DIGITAL ENTREPRENEURSHIP IN MODERN BUSINESS SYSTEMS

Filip Jovanović[1], Sanja Marković[2], Ljiljana Berezljev[1]

[1]Faculty of Project and Innovation Management Prof. Dr. Petar Jovanović,
University Educons, Republic of Serbia
[2]Academy of Applied Studies of Kosovo and Metohija, Republic of Serbia

Corresponding Author: Sanja Marković

SUMMARY

The rapid development of digital technologies, such as mobile services, information technology, and cloud computing, has irreversibly transformed the way business is conducted and opened the doors to a new era of digital entrepreneurship. In today's business world, successful enterprises are those that can harness the benefits of digital tools to create value and meet the needs of modern consumers. This paper presents the key technological trends in modern business. Cloud Computing is presented as an optimal way to distribute business applications, providing flexibility and cost reduction through remote servers. Artificial intelligence and Machine Learning are transforming the business world, enabling the resolution of various challenges. Virtual, augmented, and mixed reality provide innovative ways of interaction, while the Internet of Things connects smart objects. Big Data enables data analysis to improve business, while Data Mining is used to extract knowledge from heterogeneous sources. These technologies shape digital transformation, emphasizing the need for adaptation and the adoption of new paradigms.

KEYWORDS: *Digital entrepreneurship, Digital economy, Digital marketing, E-business, Internet.*

INTRODUCTION

The development of information technology and the flourishing of the internet have fundamentally transformed the way companies conduct their business activities, creating new business models, virtual companies, and labor markets. The concept of electronic business (e-business) has become a key part of modern entrepreneurship, opening doors to new opportunities and innovations. In this context, the internet plays a crucial role as a source of new business opportunities worldwide. The rapid advancement of digital technologies, such as mobile services, information technology, and cloud computing, has reshaped the business environment, providing impetus for the development of digital entrepreneurship. This change has, in turn, revitalized traditional industries, enabling them to survive and adapt to new conditions. Digital entrepreneurship represents the practice of seeking new investment opportunities brought about by new media and internet technologies [1]. Examples of digital enterprises include those providing online computing, software development [2], social computing, digital cataloging platforms, e-commerce [3], and multimedia companies selling digitized products and services [4].

INTERNET AS A SOURCE OF NEW BUSINESS OPPORTUNITIES

The development of the internet has drastically transformed the way companies, regardless of size and industry, conduct their business activities. New business models, virtual companies, virtual labor markets have emerged, and access to the global market has been reduced to a few clicks. Essentially, there has been a boom in a new concept known as e-business.

The internet, as a technological infrastructure, represents an integrated network of servers, routers, telecommunications equipment, lines, computers, and other elements. Various types of software and tools are required for the successful conduct of e-business. The internet operates thanks to the existence of open standards that allow any network to connect to any other network. This openness provides individuals with the opportunity to create content, provide services, and products without the need for approval from central institutions [5].

New technologies represent a source of business opportunities and demonstrate the potential of the internet to initiate new entrepreneurial endeavors. The development of information technology has opened up great opportunities for the development of digital entrepreneurship. According to Everett Rogers' theory of innovation diffusion [6], early adopters of this technology actively utilize the new opportunities that technological progress offers to create new perspectives and launch their own entrepreneurial projects.

INTERNET USAGE STATISTICS
The Internet Big Picture
World Internet Users and 2023 Population Stats

