

Transformation of Goods Supply Model Under Conditions of Digital Economy

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Abstract

Digitization has become a determining factor of transformation of supply formation model. Taking into account the Covid-19 pandemic affecting all main spheres, the analysis of such transformations is especially urgent. Nowadays digital technologies are considered as strategic weapon in competition. Competitiveness management on the basis of digital technologies will provide operation efficiency and continuity due to integration of processes. The epidemiologic situation of 2020 provided the necessary impetus for adoption and implementation of smart technologies in trading. Digitization influences structural changes of economy, industry efficiency, development of goods circulation, development of infrastructure, positioning of developing countries in global markets. Foreign trade turnover increases due to increase in export from developing to developed countries. There is no reverse relation. In addition, the experimental results demonstrate that the increasing index of penetration of global information networks, the index of wideband networks in Ghana, Kenya, Mauritania, Nigeria, Senegal, Tanzania lead to increase in export from these countries. Such transformations modify global international trade relations, including those based on denationalization of competitive advantages. Globalization of world trade, in its turn, enhances exchange with digital technologies, which predetermines high rate and extent of development of world economy. Reduction of transaction expenses due to global digitization forms economic integration of isolated territories, which a priori influences transformation of goods supply model at world markets. Marketplaces significantly reduce transaction barriers, costs of goods circulation, and form new systems of goods supply with participation of developed and developing countries on a parity basis. Analysis of such trends has resulted in detection of goods supply model under conditions of digital economy.

Key-words: Goods Circulation, Digitization, Technological Development, E-Trading, Product Offering, Consumer Demand.

1. Introduction

The United Nations Organization (UN) has formulated the concept of sustainable development up to 2030, its central elements are unconditional factors of digitization and technological development of all economical segments of all countries of the world (Matthess & Kunkel, 2020). The world e-commerce market is estimated as USD 23 trillion, which amounts to 32% of global GDP (Shao et al., 2021). Digital economy, integrating transformation of technological processes, including goods supply, forms dynamics of all macroeconomic indices. The analysis of the last five years detects the trend of growth of retail trade turnover by 22%, in average by 5.1% per year (in terms of geometric mean) (Russian Federal State Statistics Service, n.d). The chain increase rates were 2.6% in 2016 in comparison with 2015; 5.3% in 2017 in comparison with 2016; 6.2% in 2018 in comparison with 2017; 6.5% in 2019 in comparison with 2018, evidencing regular forecastable growth trend, which was verified by smoothed analytics of the last 20 years (Krasil'nikova, 2019b). The main share in formation of final stage of goods circulation was comprised by trade companies and individual entrepreneurs – 94.7% (Russian Federal State Statistics Service, n.d). Herewith, this share increased by 3.6% from 2015 to 2019 (from 92.1% to 94.7%). Exactly in the sphere of organized trade, in trade networks, the competition is very high. Turnover of wholesale trade, while reflecting the trends of supply formation at Russian home market, detects the increase in this index by about 1.5 times. In average, the cost value of goods circulation increases by 10.4%. The chain increase rates detected the following growth of wholesale turnover: 8.78% in 2016 in comparison with 2015; 12.93% in 2017 in comparison with 2016; 14.47% in 2018 in comparison with 2017; 5.55% in 2019 in comparison with 2018, which evidenced sinusoidal growth trend (Russian Federal State Statistics Service, n.d). If the estimate range is expanded, then the two-fold index of wholesale turnover in 2019 (RUB 84.2 trillion) in comparison with 2012 (RUB 42.9 trillion) should be noted.

Development of digital economy predetermines advanced informatization of the society. Under conditions of globalization, the galloping increase in the use of information services by population becomes a factor of improved competitiveness of trade companies. The increasing demand for such services refers both to absolute values and to shares in the demand structure. Technological advances, changes in demands or opportunities in their satisfaction, current epidemiological situation stipulating necessity of remote work, learning, obtaining services underline the increase in the demand for wideband communications both in the world and in Russia. Such

demands stimulate requests for goods with predefined properties (capacity, availability of applications, etc.) satisfying demand for digital services. Goods supply is transformed, respectively. The role of corporate social responsibility increases (Mayorova, 2019).

