

Technological Trends and Their Impact on the Formation of New Business Models in Startups

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Abstract— The article is devoted to the analysis of technological trends and their impact on the formation of new business models in startups. The paper examines key modern technologies such as artificial intelligence, machine learning, the Internet of Things, 5G, virtual and augmented reality, robotic process automation, blockchain and quantum computing. It analyzes how these technologies change existing and create new business models, improving the efficiency of processes and opening up new opportunities for growth. Examples of successful startups using these technologies to achieve competitive advantages are given. The study identifies the main problems and prospects for the development of startups in Russia, comparing them with foreign practices, and offers recommendations on the introduction of innovations for sustainable growth and increased competitiveness. In conclusion, the importance of further research in this area for optimal use of technological capabilities is emphasized.

Keywords— Business models, startups, technological trends, the impact of technological trends, technological trends in business models.

I. INTRODUCTION

Modern technological trends have a significant impact on business development, especially in the context of startups. Technologies not only change operational processes and increase efficiency but also contribute to the formation of new business models that align with current realities and market demands.

Technological trends such as artificial intelligence, blockchain, the Internet of Things, and cloud computing are becoming the driving force behind innovation in various industries. Their influence on the business models of startups is evident in changing approaches to customer interaction, optimizing internal processes, and developing new products and services. As a result, startups that effectively leverage these technologies gain competitive advantages and can more successfully adapt to dynamic market changes.

The relevance of this topic is driven by the rapid pace of modern technology development and its significant impact on all aspects of business. Startups, as the most flexible and innovative structures, find themselves at the center of this process, requiring them to adapt and use new technologies for growth and competitiveness.

The aim of this study is to examine the impact of modern technological trends on the formation and development of new business models in startups.

II. KEY TECHNOLOGICAL TRENDS

Technological progress significantly impacts all aspects of modern business, including startups. One striking example of this influence is the rapid development of artificial intelligence (AI) and machine learning (ML). These technologies are applied across various sectors, such as healthcare, finance, and retail, enhancing efficiency and improving decision-making processes.

Modern technological trends focus on synthesizing natural and artificial intelligence, which significantly expands human capabilities and enhances business processes. This approach

opens new horizons for business development, allowing companies to use resources more effectively and unlock employee potential.

Intelligent technologies and data analysis algorithms accelerate decision-making, optimize workflows, and reduce risks. Machine learning systems, by analyzing vast amounts of data, can predict potential business outcomes, helping to avoid problems and make informed decisions.

One of the main advantages of this approach is the significant increase in business process efficiency. Automation eases the execution of routine tasks, allowing employees to focus on more critical issues. This makes businesses more flexible, adaptive, and competitive. For example, many companies, including banks, actively use robotic assistants in their technical services to process customer requests, significantly speeding up customer service operations and reducing wait times. The Swiss bank St. Galler Kantonalbank replaced 99% of its staff with robots that serve customers through intelligent applications starting in 2023.

The integration of artificial intelligence creates opportunities for the use of intelligent technologies and HR analytics tools, accelerating employee training. This reduces the time required to prepare new specialists and enhances the qualifications of current employees, positively impacting work outcomes. For instance, IBM uses its Watson platform to train employees, offering personalized courses and training sessions while analyzing performance data to determine the most effective training methods. Google has implemented the "g2g" learning system, allowing employees to share knowledge and experience, adapting training materials to each worker.

The balance between human and artificial intelligence is crucial for achieving maximum efficiency. Proper interaction allows for optimizing business processes and unlocking the potential of both sides.

The use of artificial intelligence in software development enables developers to utilize their resources more efficiently and accelerate the application creation process. One of the main advantages of this approach is the automation of repetitive

tasks, allowing developers to focus on more complex tasks such as designing new features and improving user experience. According to Gartner's forecasts, by 2028, 75% of IT developers will use AI to create code, compared to 10% at the beginning of 2023.

Machine learning algorithms and big data analysis allow AI to predict code errors before they occur. For example, the DeepCode platform analyzes code and offers recommendations for improvement, identifying potential vulnerabilities. This significantly enhances software quality and reduces the time needed for debugging and error correction.