WORLD INTERNET USAGE AND POPULATION STATISTICS 2023 Year Estimates					
World Regions	Population (2022 Est.)	Population % of World	Internet Users 31 Dec 2021	Penetration Rate (% Pop.)	Growth 2000-2023	Internet World %
Africa	1,394,588,547	17.6 %	601,940,784	43.2 %	13,233 %	11.2 %
Asia	4,352,169,960	54.9 %	2,916,890,209	67.0 %	2,452 %	54.2 %
Europe	837,472,045	10.6 %	747,214,734	89.2 %	611 %	13.9 %
Latin America / Carib.	664,099,841	8.4 %	534,526,057	80.5 %	2,858 %	9.9 %
North America	372,555,585	4.7 %	347,916,694	93.4 %	222 %	6.5 %
Middle East	268,302,801	3.4 %	206,760,743	77.1 %	6,194 %	3.8 %
Oceania / Australia	43,602,955	0.5 %	30,549,185	70.1 %	301 %	0.6 %
WORLD TOTAL	7,932,791,734	100.0 %	5,385,798,406	67.9 %	1,392 %	100.0 %

NOTES: (1) Internet Usage and World Population Statistics estimates are for June 30, 2022. (2) CLICK on each world region name for detailed regional usage information. (3) Demographic (Population) numbers are based on data from the United Nations Population Division. (4) Internet usage information comes from data published by Nielsen Online, by the International Telecommunications Union, by GfK, by local ICT Regulators and other reliable sources. (5) For definitions, navigation help and disclaimers, please refer to the Website Surfing Guide. (6) The information from this website may be cited, giving the due credit to www.internetworldstats.com. Copyright © 2022, Miniwatts Marketing Group. All rights reserved worldwide.

Figure 1: Number of Internet users in the world [7]

In Figure 1, it can be seen that Europe has a high internet penetration rate of 89.2%, which is significantly above the global average of 67.9%. This indicates widespread internet usage among the population of Europe and a high level of internet access. Since 2000, the number of internet users in Europe has increased by an impressive 611%, indicating a continuous growth trend in internet usage in the region. Therefore, Europe has a significant impact on global internet usage due to its high penetration and large number of internet users, making it an important market for online business, digital marketing, and the development of digital services [8].

The International Telecommunication Union (ITU) (https://www.itu.int/en/Pages/default.aspx) is a specialized agency of the United Nations for information and communication technologies (ICTs). According to ITU estimates, around 5.4 billion people, representing 67% of the world's population, will be using the internet in 2023. This represents a 45% increase from 2018, with an estimated 1.7 billion people having connected to the internet during that period. According to ITU data, Figure 2. shows the number of internet users in Serbia.

SERBIA

RS - 8,680,974 population (2022) - Country Area: 77,474 sq km

Capital city: Belgrade - population 1,398,000 (2020)

GDP (per capita): $7,411 (2019) per World Bank.

6,406,827 Internet users in Jan, 2022, 73.8 % penetration, per IWS.

4,892,800 Facebook users in Jan/22, 56.4% penetration rate.

Local Time and Weather in Belgrade, Serbia

Figure 2: Number of Internet users the Republic of Serbia [7]

Despite the significant number of Internet users in the Republic of Serbia, which according to MTU data is 6.4 million or 73.8% of the total population, the analysis shows that Internet penetration in the country is slightly lower than the European Union (EU) average, reaching 78.0 %. This data indicates that the Republic of Serbia, although it has a solid presence on the Internet, has the potential for further growth in the digital sector.

Compared to EU members, such as Croatia and Slovenia, the Republic of Serbia still lags behind in terms of internet penetration and the number of users.

Keeping pace with European standards in the digital sector is becoming a key issue for the Republic of Serbia. Increasing the internet penetration rate and improving the digital literacy of the population can contribute to bringing the country closer to the European percentage average. This is especially important considering that some EU member states have made significant progress in these areas.

It can be concluded that the Internet as a potential market is constantly growing and represents a very promising space for further business development and represents a huge opportunity for those who possess entrepreneurial potential and relevant entrepreneurial skills and competencies.

In the monograph by Soltanifar et al. [9], a number of practical tools that can be directly used in the field of digital entrepreneurship are presented, Table 1. This encourages future entrepreneurs with high potential for digital entrepreneurial competencies to consider starting their own business.

