

Impact of Digitalization on the Efficiency of Supply Chain Management in the Digital Economy

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Abstract

The study considers digital supply management from the perspective of the involvement in international trade. An original concept of the role of digitalization in the efficiency of supply chain management is described. A SWOT analysis of the concept has been carried out; the concept strengths, weaknesses, opportunities and threats have been highlighted. The hypothesis of the study that the adoption of digital technologies contributes to the increase in the efficiency of supply management has been statistically confirmed. The indicators reflecting the development of digital technologies in individual countries and the levels of logistics have been analyzed. The hypothesis has been thoroughly considered through the example of the following countries: the Russian Federation (RF), the People's Republic of China and the Federal Republic of Germany (FRG); in particular, the correlation between the volume of external traffic and the investment in SCM software was built. A composite index that takes into account the efficiency of the supply chain using digital technologies has been developed; it is hierarchically structured and includes the sub-indices focused on the ICT potential, use, management and readiness, the digital technology infrastructure. The measures to improve the efficiency of supply chain management have been presented.

Keywords: digitalization; supply chain management; management efficiency; digital environment; digital economy; SCM software; international trade.

1. Introduction

Modern supply chain management (SCM) concepts are placing new requirements for measuring supply chain performance. The scale of supply chains, various goals and strategies of supply chain elements are possible factors in the emergence of conflicts, and, as a result, in a decrease in the overall supply chain efficiency. SCM is an effective tool in managing all supply chain elements in the context of limited resources; therefore, it is necessary to monitor supply chains based on their assessment, as well as to develop appropriate measures to enhance the overall supply chain efficiency – from suppliers to end consumers.

Currently, the effectiveness of supply chain management is considered based on the results of the SCM system to its operating costs; therefore, methods that involve a multi-criteria assessment of efficiency should be used (Clausen et al., 2013).

SCM in the digital transformation of the economy and society is regarded as a means of developing various systems based on financial, information, material and labor flows combined to create a single information system to solve various problems. Optimization criteria for modern SCM systems are also different – reducing total costs of the supply chain, forming partnerships, increasing total profit, maximizing market coverage, etc. (Cudziło et al., 2018).

The concept of supply chain management based on digital technologies requires a change in the patterns and principles of enterprise interaction.

One of the objectives of the supply chain concept is to ensure the competitive advantages of the enterprise. The advantages can be gained due to efficient and coordinated operation supply chains; however, in the context of their dependence on various influences (external and internal factors), there is often a need to transform them to meet new market

requirements, which can negatively affect the efficiency of the supply chain.

The relevance of the study is due to the insufficient theoretical background for determining the efficiency of supply chain management in the context of digitalization, as well as incomplete coverage of the influence of digitalization on the effectiveness of supply management.

The practical significance of the research is the possibility of using the indicators described in the study to create a digital profile of the country in the context of determining the impact of digitalization on the efficiency of supply chain management, as well as identifying the course of state regulation in this area.

2. Literature review

Supply chain management efficiency is a complex category that is considered differently by researchers.

The modern SCOR model has a holistic approach to supply chain management and is a reference model to address supply chain management decisions. The purpose of the model implementation is the integration of horizontal processes within the supply chain and the overall balance of the supply chain; it does not consider individual performance indicators (Chehbi-Gamoura et al., 2020).

In general, the set of indicators for assessing supply chain efficiency consists of the following indicators (Jabbour et al., 2019; Wang et al., 2016):

- service level indicators (the capability of the supply chain to meet customer expectations in various market segments);
- internal efficiency indicators (the capability of the company or supply chain to achieve the desired level of profitability in accordance with the type of market). If doing business in the market is risky, the margin must be high to justify a significant investment of time and money. On the other hand, in mature markets that are relatively safe, there may be lower margins that are offset by a higher income due to greater sales volumes throughout the supply chain);
- demand elasticity indicators (demand elasticity indicators measure the ability of a company/supply chain to respond to sudden changes in demand. The indicators reflect the maximum likely demand that a company or supply chain can meet compared to the current level, as well as determine the ability to respond to changes in the range due to the changes in consumer preferences, which is typical for developed markets);
- product development indicators (the ability of the enterprise and the supply chain to develop, and the ability to adapt to changing markets the enterprise operates in. They also measure the ability of the enterprise to design and implement a product in new markets, as well as the ability to gain advantages in growing markets).

