Digital technologies of marketing logistics and risks of their implementation in supply chain

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Abstract. Currently, the digitalization of logistics is receiving attention. This is due to the development of digital transformation processes caused by the Fourth technological revolution. The use of digital technology in the supply chain allows companies to ensure strategic competitive advantages. As a result, the efficiency of the sales system will increase. However, the implementation of digital technologies is associated not only with positive effects, but also with risks. When conducting the author’s research, methods of structural and functional analysis, retrospective and comparative approaches, as well as expert assessment were used. Based on this methodology, the authors have identified and considered the main risks of the practical implementation of digital logistics technologies in supply chains. The results have high potential for practical use. It is recommended to take them into account when making management decisions on digitalization of logistics. This will determine the composition of measures to improve the efficiency of the logistics system, considering the need to reduce risks.

1. Introduction

The development of digital technology will fundamentally change all areas of human activity (public administration, citizen engagement, state policies, infrastructure development, new areas of business, smart technologies and online platforms, new decision support systems, digital technologies of education, and other) [1-12, etc.]. This process of changing has already begun. In modern conditions, the most urgent task can be distinguished - rethinking economic, social and political systems in the digital era. Many countries of the world solve this problem. For example, in 2016, Russia began work on a large-scale program for the development of the Digital Economy. This program received the status of the Official State Program, and since 2018, the National Project has been launched on its basis.

If we turn to the experience of technologically advanced countries, we can make sure that the issues of digitalization of the economy are given special attention. This is primarily about countries such as the USA, China and Germany (Figure 1). Figure 1 shows the chronology of significant events in the field of digitalization of the economy and society. The authors note two significant effects. First,
there is an increase in the intensity of such events. Second, similar events occur in different countries asynchronously, the leading countries of the digital era stand out.

For example, in 2010, China created a global online trading platform selling Chinese products of the widest range from various sellers intended for buyers abroad. In 2013, in the United States, Amazon patented an algorithm that predicts a customer’s purchase of a product before it confirms it. We emphasize that the state pays special attention to the digitalization of the logistics sector. This is evidenced by the creation in 2015 in France of the “Industry Alliance of the Future”, uniting organizations of various forms of ownership, the scientific environment and several state institutes and institutions. In 2016, France and Germany began to actively develop bilateral cooperation and work to create common standards for the use of digital logistics technologies.

All these new phenomena associated with digitalization require a theoretical explanation. This led to the emergence of many scientific works in this field (as indicated earlier). At the same time, the priority in research is given to the digitalization of logistics and marketing. Research in the field of digital logistics and marketing is very diverse. So Holmström and Partanen studied the digital transformation of supply chains for complex productions [13]. Rimmer and Kam investigated the transformation in consumer logistics caused by digitalization [14]. Golda et al. analyzed the prospects of application of virtual reality systems in logistics [15]. Kovács revealed the specifics of digital asset management in the areas of logistics and marketing [16]. Pollitt investigated the transformation of the physical distribution system of goods under the influence of digital technology [17]. Lukashevich et al. developed a new methodology for forecasting and evaluating the functioning of logistics chains using digital tools [18]. Kuleshova et al. proposed an approach to reengineering of supply chain considering the effects of digitalization [19]. An analysis of the literature showed that a significant number of other studies in the subject area under consideration are being carried out.

Source: developed by the authors

**Figure 1.** Experience in the application of modern digitalization technologies in logistics systems
Along with the potential opportunities provided by digitalization, certain risks are increasing for citizens, society and the state. The issues of risk analysis in logistics in the context of digitalization are poorly understood [20-22, etc.]. Therefore, it is necessary to anticipate risks, if possible, to avoid them or minimize them. The aim of this study is to analyze the risks associated with the introduction of digital logistics technologies, as well as to find ways to reduce them.

2. Methods
During the study, the methods of structural and functional analysis, retrospective and comparative approaches, as well as the expert assessment method were used. Thus, qualitative research methods were used. The source materials for analysis were taken by the authors from scientific literature; published in business media business cases; a series of in-depth interviews conducted with managers and specialists of Russian companies. Based on this methodology, the authors have identified and considered the main risks of the practical implementation of digital logistics technologies in supply chains. The obtained results are given a meaningful interpretation. Their use will allow, when making managerial decisions, to determine a list of measures to improve the efficiency of the logistics system.

3. Results and Discussion
The advantages of using digital technologies in the economy are primarily associated with various areas of possible reduction in the added value of products, improving their quality, forecasting (predicting) demand, shortening the time of their delivery, etc. (Figure 2).

