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**ENTERPRISE DEVELOPMENT PATHS BASED ON SCIENTIFIC**  
**AND TECHNOLOGICAL ACHIEVEMENTS OF DIGITAL**  
**ECONOMY**

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**Abstract**

The article presents the results of a study of the directions of development of modern enterprises based on the use of scientific and technological achievements. The significance of new technologies in the operation of companies from the standpoint of the achievements of digital economy and the digitalization of society as a whole is revealed. The features of the practical application of new information technologies by enterprises in the context of the industrial revolution and Industry 4.0 are revealed. The use of tools of scientific and technological achievements of the digital economy in the operation of modern companies is today the most important condition that allows enterprises to respond to the challenges of growing global competition in a timely manner. This necessitates the competent application of the scientific and technological achievements of the digital economy in the development of the activities of modern enterprises. As of now, achievements in the field of electronic communications, the development of the Internet and telecommunication networks, communication systems, interactive terminals, audiovisual methods of transferring information and other means of scientific and technological advances. Scientific and technological progress today has reached such a level that modern technological solutions in the field of digitalization of the economy are so convenient and effective for companies that they begin to dominate over traditional economic instruments. In this regard, the most promising scientific and technological achievements of the digital economy are increasingly being used as priority paths of the development of modern enterprises.

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*Keywords:* Digital economy, digitalization, enterprise, information technology, Industry 4.0, marketing



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## 1. Introduction

The end of the 20th century and the beginning of the 21st century became a time of changes and transition from an industrial economy to the formation of a fundamentally new economic system – a new economy of a post-industrial society, where information and information technologies have become the main resource and the most important development factor. New means and ways of development of modern enterprises based on information technologies are today extremely relevant for the society, the manufacturers of various industries, both production and non-production spheres: economy, industry, science and education, jurisprudence, health care, culture. Nowadays, as a rule, they are developing mainly with the help of information technologies and the Internet. The ongoing digitalization of the economy and the ubiquitous impact of Industry 4.0 especially affects those areas of activity where innovative developments in managerial decision-making are a key factor to the success of enterprise development. Therefore, modern scientific and technological achievements of the digital economy and information technologies have a transformative effect not only on the communication means of interaction between companies and consumers, but also on the functioning of economic entities in the market as a whole. In this regard, the consideration of possible ways for the development of enterprises based on the scientific and technological achievements of the digital economy is relevant.

## 2. Problem Statement

Currently, the problem of studying the ways of developing enterprises in various fields of activity based on the scientific and technological achievements of the digital economy is the object of research by many scientists and representatives of the scientific community. Thus, in the works of modern authors one can find studies on the following topics: the role of digitalization of the economy in the modernization of industrial enterprises (Anokhina, 2018), as well as the prospects for the introduction of Industry 4.0 in industry (Bondarenko et al., 2020); the development of digital technologies based on Russian and foreign experience in economics and management (Avdeeva et al., 2017); the innovative development of transport logistics in the framework of the new technological order "Industry 4.0" (Anisimov & Shashkova, 2018); the specifics of management within the framework of Industry 4.0 as the basis for the effective management of Internet marketing (Krasnov et al., 2018); the peculiarities of the use of new information technologies in jurisprudence as a tool for the implementation of judicial discretion (Azarova, 2020); the importance of e-education in the development of a modern educational process management system (Arpentieva et al., 2020); the analysis of innovative development in the context of digitalization of regional economies (Azmina et al., 2020); the need to implement digital solutions for the benefits of HR (Bondarenko et al., 2020); the research of new marketing technologies (Korokoshko, 2012); the development of strategic technology partnerships (STP) of companies as a means of access to new technologies (Kilubi, 2016); strategic corporate communication in the digital age from the perspective of digital transformations, offering new challenges and opportunities for academia and practitioners (Camilleri, 2021) and others. The problem of digitalization of the economy is today considered as one of priorities for Russia. This fact confirms that digital economy is approved at the legislative level as the country's most important national project and it includes the national development

program of the Russian Federation for 2024 (Base.garant.ru., 2021) designed to shape the digital future of the Russian Federation. At the same time, digital transformation is one of the national development goals of Russia by 2030 (Garant.ru., 2021) and the following performance indicators are planned to be achieved:

- "digital maturity" of key sectors of economy and social sphere, including healthcare, education, public administration;
- increase the share of mass socially significant services available electronically up to 95 %;
- increase the share of households with broadband Internet access up to 97 %;
- quadruple investments in domestic IT solutions compared to 2019.

It should be noted that today growing interest in the problem of digital development in all spheres of life and the search for ways to develop enterprises based on the scientific and technological achievements of the digital economy is mainly due to the unfavorable epidemiological situation and restrictions around the world caused by the spread of the Covid-19 virus in 2020–2021. In this regard, the need for digital development and the formation of digital sustainability of operation of modern enterprises is the most important problem for companies to be solved for all market sectors.

