Logistics costs and their impact on performance

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Abstract

The development of an efficient and effective logistics system within a national economy has a direct impact on the work of enterprises, their management as well as their financial performance. To enable a good logistics system, it is necessary to achieve costs of a different nature, which vary depending on different factors. Logistics costs depend on the activities that the entity undertakes in its operations, that is, which part of the logistics it has in its operations. Globalization and the process of digitization have provided ways to make savings in the logistics costs that can be achieved by exploiting innovative ways of working. Lower costs largely mean a greater competitive advantage for the company as well as a higher profit.

Keywords: logistics system; performance; digitization; competitive advantage; profit

1. Introduction

In today's working conditions, expressed through the market economy and globalization, there is a need for enterprises to have a competitive advantage to survive in the markets and of course attract many more consumers. The very process of globalization allows them to attract consumers from different markets not only from the domestic. There are a number of resources, processes and flows on which competitive advantage can be built. One of the ways is by building a stable, synchronized logistics system that will offer savings for the enterprise. Logistics as a management tool on the one hand and scientific discipline of great importance on the other, show greater importance. The various activities included in the logistics are enabled to take corrective measures and opportunities for saving in different situations, ie different time in one of the activities. The biggest savings options offer new processes of work and the action of logistics, through which the degree of savings can be different. The savings have an impact on the performance that the company will accomplish, starting from financial to technical. Labor goals are to see how the costs achieved within the logistics industry can affect performance and how the development of logistics implies the general situation in national economies. In this regard, the Logistics Performance Index for the Republic of Northern Macedonia as well as comparisons with its neighbors and the Logistics Leader of Germany is shown.

2. Logistics and its functions

Logistics is part of the supply chain, which actually meet the needs and desires of consumers. The main purpose of logistics is to deliver the desired product/service (in quantity and quality), at a given place at a certain time for the lowest price. Logistics act through several types of activities: storage, stock management, purchase and transport. Through the good realization of each of these activities it can be said that the task of logistics is completed. In fact, logistics involves optimal coordination, harmonization, connecting and optimizing the course of raw materials and raw materials, semi-products as well as products and services. What is important and should be noted is the course of information and cash. [1] Managing all activities involves enabling cost minimization in each of the stages of logistics. [2] Incoming work and cooperation between the members of the supply chain can allow them to reduce costs along the entire chain, and at the same time as part of logistics. The logistics industry through its services manages to add more value to the supply chain.

The beginnings of logistics are seen in the United States in 1950, when it was linked to military activities. However, the true essence of logistics in terms of the economy is recognized in 1880, when transport and storage activities are recognized. [3] Since then, logistics is constantly evolving and today it can be said that it has taken a completely different form from that in the past. The main reason for this is the development of technology and digitization of all processes. To get a better image you must mention the main functions of logistics that are presented in Figure 1.

Figure 1 The main functions of the logistics system

During each of these functions, different activities occur that contribute to the value to be achieved to satisfy the consumer. During each of the activities, the distribution is included, ie whether it is a purchase to storage warehouses or warehouses to the end consumers the distribution takes place. The main link in logistics functions has transportation, since no product (material; raw material; finished product) can be transmitted if there is no transport. Each of the activities within these functions generates costs, some smaller some larger depending on the activity.

3. Defining logistics costs

The term "expense" can be defined in a different way, ie different definitions are found depending on the perspective seen. One of such definitions is the following, the cost is the value that is consumed to gain some benefit. [4] From an economic and financial point of view, the cost can be defined in the following ways:

Monetary or fiscal expense - costs incurred for a particular entry, ie to provide a product or service at a specified time (price for a particular production material or cost of obtaining a particular service)

Economic or Opportunity cost - the value of the omitted benefits, with the resources used to provide alternative products or services

"Accounting" types of costs - expressing the real value of the product or service for a given time, and the cost may not occur (depreciation supplement for certain equipment). *Prices in "Shadow"*- refers to products or services whose real value is not as stated.

For the purposes of labor, the costs that arise within the logistics are important, ie what costs are achieved within the framework of the execution of logistics activities. The three main cost categories can be mentioned: Personal Costs - Costs that apply to humans and their time; Costs for machinery and equipment; Costs for materials.[5] When analyzing costs, all costs arising from logistics activities must be taken into account to obtain a real picture of the costs incurred. At the same time, cost analysis enables management to make decisions of a different nature that rely on the analysis.