Modern efficiency analysis methods are complex methods that combine dependency analysis and data envelopment analysis; It has been statistically confirmed that the efficiency of supply chain management is associated with a high profit of the company while warehouse operations are of the greatest importance in ensuring the overall efficiency of the supply chain (Reiner and Hofmann, 2006).

It was established that the criteria for the supply chain efficiency assessment differ by different categories of suppliers and customers. Thus, the highest supply chain management efficiency is observed in the case of efficient suppliers and customers, and the greatest impact on the efficiency of this category is the consistency of infrastructure, delivery quality, personnel development and risk management. The categories of "other buyers and efficient suppliers" and "efficient buyers and other suppliers" are affected by the following key factors: risk management, staff development and quality assurance. The ca-

tegory of "other buyers and suppliers" is influenced by personnel development and quality assurance, and only last but not least by risk management (Kim, Son, and Kim, 2016).

The following factors affect the efficiency of supply chains: the integration of supply chains and the quality of interaction between individual elements (Kim and Schoenherr, 2018), digitalization of supply chain management processes (Soltany, Rostamzadeh, and Skrickij, 2018), supply chain structure, inventory management policy, information exchange, customer demand, forecasting technique, delivery time (George and Pillai, 2019). At the same time, the focus should be placed on digital technologies, which have changed the methods of supply chain management (Tjahjono et al., 2017).

Modern supply chain management methods are Big Data, Internet of Things, Blockchain, Cloud Computing, Virtual Reality & Digital Twins, Autonomous Robots, Next-generation Wireless, Selfdriving Vehicles, 3D-printing, Low-cost Sensor Technology, Augmented Reality, Unmanned Aerial Vehicles, Bionic Enhancement (Tjahjono et al., 2017). Digitalization in the field of supply chain management has increased the overall supply chain efficiency, reduced the human error probability, increased the overall manageability and flexibility of the supply management system, and became the basis of new concepts in the area (Digital Logistics, Digital Supply Chain, Smart Supply Chain, Cold / Cool Supply Chain, Socially responsible Supply Chain, Green Supply Chain) (Seyedghorban et al., 2020).

The major trends in the implementation of digital technologies in supply management are as follows (Schneiderjans, Curado, and Khalajhedayati, 2020; Garay-Rondero, et al., 2019; Hofmann et al., 2019):

- widespread adoption of digital technologies, in particular the Internet of Things and Big Data;
- the highest rates of implementation of digital technologies in the field of supply chain management are observed in medicine and food industry;
- the mainstreaming of the green supply chain concept to increase the overall efficiency of green supply chains, which is reflected in the overall supply chain management quality, the preference for ecological products and modes of transport, shorter delivery times and the production cycle, the increase in equipment productivity, the minimization of defects, other material losses and waste;
- growing importance of short supply chains for local rural areas, farmers and agribusiness;
- increasing supply individualization, the formation of individual orders and supply chains;
- growing importance of reviews on social networks and the role of mobile devices and the Internet;
- the development of service standards and standards for the performance of individual operations within the supply chain;
- the introduction of lean processes that provide process elasticity and system flexibility;
- increased risks in supply chains associated with a significant number of elements.

Thus, it should be noted that some issues of the supply chain management efficiency have not been properly addressed, in particular, those related to the efficiency of supply chain management in the context of digitalization, as well as the influence of digitalization on the efficiency of supply management in individual countries and in general.

2.1. Setting Objectives

The study aims to expand scientific foundations in the field of supply chain management based on the use of digital technologies through the development of the original supply chain concept involving the use of digital technologies; to develop a scientific and methodological approach to determining the impact of digital technologies on certain indicators cha-

racterizing the efficiency of supply chain management; as well as to describe measures to improve the efficiency of supply chain management.

