# ANTICIPATION OF THE DEVELOPMENT OF DIGITAL TECHNOLOGIES OF E-BUSINESS

Professional paper
DOI: 10.5937/CT_ITI25035D

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***ABSTRACT:*** *The anticipation of digital e-business technologies must basically rely on an expert assessment of elements of global business, the current state of e-business infrastructure, as well as elements of development tendencies and trends of business.*
*The infrastructure of an e-business system is a set of platforms, networks, applications, as well as data and business rules for managing internal and external business processes and is based on Internet technologies (cloud computing, internet of things, big data, ubiquitous computing), which all together lead to rapid changes in business processes and influence the more efficient functioning and development of innovative business models.*
*On the other hand, today effective global business can be viewed through important components of work and business, such as the coexistence of traditional and digital sectors and the diffusion and implementation of innovative production technologies, with the tendencies of applied automation, flexible organizational innovations and the generating and inclusion of innovative materials and the circular economy, as well as the trends of quantitative-qualitative integration of human resources, smart specializations, flexible exploitation of technical textiles, consistent "cluster strategies" and efficient integration into the global market (with "elements of state protectionism"), etc., and on which the generating of globally adaptive, prosperous and intensively competitive companies is based. In addition to all the aforementioned elements, which are the basis of digital technology adoption in e-business, the adoption should also be viewed through the aspects of the development of the Internet of intelligent devices, context-aware computing, as well as the concept of augmented reality (which indicates an increasing adaptation to the characteristics of the environment), i.e. the basis of perhaps the key factors of the future development of e-business - the integration of artificial intelligence - AI and robotic automation - RPA. To the aforementioned elements, which are still applied to a certain extent today, anticipation must of course adequately consider, adopt and add the perfected elements of the big data segment, modern dynamic architecture of information systems,*

*elements of platforms without code (as a new era of inclusive digital empowerment), concepts of programmability of computer networks or so-called software-defined networks - SDN, as well as advanced analytics (through proactive strategies) and sustainability (through so-called hybrid and energy-efficient computing).*
*The work presents the most important elements of the current infrastructure of e-business, as well as the analysis of trends and tendencies of the work and development of the technical-technological segment, as the basis of effective anticipation of digital technologies of e-business, with special reference to the needs and application in the textile and clothing industry.*

***Ključne reči**: digitalne tehnologije, e-poslovanje, tendencije, trendovi, razvoj, anticipacija.*

## ANTICIPACIJA RAZVOJA DIGITALNIH TEHNOLOGIJA E-POSLOVANJA

***APSTRACT**: Anticipacija digitalnih tehnologija e-poslovanja se mora bazično oslanjati na ekspertsko sagledavanje elemenata globalnog poslovanja, trenutno stanje infrastrukture e-poslovanja, kao i elemente razvojnih tendencija i trendova poslovanja.*
*Infrastruktura sistema e-poslovanja predstavlja skup platformi, mreža i aplikacija, kao i podataka i poslovnih pravila neophodnih za upravljanje internim i eksternim poslovnim procesima, a zasnovana je na internet tehnologijama (cloud computing, internet of things, big data, ubiquituos computing), što sve zajedno dovodi do brzih promena u poslovnim procesima i utiče na efikasnije funkcionisanje i razvoj inovativnih poslovnih modela.*
*Sa druge strane, danas se efikasno globalno poslovanje može sagledavati kroz važne komponente rada i poslovanja, kao što su koegzistencija tradicionalnog i digitalnog sektora i difuzija i implementacija inovativnih proizvodnih tehnologija, sa tendencijama aplikativnih automatizacija, fleksibilnih organizacionih inovacija i generisanja i inkluzije inovativnih materijala i cirkularne ekonomije, kao i trendovima kvantitativno-kvalitativnih integracija ljudskih resursa, pametnih specijalizacija, fleksibilnih eksploatacija tehničkog tekstila, konzistentnih "klaster strategija" i efikasnih integracija u globalno tržište (sa elementima „državnog protekcionizma"), itd., a na kojima se zasnivaju generisanja globalno adaptivnih, prosperitetnih i intezivno konkurentnih preduzeća. Uz sve navedene elemente, koji su osnova anicipacije digitalnih tehnologija u e-poslovanju, anicipacija bi se morala sagledavati i kroz aspekte razvoja interneta inteligentnih uredjaja, context-aware computing-a, kao i koncepta augmented reality-a (što ukazuje na sve veće prilagodjavanje karakteristikama okruženja), odnosno na osnove možda ključnih faktora budućeg razvoja e-poslovanja – integraciju veštačke inteligencije - AI i robotske automatizacije - RPA. Navedenim elementima, koji se i danas primenjuju u odredjenoj meri, anticipacija naravno mora adekvatno da sagleda, usvoji i pridoda usavršene elemente big data segmenta, modernu dinamičku arhitekturu informacionih sistema, elemente platformi bez koda (kao novu eru inkluzivnog digitalnog osnaživanja), koncepte programabilnosti računskih mreža ili tzv. softverskih definisanih mreža – SDN,*

*kao i naprednu analitiku (preko proaktivnih strategija) i održivost (kroz tzv. hibridno i energetski efikasno računarstvo).*
*Rad prezentuje najbitnije elemente aktuelne infrastrukture e-poslovanja, kao i analizu trendova i tendencija rada i razvoja tehničko-tehnološkog segmenta, kao osnove efikasne anticipacije digitalnih tehnologija e-poslovanja, sa posebnim osvrtom na potrebe i primenu u tekstilnoj i odevnoj industriji.*