### **3. Research Questions**

In modern conditions of the transition to "Industry 4.0" and digitalization of the economy, the following research questions are important for solving:

- a description of promising paths for the development of modern enterprises based on the scientific and technological achievements of the digital economy, indicating their relevance for companies in various sectors of economy;
- determination of the relationship between the specifics of the application by enterprises of various scientific and technological achievements of digital economy and the competitiveness of companies in the modern market.

### **4. Purpose of the Study**

The aim of the study is to identify the distinctive features of the paths of enterprise development based on the scientific and technological achievements of the digital economy in order to determine the possibilities of subsequent application and substantiate the practical significance for companies in various lines of business in modern conditions of digitalization of society and the development of the concept of Industry 4.0.

### **5. Research Methods**

The research is methodologically based in the systematic approach which made it possible to comprehensively study the problem of possible development paths for enterprises based on the scientific and technological achievements of the digital economy, as well as methods of comparative and strategic analysis, theoretical-empirical, economic, statistical and market research methods.

## 6. Findings

Digital economy has determined a new path for the development of all modern companies, and in order to successfully continue to operate in the market, enterprises must meet the challenges of both the digitalization of the economy in particular and "Industry 4.0" in general.

Today, at a new stage in the development of digital technologies, one of the main trends is the increase in the quantity, quality and variety of relationships between organizations and socio-economic systems, accompanied by the dynamics of the volume of circulating data leading to more complex and synchronized integration of all participants in the relationships (Abdrakhmanova et al., 2019). Such transformations required companies to search and form new ways of development and be ready to use new technologies in business activities. Of particular importance is the use of scientific and technological achievements of the digital economy that meet global trends in digitalization, the creation and implementation of personalized digital tools that can ensure digital sustainability of enterprises in various lines of business.

The main directions for the development of modern enterprises based on the use of scientific and technological achievements of the digital economy can be determined by digital technologies for business management, electronic budget and trade, e-commerce, e-marketing, tools for regulating the digital environment, information infrastructure and security, artificial intelligence, and introduction of ubiquitous robotization.

Important in the development of modern enterprises based on the scientific and technological achievements of the digital economy is the use of complex software based on the creation of consumer databases, behavioral analysis and elements of artificial intelligence, which allow companies to interact with customers using information messages that are most suitable and interesting to them. In the work of many enterprises today, there is a trend of active use of chat bots and specialized services of "smart autoresponders", which allow for personalized dispatch of a set of electronic messages at regular intervals thereby establishing trust and long-term relationships with potential customers. In this regard, it is the Internet that makes new technologies of the digital economy unique tools for communication of modern companies. On the Internet today, for the effective and purposeful promotion of companies in the electronic market, geo targeting technology is being actively introduced, based on the determination of the socio-demographic, geographical, personal and behavioral characteristics of a potential client by the IP address of the communication means they use (smartphone, tablet, computer, etc.).

In addition to messages on social networks and messengers, potential buyers of a car, for example, can receive SMS messages about the provision of a profitable credit loan specifically for the purchase of a car currently found on the premises of the car dealership. In addition, in traditional retail manufacturers today use smart Beacon systems that interact via Bluetooth with the phones of customers located within a radius of several meters for messages about discounts, navigation inside the store, generating heat maps for stores, contactless bill payment, etc. In retail outlets companies use self checkout systems (self-ordering) involving the use of innovative service technologies whereby there are no traditional sellers and cashiers. In addition, in order to determine the gender characteristics of store visitors and targeted retail and retail advertising companies are already implementing facial recognition technologies.

Business success is impossible without timely receipt of information about the needs of customers, changes in their tastes and preferences. In order to get a high result in building customer interactions, some companies practice latest eye tracking technology. Eye tracking refers to qualitative methods of marketing research, in which the respondent's attitude to the object is absolutely objective. The data from the eye movement analysis when viewing an image or a website is entered into company database and processed for subsequent evaluations. Eye tracking demonstrates the unconscious process of client's perception of a particular image, therefore, this technology allows you to subsequently place advertising messages in the most effective places (product packaging, billboards, Internet sites, etc.).

One of the most popular technological solutions based on the digital economy is still the use of Internet marketing, mobile advertising and SMS messages for the purpose of the company development. With the help of short messages and laconic images, users can participate in polls, promotional sweepstakes, contests, quizzes, and other promotions. For example, many businesses are still actively informing their customers through the systematic mailing of messages with appropriate topics.