Table 1. Overview of practical tools for Digital Entrepreneurship

Num.	Tool
1.	Understanding the necessity of learning how to develop a digital entrepreneurial mindset during ventures among entrepreneurs and their teams.
2.	Exploring how to enhance the concept of creativity through the use of virtual artificial intelligence, reality, and the Internet of Things, thereby encouraging entrepreneurs and their teams to establish connections, develop ideas, create value, collaborate, and communicate.
3.	Understanding how technologies and management methodologies need to be applied within the organizational plan to generate sustainable competitiveness, advantages and benefits.
4.	Learning about a structured approach to testing a venture idea and seeing examples of different, minimum specification products (MVPs) that drive the testing process.
5.	The process of learning and testing the specific dynamics of business models of the platform and the realization of the development of the platform with minimum specifications, through different approaches.
6.	Researching how to use blockchain to provide security during online counseling.
7.	Application of business models, improved by new technologies such as artificial intelligence in the digital form of entrepreneurship.
8.	Research on how to apply the concept of digital transformation throughout the entire organization.
9.	Research on how to incorporate creativity into the core of a company's digital processes to promote innovation.
10.	Testing the conceptual frameworks of emphasizing corporate digital entrepreneurship through three elements: business model transformation, operational model transformation and cultural transformation.
11.	Researching how to engage new sources of entrepreneurial funding, such as crowdfunding.
12.	Applying the Entrepreneur Proposal Criteria for Digital Innovation and learning how to create and nurture a culture that supports digital entrepreneurship.
13.	Using a roadmap for the interaction of digitization and international opportunities.
14.	Examining how to improve the current institutional infrastructure for digital entrepreneurship.
15.	Understanding the necessity and potential of digital entrepreneurship in accordance with the goals of sustainable development, learning how to develop the enterprise accordingly.

In the context of digital entrepreneurship, it is concluded that information and communication technologies play a key role in connecting computers, radio and television, while new digital technologies, such as smartphones, network platforms and artificial intelligence, further emphasize their importance. These aspects become especially important given the unique challenges and opportunities digital businesses face in terms of go-to-market strategies, revenue generation, and managing relationships with various stakeholders.

THE IMPORTANCE OF ICT FOR THE DEVELOPMENT OF DIGITAL ENTREPRENEURSHIP

From the appearance of the first computers as devices for performing basic mathematical operations until today, computers have gone through several transformations. The development of information technologies, networks

and computing in the last 30 years has been extremely fast. Starting with simple operations such as addition, subtraction, multiplication and division, all the way to computers that can graphically display complex scenarios today, chip-making technology has reached a level where chips are smaller than human cells and viruses. Decreasing chip size has led to challenges in further development, as software requirements continue to outpace hardware. In accordance with the global trend, high-speed access to the Internet as a global network has also been developed. Information technologies are constantly evolving, and innovations in software, hardware, and information systems and networks bring numerous advantages. These advantages are visible in business integrations, entrepreneurial ventures, micro, small, medium and large enterprises, where information technologies often contribute to savings and increased profits [10].

Some of the technological trends that mark the age of digital transformation and whose knowledge significantly contributes to the development of digital entrepreneurship are [11]:
1. 5G Mobile Communication Network;
2. Artificial Intelligence;
3. Autonomous devices (robots, i.e. the use of artificial intelligence to automate functions normally performed by humans);
4. Blockchain Technology (Blockchain);
5. Augmented Analytics: Big Data in combination with artificial intelligence, that is, the use of machine learning for automatic learning, and decision optimization using in-depth data analysis;
6. Digital Twins, i.e. virtual replicas of the real world or entities;
7. Advanced Edge Computing (Internet of Things, complementary models with solutions in the cloud);
8. Experiences in Smart Spaces - Smart Spaces (virtual reality - virtual reality VR, augmented reality - augmented reality (AR), and mixed reality - mixed reality MR)).

On this occasion, we will present certain technologies [10] and their potential for the creation and development of entrepreneurial ventures.

