conducted among managers and IT experts from selected companies in the sector, on the territory of the Republic of Bulgaria.

Keywords— Artificial intelligence, digital maturity, digital transformation, services.

I. INTRODUCTION

With the development of the fourth and transition to the fifth industrial revolutions, the digital transformation of business has become a fundamental foundation for adapting companies to new technologies that will dominate a high-tech and platform-oriented business model. In this sense, digital transformation has become a new stage of industrial development where the competitiveness of business structures is determined by the creation, integration and adaptation of digital technologies and their application in relationships with customers and stakeholders. This requires not only a technological, strategic and cultural rethinking of business, but also a new approach to the activities and processes for creating products and services to improve the customer experience and reduce costs. In the context of technology-oriented business, digital transformation requires companies to create value by effectively managing changes in the digital environment, adapting to customer requirements and implementing new achievements in the field of high technologies.

As digital transformation changes the concept of the business model of organizations, in addition to having to implement new technological solutions for business process optimization, they redirect their strategic efforts, competencies, resources and technological capabilities into digital business practices. This requires a fundamental change in organizational culture and a new approach to managing corporate business in a technologically oriented competitive environment. In this aspect, digital maturity is perceived as the tool through which organizations can gain insight into real business in a digital environment, to assess their capabilities and abilities to integrate modern technologies (including AI) into the applied digital business model. That is, digital maturity turns out to be a key mechanism for technology-oriented companies to diagnose their digital business practices, to assess their suitability for the digital environment, the level of technology application, the allocation of resources and the impact on customers and stakeholders. Digital maturity is a comprehensive approach to determining the organizational level for the effective use of high technologies and corporate competitiveness in individual aspects of business.

Digital maturity is a necessary tool in the context of digital business transformation, because it helps organizations gain a clear understanding of the integration of technological trends and assessment of digital practices in the context of digital sustainability and competitiveness. It should be applied at a certain time interval in the technological development of organizations, to track the management of business processes and key performance indicators of business models. The main goal of companies is to establish a high level of digital maturity from digital business transformation initiatives, so as to establish their advantages in a digital environment. On the other hand, digital maturity helps companies identify weaknesses in achieving goals and where the problems are in the field of

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technological leadership, implementation of the digital strategy, transition or a new stage of development of digital culture, digital customer service, competitiveness, etc. Based on the data obtained from the approach to determining the level of digital maturity of companies, methods and techniques for increasing the strategic and operational efficiency of the implementation of the business model are highlighted. This helps develop a structured plan to optimize digital transformation processes, use cutting-edge technology solutions, better customer experience from the purchase of technology-based products and services, and sustainable growth.

In the scientific literature and digital practice of organizations, there are different areas for determining the level of digital maturity in the process of digital transformation [1], [2]. These areas are precursors of the applied models, which form a structured framework that organizations can skilfully use to diagnose and assess digital opportunities and gaps in the business and, accordingly, determine the level (position) of their digital maturity. Six main areas for determining the level of digital maturity of organizations stand out - strategy and organizational culture, technology, customers, innovation, human factor and operations [3], [4], [5]. From the point of view of strategy and organizational culture, digital maturity generally measures the degree of readiness of organizations for management in a digital environment. The assessment of the digital strategy shows how organizations use digital technologies to achieve business goals and priorities. As for the assessment of the digital organizational culture, it determines to what extent hierarchical relationships and frequent control have been removed, how communication is carried out between employees, customers and stakeholders, what is the digital leadership potential, people's engagement with the digital transformation, behaviour and practices of work in a digital environment. In a technological aspect, digital maturity encompasses key indicators for determining the level of digital IT infrastructure, the use of cutting-edge technological tools (e.g. AI), business process automation, determining the degree of efficiency of the technological architecture for information processing, use of information system resources, etc. [6], [7], [8].

The goal of organizations in this area of digital transformation is to assess the extent to which digital technologies are implemented and effectively used in digital business. Customers are a priority area of every digital business because they determine the demand for products and services in technological platforms and the online environment. Digital maturity in this aspect of business aims to determine the extent to which organizations emphasize the external online focus on customers to add value, promote and evaluate the brand, opportunities to improve satisfaction and customer experience from the purchase, the company's personal attitude to customer needs and feedback on the results. Today, business is accessible to every point on the planet because customers have the technological capabilities and means (computers, laptops, smart phones, tablets) to search and choose products and services that satisfy them in

indicators such as price, quality, delivery time, costs and user value.

