Prospects for the development of the digitalisation of Kazakhstan's logistics fulfillment centres

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Abstract

With the growing requirements at the state level for the digitalisation of any process in any field of activity, one of the promising areas for digitalisation has also emerged - the logistics industry. Kazakhstan is currently facing global challenges and a qualitative change in the entire logistics infrastructure would definitely bring a positive economic effect. The goal of this study is to review the study of the digitalisation of logistics processes mainly in fullfilment centres as well as in classic logistics centres. The research methodology is based on descriptive and comparative types. Inductive method was also applied.

It should be emphasised that, judging from the authors' previous studies in Literature Review block, the digital era has not yet fully embraced the logistics sector in Kazakhstan, but significant changes are already taking place. One of the best solutions, in our opinion, would be the comprehensive implementation of the Digital Twin as one of the promising digital logistics solutions. In any case, for the comprehensive development of Kazakhstan's logistics complex, digital technologies should prevail over more outdated logistics solutions.

Keywords: fulfillment centres, digitalization, Digital Twin
JEL codes: R4, R40, R49

1 Introduction

At present, the economies of many countries have undergone significant changes due to the impact of global geopolitical processes. Global challenges have also affected the Republic of Kazakhstan. There are undoubted advantages for our country, such as the new economic realities. The global review of logistics systems gave impetus to Kazakhstan in terms of focus on re-creation of the Silk Road system, as well as opening up of new ultra-modern logistics routes and international hubs.

Building full-scale Fulfillment Centres on the territory of Kazakhstan will be one of the key innovative solutions both in terms of providing goods to our country and in terms of global international logistics cooperation. The

main task of fulfilment centres is quick distribution of current and incoming stock to customers of any nature, whether they are B2C retail customers or large B2B wholesale customers. Any supplier of food or non-food products will be able to send their goods seamlessly to a fullfilment partner, thereby significantly reducing the financial costs of maintaining their storage facilities, as well as optimising and redesigning their system logistics chain.

The object of this study is the fullfilment centres of the Republic of Kazakhstan. The subject is the digitalisation of logistics processes, which is an important aspect of the impact within the fullfilment structures. The digitalisation of elements of logistics fulfilment will have a positive impact on the functioning of these logistics fulfilment centres, as well as accelerating delivery processes and improving a number of internal processes.

Due to its geographical location, Kazakhstan has all the resources to become the number one country in logistics and also to be an ideal supplier of goods of any nature both for EAEC member countries and for longer-distance transport. To some extent, Kazakhstan could be compared with the so-called "window to Europe". In any case, a comprehensive implementation of digital technologies is necessary for the quality logistics operation of warehousing and transport processes in the Republic of Kazakhstan. Accordingly, the purpose of this study will be to examine the study of the digital processes of the Republic of Kazakhstan in the context of logistics warehouses and fullfilment centres on the basis of the works of Kazakh and international scientists. Based on the goal of our study, it is advisable to identify two key objectives:

- To analyse the authors' previous works in the literature review section;
- To propose a digital tool suitable for the realities of Kazakhstan, based on the best foreign research.

The practical relevance of this study is based more on the review of the prevalence of digitalisation in logistics in the Literature Review section, which will serve as a basis for subsequent works and source data analysis.

1 Literature review

According to Raimbekov et al, the globalisation of markets requires an innovative approach in terms of transport and logistics infrastructure development - a transition from single to network-based (Raimbekov et al., 2016). Undoubtedly, in order to expand the logistics image of the Republic of Kazakhstan, the network of logistics chains should be built in such a way that it is mutually beneficial both for our country and other countries in this global chain.

According to Sandugash et al., the application of just-in-time (JIT) technology allows suppliers to deliver material resources or finished products

to a particular point in the supply chain at the very moment when they are needed. Most modern logistics systems that use this scheme focus on short components of logistics cycles, which requires the logistics chain links to react quickly to changes in demand and, consequently, the production programme (Sandugash et al., 2018). By linking the just-in-time technology to just-in-time fulfilment centres, the result and total revenue for the CEO of a particular fulfilment or logistics centre will be very significant. Just-in-time technology will allow business owners to optimise their warehousing facilities for goods other than just-in-time deliveries, because a just-in-time delivery system involves regular and uninterrupted supply of goods to customers. In this way, goods passing through this technology will always be in motion, which will undoubtedly free up storage space for other product areas.