It is important to underline the innovative approach to arrangement of communication services: transition to 5G standard characterized by different system of data transfer. The digital technologies create new model of goods supply with consideration for unconditional globalization of trade.

The authors defined the following tasks: analysis of changes of traditional business processes and models of goods supply, estimation of development of logistic systems, analysis of dynamics of trading development, including e-commerce, generation of model of transformation of goods supply under modern economic conditions.

The aim of this research was transformation of goods supply model under conditions of digital economy.

2. Formulation Of The Problem

Traditional business processes and models of many vertical sectors were seriously transformed on the basis of implementation of technological innovations. The process initiated in Germany as the Industry 4.0 concept using smart ICTs is now accepted by all segments of national economy (Pereira & Romero, 2017). The Industry 4.0 or digital transformation is based on such technologies as Internet of Things (IoT), Artificial Intelligence (AI), Cloud Computing (CC), Machine Learning (ML), data analytics (DA), Blockchain technologies, big data (Big Data), VR, AR technologies, etc. These technologies can be applied for integration of generated data to make more reasonable and substantiated decisions. This fourth revolution created new environment for production control and intelligent management of processes in goods turnover sphere.

Achievements in the field of technologies lead to development of smart production. Smart factories, plants (manufacturers) forming Industry 4.0 are comprised of network and interrelated system, in which the data flow between physical infrastructure and cyberspace is optimized. This stage is initial for goods turnover sphere (Pereira & Romero, 2017).

Transformation of e-commerce market (Leung et al., 2020), especially e-commerce between companies (B2B), created wide market opportunities for retail traders and logistic services providers

(LSP). Structural modifications influenced B2B logistic flows, logistic processes in distribution centers, B2B order processing. Logistic intermediaries transformed the logistic sector of business distribution of e-commerce due to improvement of main opportunities of B2B e-commerce orders processing in their distribution centers. Smart system of order processing is used for efficient management of discrete, frequent orders of B2B e-commerce.

The transformations are related by the rate of processing of B2B e-commerce orders in distribution center, which improves satisfaction of buyers and sellers during order processing and delivery, and simplifies the opportunities to manage higher number of orders obtained from B2B e-commerce platform with accounting for wider presentation of sellers in modern B2B e-business (Mayorova et al., 2018).

In the B2C market, due to development of e-commerce, logistics and retail sales became even more indivisible. Fulfillment of orders of final consumers located from B2C online trading platforms, such as Amazon in the USA and Alibaba group in mainland China, is transferred to third-party logistic providers (3PL) for processing (Akter et al., 2020). Due to ultra-rapid development of B2C e-commerce, the B2C online retailers intensively enter the B2B markets, providing platform of online purchases, similar to the B2C online purchase platform, for corporate customers in order to form wholesale online purchases. According to the analysis by Forrester Research, in the nearest future the market volume of B2B online trading will increase twofold in comparison with B2C (Akter et al., 2020). Under the conditions of developing trend of B2B e-commerce business, numerous transactions in online market evidence that 3PL and online sellers, which can be manufacturers, retailers, or other parties in the supply chains, are of the highest importance for close cooperation with each other aiming at efficient processing of online orders, so that these B2B orders can be delivered to customers in predetermined times (Mayorova et al., 2018).

The concept of smart production is developed from simple digitization and automation of single machines to connection of machines using IoT technologies and data from connected systems in order to adopt decision online. Lean manufacturing aimed at improvement of customer servicing and reduction of production wastes is considered as one of the most popular process control systems (Öberg et al., 2017). However, the implementing companies could gain profits only when internal efforts of improvement were related with external interested parties, i.e., suppliers and consumers (Krasil'nikova, 2019b). Digitization of processes is obligatory for supply chains, especially when they are aimed at actual profits (Krasil'nikova et al., 2018). The available publications devoted to the

Industry 4.0 pay high attention to various technologies, such as IoT, AI, ML and data analytics (Novikov & Sazonov, 2020) in terms of production. However, there are few publications about interaction of advanced technologies in the supply chains (Akter et al., 2020; Leung et al., 2020; Uryas'eva et al., 2018). Most publications devoted to the Industry 4.0 concept or smart production were focused on theoretical or conceptual models of implementation. However, few works reflect economic point of view regarding this phenomenon (Del Río Castro et al., 2021). Since the Industry 4.0 concept in the supply chain is still at initial stage, the relevant publications reflect stepwise implementation of this concept in multilevel supply chain (Matthess & Kunkel, 2020).