AI is also used to optimize the application testing process. AI-driven automated tests can cover a wide range of usage scenarios, helping to detect complex errors and increase the reliability of the software product. In this area, Amazon uses the CodeGuru tool to analyze code and generate recommendations, accelerating development processes by identifying potential issues and deviations.

The integration of AI into the development process facilitates the creation of intelligent code analysis tools that can offer optimal solutions based on global standards and their own experience. AI-enhanced development represents a promising and efficient approach to software creation, saving companies time and resources while improving product quality.

Another significant technological trend is the expansion of the Internet of Things (IoT). This network includes numerous interconnected devices capable of exchanging data, transforming our interaction with the environment and creating new products and services. The rapid technological development continues, and this trend is expected to persist with the introduction of new innovative solutions.

Fifth-generation networks (5G) play an important role in the modern technological landscape. The introduction of these networks promises to significantly increase data transfer speeds and reduce latency, opening up new opportunities for mobile applications and services. Already, 5G provides higher speeds and more reliable connections, fostering the development of areas such as remote surgery and autonomous vehicles.

Virtual and augmented reality (VR/AR) continue to evolve, finding increasing applications in gaming, education, and healthcare. VR creates immersive virtual worlds, while AR adds digital elements to real-world environments, offering new opportunities for interacting with information and the surrounding world.

Robotic process automation (RPA) enables the automation of routine tasks, increasing efficiency and reducing errors. This technology continues to be applied in various fields, from manufacturing to finance, freeing human resources for more creative and strategic tasks.

Blockchain technology remains one of the key technologies changing approaches to data management and transactions. The transparency and security provided by this technology find applications in areas such as supply chain management and financial services.

Quantum computing, which utilizes the principles of quantum mechanics, promises significant advantages in data processing and solving complex problems. Although this technology is still in its early stages, it has the potential to

revolutionize fields such as drug development and financial modeling.

The process of data processing and visualization is becoming increasingly important for making informed decisions. The development of tools for data analysis and presentation helps organizations use their resources more effectively.

The use of renewable energy sources, such as solar and wind energy, continues to grow. These sources play a crucial role in creating a sustainable energy system, reducing dependence on fossil fuels.

Digital twins create virtual models of physical objects or processes, enabling optimization and improvement of their performance. This technology is already being used in manufacturing, healthcare, and infrastructure and continues to evolve.

Edge computing, which brings data processing closer to the source, is more important in the context of the increasing amount of data that is generated. This technology helps reduce latency and increase data processing efficiency.

As technology advances, the need to protect data and systems from cyber threats also grows. The importance of cybersecurity continues to increase, and it is expected to remain one of the key areas of technological development in the future.

These technological trends will shape the development of various industries in the coming years, opening up new opportunities and changing our approach to work and interaction with the world.

III. THE IMPACT OF TECHNOLOGICAL TRENDS ON STARTUP BUSINESS MODELS

The influence of digital technologies on the economy in recent years has been significant, especially in their integration into traditional business processes. Studies show that digitalization transforms business methods, marketing strategies, resource management, and significantly reduces or eliminates production and transaction costs associated with management and communication. In the Republic of Belarus, the Ministry of Economy annually develops and approves a Plan for conducting startup events since 2012. The development of events for this Plan involves the Ministry of Economy, regional executive committees, and the Minsk City Executive Committee, as well as organizations that prepare and conduct startup events. The existence of the Plan allows these organizations to receive support from local authorities, which is a significant contribution to the development of the startup movement in the country. This support is both financial and organizational and informational.

Currently, the startup ecosystem in Belarus is in the initial stage of development. Let us consider the achieved results within the six key components of the startup ecosystem.

1. Education and Science: Belarus has several educational institutions that train specialists in digital technologies. Educational resources and high-tech schools have been created, supported by IT companies to meet the demand for qualified personnel. However, programs that facilitate the successful implementation of startups are still undeveloped. Interaction between educational institutions and the financial subsystem of

the startup ecosystem is not yet established. The implementation of the "University 3.0" model is just beginning: universities organize entrepreneurship courses, business project competitions, and startup schools. An experimental project based on seven universities aims to develop research and innovation infrastructure, with the goal of creating innovative products and commercializing intellectual activities.