Logistics costs can be defined as:[6]

- Identifying different costs arising from customer services together with certain products;
- Registering, calculating and reporting all logistics costs caused by activities with suppliers and end consumers.

It is very important to know which logistics activities are taken by a company to determine the logistics costs it makes. According to Poliak, logistics costs are the total operating costs arising from the work of a logistics center, the company's logistics network, a logistical profit center or a logistical service provider.[7]

Cost analysis in logistics is done in several steps:[8]

a) Identification of cost centers is a very important step, through which functional areas can be found and divided so to see where the costs are highest;
b) Within each functional area to find the most important costs;
c) The whole center to be seen as a company, that is, as one expense, overall operations;
d) Cost classification depending on their features, so to obtain total logistics costs

This can be seen that there are different types of costs that are made within the logistics industry and it is very important to accurately analyze so that the right decisions can be made. According to Figure 1 where the functions of logistics were given, it can be said that the costs are also shared according to the various functions, ie the first function - procurement comes to purchase costs; The second function generates storage costs and third transport costs. Costs for employees, packaging costs and administrative costs can also be added here. Their participation is lower, but it takes a good deal of the costs of the logistics center.

World literature has data suggesting the importance of logistics costs, ie these costs within a country of one country account for 6% to 20%, depending on the degree of development of the country.[9] In the United States, the share of logistics costs in GDP is 7.4% in 2020.

What is specific to this type of cost is that many of them are invisible, ie it is thought that 80% of the costs in logistics are not visible to man. That is why it is necessary to apply a special methodology for monitoring and determining the costs in logistics. Within each of the functions

there can be losses, as with any other enterprise. They may refer to storage, transport, packaging, time, administration and so on.

The needs for determining, distributing and classifying costs within logistics can be of a different nature, depending on the needs at the moment. One of the main reasons for their determination is to find opportunities and ways to save. That is, the cost of discovering the basis is to detect ways and opportunities to make savings in certain types of costs.

Reducing costs within some of the logistics functions or the entire supply chain can provide a competitive advantage for the enterprise.

The main factors that have an impact on logistics costs can be mentioned:

- Market price of fuel; ○ Driver labor market; ○ Delayed arrivals;
- International trigger restrictions, tariffs and regulations; ○ Increase in rent costs

In addition to these factors, others that have a great impact on the amount of costs, and of the importance of seeing their nature.

4. Digitization and opportunities for reducing logistics costs

As mentioned, the competitor's advantage of markets (domestic and international) is achieved by reducing costs. This can happen if the company takes something in that direction, and there are several opportunities available:

- Through the analysis of the supply chain to find those activities (procedures, operations) that do not add value to the end product;
- Negotiating with suppliers or buyers in order to determine lower sales or retail prices;
- Integrating forward or backwards in order to greater cost control;
- Requesting of cheaper resources in order to replace existing ones;
- Better utilization of resources and other efficient management factors that affect the level of total costs;

Depending on the conditions under which works, the company will decide on one or some of these opportunities that will enable cost reduction. What is important to note is the development of logistics so that future perspectives that can be used by logistics centers can be understood. The development of technology and technology has enabled new opportunities to be born to save on logistics costs.

The greatest merit is digitization, which as a process has enabled most of the logistics activities to increase efficiency and effectiveness and at the same time to reduce the costs of their execution. In addition, you can look at some of those innovations assisted by digitization within logistics. In fact, these are new processes of work within the logistics functions that information technologies have enabled them to develop and develop and promote daily.