***Ključne reči**:digitalne tehnologije, e-poslovanje, tendencije, trendovi, razvoj,anticipacija.*

## 1. INTRODUCTION

Today, flexible business information systems are the focus of interest on the global market, which integrate human and technical resources, continuously develop innovative business processes and are capable of quick reaction to changing market demands, with the aim of achieving sustainable competitiveness in all business activities (because successful business today is reflected in the elements of high-quality and efficient functioning of business system components, such as speed, efficiency and optimization on the one hand, and globalization and strengthening competitiveness, on the other hand), are current and in the focus of interest on the global market.
In times of general and business globalization and digitization, the turn of the industrial sector, caused primarily by dynamic technical and technological development, but also by changed ways of thinking and consumer habits, is already shaping a new economy (as well as everyday life). In fact, the fact is that a modern and profitable industry, as well as the sustainable competitiveness of companies today, are unthinkable without timely and rapid implementation of quality and efficient process tools and complementary and adequate work and development strategies, with the inclusion and mass implementation of information communication - internet technologies, viewed through compatible and efficient business information systems (marketing, supply, payment, etc.), but also the so-called service information systems of education and continuous learning, effective health care of employees, state administration jobs, etc., as well as without innovative materials, adequate, fast and timely implementation of technical-technological and organizational innovations, cluster mode of business, market segmentation, close and flexible connection of production, production technologies, design and planning, with the possibility of quick response (Just In Time and Quick Response System), which all together indicate the needs of mass digitalization, as well as adaptation and development of quality and efficient information systems within the framework of new strategies e-business [1]. For a better assessment of the elements of business digitalization, in addition to the current elements, it is necessary to highlight the trends and tendencies of business, which are characterized on a global scale by: the development of a knowledge-based economy, innovative internet technologies and e-business, specialization of production and an increasingly shorter product life cycle, a high degree of interoperability, global supply chains, the development

of entrepreneurship and the small and medium-sized enterprise (SME) sector, the coherence of production technologies and flexible production, the creation of consistent values, and ultimately the coexistence of the traditional and newly created digitally transformed industrial sector [1, 2]. On the other hand, it is obvious that electronic business no longer represents only the implementation of new technologies, but radical changes in the way of thinking and viewing business processes, so it can be said that the key moment in new concepts of business is in fact conditioned by current technical-technological changes, as well as business tendencies and trends, with the "shifting" of business towards customers, fragmentation of products/production and defragmentation of the reproduction cycle, with enormous economic consequences of such trends that are reflected in the strengthening of new, modern and advanced industries based on the so-called high-tech technology [1, 3]. Today, the following can be singled out as advanced and innovative elements of modern business: digital platforms, internet portals, websites, online shops, Transaction Processing System (e-systems for processing transactions), Enterprise Resource Planning System (e-systems for resource planning), Supply Chain (e-systems for managing supply chains), Electronic Commerce Systems (e-commerce systems), Strategic Capability Network (strategic capabilities related to e-business), Product Lifecycle Management (e-systems for product life cycle management), Customer Relationship Management (e-systems for customer relationship management), etc. [3], which in the end directly points to the base of elements of successful anticipation through the far-reaching implementation of the innovative ICT sector and new ways of doing business.

Finally, it should be noted that digital transformation today goes beyond even the implementation of new technologies and represents the strategic adoption of innovative technologies, but with maximum use of all market opportunities of the company, and therefore continuous changes and improvement of information and communication technologies represent a key aspect of innovation in innovative e-business, which is precisely the reason why the anticipation of the development of digital e-business technologies in the coming period should be sought in these segments.

## 2. INFRASTRUCTURE OF ELECTRONIC BUSINESS

As electronic business and modern digital technologies today completely determine the w ay in which companies carry out business and represent a fundamental change, with clearly defined and visible advantages for all participants in business processes (companies, customers, stakeholders, society, etc.), it is obvious, considering the globalization of business and the conditions of the business environment, that the implementation of electronic business services is not enough to gain a competitive advantage, but it is necessary to develop innovative business strategies and models, with mass implementation, but also the maximum exploitation of the possibilities of ICT technologies, as well as the development and implementation of efficient compatible and adaptable information systems. Electronic business can also be presented as a set of business activities (optimization of business processes, improvement of public relations and other business support services), which take place through ICT technologies

(especially the Internet), which enable companies to connect and implement internal and external processes in a more efficient way (with characteristics such as speed, globalization, improvement of productivity, new clients and sharing of knowledge between organizations and institutions, etc.) [1, 3].

On the other hand, the search for elements to anticipate the digitalization of e-business must today start from the fact of the obvious cause-and-effect relationship between the two most important factors of e-business - the foundation or base and development of information and communication technologies and elements of business globalization, because the very inclusion of modern ICT technologies in business processes initiates the generation of new ways of doing business, as well as processes of business globalization (in relation to the environment or within the organization itself). And precisely because of this, it should be noted that the implementation of information technologies in business processes is primarily based on the exploitation of the components of the infrastructure of information technologies, which is otherwise based on ICT or internet technologies (web, cloud computing, internet of things, big data, ubiquitous computing, etc.), as an element of the possibility of rapid and efficient changes in business processes and rapid and efficient generation and development of new business models, which ultimately represents an important factor or resource in business processes of strategic positioning of companies. On the other hand, it should also be noted that the trends of implementing digitization or diffusion forms of implemented information systems, when generating innovative ways of doing business, represent the basis of the demand for a strong wave of e-business implementation, which obviously encourages the optimization of business processes and the strengthening of sustainable competitiveness through various service supports [1, 3].