The goal of organizations in this area of digital maturity is to assess the extent to which digital technologies and tools are used to improve customer interaction, engage their attention and choose the preferred digital channels for access and business relationships. Innovation in a technological environment is an important component of corporate competitiveness because it allows for the integration of new technologies and technological solutions into the business. Digital maturity helps organizations determine the level of effectiveness of innovative digital platforms, business models, innovative ecosystems and opportunities to implement innovative business practices. Determining the organizational level of digital maturity from the human factor perspective aims to assess the extent to which people have the necessary digital competencies, how they adapt to the digital organizational culture, how to search for and retain talent and what is the effectiveness of the human factor in a digital business environment. From an operations perspective, digital maturity measures the level at which digital business activities and processes are designed, redesigned, implemented and managed so as to increase efficiency and make the business competitive.

In the scientific literature and digital practice of organizations, various digital maturity models are applied that help determine the level of effectiveness in a selected segment (priority area) of digital business [9], [10]. They help organizations regularly track progress in implementing digital transformation and, of course, can explore a specific area to determine the level of digital maturity. This approach is important for digital business because it assesses the abilities of organizations to integrate digital practices and tools into modern business, to create technology-based innovations and business processes. Determining the organizational level of digital maturity helps companies implement the digital transformation plan, regularly track progress or lagging behind competitors. Digital maturity is a certificate for companies to respond adequately and methodically to new challenges in digital business, to determine what the next steps should be to integrate cutting-edge technologies into the business, achieve business goals, customer satisfaction, competitiveness and return on investment.

Obviously, digital maturity models help companies determine their current state in the digital transformation cycle and take the necessary steps to achieve goals in the field of digital technologies and systems. Several well-known models for assessing digital maturity are applied in the digital practice of organizations (for example, Deloitte DMM, BCG's Digital Acceleration Index, TM Forum Model, Digitopia DAIMI, Digital Maturity Assessment Model DMAM, Capability Maturity Model Integration CMMI, etc.) [11], [12], [13]. Their application in the field of digital business transformation can be a good catalyst for assessing and future planning of digital initiatives, resources and strategies for sustainable growth. These models provide a structured framework for assessing digital effectiveness, regardless of the industry sector in

which companies are developing or their size. When it comes to the practical application of a specific model in a given organization, it is necessary to determine what effect it will have on the assessment of digital business, how it will provide the necessary information and guidelines for action to increase efficiency. In this regard, it is recommended to consider several important criteria [14], [15], [16]. The selected model should be focused on the general context of the digital business or a selected segment (area) of it, it is good to take into account the specifics of the industry and the service sector, to report progress over a long period of time, to provide relevant data for comparison with competitors or adopted standards and to have practical application in different levels of digital maturity. From the point of view of comparing the results (indicators) in the different indicators of digital maturity of organizations, it is important to conduct a comparative analysis against those of competitors. This strategic approach will allow companies to optimize their digital strategies and business practices, based on good digital practices in the industry or branch in which they operate. In this way, they can accelerate the process of digital maturity, taking into account the specifics of the business and the planned key performance indicators. Typically, the results are associated with a better understanding of the current state of the companies' digital business, what are the priorities of digital initiatives and the necessary resources for working in a digital environment. The strategic innovations that are the basis of the technological development of companies and digital trends in the business sphere should not be underestimated. The factors on which competitiveness depends, strategies for countering competitors and choosing digital niches for optimal business efficiency are also determined.

Considering the comparison of the results (indicators) in the different indicators of digital maturity of organizations, it is important to apply an appropriate approach [17], [18]. Usually in the practice of companies, a periodic assessment of digital maturity is made, which covers the main components of the digital business, the current capabilities of the organizations, the available resources and the desired results. Then, information is generated from leading companies in the industry or branch and an analysis of their good practices is made with an emphasis on the strong aspects of the business and the opportunities for improving KPIs.

It is especially important to make strategic analyses and recommendations for improving digital maturity in various aspects of the assessment of business components and to develop a roadmap for achieving the expected level of digital maturity. It is also necessary to follow the process of determining progress, which enables organizations to continuously improve and develop. Of course, the comparative analysis of digital maturity should focus on key (or problematic) components of the organization's business. Often, such activities and processes related to the priority areas of digital transformation are determined - technology and innovation, personalization, engagement and customer experience, work and behavior of the human factor, strategies and tactics for operational efficiency.