The purpose of the research is to study the impact of digitalization on the efficiency of supply chain management.

The following objectives have been set to achieve the goal:

- to describe the concept of a supply chain that involves the use of digital technologies;
- perform a SWOT analysis of the proposed concept;
- to test the hypothesis that the adoption of digital technologies contributes to the increase in the efficiency of supply management.
- to study the hypothesis in more detail through the example of the following countries: the Russian Federation (RF), the People's Republic of China (PRC) and the Federal Republic of Germany (FRG); to plot the dependence of the dynamics of export/import volumes on the dynamics of the logistics indices and the introduction of digital technologies;
- propose an index structure that takes into account the efficiency of the supply chain involving the use of digital technologies;
- to develop measures to improve the efficiency of supply chain management.

3. Methods and materials

To attain the research objectives, the study has been divided into six stages. At the first stage, the concept of the efficiency of the supply chain involving the use of digital technologies has been described.

The SWOT analysis of the developed concept has been carried out at the second research stage. In this case, the use of the SWOT analysis makes it possible to generalize the Strengths, Weaknesses, Opportunities, and Threats associated with improving the efficiency of the supply chain using digital technologies (Kersten, Blecker, and Ringle, 2019).

At the third stage of the study, the research hypothesis that the adoption of digital technologies contributes to the increase in the efficiency of supply management has been statistically confirmed. The indicators reflecting the development of digital technologies in individual countries and the levels of logistics have been analyzed. These include:

- the ICT Development Index (IDI), developed by the International Telecommunication Union (UN) as an indicator of the digital society, takes into account 11 different pillars grouped into three categories: access, usage, and skills;
- the Logistics Performance Index (LPI) describes the level of logistics development in the country based on the following indicators: Customs, Infrastructure, International shipments, Logistics quality and competence, Tracking and tracing, Timelines.

At the fourth stage of the study, the research hypothesis has been more thoroughly considered through the example of the following countries: the Russian Federation (RF), the People's Republic of China (PRC) and the Federal Republic of Germany (FRG); the correlation between the volume of external traffic and the investment in SCM software (Supply chain management (SCM), 2020) in the countries under study for the period from 2011 to 2019 (TF, Goods Transport, ITF Transport Statistics (Database), 2020) was built.

The fifth stage of the study involves the development of a composite index that takes into account the efficiency of the supply chain using digital technologies. The index should be hierarchically structured and include the following sub-indices: potential, use, management and readiness, infrastructure, innovation and investment in digital technologies in the field of supply chain management.

At the final stage, measures to improve the efficiency of supply chain management have been developed.

The object of the study is the supply chain management processes relying on digital technologies; the object of the study is the impact of these processes on the efficiency of supply chains.

4. Results

When categorizing certain methods of supply chain management as the digital ones, the degree of the use of digital technologies by the company and its involvement in international trade is a key factor. The approach allows us to describe supply chain management based on digital technologies as a set of methods and tools that ensure planning, transportation, processing, production, trade, logistics, design, and marketing with the help of digital tools that facilitate interaction between the supply chain elements and contribute to the processing of material, information, financial and labor flows.

The results of the SWOT analysis of the described concept made it possible to identify the concept characteristics.

Strengths:

Tracking changes and control (increasing the efficiency of information processing, control of transactions, duplication and storage of information, multiple channels and multitasking);

Information flow processing (transparency, flexibility, and immutability in the exchange of information, improving interaction between participants, providing 24/7 feedback, the ability to use blockchain and cryptocurrencies, a wide range of possible options for information exchange);

Material flow processing (a wide range of possible options for action, visibility and traceability of material flows, reducing the cost of joining the supply chain, reducing the need for intermediaries, levelling the geographic factor);

Data analysis (general data analysis system that differentiates access levels and identifies bottlenecks in the supply chain, objectivity of information, maximum process automation).