2. Human Capital: Belarus has significant potential in human resources, including highly qualified specialists and innovative entrepreneurs. This potential contributes to the increase in the number of startups and their entry into international markets. However, sanction pressures on the country cause a brain drain, especially from the IT sector, negatively impacting the state of human capital.

3. Financial Resources: Venture financing for startups in Belarus remains problematic. Despite the existence of the Belarusian Innovation Fund, resources to support projects are limited. Joint venture funds with foreign countries are developing slowly, and Belarusian companies and business angels conduct strict project selection, forcing investors to seek financing abroad.

4. State Support: The state actively supports the development of startups through the improvement of educational policies and the creation of technoparks. Legislative measures have been adopted, such as tax benefits for token operations and the creation of a legal framework for the functioning of cryptocurrency exchanges.

5. Infrastructure: The existing infrastructure of the startup ecosystem requires improvement. There is a need to increase the number of accelerators and online platforms that have proven themselves abroad. Currently, the entrepreneurial ecosystem infrastructure does not fully meet the specifics of startups.

6. Favorable Environment: There remains a cautious attitude towards startups and innovators in Belarus, which hinders the development of an innovative climate. Raising public awareness of the benefits of startups can improve the situation and stimulate their growth. At the moment, despite the presence of 339 startups in the country, many of them are oriented towards external markets due to the limited capacity of the domestic market and insufficient access to investments.

To improve the startup ecosystem in Belarus, it is proposed to create an online platform called "Startup Community," which will support startup participants at all stages of their lifecycle. It is also advisable to attract funds from China to create this platform, which will help establish connections between startups, National Innovation Systems (NIS), and the entrepreneurial ecosystem. The use of advanced technologies contributes to the creation of new types of partnerships and ecosystems where the demand for digital products or services is stimulated by innovative methods.

Key company processes are also transforming: on one hand, digital technologies are being integrated into existing activities, automating them; on the other hand, new solutions based on fundamentally different technologies, such as blockchain, are emerging.

At the same time, any global trends manifest differently in each country. The geopolitical situation, legislative specifics,

and market characteristics leave their mark on global trends. Often, regional trends have a decisive influence on global ones.

A recent example of such influence is the European Union's decision to standardize charging devices for technology to a single Type-C format. Starting in 2024, Apple will transition all its devices to this standard, impacting its financial performance. Thus, one legislative act in the European Union changed the company's policy on a global level.

IV. EXAMPLES OF SUCCESSFUL STARTUPS ADAPTING NEW BUSINESS MODELS

Founded in 2019 by Sergey Yudovsky, Dmitry Karpov, Mikhail Rozhin and Alexey Astafiev, ElectroNeek specializes in the automation of work processes using RPA robots. These bots are designed to perform repetitive tasks such as management report generation, tender search and processing, and data entry into Excel and 1C. Since its inception, the company has raised \$23.7 million from funds such as Baring Vostok, YellowRockets.vc, Dragon Capital, I2BF, AngelsDeck, and Softline Venture Partners. In 2021, the company completed a \$20 million funding round, raising its valuation to \$100 million. In 2022, ElectroNeek opened its headquarters in Austin and was listed among the 20 most promising cloud companies by American Forbes. Today, the company's annual recurring revenue (ARR) exceeds \$5 million, with 85% coming from clients in the USA, Brazil, and India. According to Sergey Bogdanov from YellowRockets, ElectroNeek has the potential to become a leader in its field due to the high speed of work process automation and sustainable capitalization growth. Below, Table 1 briefly describes the company's solution.

TABLE 1. Description of a Startup Adapted to the New Business Models of ElectroNeek

Industry	Business Process Automation
Key Investors	Baring Vostok, I2BF, YellowRockets, Softline Venture Partners
Year Founded	2019
Raised Investments	\$23.7 million

Another example is the activities of Fintech Holdings. In July 2022, Georgiy Chesakov and Pavel Fedorov, who previously held top positions at Tinkoff Bank, together with entrepreneur Raffi Montemayor, started working on a fintech startup in the Philippines named Fintech Holdings. In October, the company raised \$16 million from the Arab fund Disrupt AD, an unnamed European investor, and a group of Filipino investors. The team registered a local legal entity and recruited 50 employees, mostly local specialists. The startup aims to engage in retail lending and the sale of banking products, having already reached an agreement to purchase a controlling stake in one of the Filipino banks. According to Denis Efremov from Fort Ross Ventures, the team's experience and significant investments give Fintech Holdings a chance to succeed in the challenging conditions of the Philippine market. Table 2 briefly describes the company's solution.