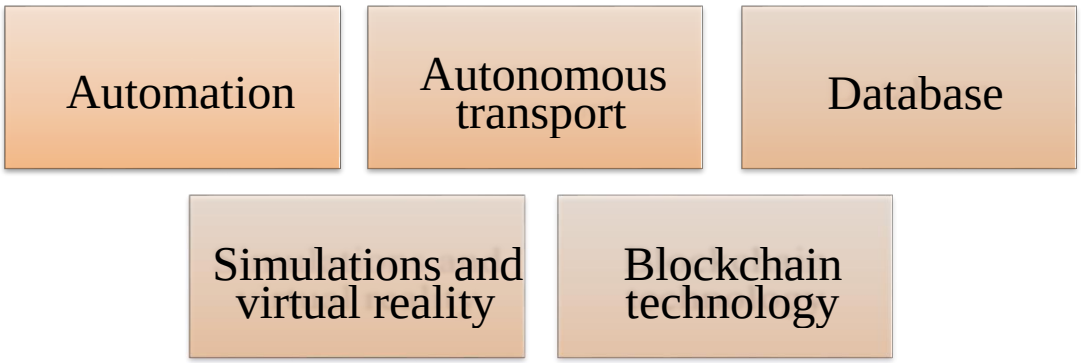


Figure 2 Innovation in logistics functions

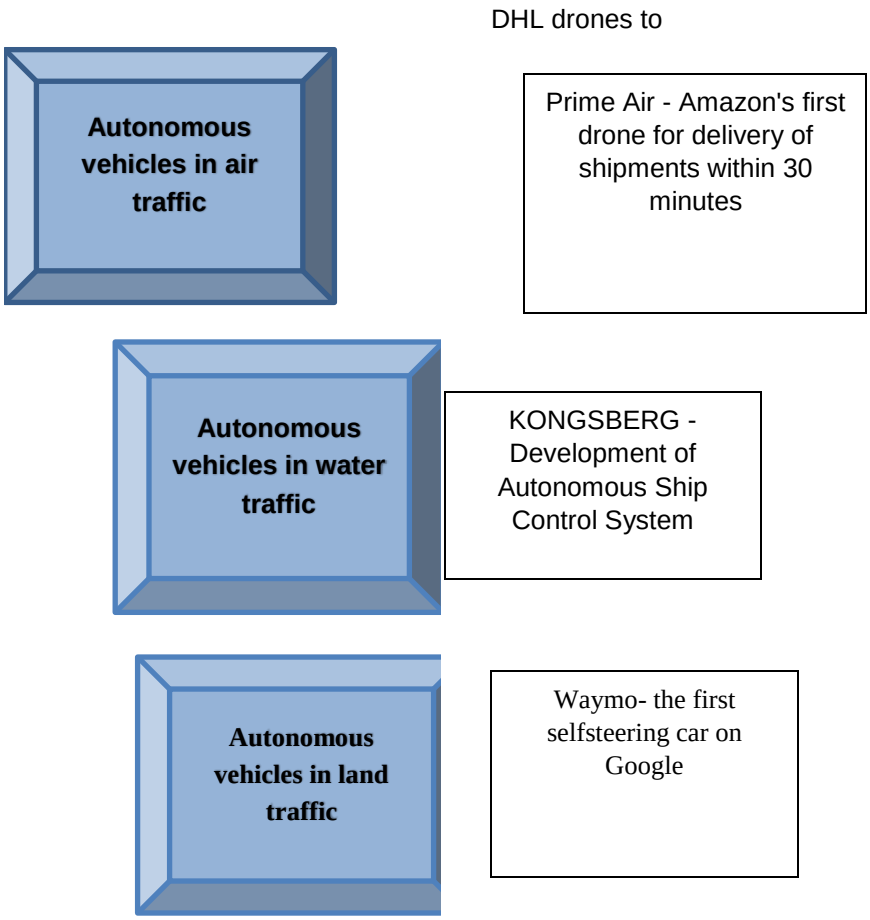
Logistics automation involves the use of computer software, automatic machinery and equipment to enable greater efficiency. According to Robinson, the utilization of automation as a process in different aspects allows for the logistics centers certain benefits:[10]

- reducing errors;
- more customer services;
- Organizational control;
- Adaptability and speed;
- availability to information and data to analyze

The automation processes have a number of advantages to the enterprise and are constantly completing.

The emergence and development of autonomous transport have a huge impact on the work of logistics enterprises, especially if it is noted that this type of transport is enabled in land, air and water traffic. This type of means of transport is adapted to the weather and do so at high speed and less mistakes than the human factor.

This increases the efficiency of transportation, but also positively saving fuel consumption and thus have a positive environmental. [11] The following is an autonomous vehicle that have appeared in different types of traffic.



The existence and development of automatic processes is no importance unless the information and data that today in logistics centers are stored in databases are not used. These bases are electronically saved, the data are automatically saved and are available to each interested party in the logistics center.