According to the authors Serikbekuly and Mutanov, the key business process in need of re-engineering in Kazakhstan's small and medium retail companies in the FMCG distribution chain is the distribution process and logistics system, as it should ensure the timely and constant availability of essential goods in the right quantity on retail shop shelves, which is the link between the producer of goods and its end consumer (Serikbekuly & Mutanov, 2019). If we view these authors' statements through the prism of logistics fullfilment centres, these same fullfilment centres can ensure that the necessary flow for FMCG distribution is maintained at all times. By setting up the supply chain in the correct way, the suppliers-fultilier-end user or suppliers-fultilier-FMCG company, and expanding the nomenclature base of local and international suppliers, supply problems will be almost completely eliminated. After that, the customer satisfaction rating will improve significantly.

Saktaganova et al. believe that Kazakhstan's transport and logistics complex, international transport corridors and bridges provide a nexus in creating a Eurasian transcontinental bridge and ensuring sustainable development in Kazakhstan (Saktaganova et al., 2018). If an analysis is conducted by finding the critical path and identifying the weak links that cause any deliveries to get stuck, it would make sense to place the top of the largest fullfilment centres around the most problematic logistics routes. In this way, Kazakhstan will be almost an ideal place to solve all logistical problems with deliveries and will provide local and international transport in the best possible way.

In Selmier's view, in terms of location, Kazakhstan is the best country to benefit from and exploit logistics opportunities along the new Silk Road, and investments in the Belt and Road Initiative confirm this good location. But there are at least four key challenges in Kazakhstan's quest to become a logistics linchpin in the BRI. Each can be partially or fully addressed through

investment and continued development, and consideration of each helps us assess risks in more detail and allocate funding more effectively. In ascending order of investment allocation there are four key indicators: 1, Kazakhstan has a small population in a very large country; 2, containerisation in all its forms is underdeveloped; 3, railway gauge in Kazakhstan (and in all former Soviet Union countries) is larger than in China and Europe; and 4, facilities for transport, handling, processing, administration and financing are still underdeveloped. Each of these indicators increases transport costs, makes logistics chains more complex and pushes the search for other, more optimal supply networks. (Selmier II, 2018). If one speculates about building global fullfilment centres in the ring of the new Silk Road, a number of problems will be solved in a positive way. Nevertheless, at the moment there are indeed a number of challenges that need to be addressed from the perspective of building an ideal logistics world in Kazakhstan, this concerns both transport systems and other logistics components.

Kredina et al. believe that it is worth noting the fact that the logistics industry in Kazakhstan has problems such as disorderly competition, poorly developed transport infrastructure, and uneven distribution of resources, which are a barrier to further economic growth. In recent years, Kazakhstan has developed a mixed economy, a transport services market and many logistics processes have been intensively developed. It is therefore natural that digital transformation has started to ensure that the core processes of the Kazakhstani logistics industry become more efficient. Therefore, it is imperative to expand the logistics capacity as part of the development of digital transport and logistics services and to accelerate the transition from traditional to digital logistics. In addition, managing logistics processes and addressing research development in the context of digital transformation requires further research and rethinking of tools for sourcing and managing transport flows.

The digitalisation of the transport system and the automation of logistics processes offers an opportunity for the transition of a country's economy to global trade and industrial networks. This is a fascinating topic and has received coverage in a number of academic fields. However, the context of the relationship between logistics and ICT performance and the economy still needs to be explored (Kredina et al., 2022). We fully agree with these authors' statements, as the transition from traditional to digital logistics processes requires the undoubted introduction of IT solutions and the implementation of all possible digital technologies. In the case of fullfilment centres, the robotisation of certain processes within a company is becoming more and more prevalent every year. Abroad, innovative digital solutions have turned the work of robots into a clear mechanism. The robots receive data for specific actions in a given process directly from the configured digital

solutions; the system itself allows the robots to be monitored, thereby minimising the possibility of any error or technical malfunction. The more robotic and digital processes there are in fullfilment centres, the fewer jobs are allocated to rank-and-file human capital.