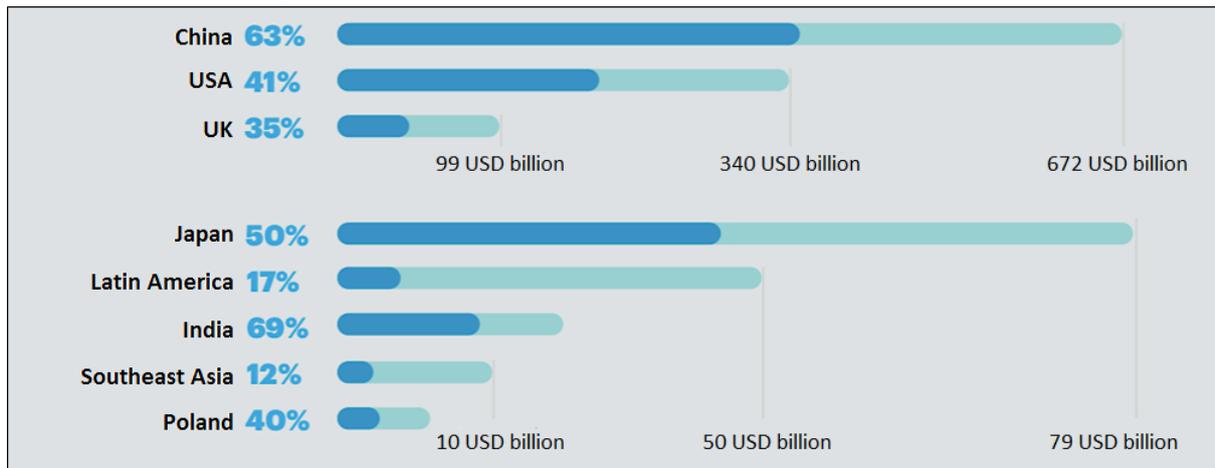
Introduction of nanotechnologies and biotechnologies, improvement of soil fertility systems, development of substitutes of agricultural raw stuff form a new segment of food products with preset consumer properties and controlled prime cost together with partially retail cost (Shkolyarenko, 2018). Technological development of agriculture and industry promotes increase in rates of import substitution (Panasenko et al., 2019), formation of demand for new goods, modification of the existing structure of commodity markets (Shkolyarenko, 2018). Technology of gene modification formed new steady segment of world commodity market, point farming; IoT, agricultural robots, drones transformed production processes, which allowed to decrease ex-factory prices as well as sales prices for final consumers.

3. Methods

Technological development, efficient and high-quality updating of the existing industrial and business processes on the basis of integrated implementation of advanced innovations generate digital engineering (Shao et al., 2021). The key business tasks of the Industry 4.0 concept are translated into the Logistics 4.0, Shop 4.0, which form digital technological sphere of goods turnover. Exactly these transformations allow to develop innovation strategies of competitiveness of trading companies. Adaptation of updated business processes to key requirements of digital economy takes into account the basics of operation of various interdisciplinary systems and process chains, which allows to efficiently solve the occurring issues of goods turnover (Krasil'nikova, 2015).

