MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

UKRAINIAN-AMERICAN CONCORDIA UNIVERSITY

Faculty of Management and Business

Department of International Economic Relations, Business & Management

Bachelor's Qualification Work

DIGITALIZATION OF LOGISTIC IN DEVELOPING COUNTRIES (BASED ON PRIVATE ENTERPRISE ФОП «ЧЕРНЕНЬКА» CASE)

Bachelor student of the 4th year of study

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Field of Study 29 – International Relations

Specialty 292 – International Economic Relations

Educational program – International Business

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Doctor of Economic Sciences

Kyiv – 2024

Abstract Topic - Digitalization of logistic in developing countries (based on private enterprise ФОП «Черненька» case)

In the process of writing this research, I have covered the topic of digitalization in logistics processes and explored the peculiarities of digital technologies in developing countries. I analyzed the main problems of logistics in the EU countries and identified their causes and consequences for the economies of the countries. I also studied the use of modern artificial intelligence technologies and their application in the transportation of products and in logistics chains.

As for the practical part of the study, I investigated the peculiarities of using digital technologies in the ФОП «ЧЕРНЕНЬКА» and determined that the company does not use enough information technology, which affects its efficiency. Therefore, I proposed the use of the REST API CRM system, which will allow tracking cars and monitoring the timeliness of product delivery.

Keywords: logistics, technology, artificial intelligence, management, REST API CRM

Анотація

В процесі написання дослідження, мною була розкрита тема діджиталізації в логістичних процесах та досліджено особливості застосування цифрових технологій в країнах, що розвиваються. Мною було проаналізовано основні проблеми логістики в країнах ЄС та визначені їхні причини та наслідки для економік країн. Також мною було досліджено використання сучасних технологій штучного інтелекту та їх застосування при перевезенні продукції та в логістичних ланцюгах.

А практичній частині дослідження було досліджено особливості використання цифрових технологій в ФОП «ЧЕРНЕНЬКА» та визначено, що компанія не використовує достаньо інформаційних технологій, що позначається на її ефективності. Тож мною було запропоновано використання системи REST API CRM, яка дозволить відстежувати автомобілі та слідкувати за вчасністю доставки продукції.

Ключові слова: логістика, технології, штучний інтелект, управління, REST API CRM

PHEE-institute «Ukrainian-American Concordia University»

Faculty of Management and Business
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Educational level: **Bachelor degree**
Specialty **292 "International Economic Relations"**
Educational program **"International Economic Relations"**

APPROVED
Head of Department _____

__Prof. Zharova L.V._____
"____" _____20_____

TASK
FOR BACHELOR'S QUALIFICATION WORK OF STUDENT

Kuzmichova Dariia

(Name, Surname)

1. Topic of the bachelor's qualification work

DIGITALIZATION OF LOGISTIC IN DEVELOPING COUNTRIES (BASED ON PRIVATE ENTERPRISE ФОП «ЧЕРНЕНЬКА» CASE)

Supervisor of the bachelor's qualification work Prof. L. Zharova,
(surname, name, degree, academic rank)

Which approved by Order of University from ***"25" September 2023*** № 25-09/2023-4к

2. Deadline for bachelor's qualification work submission "***25" April 2024.***

3. Data-out to the bachelor's qualification work The secondary data, quantitative and qualitative – reports, scientific papers, industry studies, and official statistics reports. The primary data received during the internship – ФОП «ЧЕРНЕНЬКА»

4. Contents of the explanatory note (list of issues to be developed) The purpose of the diploma work is to analyze the use of digital technologies in organizing the logistics process using the example of ФОП «ЧЕРНЕНЬКА». During the research process, a number of tasks were set:

- Explore the essence of logistics transportation management
- Highlight the features of logistics development in developing countries