Digital maturity models have advantages in terms of assessing the real state of companies and predicting future actions in a digital environment [19], [20]. In addition, some limitations and considerations arise, the most important of which are related to the subjective assessments of analysts, their perception as a framework for mandatory implementation (it only directs implementers to decisions and actions that depend on the context of digital business practices) and the understanding that the relevant model will solve all the problems of organizations in digital transformation. It is good to make a choice of an appropriate model, according to the relevant stages and their importance for the digital business of companies or to approach globally with a scientific purpose (as in the practical part of the publication), by determining the organizational level of digital maturity in a specific area of companies in a specific industry sector. This is done through surveys, interviews, comparisons through data analysis, a comprehensive assessment of the digital business, etc.

Determining the organizational level of digital maturity goes through various steps that depend on the specifics of the company's business, the industry in which it operates and the goals when choosing an assessment model. These steps help organizations to establish the actually achieved results with the previously planned goals and performance indicators [21], [22], [23]. In the context of digital maturity, the steps have a specific application focus, with the main ones having the following specificity. First, a connection is sought between the set goals and the desired performance indicators, which must be clearly defined, measurable and achievable. Second, information is generated for a specific area (or areas) that will be the subject of assessment.

On the one hand, this helps companies understand the mechanism by which digital transformation works, and on the other hand, how individual systems, technologies and business processes interact in the value chain. Thirdly, a comparative analysis is made with adopted performance indicators or certain standards, so as to identify the activities and processes that are of strategic importance to companies and those that hinder their digital development. Fourthly, a detailed analysis of the results obtained is made, priorities for increasing digital efficiency are ranked and measures for redesigning inefficient activities and processes are identified. Fifthly, conditions are created for planning potential changes that will improve digital transformation and the resilience of companies to technology-oriented business practices and competitive digital strategies.

II. MATERIALS AND METHODS

The aim of this study is to determine the organizational level of digital maturity of organizations based on a survey of managers and IT experts from randomly selected companies in the service sector, in the context of the integration of artificial intelligence-based technologies. The focus is on identifying the main aspects that facilitate or hinder the process of their successful integration and effective application.

The study is preliminary (pilot), and its scope is quite sufficient to obtain a real idea of the degree of digital maturity in small and medium-sized enterprises in the service sector, as well as to outline the main trends, attitudes and challenges related to the implementation of technologies based on artificial intelligence. The study also allows to identify key factors determining the readiness of organizations for technological adaptation and development. The results obtained and the applied methodology will serve as the basis for a subsequent expanded study with a larger sample size, additional indicators and a more in-depth comparative analysis between organizations from different economic sectors of the economy.

The survey was conducted in four major cities in the Republic of Bulgaria – Sofia, Plovdiv, Burgas and Ruse. The survey was randomly sent to 31 organizations in the service sector. The completed and returned surveys were from a total of 76 respondents, representing 24 organizations. The sample mainly includes representatives of senior management (32%) (owners/managers setting strategic development goals) and middle management/head of departments (38%) (operational managers implementing digital tools), as well as IT experts (17%) (usually these are managers who have technical expertise in implementing a given infrastructure). In terms of the size of the surveyed companies, according to the criterion “Number of employees”, micro-enterprises with up to 10 employees (58%) and small and medium-sized enterprises with 11-50 employees (29%), and organizations with employees between 51-250 employees – 13%.

The research focuses on small and medium-sized enterprises (SMEs), as unlike large companies that have not only financial security but also expert capacity, SMEs in Bulgaria often face limited financial, technological, human resources, as well as barriers to the integration of artificial intelligence. A quantitative approach was adopted to conduct the study through an online survey for a period of three months (December 2025 to February 2026).

The survey questions are 15 in total and are structured in five areas for studying digital maturity, namely: Digital maturity at the level of strategic initiatives of senior management; Digital maturity at the level of organizational culture; Digital maturity at the level of human resources; Digital maturity at the level of technological infrastructure and Digital maturity at the level of automation and artificial intelligence. The questions are combined - questions on a 5-point Likert scale, closed questions with pre-set statements and several open-ended questions. The questionnaire was developed to assess both the current level of digital maturity and the readiness of organizations for the implementation and integration of technologies based on artificial intelligence in small and medium-sized enterprises in the service sector. Due to limitations in the volume of the publication, the full version of the questionnaire is not attached to this article, and only a part of the results obtained are presented.