The achievement of the digital economy, especially widespread among technologically modern people, is the QR code (Quick Response) technology – a matrix (two-dimensional) barcode developed by a Japanese company. By scanning and reading the barcode on the product or any image, the user can receive valuable information from the company on its exclusive offers, discounts, product consultations, etc. A successful example of using the QR code technology not only in the development of enterprises, but also in the development of a region is the QR-gid project in Saransk which is unique for Russia. Users of this service scan a code located on the sidewalk, go to the website with photographs of past years of the location in Saransk where they are at the moment. Before viewing the photo, users were asked to watch an advertisement of one of the project organizers. The "Travel in time – win a tablet!" promotion from regional organizations of the city of Saransk was held for the "City Day" holiday in the region, the main conditions of which were: scanning the QR code using a mobile device or a tablet computer, navigating through all QR ports located in the city, a photo in front of the place of each QR port and participation in the drawing of valuable prizes at the solemn celebration of the City Day on the Central Square of Saransk.

A new tool for business development of enterprises based on digitalization today is the technology of lead generation (Lead – acquire, involve), which consists in attracting customers through the generation of their various Internet actions associated with the submission of contact information and expressed in applications for newsletters, callbacks, registrations, orders. The most important trends in the development of the operation of enterprises based on digital economy technologies and the evolution of e-commerce are also: convergence (from the Latin *convergo* – bringing closer), expansion (from the Latin *expansio* – expansion) and improving the quality of digital services. At the same time, the main trend in the development of enterprises based on new digitalization technologies is the synergy of online and offline activities of customers/users and the achievement of the effect of simultaneous interaction with the consumer, both on the Internet and in the “tangible” reality.

It should be noted that at present, personalized mailings, e-mail and new technologies are primarily based on building the trust of the client and company's partners. In this regard, the concept of technologies of trust marketing (permission marketing) which is successfully developing in many industries and spheres of economy arose. It is the extensive toolkit of trust marketing (normally with the

help of information technology and the Internet) that envisages voluntary permission of the consumer to participate in various communication activities of companies. The technology of trust marketing consists in using the results of marketing activities obtained with the permission of the client and investing funds in their frequent implementation. In this case, client's trust is formed by the frequency of displaying communication messages at the initiative of the consumer himself. Consequently, the higher the level of consumer approval and his confidence, the greater the profit of the company. The company, first of all, must work to maintain the interest of the consumer, so as not to lose the attention and trust of the client. In this regard, the manufacturer must focus all its communication activities on convincing potential consumers to grant their permission to the company to sell and promote the product to them. Therefore, in order to sell and promote products to the buyer in the future, it is necessary to secure their consent to participate in the sale, purchase and its promotion in advance. This can only be achieved by involving the client in a dialogue and two-way communication. Thus, the buyer, based on the emotional interest in a particular product, must allow himself to be involved in its promotion, which will subsequently create consumer's confidence in the company and repeatedly involve them in the marketing communication process.

Based on obtaining client's consent to receive information from the company, trust marketing includes the use of the following means based on the use of new technologies: direct marketing, e-mail marketing, game marketing, viral marketing that involve opt-in mail or permitted mailings (mass mailings only to addresses whose owners have previously agreed to receive letters from this company), e-mail based advertising (advertising by e-mail through themed mailing lists to clients with a link to the advertiser's website in e-mails), hidden marketing (hidden marketing or spam, consisting in the dissemination of information beneficial to the customer, under the guise of an independent opinion in forums, guest books, blogs), independent and voluntary transmission of marketing messages by customers to each other, discussion forums and web conferences, etc.

In this regard, leading companies in various industries today have taken up the challenge of rapid digitalization and are developing their activities, transforming traditional business based on the trends of "Industry 4.0" and scientific and technological achievements of the digital economy.

## **7. Conclusion**

Thus, in the activities of modern enterprises, development paths that involve the use of digitalization technologies and the trend directions of Industry 4.0 are becoming more and more in demand. This makes it possible to establish the relationship between the specifics of the use of various scientific and technological achievements of the digital economy by enterprises and their competitiveness in the modern market. Therefore, further consideration of new technological solutions based on the digitalization of the areas of activity of enterprises is extremely important in these conditions. Competent use of information technologies in the operation of companies will allow not only for building customer confidence but also for the independent involvement of potential consumers or partners giving them new opportunities in the process of interaction with the manufacturer.

Currently, scientific and technological progress has reached such a level that modern technological solutions offered by the digital economy are so convenient and effective for enterprises that they begin to

dominate over traditional economic instruments of maintaining competitiveness. At the same time, the main task in choosing the paths for the development of enterprises based on the scientific and technological achievements of the digital economy should be the construction of an integrated communication system of the company which will be able to adapt as quickly as possible to any new conditions in the constantly changing information world of Industry 4.0.

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