TABLE 2. Description of a Startup Adapted to the New Business Models of Fintech Holdings

Industry	Financial Technology
Key Investors	Disrupt AD
Year Founded	2022
Raised Investments	\$16 million

Optic was founded in January 2022 by Andrey Doronichev, Roman Doronin, and Vlad Vinogradov to develop a service for identifying copies of non-fungible tokens (NFTs). The idea for the startup arose after Doronichev discovered that the OpenSea platform could not automatically compare new tokens with existing ones. In March 2022, Optic secured its first client, OpenSea, and in April, it raised \$11 million from Kleiner Perkins and Pantera Capital. According to Denis Efremov of Fort Ross Ventures, Optic stands out among crypto projects due to its focus on web3 infrastructure and its specific product—an NFT verification service. For greater clarity, Table 3 briefly describes the company's solution.

TABLE 3. Description of a Startup Adapted to the New Business Models of Optic

Industry	Blockchain
Key Investors	Kleiner Perkins, Pantera Capital
Year Founded	2022
Raised Investments	\$11 million

Monite was created in 2020 by Ivan Maryasin and Andrey Korchak, who previously held leadership positions at the German neobank Penta and the Russian bank Tochka. The startup began its operations in Germany, offering an invoicing and payment processing platform for small and medium-sized businesses. In 2021, Monite raised €1.1 million from Runa Capital and Tomahawk VC, then shifted its strategy to provide an API for digital banks and financial services. In early 2022, the company raised \$5 million from Point72 Ventures and other investors. According to Yevgeny Timko of Xploration Capital, Monite successfully positions itself in the market thanks to its innovative platform and support from specialized investors. For greater clarity, Table 4 briefly describes the company's solution.

TABLE 4. Description of a Startup Adapted to the New Business Models of Monite

Industry	Financial Technology
Key Investors	Point72 Ventures, Runa Capital
Year Founded	2020
Raised Investments	\$6.3 million

Buddy.ai was launched in 2017 by Ivan Kryukov and Dmitry Plotnikov, who previously worked at the startup Cubic AI. Buddy.ai is a virtual English tutor for children. The project attracted \$500,000 from business angel Konstantin Senchenko and, between 2020 and 2022, raised another \$4.5 million from funds like Leta Capital, YellowRockets, and One Way Ventures. In 2021, Buddy merged with Edwin, and in 2022, it entered the markets of Brazil, France, Germany, and the MENA region. According to Sergey Bogdanov of YellowRockets, Buddy.ai became the leader in downloads in the "Kids and Education" category in the AppStore in Germany and Brazil, indicating a successful strategy and support from specialized

investors. For greater clarity, Table 5 briefly describes the company's solution.

TABLE 5. Description of a Startup Adapted to the New Business Models of Buddy.ai

Industry	Online Education
Key Investors	Leta Capital, YellowRockets, One Way Ventures
Year Founded	2017
Raised Investments	\$5 million

V. CONCLUSION

In conclusion, the research highlights the significance of technological trends for the development of startups and their business models. Modern technologies such as artificial intelligence, machine learning, the Internet of Things, and others have a substantial impact on all aspects of business, enabling startups to improve processes, optimize resources, and create new products and services. Examples of successful startups demonstrate how the effective use of technologies contributes to sustainable growth and competitiveness. The importance of analyzing foreign experience and adapting it to Russian conditions helps identify best practices and apply them to improve local startups. Recommendations for the development of startups include strengthening government support, improving entrepreneurial culture and infrastructure, and actively using innovative technologies. Further research in this area is necessary for a deep understanding and optimal utilization of technological opportunities, allowing startups to effectively adapt to changes and reach new heights in their activities.

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