Cloud Computing

Cloud Computing is becoming ubiquitous and represents an optimal way to distribute business applications, becoming an increasingly popular solution among growing companies. This concept can be described as a set of interconnected computers and/or services. On the other hand, Cloud Computing can also be seen as a data center infrastructure tailored to the type of cloud service being provided. Although the concept of cloud computing is not entirely new, the idea is essentially to move the "machine - central unit" to the "cloud," or a remote location that is not directly accessible to users [12].

Cloud Computing revolutionizes the way companies access, use, and maintain their applications. Instead of local resources, organizations are increasingly relying on remote servers and services provided by cloud providers. This shift allows companies to more efficiently manage their IT resources, scale operations as needed, and adapt to changing market demands. Cloud computing brings numerous benefits, including flexibility, scalability, efficiency, and cost reduction. Companies no longer need to invest in expensive physical servers and equipment but can instead use resources as needed, reducing initial costs and increasing operational efficiency [13].

Artificial Intelligence and Machine Learning

Artificial intelligence represents an impressive example of human creativity because it successfully combines different disciplines, including philosophy, mathematics, computer science, psychology and neurology [14]. As defined by Russell and Norvig, "artificial intelligence" is the term used when a machine behaves as if it has cognitive functions that humans associate with other human minds, such as learning and problem solving [15].
In the business world, artificial intelligence is increasingly becoming a key factor in the transformation and improvement of various aspects of business. Google, as a leader in the digital environment, has already been using its advanced artificial intelligence system called RankBrain for various purposes since 2015. This system plays a key role in areas such as advertising, chatbots, data analysis, product recommendations and dynamic pricing. Artificial intelligence is not limited to just one type of algorithm. It encompasses a wide range of technologies, including machine learning, robotics and rule-based systems, which together contribute to predicting outcomes and making intelligent decisions. This comprehensive approach enables artificial intelligence to effectively solve various business challenges [16].
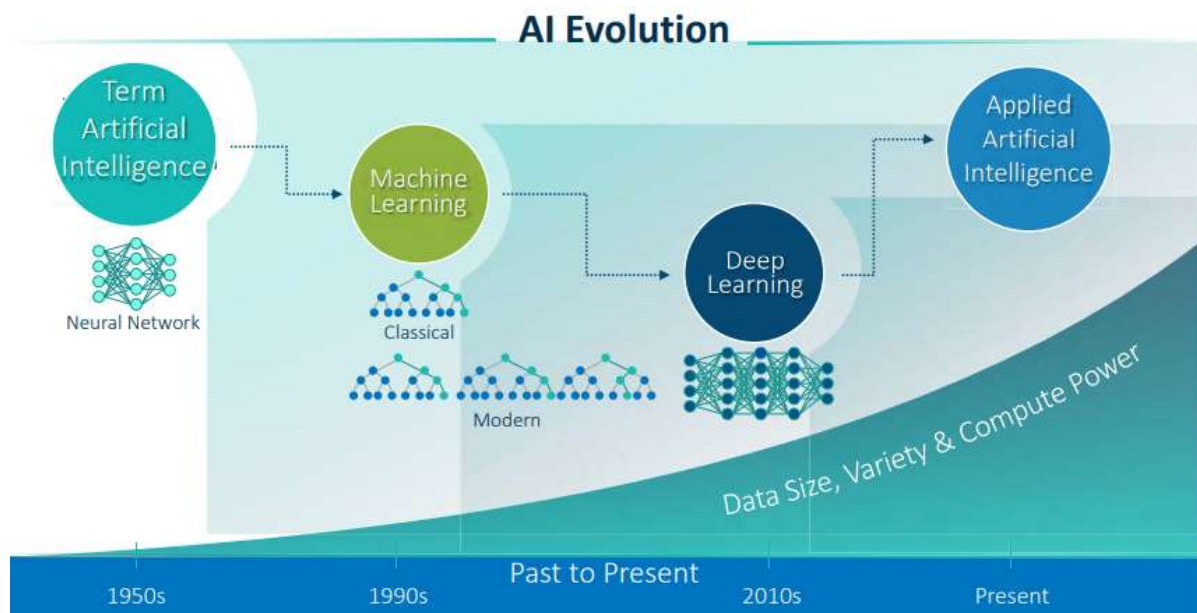Figure 3. shows the evolution of artificial intelligence.