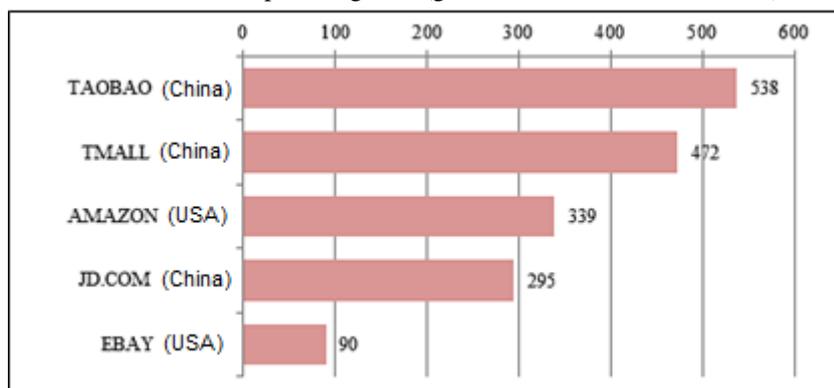
The increasing role of online marketplaces in e-commerce is a global phenomenon (Fig. 1).

Figure 1 - Portion of marketplaces on the largest online markets, %



In the USA, Amazon.com Inc. dominates in the area of e-commerce. In China, these are numerous trading portals of Alibaba Group Holding Ltd., amounting to three fourths of all online expenses in the country. In other regions, there are such major players as MercadoLibre Inc., Flipkart Internet Private Ltd., and Lazada Group (DATA insight, n.d). The aforementioned marketplaces offer low prices for customers, wide assortment of goods and convenient opportunities unavailable for individual online shops. Estimations of world market of e-commerce regarding development of marketplaces are rather different. Figure 2 illustrates the leading marketplaces of the world in terms of goods turnover.

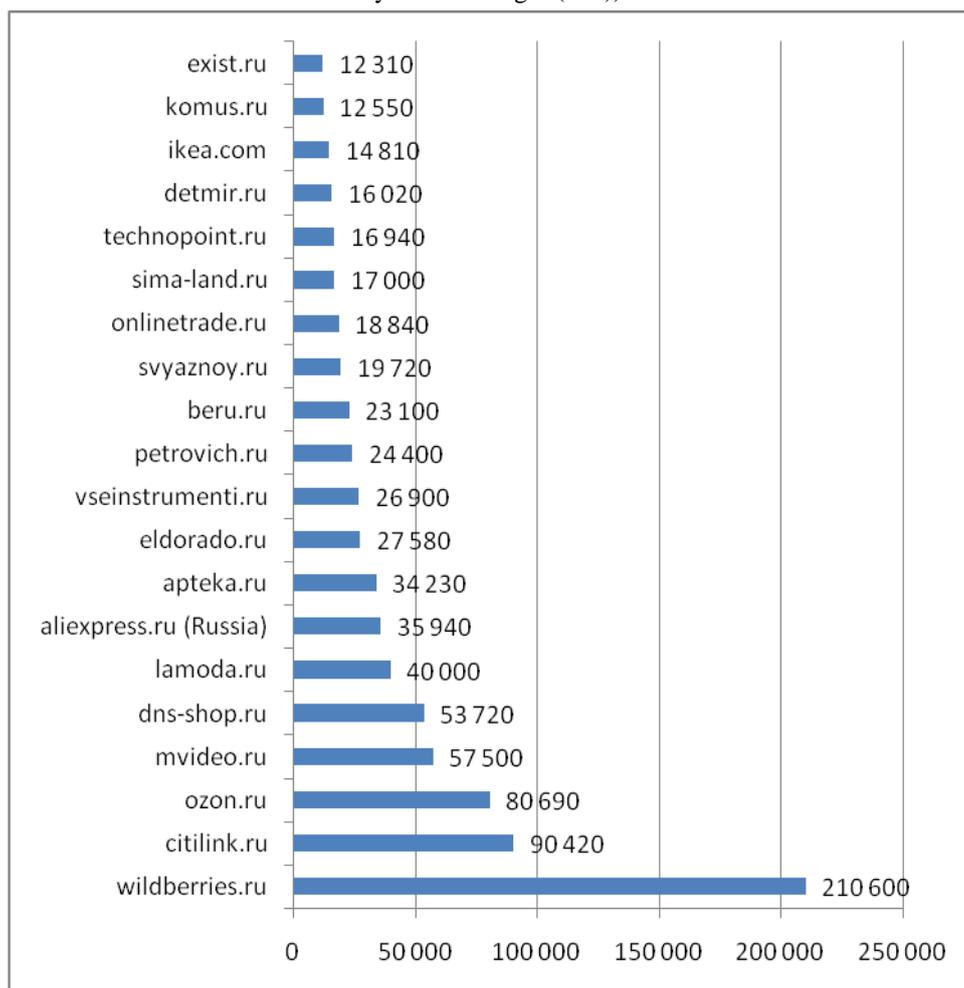
Figure 2 - World leaders in the marketplace segment (gross merchandise value, GMV) in 2019, USD billion