The authors of Yeargaliyev and Raimbekov believe that the influence of business in improving transport efficiency is very high and should not be reduced only to formulating government requirements. For example, at present, delivery speeds in Kazakhstan are 2-3 times lower than in Europe and the USA. Violation of drivers' work and rest time regimes is a common practice. The reason for this situation is the inability and unwillingness of employers to organise safe and efficient transport schemes, e.g. by the pulling arm system or by changing drivers at the reporting points of the truck with cargo. There is no need to build new roads or buy additional vehicles. Skills and clear organisational arrangements are needed. Businesses also need to make an effort to organise the workflow in moving traffic electronically. These and other actions are possible with appropriate organisational and technological culture of transport business. So far, in Kazakhstan, about half of transportation is carried out by cargo owners' vehicles on the principles of "subsistence economy", and the rest is carried out by vehicles of private individuals, whose purpose is elementary survival rather than development of efficient transport technologies. They are unable to renew the fleet of trucks and optimise its structure. Therefore, competitive foreign logistics and forwarding companies are winning on the Kazakhstani market. The state should ensure the formation of social institutions that stimulate the business structure to function in a way that meets its long-term strategic goals and the interests of society (Yergaliyev & Raimbekov, 2016). Fulfillment centres in practice need to incorporate digital solutions regarding the optimisation of freight vehicles and, consequently, drivers. Modern digital solutions also allow for the scheduling of transport movements in such a way that downtime is not created. Each vehicle will have its own individual timetable. On this basis, drivers will be fully responsive to requests according to a set schedule without compromising sleep and rest patterns.

According to the authors Alimbetov et al., the development of information systems in all industries has affected not only the sale of goods via the Internet, but also the distribution of market research, data collection, market participant analysis and the renewal of payment system processes between different individuals. Customisation of services, development of logistics, flexible pricing, process automation and remote business management play a key role in ensuring the competitiveness of companies. Big data analysis and management are coming to the forefront of the development of enterprises, industries and nations. Today, digital technologies are enhancing operational management capabilities that help

improve the speed and efficiency of management decisions. New organisations with digital business models are already emerging (Alimbetov et al., 2020). All the above-mentioned processes should affect the digital transformation of both fullfilment centres and classic logistics premises. In the long term, Kazakhstan should enter the global arena as a guarantor of a flawless logistics provider, in case classical logistics processes are transformed into digital ones as soon as possible.

Koperin et al. believe that the need to acquire competences in digital economy and digital logistics as part of modern training for economists is a prerequisite for them to acquire competitive skills in modern information systems during their studies. In this way, future specialists will be able to plan and manage all data sets, production processes and logistics in the enterprise. The authors analysed the dynamics of digital economy and logistics indicators in the Russian Federation. The authors considered integration of internal information systems and shared access to information to be a separate trend among companies. The share of organisations using enterprise resource planning (ERP) systems increased from 5.1% to 13.8% in the total number of organisations examined over this period, and the share of organisations using customer relationship management (CRM) systems from 4.1% to 13.2%, respectively. In addition, the share of organisations using electronic data exchange between their information systems and those of external counterparties increased to 64.9% of the total number of organisations surveyed in 2018, while the share of organisations using supply chain management (SCM) systems increased to 6.4%, respectively (Korepin et al., 2020). SCM is a more modern tool as a tool to build optimal logistics pathways. Some fulfilment centres may use several scheduling systems at the same time. But the goal of almost all of them is the same: a rapid transition to a digital business principle.