Figure 3. Evolution of artificial intelligence. [17]

With built-in artificial intelligence, machines can learn from experience, adapt to new inputs, and perform certain tasks without human intervention. Examples of this include facial recognition, speech recognition, winning chess games, and the like. Although artificial intelligence has been around since the 1950s, it is currently experiencing its most intensive application thanks to the explosion of data in the Internet of Things, high-speed connectivity and high-performance computing. Machine learning, as a subset of artificial intelligence, identifies patterns and anomalies in data from smart sensors and devices without being explicitly programmed where to look. Over time, machine learning algorithms "learn" how to produce more accurate results. As such, machine learning goes beyond traditional business intelligence tools and provides operational predictions several times faster and more accurately than rule-based and schedule-based systems [17].

In essence, AI is becoming an indispensable part of business tools and applications, and its contribution often goes beyond the technology itself, focusing on achieving specific business goals and improving the user experience.

Virtual, Augmented and Mixed Reality
Today's virtual reality equipment allows a wide range of people to enjoy this technology. Sightseeing is done by moving the head in the desired direction, walking with the help of control sticks or motion sensors. In this way, virtual reality tries to occupy all human senses in order to make the experience as close to reality as possible. It is as if the user is in a completely different place and time, that is, in the virtual world [10].

An example of the successful application of virtual reality in electronic business can be seen through the cooperation of the world-famous site eBay with the Australian company Mayer in 2016. During this initiative, the first department store was created in virtual reality. Through the use of mobile devices and virtual reality cases, consumers are given the opportunity to virtually explore the products available in that department store. Users are enabled to move, rotate, and zoom in on products, are provided with real-time availability information, and are also provided with the ability to directly purchase products online [18].

Augmented reality is a combination of a real representation of the physical world and a digital representation of the virtual world in such a way that digital content is projected onto a real location, creating a new, enriched space with digital elements. Although augmented and virtual reality have promising perspectives and applications in future applications, there are several differences in their characteristics. Unlike virtual reality, whose purpose is to completely isolate the user and move them to another world, augmented reality encourages the user to interact with the real environment. Also, there are devices that combine the features of both technologies, enabling the transition from one to the other [18].

Mixed reality represents the integration of the physical and digital worlds, creating connections between the interaction of humans, computers and the environment. This innovative form of reality is based on advances in computer vision, graphics processing, display technology and input systems. The term was introduced by Paul Milgram and Fumio Kishino in 1994 through the "Taxonomy of Mixed Reality Visuals" [19].

In Figure 4, we can see the spectrum of mixed reality and the relationship between the physical and digital worlds, virtual reality, augmented reality and mixed reality. Mixed reality integrates the physical and digital worlds, and these two realities are defined as extremes on the virtuality continuum. The spectrum of mixed reality encompasses different levels of reality. At the left end is the physical reality with real people, while at the right end is the corresponding digital reality. This image illustrates how the blending of the physical and digital worlds takes place on the mixed reality continuum.
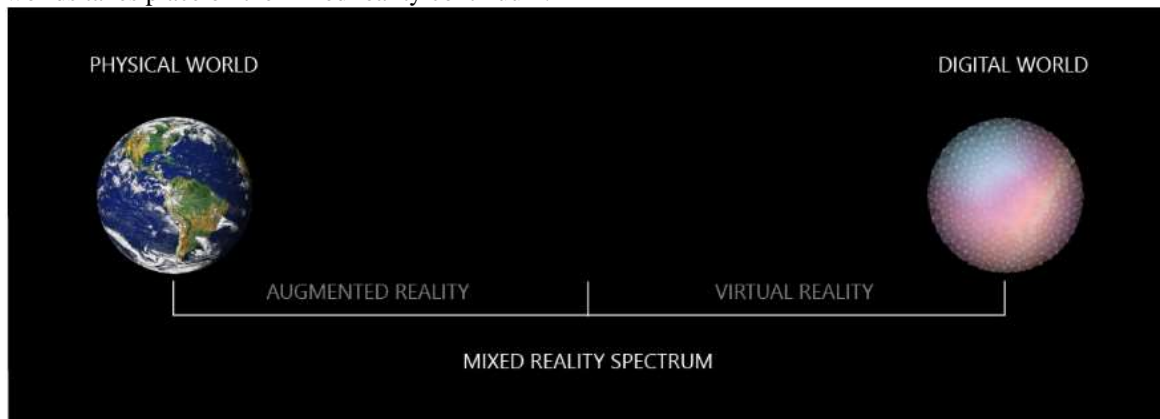