Since some of that data are "entered" by automated machines and equipment, the need to use the Internet arises, and the logistics are used on the internet of things (IoT). Overall connection to the global network has led to the emergence of blockchain technology that with its products offers certain advantages and benefits in the operation of logistics centers. Blockchain allows a reduction in many costs, including the value of verification and the cost of networking. Since administrative transactions are cryptographic, permanently preserved on blockchain and confirmed permanently with consensus there is no need for additional safety and security costs.[12] Blockchain is a chain of blocks, and each of those blocks contains data - a set of transactions and appropriate information contained in those transactions. Combining blockchain with tracking devices helps to follow the goods from the place where it comes to its arrival, making this whole process legitimate and independent. The use of this technology provides great accuracy in the product details by constantly monitoring the quality of the product. Blockchain technology can greatly facilitate the functioning of logistics, ie companies tasked with meeting consumer needs and desires.[13]

Each of these processes has a positive impact on reducing costs in different aspects, starting from reducing the participation of the human factor then continues to reduce different software

and hardware solutions to organize work. The use of these digitized processes during activities depends on several factors, including the development of the country. The opportunity to adopt technological processes depends on the economic stability of the country, and thus the conditions in which companies work. To enable cost savings in the logistics industry, it involves good development of the industry itself and the opportunity to enable companies to take advantage of digitalization. The logistics performance of a national economy is displayed through the so -called. LPI (The Logistics Performance Index), it is an interactive tool created by the World Bank so that countries can identify the challenges and opportunities they face in their performance through such indices.[14]

The last LPI is in 2018, where data on 160 countries around the world is presented. The results presented in LPI are obtained through worldwide research by field operators (freight forwarders and carriers) that provide qualitative data. This information is combined with quantitative data and it gives the logistics profile of the economy. In fact, the index measures performance throughout the logistics chain in one country, while offers two perspectives: domestic and international.

Homemade LPI - offers the country's qualitative and quantitative data from professionals working in the country itself. This index offers information on the logistics environment, infrastructure, basic logistics processes, institutions and time and cost data.

International LPI - provides qualitative data to a country in six areas where the country has trading partners, i.e. logistics professionals working outside the country. The international index provides ranking of countries by six dimensions:

- Efficiency of customs clearance and border management
- Trade and transport infrastructure quality
- Easy to edit price competitive products
- Competence and quality of logistics services - trucks, freight forwarding and customs intermediation
- Ability to track shipments
- Timeline on shipment delivery

Standard statistical techniques collect data in one indicator, which can compare between countries. In 2018. When the World Bank's latest report, the LPI result in the Republic of Northern Macedonia was 2.7 - showing improvement from the previous LPI in 2016 when the result was 2.5. Figure 4 can see the structure of the LPI, ie to see the results for the different indicators through which the result is obtained.

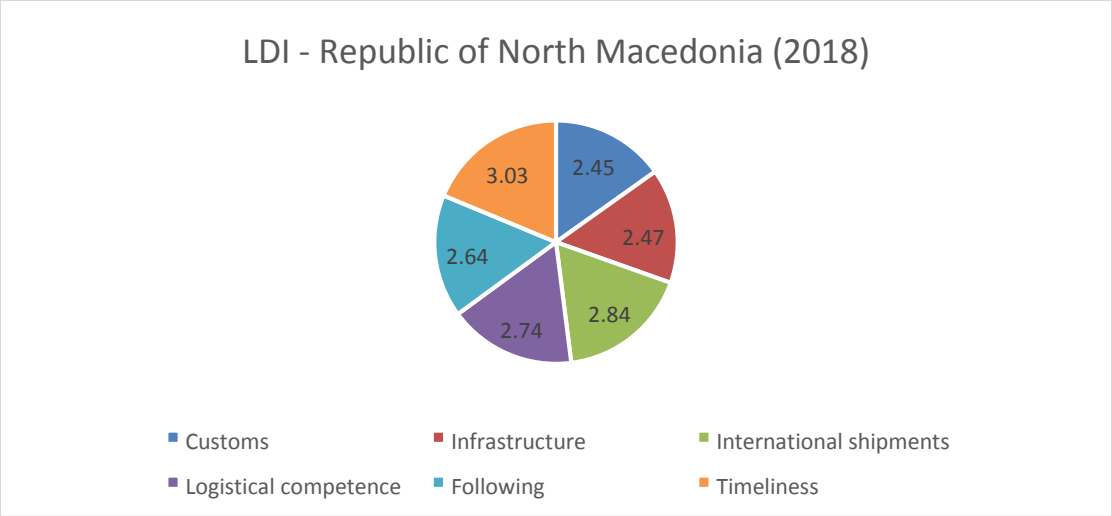


Figure 4 Logistics Performance Index of the Republic of Northern Macedonia

Timeliness performance is at the highest level in the logistics industry of the Republic of Northern Macedonia, which is largely due to the size of the country. That is, the small area allows the space to be overcome faster and thus achieving better results. Improving infrastructure and shipment systems can provide even better results in the future and more important savings for enterprise. The continuation of the differences in LPI between Macedonia and its neighbors in the latest report - 2018, presented in Figure 5, can be observed.