The areas defined in the study are based on theoretical and applied models for determining digital maturity [3],

[4], [5], [9], [10], [24], [25], [26], which allow for a comprehensive assessment of the readiness of modern organizations for technological transformation.

III. RESULTS AND DISCUSSION

The following figures reveal the key factors that limit or stimulate the achievement of digital maturity in small and medium-sized enterprises in Bulgaria. The distribution of responses regarding the role of management in the process of digital transformation and implementation of artificial intelligence is presented in Fig. 1.

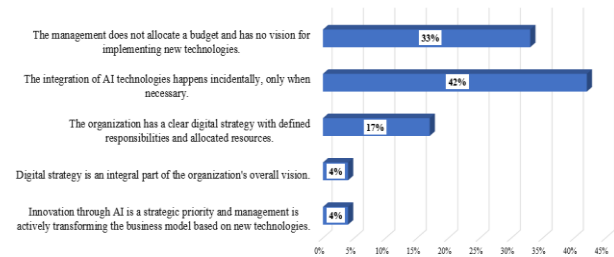


Fig. 1. Answer to the question "What is the role of management in the process of digital transformation and AI?"

The following figure (Fig. 2) illustrates the level of digital maturity at the organizational culture level, reflecting the attitudes of employees in the surveyed organizations towards new technologies and artificial intelligence.

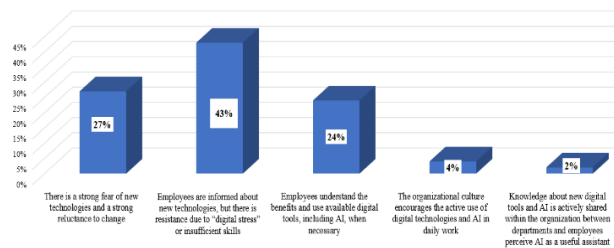


Fig. 2. Answer to the question "What is the attitude of employees in your organization and the organizational culture towards new digital technologies, including AI?"

The distribution of responses describing the level of digital competencies of human resources when working with artificial intelligence are presented in Table 1.

TABLE 1 LEVEL OF EMPLOYEE TRAINING FOR WORKING WITH ARTIFICIAL INTELLIGENCE-BASED TECHNOLOGIES

Level of competence and training	Relative share of respondents (%)
Employees do not have the necessary skills to work with AI-based technologies, and the organization does not invest in training.	50%
Employees have basic digital skills, but face difficulties when working with AI, and training is conducted only when absolutely necessary.	31%
A significant part of employees have the necessary skills to work with AI, as the organization conducts periodic training.	8%
Employees have the necessary skills to work with AI on a daily basis, as the organization regularly invests in specialized training.	7%

All employees are highly competent in working with AI, and the organization has its own experts for the implementation and development of AI-based tools.	4%
Total	100%

Fig. 3 presents the distribution of responses that most accurately describe the state of the IT infrastructure in the surveyed enterprises and their readiness for the integration of AI technologies.

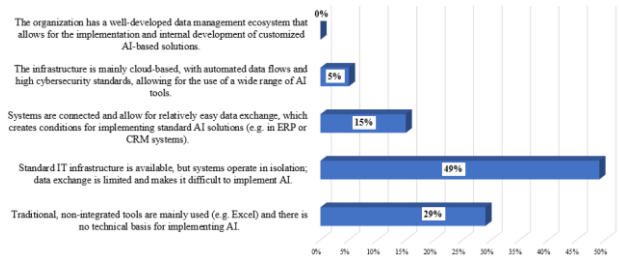


Fig. 3. Answer to the question "Which of the following statements best describes the state of your IT infrastructure and its readiness for implementing solutions based on artificial intelligence (AI)?"

The following Table 2 shows the digital maturity at the automation level, reflecting the degree of real application of artificial intelligence technologies in the business processes of the surveyed organizations.