ICT infrastructure is a set of technologies, platforms and services aimed at ensuring the smooth implementation of business activities in a company, because the requirements of modern business related to efficiency, cost optimization and scalability of infrastructure have led to the development of new approaches in the design and implementation of the same, while the infrastructure of e-business systems (which is a broader concept than ICT infrastructure) is a set of shared technical and technological resources (hardware, software, networks, products, applications, servers, operating systems, data and business rules, etc.), intended for the formation of platforms with applications for managing internal and external business processes. The infrastructure of e-business systems is based primarily on Internet technologies, such as cloud computing, the Internet of Things, the collection and mass processing of large amounts of data - big data, and ubiquitous computing, which ultimately enables rapid and adequate changes in business processes, influences the development of new and more efficient business models, and represents the basis of influencing factors and possible directions for the further development of digital e-business technologies [4, 5, 6]. It can be said that today, in the time of globalization and mass implementation and continuous improvement of ICT technologies, which increasingly and drastically "occupy" all the pores of the economy and society, and on the other hand with "unexpected" geostrategic changes, new value systems and business rules, and therefore the directions and ways of thinking and functioning of the world's largest

economies, it is really very ungrateful and complicated to anticipate the directions and elements of the development of digital technologies of e-business. However, since the e-business infrastructure can be singled out as one of the most important factors of influence on effective e-business, in this consideration, first of all, the idea of a fundamental and comprehensive analysis of the constituent elements of ICT infrastructure is imposed, then the analysis of other factors influencing the further development of e-business from the aspect of digital technologies, but also the analysis of tendencies and current trends of work and development, in order to eventually obtain real potential factors of influence of modern e-business in perspective, and thus the outlines of the anticipation of the development of digital e-business technology [5, 6]. Problems in such analyses and research mainly arise with information about the breadth of the e-business infrastructure, i.e. the fact that the ICT infrastructure consists of all areas of information technology (not including people, processes and documentation), which points to the problem of isolating only some elements for analysis, which also indicates that this is precisely why the process of quality and successful anticipation is reflected in expert knowledge, primarily in the field of ICT technologies, but also in the field of information systems of business activities, so this section will mention only some of the most important elements of the ICT infrastructure, as well as elements that are in trend, and whose further improvement should certainly be worked on:

- *Internet* - an infrastructure and communication technology and one of the main tools of the digital economy, with all the necessary supporting technologies, which in a short time has brought radical and intensive applications in business and global technical and technological development, and significantly influences the development and improvement of modern business. Like a catalyst, the Internet today drastically accelerates business and globalization processes, breaking down spatial and temporal limitations in the circulation of intangible goods, profiling product characteristics, forming a global market and fundamentally changing the relationship between producers and consumers, thus in fact represents the technical-technological basis for the creation of a new economic order, created as a result of the convergence of the implementation of digital technologies (computer, telecommunication and multimedia) [4, 5]. Today, the impact of the efficient exploitation of a key innovative technology - the Internet, as well as the Internet experience and improvements in ICT in the positive implications of the information technology (IT) infrastructure is increasingly evident, with companies using the Internet and digital technology to modernize and reorganize their businesses, as active drivers of digital transformations of business practices with increased competitiveness, sustainability and diversification. Even though the Internet functions as a single global network, with a current architecture that can be described as a set of logically interconnected entities (provider and user networks), it is actually a global decentralized information system of multiple autonomous local and global networks that are interconnected, with decentralization enabling network resilience to failures, while the very method of connecting autonomous entities into a single network is subject to constant change [4, 5]

- *Computer network* - enables communication and data exchange, and consists of computers and the network infrastructure (links - telephone and fiber optic cables, wireless signal, etc., and nodes - switches, routers, etc.) that connect them. The logical structure of modern computer networks used in business operations can be divided into levels: core layer (the central layer and the most critical point in the network that provides connectivity between distribution layer devices, and therefore requires the implementation of high-performance devices, as well as special attention to high availability and redundancy, i.e. it must support high data transfer speeds with low latency), distribution layer (the interface between the core and access layers and the access layer, with the task of providing data aggregation, as well as traffic flow control, using routing policies and defining broadcast domains) and access layer (represents the interface to end users and the connection of user devices - computers, printers, IP phones, etc., with the rest of the network and with the task of connecting to the network and controlling access) [4].
- *Cloud computing* - represents an abstracted, highly scalable and controlled computer infrastructure that hosts applications intended for end users. It is also a network of remote computers (owned by large companies), which are able to provide a range of services for the needs of individuals and organizations, from e-mail communication, through word processing programs, demanding applications for complex analysis of various types of data, to virtual storage space and a platform for the development of various applications, thus reducing the need for investments in IT infrastructure. Currently, three categories of cloud computing services are current: *Software as a Service* - software that is accessed via the Internet as a hosted service and has great potential for application in the field of information management at the individual level - time management applications, document management tools, word processing programs, analytical applications, e-mail clients, etc.), *Platform as a Service* - use of a platform provided by a PaaS service provider for application development, which eliminates the need to purchase necessary hardware and software resources, and *Infrastructure as a Service* - includes computer infrastructure, servers, data storage, networking, etc. in virtual space). Some of the most significant solutions based on cloud computing in the context of information management are e-mail communication (e.g. Google), document management (Google Docs) and business continuity [4, 7].
- *Virtual Private Networks* - VPNs are networks implemented on the public Internet network infrastructure, which use the same security and availability principles as private networks, as well as the management methods and quality of services provided by the Internet, and operate according to the principle of client-server architecture. It can also be said that VPN networks are a combination of tunneling technologies, encryption, access control, and services used to enable secure and protected intranet and extranet traffic on the Internet, with the process of configuring and creating a VPN itself being known as virtual private networking.