The global rating of online trading platforms was headed by TAOBAO marketplaces of Alibaba Group (online shop aimed at final consumer) and TMALL (the platform for sales of original goods from official brands) with total goods turnover of about USD 1 trillion, as well as Amazon

(USD 339 billion), JD.COM (USD 295 billion) and Ebay (USD 90 billion). Alibaba.com, the largest B2B marketplace, is oriented not only at China but all the world. Alibaba.com allows for importers and exporters all around the world to exchange with business data and to sell wholesale goods, using the company profiles and goods listings, as well as offers integrated software for business management.

Figure 3 - Major companies of e-commerce segment in Russian market in terms of sales amount, RUB thousand (statistics by DATA insight (n.d.))



Tmall.com platform is included into Alibaba Group (China) being one of the world leaders of e-commerce for small scale business. In order to protect buyers against counterfeit goods, the site maintains Taobao Mall section (TMall.com), which lists only officially registered China shops and shops of foreign brands verified by the special service. Amazon is one of the largest and the most popular online marketplaces in the world. Amazon service covers 34 goods categories. The platform

share in e-commerce market in the USA is about 50%; the number of monthly accesses to the platform is 1.6 billion users; the number of active customers in the world is higher than 300 million (DATA insight, n.d). eBay.com is one of the largest and the most popular online marketplaces in the world. Initially eBay was an auction market, but at present, more than 80% of goods presented in eBay list are sold at fixed price. In 2018–2019 one of the main trends in development of online sales was orientation at marketplace business model. Several new major players appeared, initially oriented at similar business model. In 2018–2019 the choice of marketplace business model by many Russian major retailers was based on the experience of development of other countries (mainly the USA and China), where such model was the most efficient for sellers. As a consequence, many traditional online shops began to implement the marketplace model. For instance, at present, Wildberries offers for suppliers to trade using its platform (Fig. 3). In March, 2019 Wildberries reduced the commission from 38% to 19% in order to attract more third-party suppliers. As a consequence, at the end of 2019 the number of participants increased from 9 to 19 thousand, the assortment expanded from 1.8 to 3.6 million SKUs. Another traditional retailer, Ozon, prioritizes the increase of role of Ozon Seller marketplace. The Ozon commission for suppliers depends on type of goods and is from 5% to 20%. In 2020 the company informed that it would operate only as logistics platform. In addition to conventional players, in 2018–2019 new market participants appeared, initially aimed at marketplace business model, such as Beru Marketplace. In April, 2018 Yandex sold a share in Yandex.Market to Sberbank in the frames of strategic alliance between the companies. The cost of the joint venture upon the transaction was estimated as RUB 60 billion. In October, 2018 the joint venture launched the Beru Marketplace (beru.ru). Therefore, the year of 2019 was the first full year of operation of this trading platform. According to the data by the company, in 2019 Beru collected the base of more than 2.5 million of active customers, and the monthly GMV reached RUB 4 billion in the 4th quarter, 2019. The marketplace offered fixed prices for delivery and free delivery for large orders, which increased attractiveness of goods placed at the platform. For customers of paid Yandex services (Yandex.Plus) free shipping of three orders per month is offered. According to data of Yandex.Radar, in 2019 the average number of unique monthly users (MAU) of the platform was 6.8 million persons, and for mobile application – 1.2 million persons (according to SimilarWeb). Goods Marketplace. The goods.ru platform of MVideo/Eldorado group was launched in September, 2017. At the end of 2019 the marketplace cooperated with about 3 thousand suppliers, the assortment was about 1.6 million SKUs, order opportunities were available for buyers from 149 cities (Del Río Castro et al., 2021). In