Thanks to the analysis conducted by Moldabekova et al, their study provides a comprehensive picture of the level of digital readiness and logistics performance in the context of countries and their respective development. The results show that a country's digital readiness is positively and statistically significantly correlated with the country's logistics performance. Thus, the overall underlying policy value can be seen in the fact that continuous investment in digitalisation improves logistics performance in countries. It is therefore necessary to introduce new digital solutions in the activities of logistics service providers to improve countries' logistics performance. Managerial implications for improving logistics performance through modern technology are as follows: integration of information systems in the provision of logistics services; making appropriate decisions while using ICT and digital technologies for planning and scheduling logistics activities; automation of processes and operations (loading/unloading, warehousing,

ordering, delivery, etc.); development and implementation of omni-channel logistics; better communication and development of closer links between customers To summarise, especially the proper integration and use of digital technologies to improve logistics efficiency provides a competitive advantage that contributes to economic development (Moldabekova et al., 2021). Absolutely all logistics processes should be subject to digitalisation. Strategically, the Republic of Kazakhstan has to build each and every element of the entire logistics sector, whether it is transport hubs or internal warehousing logistics system. If the focus is on financing logistics on a full scale, the state will notice an increased percentage of imports and exports in various directions in a few years' time.

ICT infrastructure trends in Agafonova's view are as follows: 1 "Digital transformation," or deep transformations in the IT system that enable companies to better manage customer acquisition, manage operations more effectively, and enter new markets. A key prerequisite for such changes is the criterion of infrastructure agility, which in practice is often achieved through infrastructure virtualisation, including cloud-based solutions; 2 The importance of application programming interface to improve business infrastructure. This eliminates downtime, increases both data storage capacity and computing capabilities of servers, and improves the efficiency of business IT infrastructure; 3 The transfer of data generation processes outside the corporate data centre; 4 The active development of decentralised data collection and processing based on Edge Computing technology. So-called "edge computing", i.e. computing performed on user devices rather than in data centres, shows higher efficiency compared to the traditional data centre model, which, according to experts, will significantly affect companies' infrastructure strategies; 5 Redefining the responsibilities of IT infrastructure support specialists. With the emergence of new management tools and the active use of cloud services, it will expand, leading to the need to account for changes in educational programmes and HR. In 2018, the global IT market was $3.69 trillion (up 4.5% from 2017) (Agafonova, 2020). This author certainly emphasises the importance of using IT solutions for the success of all operating systems. Cloud servers can digitise almost any human capital activity with particular success. The more automation and digital content contained within a logistics company, the more net profit the CEO will receive at the end of the quarter.

Guillén et al, suggest that new technologies are changing not only how businesses deal with customers and suppliers, but also the very nature of competition in many sectors, requiring new approaches to business strategies. In some markets, such as book and music distribution, information services, travel agencies and financial services, we are seeing a complete disruption of traditional ways of doing business, to name just a few of those most directly

affected by this technological revolution. There is no doubt that many of these emerging companies will disappear: their business models (the logical description of how a company does business, creates, delivers and captures value) are not sustainable, and the rate at which they are burning through cash is exceeding their ability to raise new capital or transform their operations into viable businesses that can start generating revenue. However, it should not be forgotten that they have led to a radical transformation of consumer patterns, defined new ways for businesses to relate to customers and suppliers and laid the foundation for different approaches to doing business. Their impact has given rise to competition based on the innovation of certain services at prices that have never been so low. Such transformations require reflection on the strategic approach of both traditional companies and new businesses created to exploit the opportunities offered by the Internet. Similarly, new technologies have brought with them new business models that are laying the groundwork for a major revolution in relationships between companies (known as B2B), and especially between suppliers and customers (Guillén et al., 2019). When it comes to the Kazakh realities, we believe that the change in business processes should concern both classic logistics centres and fullfilment companies. There is a need for a certain business scheme, which will rely more on digital transformation.

The transport and logistics system, according to Dyomin et al. The supply chain is an integral part of the logistics system. The supply chain involves the organisation, planning, control and management of commodity flows. The supply chain has several links, from the production of products to their delivery to the end user. Product manufacturing is the first link in the chain. At the production stage, it is necessary to determine the inventory to be RFID-coded and the format of the shipping unit. To determine the format of cargo units, the primary cargo unit is the cargo in transport packaging, e.g. crates, drums, bags, etc. As an aggregate cargo unit, a cargo package formed from a pallet of primary cargo units, i.e. cargo units in transport packaging, may be considered, depending on the volume of delivery. its procedure includes determining the maximum possible number of cargo units to place on the pallet, stacking options and probing capacity. Stacking standards for shipping units need to be developed for the previous step to be effective. RFID system testing determines the maximum possible number of cargo units per pallet, stacking variants of cargo units, antenna placement geometry, and sensing signal strength for the best readability of RFID transponders (Dyomin et al., 2020). Such technologies, which have been listed by the authors, are already a great advancement in terms of digitalisation of business processes. Going forward, the first stage of product manufacturing is also subject to digitisation. Robotic systems must replace human resources and obey the commands that the digital cloud will offer. In the future, depending on the