Tunneling is a technology that establishes an encrypted point-to-point connection between two computers and includes: encapsulation, transmission and decapsulation of packets transmitted over the network. The advantages of using VPN networks are connecting customers, suppliers and business partners in the global market, reducing telecommunications costs by using the Internet and using the existing Internet infrastructure, wider connectivity options, greater employee productivity, etc., while the disadvantages of VPN networks can primarily be highlighted as security problems and insufficient reliability, as well as potential incompatibility of different equipment manufacturers [4].

- The development of e-business applications in the *Internet environment* is conditioned by the requirements of modern information systems, with the degree of implementation depending on the architecture of information systems and available technologies. The possibility of increased processing power of client devices (computers, smartphones, tablet devices, etc.) represents a new challenge in the design of the architecture of information systems in the Internet environment. One of the most important technologies in the development of e-business applications is XML, as a standard that enables the transfer of data from the business logic layer to the presentation layer, and thanks to its hierarchical structure, it supports the existence of semantics and defines a set of standards for marking the structure and content of a document. It therefore represents one of the key technologies for achieving interoperability in e-business systems, as it enables their readability on different platforms and within different applications [4].
- *World Wide Web* – WWW is one of the most famous and most commonly used application-level Internet services, with standards for storing, retrieving, forming and presenting information on the Internet. In fact, it can be said that WWW is a network of links, text content and multimedia that represent the content of websites connected to the Internet, where access to WWW pages is defined by URL (Uniform Resource Locator) addresses, and the communication protocol in the network is HTTP (Hypertext Transfer Protocol). The development of modern business systems on the web implies comprehensiveness, a high level of complexity and quality of solutions, with minimal costs and a short timeframe, so application development frameworks are increasingly being used, which facilitates and accelerates application development, enables system modularity, improves security, etc. [4, 8].
- The basic technology of cloud computing is *virtualization* - the logical division of computing resources between multiple clients or the combination of multiple physical resources into one logical unit. The main advantages of implementing virtualization technologies are resource consolidation, energy saving, ease of maintenance, ease of creating system backups and system recovery, independence from the operating system, etc., so it can be said that virtualization actually enables scalability and cost-effectiveness of cloud infrastructure [4, 8].
- *Public Key Infrastructure* – as the security and protection of e-data and communications within and outside the company network are increasingly important elements of modern e-business, so too the public key infrastructure with

its constituent elements (cryptography, encryption, standards, protocols, etc.) represents one of the most important elements of the future of digital business.

- *Digital identity management* – represents a set of business processes and infrastructure for the creation, maintenance and use of digital identities, the application of which provides a tool for business automation. Since in modern computer architectures, data about entities (persons or resources) is distributed across various locations, it is necessary to establish adequate systems for managing digital identities (data that uniquely describes a person or resource and contains links between all entities). Digital identity management systems encompass authentication, authorization, security, and system access, and enable secure access to resources, effective access control, rapid change of identity-resource relationships, and protection of confidential information from unauthorized access [4]. Digital identity management is still an element that is being worked on today, but significant improvements in approaches to managing this element in a cloud environment are expected in the future.

The aforementioned trends, together with innovative technical-technological elements such as polyfunctional robots, neurological enhancements and ambient invisible intelligence, are likely guidelines and a database in looking at future development and creating anticipation of digital technologies of e-business and business processes, where artificial intelligence and digital platforms are likely to play a central role.

## 3. ANTICIPATION OF THE DEVELOPMENT OF DIGITAL TECHNOLOGIES

Based on all the above, it can be concluded that the anticipation of digital e-business technologies must basically rely on the current state of the e-business infrastructure, as well as an expert assessment of current trends, tendencies and possibilities of technical-technological development, but also variable elements of globalization, because dynamic technical-technological development, increasingly intense global connectivity, as well as changing consumer habits lay new foundations and a new era of electronic business. Today, it is already completely clear that information and communication technologies directly influence the improvement of business through the application of the concepts of business intelligence, supply chain management, e-logistics of transport, document management systems and accounting programs, as well as the concepts of electronic sales, internet marketing and public relations, so the anticipation of development should include and consider possible elements of advancement and improvement in these domains as well. Thus, in the coming period, the expansion of business models based on innovative digital technologies is expected in all areas, and thus the growing need for professionals with narrow expertise in the aforementioned areas, with the directions of further development being dictated by global trends in digital transformation and e-business, global connectivity and the increasing growth of the application of the Internet and ICT technologies, as well as changes in consumer expectations and the increasing emphasis on

ethical business and inclusiveness [8, 9, 10], so the following text will present and analyze some of the elements that need to be worked on and that need to be changed and improved, in order to represent the backbone and elements of the impact of development:

- One of such elements is certainly the Internet of intelligent devices - ***Internet of Things***, as a technology that ensures efficient connection of the digital and physical world through the intensive implementation and exploitation of increasingly perfect and compatible sensors and actuators, which on the other hand directly indicates the possibilities of automation and creation of the so-called smart environment, which together with the so-called Machine to Machine - M2M communication represents a critical element in the realization of the Internet of intelligent devices. Today, so-called smart environments rely primarily on sensor networks, which are composed of sensors and other devices distributed in space, which are in mutual communication and are used to monitor various physical phenomena - manifestations (temperature, light, sound, vibration, pressure, movement, etc.). Communication M2M communication networks enable two-way exchange of information with business applications, where HTTP (in combination with web services) is most often used as a communication protocol [11, 12, 13]. Thanks to this way of functioning, improvement and exploitation of technical means and tools, in practice, as a consequence, various segments of "smart" environments of production/business processes are increasingly present, as well as the so-called smart classrooms, houses, traffic, etc., which is a good incentive for further improvements, so this element should be included in the very top of the elements of the future development of digital technologies.
- Today, when computers are in use everywhere, ***ubiquitous computing*** does not seem like a special direction of development that needs to be particularly emphasized, but when it is treated as a combination of the Internet of intelligent devices and a smart environment on the one hand, and mobile and wearable computing on the other, with realization through smartphones, GSP, RFID, smart cards, etc., and unobtrusive or imperceptible distribution, but also continuous collection and processing of data at all times, then one can see the importance and uniqueness of this element, as well as the need to define it as an element of anticipation of the direction of development of digital technologies. In fact, the concept of ubiquitous computing should, above all, be based on systems that recognize and adapt to the characteristics of the environment (sensors, adapters, etc.), which represents the initial stage of the implementation of the so-called artificial intelligence, with the mass implementation of wearable components of computer innovative technologies, as well as devices that are in continuous interaction with users (clothes or shoes with sensors, smart watches or glasses, etc.) - which all together represent the so-called ***context-aware computing***.
- However, it should be noted that even better results of context-aware computing can be obtained in combination with techniques of the so-called augmented reality, i.e. in combination of data from the real environment with ***visualizations*** and ***virtualizations*** - which represents the so-called ***Augmented reality*** concept, where display devices (screen, cameras, etc.) are the main hardware components, because