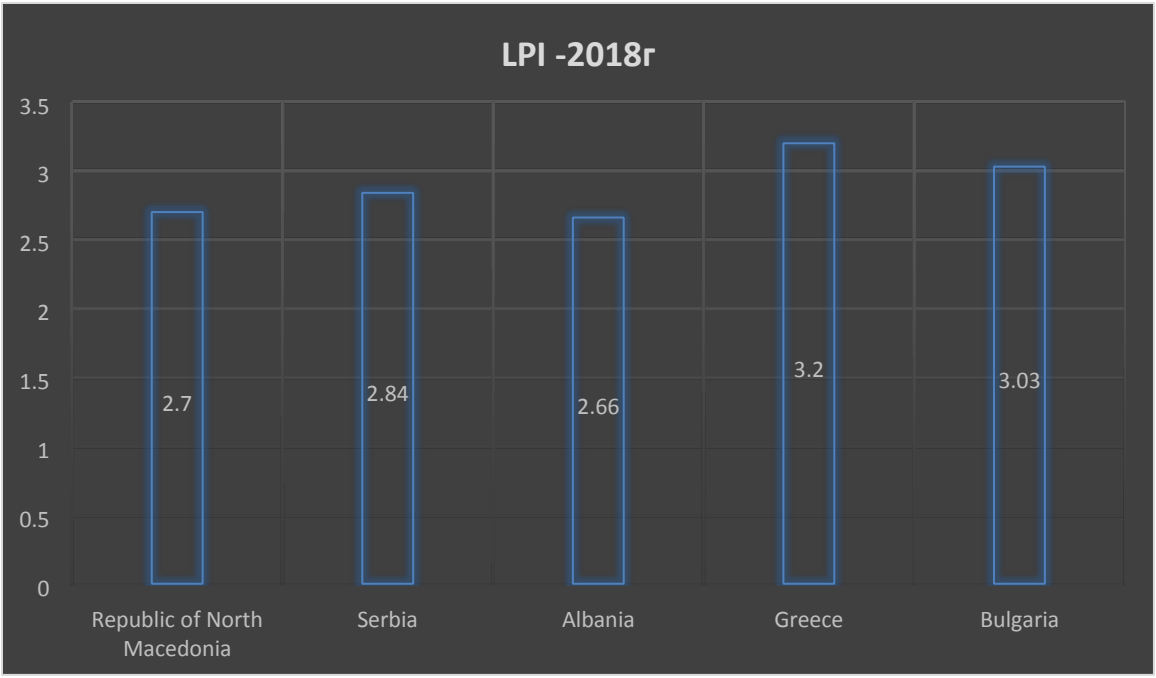


Figure 5 Logistics Performance Indexes of Macedonia and neighbors

The latest graph indicates that the best logistical performance is achieved by a neighboring Republic of Bulgaria, which is largely due to the entry into the European Union that supports the growth and development of the logistics industry, thus providing savings in their costs. The paper will present (Table1) parallel between the Republic of Northern Macedonia and the country with

the best LPI in Europe - the Republic of Germany. The differences between the two countries in the two consecutive World Bank reports (in 2016 and 2018) can be noted.

Table 1 Comparison of LPI Results between North Macedonia and Germany

	Republic of North Macedonia	Germany
LPI – 2016	2,5	4,1
LPI - 2018	2,7	4,23

The difference in results is obvious and expected, as Germany is one of the world's leading economies, where the opportunities and challenges for the logistics industry are very high. The comparison between these countries is designed to follow the members of the logistics industry in our country to follow the example of the Republic of Germany.

The extended LPI results are presented by our country from 2007 until 2018, which includes 6 results and its place in the ranking compared to all 160 participating countries.