observation and efficiency of the process to be implemented, the reduction of human capital in favour of robotic systems and a single digital matrix can be reconciled.

Hryhorak et al. believe that key trends in the digital transformation of customer service logistics based on customer centricity include: personalisation of products, experiences and communications using digital technologies; transition to flexible management methods; formation of a qualitatively new marketing structure of enterprises (emergence of specialists in customer preferences and data processing); ensuring multichannelism in marketing communications; introduction of chatbots as one of the most effective ways to provide This would increase customer satisfaction with service and the quality of logistics services by about 3%; maintain loyal customers and attract new ones through loyalty programmes; enhance organisational culture through a customer centric approach to human resource management; optimise the cost of logistics organisation; and increase sales volume and profitability of sales (Hryhorak et al., 2020). Automated customer support by chatbots would allow the prompt and immediate provision of feedback to any link in the logistics chain, be it the supplier or the end-consumer. It would also make sense to apply the Wildberries system to warehousing and distribution logistics, where any end-consumer can track the status of an order and its form of readiness. It would also be possible to set up an automatic customer support chat room, with queries mostly answered by a robotic system.

3 Methodology

The research methods in this paper are predominantly descriptive and comparative. The method of induction was also applied, which allowed for reasoning in the literature review block of this study.

4 Results and Discussion

For the Kazakhstani reality, we propose a digital twin model for the large-scale development of logistics systems:

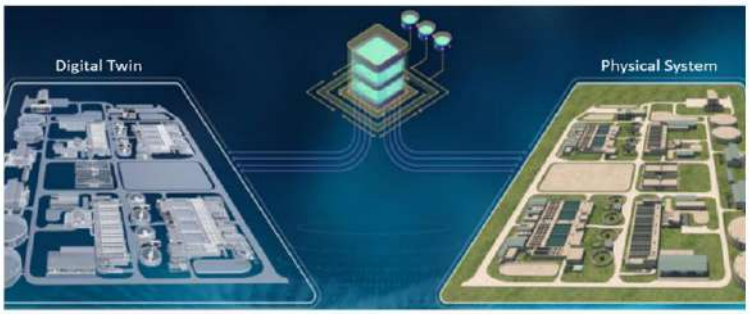

Figure 1 - 6. Visual Representation of Digital Twin

The Digital Twin will help to solve any logistics problem in the Republic of Kazakhstan. This innovative digital solution will help to design a logistics chain of any complexity in digital form, thus enabling a company to set up certain processes digitally, and then implement them after making all necessary adjustments. The advantage of the Digital Twin is that after entering information about a particular production logistic process into the virtual field, the necessary IT solutions and programs will be connected, after which the processes and errors of the real production will be set up virtually. Then, once the adjustments have been made, the process can be reproduced from the virtual to the real world. One of the main advantages is that robotic systems can be connected to the digital instruction in reality, so that the risk of errors in any logistics process can subsequently be reduced almost to zero.

5 Conclusion

Thus, it can be concluded that the Republic of Kazakhstan, due to its geographical location, has a great chance to fully develop logistics services, to be a major supplier of goods to the EAEU, as well as a conduit between Europe and the South Asian region. The digital transformation has not yet fully touched our country; therefore, it is necessary to draw on best international practices in implementing digital solutions in the logistics sector. The Digital Twin model is a promising, but by no means the only digital support for the implementation of logistics activities. The future results of the improvement of Kazakhstan's entire logistics chain will depend on the implementation of as many innovative digitalisation solutions as possible.

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