they can provide the user with information and enable interaction in accordance with the environment in which they are located, which is an excellent recommendation for application in industrial design (e.g., a model of a future product can be displayed in space, a prototype upgrade, as well as displaying information about individual components and highlighting or hiding parts of the model) [11, 14]. It can be said that in addition to artificial intelligence, virtual reality (a computer model and abstract mental image of the real world that is stored on media and transmitted through space and time) and augmented reality (a variation of virtual reality in which the user can see the real world, i.e. the real environment is used as a background, combined with virtual objects), which are technologies that allow users to experience products before they buy them, will play an increasingly important role in modern business [11].

On the other hand, it should be noted that virtualization erases the traditional boundaries between hardware and software and significantly increases hardware utilization, which is one of the most important benefits of this element, as well as that in addition to data virtualization, it is also possible to achieve virtualization of networks, applications, desktops, servers, etc.. In connection with the above, it should be noted that 3D printing will also bring major changes and challenges in the areas of production and trade, because instead of selling physical products, there is the possibility of selling ***3D models***, which can be distributed over the Internet, and the user can print them on his 3D printer. 3D modeling enables quick and easy construction of objects of complex business models, adapted to virtual reality applications, but currently there are no fully defined standards for the integration of 3D content, or a clear methodological design for user interfaces that tightly integrate hypertext and interactive 3D graphics, which is why the development of modern Internet technologies and standards is expected in the coming period, which open up new opportunities for the transition to 3D web virtual realities (although they are already being applied today in engineering, medicine, biochemistry, art and industrial design, educational processes, etc.) [4].

It is obvious that one of the key factors in the development of electronic business is the ***integration of artificial intelligence - AI***, which is already used to personalize the user experience, analyze large amounts of data and optimize business processes, where the expectations of application and impact are even greater.

As artificial intelligence can autonomously analyze data, create customized proposals and enable faster responses to business challenges, it can be expected that it could completely change the way companies manage or make decisions. Thus, with a detailed review and analysis, it can be anticipated that in the coming period (the next five years), a critical mass of artificial intelligence implementation can already be expected, especially in the areas of e-commerce (sales and customer engagement), as well as in decision-making (at least 20-30 percent of business decisions). However, security, the degradation of human work and thinking, as well

as the interpretation of the positive and negative effects of implementation are already causing great debates and dilemmas about mass implementations of this element, which is why, with all the benefits brought by new technologies, and especially the technical-technological elements of artificial intelligence, it is necessary at the very beginning of mass implementations to choose and set them as the foundation, not as the future of technology [7, 15].

- Along with artificial intelligence, which brings the ability to learn from experiences, adapt to new contexts and overcome more complex challenges, technical-technological solutions and tools are necessary that are characterized by performing tasks with great precision, following programmed instructions, viewed through ***robotic process automation - RPA***. Of course, the synergy of these two, certainly the most influential technologies of today, is also necessary, which form a strong winning combination of two flexible systems with rapid adaptation to new requirements, in which robotic automation - RPA sets the pace, and artificial intelligence - AI brings the necessary intelligence to improve performance, whereby the mass application of robotic automation is expected above all in the segments of production (primarily on dangerous and boring jobs of large iterations) and supply - logistics (warehousing and transport) [7, 15].
- It is a fact that robotic process automation, as well as artificial intelligence, contain or represent a set of various ***ERP systems***, that is, a set of interconnected, compatible and connected information systems, accompanied by adequate technical and technological solutions. Seen from that aspect, a special segment should be highlighted - ***ERP systems based on the cloud***, because they enable real-time access and improve collaboration and decision-making, simplifying and facilitating upgrades and integration.

  Ultimately, all of this enables easier business optimization and faster implementation of innovations, transforming the way companies manage their business, thus enabling growth, enabling enhanced agility and economy of companies, as well as easier adaptation to changes. Of course, it is necessary to emphasize that it is necessary to improve this element of digital innovation and modern business, because by adopting an ERP system in the cloud, software updates become imperceptible, ERP systems can continuously monitor technological innovations, security is raised to a higher level, and the company's work is optimized by eliminating hardware costs and simplifying the maintenance of ICT infrastructure [7, 15]**.**
- One of the growing problems of the digital world and e-business is ***cyber security***, which is especially multiplied by the appearance of quantum computers that threaten to break the current asymmetric cryptography, which will affect data security and require the transition to the so-called post-quantum cryptography, which could and should provide effective resistance to decryption risks. Strong and effective current data security today implies the implementation of a zero-confidential ERP system with advanced encryption, reinforced by sophisticated verification processes - from multi-factor authentication of identification checks reinforced by artificial intelligence. In the coming period, increasing cyber

protection needs are expected, including security platforms, specific management tools and responsible use of artificial intelligence, in order to reduce security incidents [7].