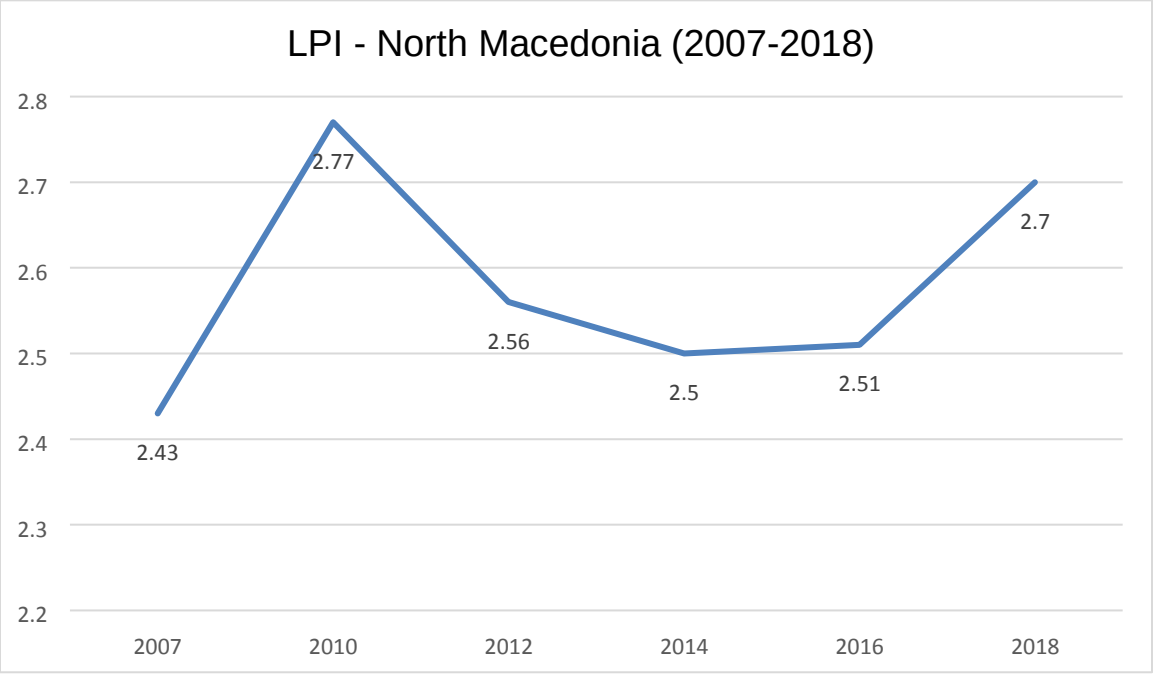


Figure 6 LPI Performance Index of North Macedonia

It can be seen that the country's logistics performance was the highest in 2010. which may be due to the high indicators - timeliness (3.1) and the tracking indicator (2.8) which, unlike all years, have the highest value. The reason for this is seen in the development of shipment and monitoring systems, which came to our country with delay and was swinging during that period. In terms of ranking, it can be mentioned that during these years there were different places the country took.

The good index achieved in 2010 allowed the country to rank the highest place during all the years when it participated in World Bank research. The need to follow LPI is evident, as it gives guidance on how to develop in the future. That is, the results given should give direction and development in the logistics industry. Also, the results of the logistical performance index provide guidance to find out in what processes and activities of logistics there is the possibility of taking corrective actions or introducing innovation to enable cost reduction. What was previously mentioned, the transport as a function of logistics takes most of the "cake", i.e. the costs that occur here are the largest when viewing the total logistics costs. That is why we will look at what they make up for transportation costs and how they can reduce what they can actually mean by reducing logistics costs as a whole.

5. Covid -19 and his impact on the logistics sector

The logistics sector in charge of movement as well as product storage is directly influenced by the pandemic caused by Kovid-19. The first disorders that the pandemic makes is the flow of products, ie their transfer from one point to another, ie to the end consumers. Such disorders within the logistics sector further influence economic development, competitors and create new jobs.