TABLE 2 DEGREE OF REAL APPLICATION OF AI TECHNOLOGIES IN BUSINESS PROCESSES

Level of competence and training	Relative share of respondents (%)
We do not use AI tools and have no plans to implement them in the next two years.	42%
Incidental and unsystematic use of ready-made free tools (e.g. ChatGPT, Canva) by individual employees for administrative tasks.	29%
Targeted use of AI primarily for optimization of individual auxiliary processes and daily tasks.	13%
Targeted use of AI primarily for optimization of core processes, marketing, risk assessment or customer service.	12%
We use customized AI solutions, which are a leading factor in our operational efficiency and competitiveness.	4%
Total	100%

The gradual integration of modern technologies and the systematic development of human capital are critical factors for the transition to higher levels of digital maturity. Since the lack of specific expertise is a leading barrier to the implementation of artificial intelligence for 72.7% [27] of enterprises in Bulgaria, targeted training programs are crucial to overcome resistance to change and mitigate "digital stress". This allows SMEs to move from incidental experimentation and the use of AI only when necessary to the transformation of business processes through the systematic integration of AI tools.

The results in Fig. 1 show that according to 42% of respondents, the integration of AI in the organizations they belong to happens incidentally, and 33% of managers do

not have a vision and do not allocate a budget for the implementation of new technologies. Only 4% indicate that organizations consider AI as a strategic priority and according to 4% - the digital strategy is an integral part of the overall vision of the organization. In the second direction regarding digital maturity at the level of organizational culture (Fig. 2), the results show serious barriers related to resistance to new technologies due to "digital stress" and lack of sufficient skills (43%), while 27% of staff have a pronounced fear and strong reluctance to change. Only 4% of respondents indicate that they work in an environment that encourages active sharing of knowledge related to AI.

The trend of low digital maturity is also confirmed in the third area of research, related to human resources, which is confirmed by the results in Table 1. A total of 81% of those surveyed experience serious difficulties related to human capital, which makes the lack of competencies a major barrier to their technological adaptation. According to 50% of those surveyed, employees do not have the necessary skills to work with AI, but at the same time, organizations do not invest in training. Another 31% believe that employees have basic skills, and training is conducted only when absolutely necessary, despite the fact that they face difficulties when working with AI. On the other hand, the remaining 19% of those surveyed are aware of the need for human resources development. According to only 4%, the companies they belong to have highly specialized internal experts.

In addition to management and personnel challenges, the integration of AI in Bulgaria also faces a serious technological barrier, which is confirmed by the results in Figure 3. Nearly half of those surveyed (49%) report incompatibility of new technologies with existing systems that operate in isolation. A critical indicator of low digital maturity at the level of technological infrastructure is the fact that, according to 29% of respondents, organizations still use mainly traditional, non-integrated tools (e.g. Excel) and there is a complete lack of technical basis for implementing AI solutions.

Regarding the answer to the question of system connectivity, only 15% of respondents indicated that their systems allow for relatively easy data exchange, which creates conditions for the implementation of standard AI solutions within ERP or CRM systems. This result is in full harmony with the trends on a national scale. According to official NSI data for 2025, a total of 11.9% use CRM systems, and 26.6% - ERP systems (NSI, 2025). Based on these results, it can be concluded that technological infrastructure remains a key obstacle to the larger-scale penetration of artificial intelligence in small and medium-sized enterprises in the service sector.

The results for the fifth research area, namely "Digital maturity at the level of automation and AI", reveal the real state of technological transformation in the organizations studied. Table 2 shows that the largest group of enterprises do not use AI tools and do not have plans for implementation in the next two years, i.e. These are organizations that are characterized by low innovation and

lack of management vision. Nearly a third (29%) believe that companies use AI incidentally and unsystematically using ready-made free tools (e.g. ChatGPT, Canva) by individual employees for administrative tasks. A total of 25% indicate that organizations use AI purposefully – 13% mainly for optimization of individual auxiliary processes and daily tasks, and 12% - mainly for optimization of core processes, marketing, risk assessment or customer service.

CONCLUSIONS

The study shows that the integration of AI in small and medium-sized enterprises in the service sector in Bulgaria is still in the “exploration” or “incidental experimentation” stage, i.e. if it is to be defined as a level of digital maturity – “initial” or “developing” level of digital maturity. The transition to a systemic transformation of business processes based on AI solutions requires not only technological modernization, but also continuous improvement of human resources in order to overcome the barrier of lack of skills. All this requires direct commitment of senior management by setting a target budget for innovation, developing a clear digital strategy with defined responsibilities and provided resources, which is an integral part of the overall vision of the organization.

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