- A significant role in the future of e-business (more precisely - e-commerce) will be played by the implementation and mass exploitation of ***cryptocurrency payments*** as well as ***Blockchain technology*** (decentralized database, composed of interconnected blocks of data), which can ensure transparency and security in transactions, reducing the possibility of fraud and increasing user trust. The benefits of using cryptocurrencies, which could become a standard payment method, are faster and cheaper transactions, especially in international business, while the true value and benefits of blockchain implementation can be seen in observing the process of digital trust, i.e. through process automation, cost reduction and increased efficiency through blockchain-based smart contracts. Of course, the digital component of these elements is still completely current today, but their commercialization and mass application would require more perfect, safer and cheaper opportunities, the improvements of which should be worked on (which will certainly encourage a technological revolution in many areas), regardless of what, or precisely because it currently seems as if the possibilities of using blockchain technology are unlimited [15, 16].
- The close cause-and-effect relationship between the possibility of the formation and existence of elements of artificial intelligence, virtualization, robotic automation of processes, etc., and the ***Big data*** element is obvious and inevitable, whereby a modern and efficient business today is unthinkable without the implementation and adequate and efficient exploitation of the Big data element (large and complex data sets of various formats, high processing speeds, volume and access, where traditional data processing applications are not applicable).
  In fact, Big Data element, which is already in widespread use, often refers not only to the size of the data set, but also includes the use of predictive analytics and other advanced methods for extracting value from data, as well as the design and implementation of a reliable, distributed, and scalable infrastructure for managing, analyzing, sharing, storing, and transferring large amounts of data. However, since the amounts of data used, as well as the processes of data search, analysis and visualization, are so large that it is not possible to process them with a standard approach and tools, the expectations for improvements in such concepts in the coming period are very high, i.e. the Big Data component is becoming the very top of the "top list" of elements of anticipation of the future development of digital e-business technologies, with special expectations of extensive and intensive applications in small and medium-sized enterprises. Traditional computer networks are otherwise based on a hierarchical model and can respond to standard requirements, whereby modern information systems involve a dynamic architecture, which requires certain changes in the approach to designing and implementing network infrastructure [13, 17, 18].

Future challenges in adopting big data technologies include designing and implementing infrastructure and storage services, as well as searching, analyzing, sharing, and visualizing large amounts of data, which offers certain industries the opportunity to generate competitive advantage, whereby ***software-defined networks*** (which operate on the principle of separating network management and data forwarding processes – the so-called ***concept of computer network programmability***) can successfully solve some of the above problems [19].

- Building software with ***no-code platforms*** has become a new reality because, by reducing dependence on technical teams, various sectors such as marketing, human resources and sales, thus facilitate innovation and application development, while increasing agility and reducing costs. All of the above leads to the process of mass digital transformations, so it can be said that the adoption of code-free platforms represents a new era of inclusive digital empowerment, and in the coming period, various innovative solutions in that area can be expected [7].
- Marketing and public relations are the elements of modern business that are changing the fastest today, accepting and implementing the elements and possibilities of digitalization, so it is expected to be the same in the future. A sufficient reason for one of the key elements of digital trends in marketing to be visualization or video content (which in the future can shape the future of the business world) is the data that shows that today over 90% of the world's population uses the Internet, and 60% is “on social networks", where about 90% of consumers use video content as a marketing tool, and almost the same percentage of consumers view video content and then make a purchase.

  ***Mobile marketing*** with SMS and MMS messages, mobile websites, bluetooth marketing, mobile applications, etc., on the one hand and smartphones as part of everyday life on the other hand, also represents a type of marketing on the rise, because it enables simple, cheap, highly responsive, targeted and personalized marketing activity in attracting individual consumers. Of course, a special place in the field of digital marketing, with all its specificities, is occupied by ***content marketing*** (blogs, podcasts, e-books, etc.), so-called ***influential marketing*** (with influencers), as well as ***social networks*** (Facebook, Instagram, Twitter, LinkedIn, etc.), whose further improvement and impact are expected in the coming period. Of course, in this area as well, an increasing application and strong influence of artificial intelligence is expected, which in the future will unambiguously influence the generation of all, including marketing strategies, as well as the business models of companies [11].
- One of the directions of further development of digital technologies of modern business will certainly be the development of ***mobile technologies***, taking into account that trends in mobile business technologies are moving towards the development of infrastructure for fast, reliable and secure transmission of large amounts of data through wireless media. Therefore, in the coming period, we should expect the dominance of mobile platforms, which will, on the other hand, be an ultimatum for companies to develop more intuitive and functional mobile solutions in order to attract and retain users. Of course, one of the basic

prerequisites for the development of mobile computing is the existence of mobile infrastructure, so one of the biggest challenges is the need to improve all types of mobile networks (WAN, MAN, LAN, PAN) by increasing data flow, and therefore the need for more efficient and secure collection, analysis and exploitation of the same [11].

- Finally, it should be noted that with the help of the so-called ***advanced analytics***, such as ***predictive***, ***prescriptive*** and ***diagnostic analytics***, or ***Text Mining*** and network analysis, and tools such as artificial intelligence, data mining, machine learning, etc., as well as proactive strategies, companies can turn the data they have into valuable insights, predicting trends, developing intelligent data processing models, optimizing operations and providing personalized user experiences, which are obvious and important causes of the improvement and advancement activities of this digital segment [7].