Weaknesses:

The likelihood of the leakage and/or insufficient safety of important information (insufficient control, inconsistency of data management systems in the supply chain, loss and/or delay in data transmission);

Ineffective data and process management (insufficient qualifications to manage processes in the system, low productivity, low confidentiality of data and/or users, data transfer rate limits in large supply chains, the need for servers to store data);

Low resistance to cybercrime.

Opportunities:

Implementation of innovations (cost reduction, controllability of all types of flows, increased data protection and confidentiality);

Optimization of the use of all types of resources within the supply chain);

The ability to enter new markets;

Cooperation between various technologies;

Higher quality of all processes related to the service and production of products.

Threats:

Excessive control and/or data redundancy;

Vulnerability to cyber-attacks and cyber fraud;

Dishonesty of supply chain participants;

Overconcentration of data and/or topmost importance of individual supply chain participants.

Let us consider the study hypothesis that says that the adoption of digital technologies contributes to the increase in the efficiency of supply management in more detail. Table 1 shows the ICT Development Index and LPI of various countries. Based on the data from World Bank Research and Publications (2020), Aggregated LPI (2020).

QUALITY MANAGEMENT

Country	LPI	ICT Development Index	Country	LPI	ICT Development Index	Country	LPI	ICT Development Index
Australia	8.24	4.2	Guinea	1.78	1.9	Latvia	7.26	3.9
Austria	8.02	4	Guinea-Bissau	1.48	1.6	Lesotho	3.04	2.01
Azerbaijan	6.2	3.2	Germany	8.39	4.19	Lebanon	6.3	3.2
Albania	5.14	2.8	Honduras	3.28	2.56	Lithuania	7.19	3.7
Algeria	4.67	2.56	Hong Kong	8.61	4.2	Nigeria	2.6	2.59
Angola	1.94	2.17	Grenada	5.8	3.19	The Netherlands	8.49	4.07
Argentina	6.79	3.4	Greece	7.23	3.2	Norway	8.47	3.74
Armenia	5.76	2.4	Georgia	5.79	2.9	Poland	6.89	3.5
Afghanistan	1.95	2.2	Egypt	4.63	2.5	Romania	6.48	3.1
Bangladesh	2.53	2.6	Zambia	2.54	1.5	Saudi Arabia	6.67	3.08
Belarus	7.55	2.54	Zimbabwe	2.92	2.17	The USA	8.18	3.92
Belgium	7.81	3.99	Israel	7.88	3.99	Turkey	6.08	3.92
Benin	1.94	2.65	India	3.03	1.8	Finland	7.88	3.7
Bulgaria	6.86	3.5	Indonesia	4.33	3.08	France	8.24	3.86
Brazil	6.12	3.35	Jordan	6	2.78	Croatia	7.24	3.12
Great Britain	8.65	4.2	Iran	5.58	2.18	Switzerland	8.74	3.91
Hungary	6.93	3.41	Ireland	8.02	3.99	Estonia	8.14	3.3
Venezuela	5.17	3.1	Iceland	8.98	3.99	Ethiopia	1.65	1.9
Vietnam	4.43	2.37	Spain	7.79	3.6	Jamaica	4.84	2.52
Gabon	4.11	2.19	Italy	7.04	3.45	Japan	8.43	3.99
Guyana	3.44	2.45	Cape Verde	4.92	3			
Haiti	1.72	1.8	Kazakhstan	6.79	3.2			
Gambia	2.59	2.2	Canada	7.77	3.81			
Ghana	4.05	2.6	China	5.6	3.6			
Guatemala	3.35	2.51	Kuwait	5.98	2.96			

Table 1. Initial data for building the relationship between the indices describing the implementation of digital technologies and supply chain management (ICT Development Index and LPI of different countries based on the data from (World Bank Research and Publications, 2020; Aggregated LPI, 2020)