Figure 4. Spectrum of mixed reality [19]

Internet of Things

In 1999, British technologist Kevin Ashton coined the term "Internet of Things" to describe a network that not only connects people, but also the objects around them. Today, the Internet of Things represents a vast network of smart objects that work together to collect, analyze data and perform various actions autonomously. The emergence and development of the Internet of Things concept has created the preconditions for traditional stores to apply these tools to improve their business. Tools have emerged that allow brick-and-mortar stores to collect data about their customers by tracking their steps and behavior throughout the shopping process, as they move between shelves and select products [10].

Big Data

Big Data includes the collection of data from various internal and external sources of the organization, and the interpretation of that data in order to improve efficient business management and improve customer service. It enables tracking of customers and their communication through different channels, which helps in measuring and managing the customer experience - the overall experience that the customer has with the company. Key issues related to the value of Big Data for organizations include [16]:

- Data itself is not as important as analysis and the ability to use that analysis in decision-making;
- Mathematical algorithms provide a wealth of data about things that have happened or are still happening, but they do not provide an answer to the question of why something happens, so analytics is needed;
- It is useful to first learn how to maximize value from small data before moving on to big data;
- Some of the data may be misused to the detriment of the individuals to whom the data refer.

The importance of data exchange within the concept of Big Data is important for many industries, but the data that is often used is the user's personal data, which can be sensitive, and the disclosure of such sensitive information violates the individual's privacy. Privacy is considered one of the most important issues in the application of Big Data. In order to ensure the privacy of big data, it is necessary to apply data recovery operations. Recently, anonymization techniques have been the subject of numerous researches and are considered the best way to sanitize data.

Data Mining

Data Mining is used to extract patterns that lead to knowledge from data collected from heterogeneous sources. It consists of elements of many areas such as statistics, DBMS, DataWarehouse, High Performance Computing, Information retrieval, Algorithms, Visualization, Pattern Recognition, Machine Learning and others. Data

Mining can have its application in many interdisciplinary fields for the extraction of data used for decision-making and their implementation [10].

CONCLUSION

In today's business environment, the rapid development of digital technologies, including mobile services, information technology, cloud computing, artificial intelligence, Internet of Things, virtual, augmented and mixed reality, as well as big data analysis, have significantly transformed the way business is done. Digital entrepreneurship is becoming critical to the success of businesses, as those that effectively use these digital tools can create value and meet the needs of today's consumers.

The Internet plays a key role as a source of new business opportunities around the world, opening the door to innovation and new opportunities. In this context, e-business is becoming an integral part of modern entrepreneurship, enabling companies to adapt their business models to the global market via the Internet.

Cloud Computing provides the optimal way to distribute business applications, providing flexibility and cost reduction through remote servers. Artificial intelligence and machine learning are transforming the business world, making it possible to solve various challenges and improve operational processes.

Virtual, augmented and mixed reality provide innovative ways to interact, while the Internet of Things connects smart objects, creating a network that spans a wide range of devices. Big data analysis enables businesses to make informed decisions and improve their operations.