**a. Digital transformation of e-business technologies - a special review of the textile and clothing industry**

Business today can be viewed through the existence of innovative capacities, incentives and performance, which represent the elements of creating globally adaptive, prosperous and intensively competitive companies. It can be said that the generation of a modern and profitable industrial infrastructure with sustainable competitiveness of the textile and clothing industry is demonstrated through the digitization of business/production processes, the implementation of adequate information systems, elements of artificial intelligence, etc., but also through the adequate and timely implementation of organizational and technical-technological innovations, as well as the missions and visions of creative and original specializations [20].

On the other hand, the development and perspectives of digital technologies e-business of the company of textile and clothing industry must also be sought in the elements of the current infrastructure of production and business processes, as well as in work trends and development tendencies, and viewed partially, depending on the possibility of application and economic justification. Of course, all the mentioned elements will be applied in the process of digitization of the business processes of the company of textile and clothing industry, but due to specificitiesof this branch of the industry, some of the elements of digital technologies can be singled out and emphasized, which will be applied the fastest, most directly and most visibly and will significantly influence the further work and development of this branch of the industry, and thus, as some of the key trends for the next period, can be singled out:

- elements of *artificial intelligence* - technology that enables the creation of hyper-personalized recommendations, which will be based on a wide range of data, including the analysis of user behavior online, geolocation and even biometric data, thereby simplifying the provision of services, predicting demand and customer behavior, optimizing inventory management, empowering business and personalizing offers, effectively creating titles and descriptions customized SEO based on customer behavior, etc., improving operational efficiency. Ultimately, all

this optimizes processes and redefines the ways in which companies provide services, creating personalized user experiences that encourage operational efficiency and satisfaction, with a critical mass of implementation of this technology, primarily in the e-commerce segment (sales, customer engagement, etc.), marketing and public relations, but also logistics (by reducing delivery times and improving order accuracy), otherwise particularly important elements of the clothing industry;

- *Robotic process automation* - tedious and high-frequency tasks of the textile and clothing industry can be quickly solved by mass implementation of automation elements, as well as sensors and actuators, through various technical and technological innovations, primarily in the part of production processes (CAD/CAM systems), but also in parts of logistics - the storage and packaging segment, as well as the transport segment - delivery by autonomous vehicles and drones, which, on the other hand, will additionally affect the business phase of e-commerce, i.e. improvements to the efficient purchasing process.
- *Elements of augmented reality, visualization and virtualization - Augmented reality concept* is an excellent recommendation for application in industrial design, because in this way, for example, it is possible to display a model of a future product in space, while users can experience products before buying them, i.e. they can virtually try on a product (clothes, shoes, etc.), or even "visit" stores in virtual space, which can eliminate the uncertainty of online shopping and increase the trust and satisfaction of users. In connection with this, of course, the accelerated development of technologies that ensure the efficient connection of the digital and physical world is expected through the massive and precise implementation of the Internet, as well as the intensive implementation and exploitation of increasingly perfect compatible sensors and actuators - the *Internet of things strategy* [13, 14].
- Implementation and exploitation of *advanced analytics*, which companies enables to automatically update with accurate and relevant content, as well as optimization and simplified functioning of key functions of business processes (logistics, marketing, sales, etc.), with cost reduction, better understanding of users and achievement of comparative advantages that will lead to more successful operations of companies in the textile and clothing industry, but also with the increasingly massive exploitation of the so-called *virtual assistants or chatbots*, which through text messages communicate and provide assistance to users, without human intervention (especially interesting and applicable in marketing and public relations processes). Of course, there is a direct causal relationship with storage, speed and throughput, as well as the exploitation of large amounts of data, which is why the mass adoption of ***big data*** technologies can be expected in the coming period, which ultimately directly brings opportunities for generating competitive advantage to certain specific industrial sectors (e.g. the clothing industry).
- *Blockchain technology* - is another element of business modernization and digitization that can be expected to play a particularly significant role in e-commerce of textile and clothing industry companies in the future, because it can provide transparency and security in business and especially financial transactions,

reducing the possibility of fraud and increasing user trust, which is especially compatible with mass implementations of elements of artificial intelligence and personalization, virtualization and visualization, AR and one-click payment, advanced catalog management, etc., which can be expected in the following period.

- In the conditions of the current economic crisis, a particularly interesting option for smaller organizations (such as small and medium-sized enterprises of the textile and clothing industry, which normally make up over 90% of the total number of enterprises) is *cloud computing* - a network of remote computers that are able to provide a range of services for the needs of individuals and organizations, which primarily facilitates the manipulation and efficient exploitation of necessary data, but also drastically reduces the need for investments in ICT infrastructure.

## 4. CONCLUSION

In times of serious market disruption and the collapse of many business values and rules, as well as tectonic global economic and political disturbances, it is really very ungrateful to give development forecasts, especially forecasts of the development of the unstable and dependent on many elements of the digitization of e-business, so the anticipation of the development of digital technologies in e-business should logically follow on from an expert and analytical assessment of the current situation, as well as an assessment of the tendencies and trends of the operation and development of digital technologies, with a critical contemplative perception adequate areas of technical and technological innovation. Thus, it can be said that the anticipation of the development of digital technologies in e-business can be seen through aspects of the development of the Internet of intelligent devices (with emphasis on the development and implementation of sensors and actuators), as well as context-aware computing, but also augmented reality concepts, i.e. visualization and augmented and virtual reality, which indicates an increasing adaptation to the characteristics of the environment, i.e. the basis of perhaps the key factors of the future development of e-business - the integration of artificial intelligence and robotic automation. It should be emphasized that, regardless of all the expectations directed towards the implementation of artificial intelligence and robotic automation, it is necessary to insist on the fact that their implementation should not represent the future of technical-technological development, but primarily the base and tool of new technologies, represented in jobs dangerous to human health, as well as boring jobs with high frequency iterations. In addition to the above components, most of which are still in use to some extent today, we should also add the necessary expected development of the big data component, as well as elements of generating modern dynamic architectures of information systems, by introducing the concept of programmability of computer networks, i.e. software-defined networks. Anticipation, of course, must adequately consider the elements of the adoption of code-free platforms (as technological progress and entering a new era of inclusive digital empowerment),