Source: developed by the authors

Figure 2. Possible benefits from the application of digital economy technologies

One of the key sectors of the economy of most countries is logistics. When studying the main problems of digitalization of the economy, we found that the digitalization of logistics and supply chains may become the bottleneck in the implementation of digital technologies in several countries, in Russia. It is assumed that the supply chain using digital technology will be in online (rarely offline) communication with each element. The communications tool is currently called the “Internet of things”.


Let us turn to new digital technologies that can be implemented in a new techno-economic wave in logistics systems. First of all, we are talking about (1) the removal of cargo using unmanned vehicles, (2) three-dimensional printing to produce various products, (3) the use of drones, (4) “Smart” systems, and “Internet of things”.

The removal of cargo using unmanned vehicles. Uberization in logistics is a new phenomenon. Thanks to this, it seems possible to refuse to conclude contracts with many carriers and from the administration of shipments in favor of automatic ordering and fast electronic document management. Uber, based on available transportation statistics, allows you to determine the cost of logistics services in real time. Moreover, such services are financially responsible for the reliability of the carrier and can get rid of corruption schemes between employees of interacting companies.

Three-dimensional printing to produce various products. 3D printing technology in the production of various products will radically change the traditional supply chain. Thanks to the use of this method of manufacturing goods, it is expected to increase the production rate, it becomes possible to focus directly on the client. The consumer will be able to make individual changes to the product that he wants to receive. In addition, the environmental impact is reduced. Significantly reduced logistics costs, as the product is produced in the immediate vicinity of its place of consumption.

The use of drones. It is assumed that drones in logistics will play an auxiliary function and be used in conjunction with traditional transport. Restrictions on the use of drones are related to the fact that they can cover short distances and carry objects with small dimensions and weight, while there are also safety requirements. However, thanks to the use of drones in logistics, it becomes possible to solve previously impossible tasks: for example, express delivery within half an hour; delivery of goods to inaccessible areas, as well as delivery in conditions of traffic congestion by road. In addition, this type of transport does not need personnel (drivers, forwarding agents, movers, operators, etc.), the consumer can order the goods he needs automatically. In addition to delivering goods in logistics, drones can be used to scan and verify storage locations as part of a warehouse inventory. As for the issues of ensuring the safety and security of goods, here drones also find their application. Unmanned aerial vehicles can accompany cargo transported by another mode of transport, such as automobile, and inform the company’s security service as soon as something suspicious is noticed. It should be noted that further development of this technology will remove a few existing restrictions and expand the scope of application of drones in logistics [23, 24].

“Smart” systems, and “Internet of things”. The Internet of things that has combined many items and devices into one network provides an opportunity to transform existing business models, while allowing companies and consumers to get additional benefits. Smart systems will significantly facilitate the organization of cargo transportation, increase the efficiency of the warehouse. In addition, thanks to this technology, it allows to increase the transparency of operations and minimize the impact of the human factor.

An analysis of the implementation of digital technologies in logistics by the authors revealed a few risks. During the analysis, both empirical data and the results indicated in the literature were used [25-29, etc.]. Table 1 shows the risks that should be considered when designing logistics systems for the digital economy.

Some of these risks (for example, “The uncertainty of the future” and “Lack of the necessary number of specialists”) are systemic. They are inherent not only for digital, but also for traditional supply chains and systems. The authors drew attention to this in their earlier studies (Plotnikov et al. [25], Vertakova and Kurbanov [26]). But in the digital age, these risks get new content. They are changing. This requires the development of new tools to counter them. Most of the risks discussed in Table 1 are of a specific digital nature (“Problems encountered when synchronizing the work of various participants in the digital supply chain”, "Resistance of personnel to the introduction of digital technologies in logistics", "Lack of balance in the development of the logistics system elements in the transition to the digital economy”, “Blockchain crash”). Previously, they were not significant [30-32]. There was no technical basis for their appearance and serious influence.
Table 1. Risks associated with the implementation of digital logistics technologies