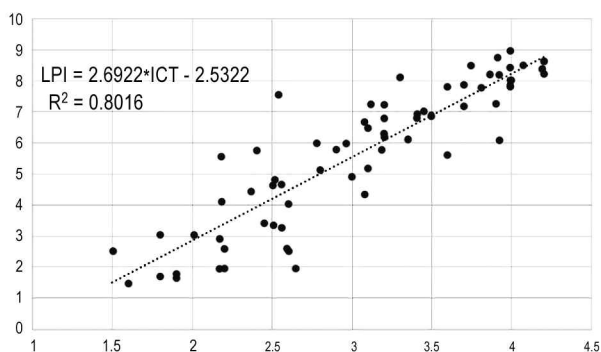


Figure 1. Relationship between the indices describing the implementation of digital technologies and supply chain management

The following dependency has been obtained:

$$LPI = 2.6922 * ICT - 2.5322, R^2 = 0.8016$$

The high correlation coefficient indicates that the adoption of digital technologies contributes to the increase in the efficiency of supply management.

When studying the impact of economy digitalization on the trade volume of various countries (based on the example of the Russian Federation, the Federal Republic of Germany and the People's Republic of China), the dependences of the volume of external traffic on the volume of investment in supply chain management software were built (Table 2).

The following dependences have been obtained:

Russia:

The volume of external traffic, billion dollars = 5.352 * SCM software investment, million dollars + 353.23 $R^2 = 0.906$

China:

The volume of external traffic, billion dollars = 74.498 * SCM software investment, million dollars + 3880.8 $R^2 = 0.8692$

Germany:

The volume of external traffic, billion dollars = 1.3487 * SCM software investment, million dollars + 266.24 $R^2 = 0.926$

Year	Russian Federation		China		Germany	
2011	86.13	810	197.49	10006.4	61.944	349
2012	94.08	855	200.088	10769.6	61.32	352
2013	108.8	932.8	211.99	11448	63.495	354
2014	108.36	925	224.116	12550.4	66.736	351
2015	95.45	840	225.594	13992	67.147	354
2016	102.09	920	234.89	14840	68.724	361
2017	94.35	880	250.07	15688	74.12	367
2018	107.01	928	265.698	15348.8	78.561	372
2019	107.5	926	282.08	16281.6	79.894	375

Table 2. Statistical data on the volume of external traffic in the Russian Federation, China and the Federal Republic of Germany for 2011-2019 (TF, Goods Transport, ITF Transport Statistics (Database), 2020) and the volume of investment in SCM software (Supply chain management (SCM) software, 2020)

The results show that investing in specialized software that is increasing the digitalization of supply chain management, contributes to an increase in external traffic.

In some countries, an increase in the volume of external traffic due to an increase in investment in SCM software is associated with the complication and globalization of supply chains, which increases the competitiveness of goods and services of these countries.

At the same time, there is a need to develop a composite index that takes into account the efficiency of the supply chain involving the use of digital technologies. In view of this, the key indices (Digital Opportunity Index, Networked Readiness Index, Information Society Index, Digital Access Index, Digital Divide Index, etc.), which fundamentally differ from each other both in the basic samples of the major indicators and in the methods of constructing, have been analyzed. Each index is focused on the assessment of various areas of the information society and objective ranking of countries by the development of digital technologies.

On the basis of the system of indicators, a composite (aggregate) indicator is proposed to display the efficiency of the supply chain that involves the use of digital technologies. The index is hierarchically structured and includes the following sub-

indices: potential, use, management and readiness, infrastructure, innovation and investment in digital technologies in the field of supply chain management.

A detailed list of sub-indices of the composite index is presented in Table 3.