advanced analytics (through transitions from reactive to proactive strategies), as well as elements of sustainability (through so-called hybrid and energy-efficient computing).
On the other hand, anticipation can be viewed from the aspect of major technical-technological changes and challenges of each segment of e-business separately, so for example in the area of production, increased implementation of CAD/CAM and robotic systems is expected, in the area of e-marketing - the increasing implementation, development and rise of video content, as well as content, mobile and influential marketing, while in the area of e-commerce it is further development and mass exploitation of social networks and improvement of mobile technology in terms of increasing the speed and flow of information, but also blockchain technology and the use of cryptocurrencies, and in logistics, these are the specifics of transport and delivery, as well as storage.
In the global world of fast fashion and e-commerce, the analysis, refinement and implementation of artificial intelligence and robotic automation, the so-called. fast sites, i.e. pages that load quickly and searches that give immediate results, augmented reality concepts in industrial design, advanced analytics in logistics, marketing or sales, with the continuous exploitation of big data elements, as well as simplified one-click payments, digital wallets and cryptocurrencies, personalized online experiences with the possibility of adjusting the price, promotional offers and product recommendations, will certainly be in the spotlight in the coming period, with automatic imposition of needs for technologies that will bring qualitative changes in the areas of security, efficiency and customization of digital tools.

## REFERENCES

[1] Dimitrijević, D. (2021). Teze za nove strategije rada i razvoja tekstilne i odevne industrije, deo 3. *Tekstilna industrija*, 69(4), 4-13. https://doi.org/10.5937/tekstind2104004D
[2] Keun, J.K. (2023). The Impact of Digitalization on the Textile Industry, *Trends in Textile Engineering & Fashion Technology*, 8(2), 933-934
[3] Dimitrijević, D. (2021). Teze za nove strategije razvoja tekstilne i odevne industrije - deo 2. Tekstilna industrija, 69(1), 36-46. https://doi.org/10.5937/tekstind2101036D
[4] Radenković, B., Despotović-Zrakić, M., Bogdanović, Z., Barać, D., Labus, A. (2015). Elektronsko poslovanje, Fakultet organizacionih nauka, Beograd
[5] Dimitrijevic, D., Dimitrijevic, N., Gligorijevic, J. (2023**)**. E-business implementation trends in small and medium-sized enterprises of the textile and clothing industry, *Savremeni trendovi i inovacije u tekstilnoj industriji*, Beograd, septembar 2023., 284-299
[6] Dimitrijevic, D. (2022). Tendencies of the global development of the textile and clothing industry of developing countries, *Trends Textile Engineering & Fashion Technology*, *Crimson Publishers***,** vol. 7, issue 2, 845-847,
[7] https://www.nedeljnik.rs/svet-poslovanja-u-2025-otkrivamo-koji-trendovi-oblikujudigitalnutransformaciju

[8] https://www.deorwine.com/blog/ the-role-digital-transformation-in-e-commerce/, 2024
[9] Yaqub, M.Z., Alsabban, A. (2023). Industry-4.0-Enabled Digital Transformation: Prospects, Instruments, Challenges, and Implications for Business Strategies, *Sustainability*, vol 15, no 11, 8553
[10] Jehangir, M., Dominic, P.D.D, Naseeb, L., Khan, A. (2011). Towards Digital Economy: The Development of ICT and E-Commerce in Malaysia, *Modern Applied Science*, vol 5, no 2, 171-178
[11] https://www.doba.rs/doba-znanja/digitalni-trendovi-u-marketingu-promena-igre-u-poslovnom-svetu/, 2023.
[12] Ilić, B., Anđelić, S., Krušković, T. (2022). Značaj Informacionih tehnologija i Internet inteligentnih uređaja za savremeno poslovanje, *Međunarodna naučna konferencija mediji i ekonomija*, 189-196
[13] Tomanović, I. (2017). Implementation of Internet of things in retail development, *Info M*, vol. 16, iss. 64, 18-25
[14] Ghuloum, H., Al-lamki, Z. (2021).The Interactive Applications (IAs) in Academic Libraries: Challenges and Opportunities, *Digital Libraries* [Working Title]
[15] https://www.fragment-studio.com/sr-latn/posts/ecommerce-trends, 2025.
[16] Horvatić, H., Tafra, V. (2022). Identifikacija komercijalne blockchain tehnologije te izazovi i opasnosti primjene kroz primere, *Obrazovanje za poduzetništvo*, vol 12, br 2
[17] Curry, E., Auer, S., Berre, J.A., Zillner, S. (2022). Technologies and Applications for Big Data Value, Springer
[18] Zekavica, A., Ćirić, M., Vukmirović, J. (2018). Significance of the Big Data phenomenon for making marketing decisions in real time, *Ekonomija teorija i praksa*, vol 11, no 2, 35-50
[19] Bojović, D. P. (2019). Praktične primene softverski definisanih mreža, Računarski fakultet, Beograd
[20] Dimitrijević D., Urošević S., Adamović Ž., Prokopović B. (2019). Anticipacija perspektive MSP industrije odeće u državama u razvoju, II International Conference “Contemporary trends and innovations in the textile industry”, CT&ITI 2019, 16-17th May 2019, Belgrade, Serbia, Proceedings, 179-193.