| Risks                                                                 | Characteristics                                                                 |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------|
| The uncertainty of the future                                      | Given the uncertainty of the further trajectory of the techno-economic wave, it is necessary to determine the mechanisms and models that will allow all participants in the supply chain to work effectively |
| Problems encountered when synchronizing the work of various participants in the digital supply chain | Achieving consensus between large, competing and distrusting companies is a definite problem that needs to be addressed in the transition to a digital economy |
| Resistance of personnel to the introduction of digital technologies in logistics | At the stage of implementation of digital technologies, timely identification and suppression of sources of unjustified resistance is necessary. Justification of benefits and motivation can significantly prevent or minimize the occurrence of this risk. One of the contradictions is the confrontation between the defenders of the existing order and the supporters of digitalization |
| Lack of the necessary number of specialists                         | Due to the high speed of changes in logistics during the digitalization of the economy, a situation may arise in which there will be a shortage of personnel |
| Lack of balance in the development of the logistics system elements in the transition to the digital economy | If one of the elements of the system is significantly improved and can work quickly and efficiently, and the other remains unchanged, the result can only be unsatisfactory operation of the system as a whole |
| Blockchain crash                                                    | Digital technology designed to improve the efficiency of logistics operations due to the transparency, availability and immutability of digital information will lead to the fact that even if the transaction was incorrect, caused by a failure, erroneous or fraudulent, but it is confirmed, it can no longer be fixed |

Source: developed by the authors

Let us turn to the question of analyzing the advantages and problems of automation of logistics processes at the state level. This also raises a set of questions that need to be answered (Figure 3). So, for example, if we are talking about Russia, the insufficient development of the domestic electronic element base and the high degree of dependence on foreign technology suppliers largely determine the possible scope of measures to digitalize supply chains. Moreover, in the context of an increase in the level of geopolitical risks [29], technological dependence casts doubt on the very possibility of a large-scale transformation of the system of product promotion to the final consumer in the future. Similar problems are characteristic of many other countries of the world, besides Russia.

An important clarification is needed here. We proceed from the fact that the digitalization of some logistics systems (their individual elements) may not be possible at a certain stage of their development. We cannot rely on the fact that all companies can develop equally efficiently. At the same time, a global logistics transformation based on digitalization of supply chains is possible only in this case. And the matter is not only the need for significant financial investments. The problems of digitalization of logistics can be associated with legislative, organizational and even socio-psychological reasons.

The functioning of logistics systems using digital technology involves constant monitoring of the effectiveness of digital infrastructure, the availability of technical equipment, software updates and advanced training for both managers and staff. Without these activities, carried out continuously and in combination, the operability of modern logistics supply chains will be negligible, and the costs may exceed the possible effects.
At the same time, if we turn to the opinion of the leaders of large, for example, automobile corporations, then in most cases they believe that digital transformation gives the company more opportunities than threats. Therefore, almost all these corporations have a well-developed program for carrying out the necessary transformations. However, Russia here is somewhat inferior to world leaders (Figure 4). Therefore, the joint efforts of business and government authorities in expanding the use of digital technologies are necessary.

Source: developed by the authors

Figure 3. Advantages and problems of logistics processes automation
Source: 2018 Global CEO Outlook, KPMG International

Figure 4. Surveys of executives of major global automotive concerns

4. Conclusions

The study allows us to formulate several conclusions.

- Digitalization is the most important trend in the development of modern economy and society. It affects all areas. In this regard, in many countries of the world special State Programs, Strategies and other documents for the development of the digital economy are adopted. Such actions of state authorities require coordination with the business, the use of its resources. If this kind of interaction is productive, economic growth occurs and technological leadership is formed.

- The use of digital technology is one of the priority areas for the development of logistics. This issue is paid attention not only to commercial companies, but also to the state. The study revealed that promising areas are: the removal of cargo using unmanned vehicles, three-dimensional printing to produce various products, the use of drones, “Smart” systems, and “Internet of things”.

- If you improve an individual element of the logistics system (warehouse, means of delivery of material resources, etc.), bring it to a state in which it can work quickly and efficiently, that is, digitally, while the other remains unchanged, the result it will still be unsatisfactory and the profit will not compensate for the invested funds. Therefore, integrated digital solutions are needed.

- Digitalization of logistics and supply chains has certain risks that must be considered when designing logistics systems for the digital economy. There are: the uncertainty of the future; problems encountered when synchronizing the work of various participants in the digital supply chain; resistance of personnel to the introduction of digital technologies in logistics; lack of the necessary number of specialists; lack of balance in the development of the logistics system elements in the transition to the digital economy; blockchain crash. Localization and reduction of these risks will make it possible to fully use the new opportunities from digitalization for both business companies and consumers. Of course, our work does not pretend to identify all the risks
associated with the digitalization of logistics and supply chains. Further research is needed on these issues. However, we tried to cover the main ones.

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