Sector	Indicator
ICT potential	Share of the SCM software costs in the total investment in ICT
	Percentage of customers making purchases via the Internet
	Percentage of customers using online banking
ICT use	Percentage of enterprises using SCM software
	Percentage of online purchases in total costs
Innovation	The level of innovation activity
	The level of support for the activities of business entities in the field of information technology
	Percentage of IT research organizations
	The level of the Internet advertising market development
ICT infrastructure	The level of support for the activities of business entities in the field of information technology
	Percentage of IT research organizations
	The level of the Internet advertising market development
	The level of e-commerce application
ICT management and readiness	The level of e-commerce application
	The level of the application of widespread SCM software (e.g. Knapp, SAP and Ubimax)

Table 3. Sub-indices of the developed composite index, which takes into account the efficiency of the supply chain involving the use of digital technologies

Thus, the measures to enhance the efficiency of supply chain management with the help of digital tools can be generalized:

- harmonization of supply chain management standards with international best practices (for example, the introduction of eIDAS regulations in the Russian Federation, participation in the EU Stork 2.0 project, the EU Interoperability Solutions for European Public Administrations 2 (ISA2) program, e-CODEX, e-Invoicing, and the Single Digital Gateway initiative);
- harmonization of standards, in particular the Codex Alimentarius, and the standards that Logistics 4.0 is based on;
- introduction of electronic systems in accordance with EU requirements, in particular the European Interoperability Framework 2.0, integration with European open data portals (europeandataportal.eu and data.europa.eu);
- introduction of Electronic Customs in accordance with the requirements of the EU and the introduction of the Single Administrative Document (SAD);
- implementation of content protection systems, security measures, awareness of risks and threats, bridging the digital divide, digital transformation of workplaces, the use of cloud services of the highest security level provided by local providers;
- balanced regulation of competition in order to develop markets and stimulate investment.

The measures described will contribute to the introduction of digital technologies in the sphere of supply chain management, which, in turn, can become an economic development driver.

5. Discussion

The research results indicate that the rapid development of digital technologies, an increase in the share of online shopping, and the new employment form (remote) make it possible to predict further demand for the introduction of digital technologies into supply chain management. According to scientists, there is an objective need to create a universal software solution available to every logistician. The complexity is associated with processing and comparing a number of different indicators characterizing the activities at different stages and levels of

supply chain management. Efficient supply chain management involves the implementation of all operations at minimum expense at every stage.

The study has defined the concept of supply chain management based on digital technologies as a set of methods and tools that ensure planning, transportation, processing, production, trade, logistics, design, and marketing with the help of digital tools that facilitate interaction between the supply chain elements and contribute to the processing of material, information, financial and labor flows. The approach described in the study is based on the degree of the use of digital technologies by the company in supply chain management; it generalizes the interpretations given in Seyedghorban et al., 2020, Schniederjans, Curado, and Khalajhedayati, 2020 and Garay-Rondero et al., 2019, which considered supply chain management as an integral part of Industry 4.0.

A SWOT analysis of the concept has been carried out and the following key strengths have been determined: the possibility of integrated tracking and optimization of material, financial, and labor within the supply chain. On the other hand, the main threats are vulnerability to cyber-attacks and cyber fraud.

The hypothesis that the adoption of digital technologies contributes to the increase in the efficiency of supply management has been statistically confirmed. In particular, this conclusion is consistent with the WTO conclusions that an increase in the economy digitalization allows participation in international supply chains, which, in turn, contributes to the economic growth of these countries (up to 3.3%) (Global Value Chain Development Report, 2019).

The impact of the economy digitalization on the trade volume of various countries has been considered in more detail (through the example of the Russian Federation, the Federal Republic of Germany and the People's Republic of China). It has been shown that the implementation of SCM software contributes to an increase in the volume of external traffic as the introduction of digital technologies makes it possible to synchronize the interests of all supply chain participants, increase the efficiency of their interaction, ensure control and traceability of various processes, and facilitate documenting.

An index model for assessing the performance of a digital supply chain has been developed. The index is hierarchically structured and includes the following sub-indices: potential, use, management and readiness, infrastructure, innovation and investment in digital technologies in the field of supply chain management. It is with the help of the composite indicator, which includes a certain number of basic indicators (depending on the time and purpose of the study, the basic indicators can change), that the trends in the society readiness to introduce digital technologies in the field of supply chain management can be assessed. The use of a number of basic indicators to model the assessment of the digital society development allows us to determine the influence of each factor, analyze critical values and focus on those points that impede the growth of the country.