Despite the significant number of Internet users, some countries, including the Republic of Serbia, can additionally work on increasing the rate of Internet penetration and improving digital literacy in order to keep pace with European standards.

Digital entrepreneurship requires adaptation and adoption of new paradigms in order to take advantage of digital technologies. Proper use of these tools can bring competitive advantages and enable businesses to remain relevant and successful in a dynamic business environment.

REFERENCES

1. Davidson, E. & Vaast, E. (2010). Digital Entrepreneurship and its Sociomaterial Enactment. 43rd Hawaii International Conference on System Sciences, IEEE Computer Society, doi:10.1109/HICSS.2010.150, 1-10.
2. Vasilchenko, E. & Morrish, S. (2011). The Role of Entrepreneurial Networks in the Exploration and Exploitation of Internationalization Opportunities by Information and Communication Technology Firms. Journal of International Marketing, 19(4), 88-105.
3. Javalgi, R. G. (2012). Entrepreneurship, muddling through, and Indian internet-enabled SMEs. Journal of Business Research, 65(6), 740-744.
4. Hair, N., Wetsch, L. R., Hull, C. E., Perotti, V. & Caisy Hung, Y.T. (2012). Market Orientation in Digital Entrepreneurship: Advantages and Challenges in A Web 2.0 Networked World. International Journal of Innovation and Technology Management, 9(6). https://doi.org/10.1142/S0219877012500459.
5. Simović, V. (2016). E-business. Belgrade College of Vocational Studies for Information Technologies.
6. Orr, G. (2003). Diffusion of Innovations, by Everett Rogers (1995).
7. Internet World Stats, https://www.internetworldstats.com/stats.htm, Available 10.01.2024.
8. Trifunović, I., Spalević, Ž., Marković, F. & Savić, S. (2023). Legal regulation of e-tourism and the future of the application of artificial intelligence in e-tourism. Artificial Intelligence: Innovation, Application and Ethical Challenges, Sinergija University, Bosnia and Hertzegovina.
9. Soltanifar, M., Hughes, M. Göcke, L. (2020). Digital Entrepreneurship - Impact on Business and Society. Springer Nature.
10. Simović, V. & Ilić, M. (2021). Digital entrepreneurship, Belgrade.
11. https://www.bbva.com/en/nine-technology-trends-in-2019/ BBVA, 2020, Available 12.01.2024.
12. Dempsey, D. & Kelliher, F. (2018). Industry Trends in Cloud Computing. Cham: Springer.
13. Developing a Digital Entrepreneurial Mindset for Data-Driven, Cloud-Enabled, and Platform-Centric Business Activities: Practical Implications and the Impact on Society, Mariusz Soltanifar and Edin Smailhodžić.
14. Kumar, K., & Thakur, G.S.M. (2012). Advanced Applications of Neural Networks and Artificial Intelligence: A Review. I.J. Information Technology and Computer Science, 6, 57-68.
15. Russell, S. & Norvig, P. (2003). Artificial Intelligence: A Modern Approach. London: Pearson.
16. Charlesworth, A. (2020). Absolute Essentials of Digital Marketing. London: Routledge.
17. SAS, The Artificial Intelligence of Things From smart connected devices to artificially intelligent things, services and experiences,

https://www.sas.com/content/dam/SAS/documents/marketing-whitepapers-ebooks/sas-whitepapers/en/artificial-intelligence-of-things-110060.pdf, Available 17.01.2024.

18. *Dieck, M. C. & Jung, T. (2019). Augmented Reality and Virtual Reality. The Power of AR and VR for Business. Springer Nature Switzerland AG.*

19. *Microsoft, https://learn.microsoft.com/en-us/windows/mixed-reality/discover/mixed-reality, Available 17.01.2024.*

20. *Zbakh, M., Essaaidi, M. & Manneback Chunming Rong, P. (2019). Cloud Computing and Big data technologies, aplications and security. Springer Nature Switzerland AG.*