2019 the Goods turnover, according to the company data, was RUB 6 billion in comparison with RUB 2 billion in 2018. Bringly Marketplace. Yandex.Market opened the Bringly marketplace as a platform to order goods from Turkey, China and other countries. The main partner of the project was Hepsiburada marketplace from Turkey. However, the results of the marketplace did not justify expectations. The number of its users after a short burst sharply dropped in the middle of 2019 (AKIT. Internet Trade Companies Association, n.d). As a consequence, the marketplace was closed already in the second half of 2019.

It should be mentioned that the decrease in transborder online sales under conditions of advanced growth of major Russian players creates conditions of monopolization of Russian market of online sales, which already in the medium-term prospects would result in growth and decrease in supply assortment impairing tight situation of Russian consumes, especially in small towns.

4. Results

The problems to be solved by marketplaces are not new, they were already met by classic retailers: organization of efficient logistics and storage of goods, low marginality and expensive marketing. Rapid processing of orders, logistics, bonus programs, user-friendly interfaces, interaction and mutual settlements with suppliers: all technological processes require for digitization (Popenkova & Nikishin, 2019). One of the existing problems of large marketplaces is difficulty in controlling the assortment (Komissarova et al., 2017). Due to high number of goods positions and partner companies, counterfeit consumer goods are relatively easily found on large trading sites. Thus, Ozon, according to its own data, during the year of operation blocked several thousands of goods with unconfirmed documents. Herewith, it is the small and medium scale business that remains the driver of the format increase. Due to intensive growth, the marketplaces meet infrastructural and operation limitations. In order to achieve continuous growth of e-commerce (hence, marketplaces), the capacity of warehouses in Russia should equal to 1.5 million sq. m. In addition, the transformation of market structure after arrival of major players was followed by reconstruction of infrastructure. Ozon develops logistics in the Russian Federation. The increase in logistics capacity would allow to increase the number of customers and orders, hence, this would affect sellers of marketplaces: they could sale their goods to higher number of loyal users. Z generation defines the trends of demand. Each new platform should be oriented more at young generation, solving its needs and meeting its

basic values. Marketplaces should be adapted to the way of life of new generation, the key characteristics of which are the responsible consumption and tendency to sharing economy.

Herewith, the key limitations in development of marketplaces in the world and Russia are as follows:

high cost of entry and, hence, difficulties in development of economically efficient business model. Opening and maintenance of marketplace project requires for high investments in the required amount of traffic, customer base and search for suppliers;

differentiation of B2B and B2C marketplaces by managers (managers are millennials with absolutely new behavioral pattern, they amount to about one third of working force): if goods or suppliers are not available in Internet, the millennials consider this as suppliers do not exist;

low level of goods digitization and implementation of PIM systems. For comparison: in Europe, information models have been developed and adopted at the level of large associations for a long time. In the USA, the goods without Amazon ID quite often cannot participate even in federal biddings;

low level of culture of warehouse accounting and data synchronization between IT systems. The absence of updated data for residuals with high degree of details often makes meaningless all attempts to automate the sales process.

It should be mentioned that at present, there are certain limitations regarding online sales in Russia: alcohol products, medications. In addition, while evaluating transformation of goods supply model, it is necessary to underline operation and projects of the system of marking goods by ID means.