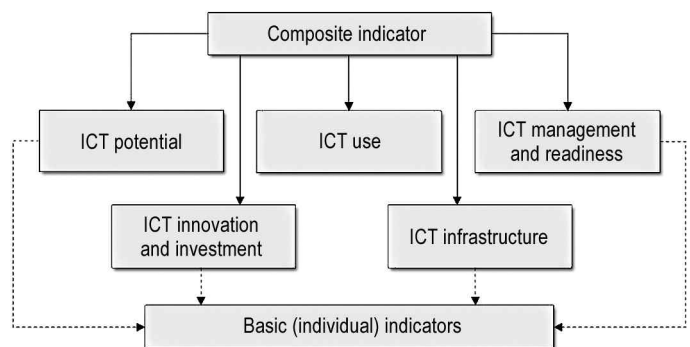


Figure 2. The composite index structure that takes into account the efficiency of the supply chain involving the use of digital technologies

We believe that the introduction of digitalization in logistics should be based on the support of integrated development systems related to the improvement of the movement of information, material, financial and labor flows in the supply chain.

Measures to enhance supply chain management efficiency with the help of digital tools have been proposed.

These include:

- ❑ focus on the harmonization of logistics standards with the standards of developed countries;
- ❑ the development of strategies and programs aimed at the synergistic development of digital technologies in the field of supply chain management;
- ❑ increased implementation of digital technologies in the field of e-commerce;

The measures are primarily aimed at the removal of the following barriers to the introduction of digital technologies in the field of supply chain management in the Russian Federation: regulatory (lack of a system of rules, regulations, and standards for collecting, classifying, storing and using data; problems of protecting intellectual property; legislative barriers to the spread of the digital economy ideology in domestic markets; lack of "cloud" technology legislation), technological (data protection problems, cybersecurity risks; a small number of developments and innovations; lack of specialists and engineers in the area, unpreparedness of the education system, lack of staff, lack of local providers of "cloud" services of the highest security level); organizational and economic (lack of national systems and infrastructure to support, stimulate and develop an innovative business; lack of vision, strategy, and initiatives to digitalize supply chain management systems in the country; lack of a system for developing innovative entrepreneurship skills at the level of secondary and higher education, as well as in the economy sectors and the society), and financial barriers to the operation of companies in global markets, namely, those related to the easy receipt of funds to the accounts opened in the Russian Federation.

Unfortunately, within the framework of the study, the interaction between the government and the business in the field of creating a single state policy for digital supply chain management has not been considered.

6. Conclusions

The important objectives of modern supply chain management tools are the focus on the result, maximum customer satisfaction, constant attention to manufacturability and innovativeness of product development, reduction of the release time, operation in the context of constant changes.

The efficiency of a supply chain involving the use of digital technologies is determined by a system of economic relations based on the use of information and communication technologies. The introduction of this system will provide the state with significant dividends for its development. When considering the positive effect of the digitalization of supply chain management on businesses, we can highlight a number of opportunities: higher labor productivity; reduced level of fraud, increased level of transparency and ease of conducting operations; automation of production; expansion of product distribution channels.

The digitalization of supply chain management makes it possible to:

- ❑ ensure the operation of the supply chain management system in a single virtual environment, which is an aggregated environment for the reproduction of material, information, financial and labor flows;
- ❑ adapt logistics functions to the conditions of the virtual environment with the help of smart technologies and the digitalization of the economy;
- ❑ optimize costs by building "accurate" supply chains; in

this case, building, tracking and controlling processes are based on business analytical systems using cloud computing and big data analysis.

In this regard, supply chain management involving digital technologies is a means of increasing the development rate of economic systems providing for the effective management of material, information, financial and labor flows with the help of a holistic management system.

The practical significance of the research is the possibility of using the indicators described in the study to create a digital profile of the country in the context of determining the impact of digitalization on the efficiency of supply chain management, as well as identifying the course of state regulation in this area. The scientific value of the results obtained is the development of the scientific foundations for supply chain management with the help of digital technologies as a factor in increasing the involvement of countries in global trade.

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