The beginnings of the influence are felt in China where the crisis Corona first appeared, and the city of Wuhan plays a major role in global production. China is the main consumer of global goods and agricultural products so its connection to other countries was "damaged" as the movement of goods was interrupted and slowed on several occasions.[15] The interruptions in China's production were stirring up, ie it was transmitted through the global supply chains that were gradually felt. The globalization and connection of national economies, and thus their industries, has influenced it to slow down in various industries around the world such as automotive, production of medical equipment and materials, consumer production and consumer production and the like.[16] Very quickly, the developments from China have spilled around the world, so in

a short time the whole world has closed and the setting of barriers and fencing every national economy has begun. It not only led to the isolation of the people, that is, the inhabitants of a country, but caused the closure of economies and turning to themselves. At that time, the moments of globalization were stopped and the connection did not happen as fast and simply as it was. The course of the pandemic has taught the economies, that is, its stakeholders to live with it and work in those conditions.

In this direction of isolating persons to prevent the spread of the virus, many of the logistics companies had the opportunity to develop or develop technological capacities. The main problem in such conditions for each country was the possibility of delivering the necessary, essential goods without the risk of contagion. At such times the solutions of technology go very far, so consumer satisfaction is allowed even though they do not have the opportunity to be with the rest of the world. One of those solutions is a synchronized product delivery system that maintains social distance.[17] In the literature, many authors offered solutions to this problem and gave that a synchronized system, how it would work and what convenience would offer them.[18]

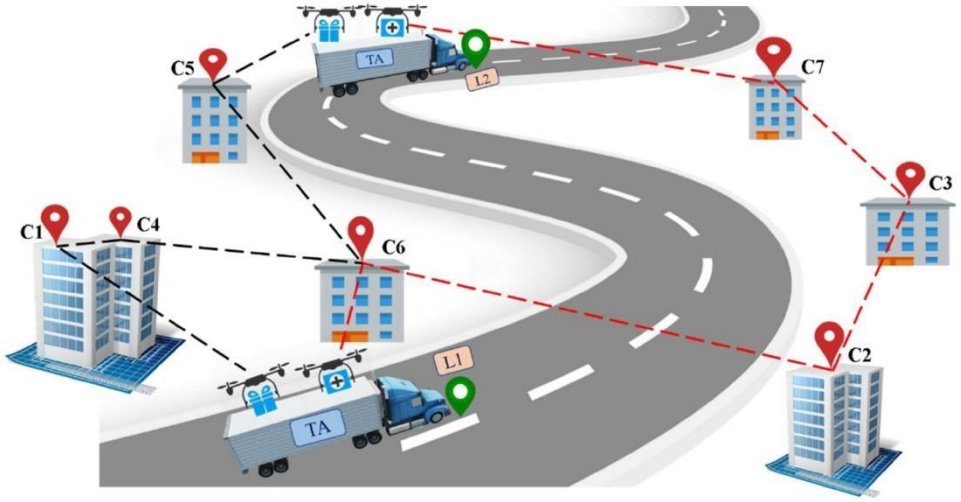


Figure 7 Coordination of unpleasant aircraft and trucks for delivery of food and medicine

The picture is well presented what the role of this synchronized system is, that is, how the trucks that go into risky areas to deliver food and medicines are used drones to submit them to consumer homes without endangering other persons. These solutions point to the opportunities and challenges the pandemic offers for the logistics sector, that is, it fueled the development of new ways of delivering and delivering deliveries.

In addition to this, the pandemic offers a number of challenges on logistics as a sector, while technology serviced and implemented these challenges in reality. [19] What will be the direction of development in the future depends on many factors, and it remains to be seen what the future results will be for the logistics sector, but also on the economic stability of any national economy.

Conclusion

The costs of logistics take up much of the costs that the company makes, but their nature does not allow them to be fully discovered. Very often in the logistics there are "hidden" costs that are not visible to man and it can be difficult to say how much part of the total cost. The need for their savings is certainly in order to make greater profits and of course competitive advantages. The possibilities for their savings are at different points, which need to be found and used best.

Digitization through its action in different spheres makes the biggest contribution to cost savings in this area. The connection of digitization to costs is inversely proportional, ie the greater the development and application of technological inventions as much cost savings are. Hence the connection to the achievement of success, ie the achievement of high performance.

The logistical performance index is an indication of how much a national economy manages to achieve good performance while reducing costs in the logistics that arise. In such a ranking, the Republic of Northern Macedonia is at lower levels than its neighbors except the Republic of Albania. Such a position is due to underdeveloped logistical infrastructure as well as outdated technological processes in the industry. The need to introduce innovation and accepting the new challenges that digitization brings are necessary for our economy, which will enable better performance as well as the necessary savings in the logistics industry.

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