5. Discussion

In the area of management of supply and logistic chains, the involved parties, such as manufacturers, retail and wholesale sellers, face serious problems. Herewith, it is possible to state that all participants in the goods turnover have adapted to the established conditions of digital economy. Manufactures aim at automation and data exchange with other areas of goods supply chain, for instance, in the Industry 4.0, by means of integration of IoT, cloud computations, and artificial intelligence. Logistics intensively improves its main opportunities regarding not only timely supply of goods but also improvement of servicing due to transparency of data about orders or supply to

other participants of the chain and final customers. Expansion of main opportunities of internal processing of orders has always been an efficient strategic tool of logistics support. Facing the increasing problems with processing of B2B logistic orders, it is important that 3PL could adapt to dynamic and varying environment of retail trading and logistics (Akter et al., 2020). Typical problems of fulfillment of B2B orders at warehouses are as follows:

a) macroeconomic factors: decreased lifecycles of products and hypergrowth of diversity of goods resulted in higher time sensitivity of orders. Adding the factor of product seasonality, 3PL should not only support but also increase the rate of fulfillment of their internal orders, providing duly and accurate processing of B2B orders in warehouses without delay in goods dispatching;

b) microeconomic factors: globalization of economy, formation of transnational supply chains allow for 3PL to obtain more orders from B2B customers around the world. Aiming at continuous fulfillment of numerous orders, their grouping is common practice. Therefore, important constituents of the process are the rate and accuracy of order picking.

In the e-commerce market, the B2B orders are accepted online. Intelligent systems are implemented for transformation of order processing. The transformation especially influenced the rate of order fulfillment, distribution of resources, satisfaction of customers and partners. The time of order planning and actual time of processing are two key indices of efficiency of internal processing of orders in distribution center.

The digital transformation allowed to reduce at maximum the length of goods supplier–buyer channel, to exclude excessive links in the goods turnover chain. In addition, the manufacturer response to changes of consumer demands was accelerated. When applications for big data became available, companies developed dynamic analytics in order to recognize, use and transform their systems of demand satisfaction. Dynamically generated analytical data became strategically important for trade companies (Panassenko et al., 2020).

Nowadays smart production means development of working platform, where employees, equipment, corporate systems and devices are connected with each other with cyber hardware as well as with joint network (Panassenko et al., 2020). The amount of data generated by the systems of commercial production has increased and, as expected, will be increasing. The increase in computing capacity forces companies to make more substantiated decisions, which is reflected conceptually in retail business processes (Krasilnikova, 2019a).

Despite the fact that LSP have great market potential for utilization of B2B e-commerce sphere, their infrastructure of logistic objects and internal procedures of order processing, initially intended for traditional orders, complicate order processing of B2B e-commerce, which are delivered from trade online platforms (Leung et al., 2020). Comparison between traditional B2B orders and orders of B2B e-commerce in terms of logistics forms the reasons due to which it is more difficult for logistics to process the B2B e-commerce orders:

1) greater market presence for sellers on B2B e-commerce platforms. Traditionally, e-purchasing depends on communication channels between two companies; herewith, the traders sell less goods in Internet using third-party B2B platforms. In its turn, greater presence on B2B platforms increases sales than ever before. Therefore, it is required from 3PL, who are in partnership with sellers for processing of overall process of orders fulfillment and distribution, to process more B2B orders during one and the same time interval (Leung et al., 2020);

2) in order to process more fragmented orders, higher capacity in distributor centers is required. Taking into account that the B2B e-commerce platform increases transborder transactions between companies, 3PL are required for more timely and accurate processing of B2B e-commerce orders in order to meet the deadlines of delivery to certain customers in required amount (Leung et al., 2020).

6. Conclusion

Digitization and technological development are the determining factors of growth of macroeconomic indices in the world. Goods circulation as a platform of interrelations and interests of production and consumption is, obviously, one of the first segments accepting the conditions of digital evolution.

The revealed blocks of transformation of goods supply model under conditions of digital economy reflect radical changes in goods supply system. The goods circulation channels form vectors of interaction among participants in goods circulation. Significant transformations of online goods circulation stipulate development of marketplaces. Networks integration, flexible automation determine global technological trends. Digitization resulted in integrated databases, their processing allowed to transfer data both in forward and reverse directions. Planning of orders, ultra opportunities to modify their amount and assortment allow to develop maximum flexible systems of goods supply both in regional and social economical aspect.

The obtained results allow to verify selection of the competitiveness management strategy of trade organization on the basis of transformation of goods supply model under conditions of digital economy.

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