- Conduct an analysis of technological trends in logistics
- Make a general economic description of the enterprise
- Assess the logistics transportation management system at the enterprise
- Make an analysis of the use of digital technologies when transporting products to the ФОП «ЧЕРНЕНЬКА»
- Determine ways to optimize the transport process at an enterprise in the context of digitalization
- Make an economic assessment of the proposed measures

5. List of graphic material (with exact indication of any mandatory drawings)

- Technological diagram of the process of transporting cargo by various modes of transport
- Organizational structure of ФОП «Черненька»
- Employee structure ФОП «Черненька»
- ФОП «Черненька» financial strength analysis
- ФОП «Черненька» liquidity and solvency analysis
- ФОП «Черненька» profitability analysis
- Analysis of business activity ФОП «Черненька»
- Behavior of transport market participants
- Diagram of priorities of customer requirements for the services of a ФОП «Черненька»

6. Date of issue of the assignment

Time Schedule

№	The title of the parts of the qualification paper (work)	Deadlines	Notes
1.	I part of bachelor thesis	*10.12.2023*	In time
2.	II part of bachelor thesis	*27.02.2024*	In time
3.	Introduction, conclusions, summary	*25.04.2024*	In time
4.	Pre-defense of the thesis	*30.04.2024*	In time

Student _____
(signature)

Supervisor _____
(signature)

Conclusions (*general description of the work; participation in scientific conferences/ prepared scientific article; what grade does the student deserve*):

The bachelor's work was performed at a high level using retrospective analysis based on the processing of a sufficient number of sources of Ukrainian and international scientists, systematization of information on the latest trends in the industry, and processing and analysis of data obtained during internship at the enterprise. All this made it possible to formulate specific, time-bound and impact-measurable recommendations for the enterprise.

The student published the results of the research at 2 conferences.

The work deserves an "excellent" grade under conditions of successful public protection.

Supervisor_____
(signature)

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Introduction

The war in Ukraine, which began in 2022, shook up not only the food and financial markets, but also significantly affected freight transportation, leading to an insane rise in prices. The prerequisite for the rise in prices for freight transportation was the rise in prices for energy resources and fuel, which especially increased critically against the backdrop of sanctions against the Russian Federation. Studying the situation in the freight transportation market is a relevant topic for research, because it is the price of transportation that falls on the end consumer, who will pay more for the product due to the increase in the cost of its delivery.

Today, the organization of transportation plays an important role in the field of trade and is an integral part of it. It is logistics that ensures the delivery of goods between countries and cities and is a bridge that combines not only the business of companies, but also the economies of countries.

Organizing a transport facility can increase the costs of an enterprise due to the emergence of such difficulties as: a vehicle not ready for travel, temporary losses caused by weather conditions and traffic jams, damage to cargo during transportation; lack of necessary transport, etc. Proper organization of transport facilities at an enterprise solves these issues, helping the enterprise reduce costs and unnecessary capital investments for production.

The purpose of the diploma work is to analyze the use of digital technologies in organizing the logistics process using the example of ФОП «ЧЕРНЕНЬКА».

During the research process, a **number of tasks** were set:

- Explore the essence of logistics transportation management
- Highlight the features of logistics development in developing countries
- Conduct an analysis of technological trends in logistics
- Make a general economic description of the enterprise
- Assess the logistics transportation management system at the enterprise
- Make an analysis of the use of digital technologies when transporting products to the ФОП «ЧЕРНЕНЬКА»

– Determine ways to optimize the transport process at an enterprise in the context of digitalization

– Make an economic assessment of the proposed measures

The subject of the study is the assessment of the use of information technology in the logistics organization of the ФОП «ЧЕРНЕНЬКА».

The object of the study is the conditions for the introduction of technologies into the logistics processes of the ФОП «ЧЕРНЕНЬКА».

Research methods: statistical method, analytical method, economic analysis method, comparison method.

Practical significance of the obtained results. We proposed the optimization of transport costs through the introduction of digital technologies in logistics management.

The thesis consists of an introduction, three chapters with subdivisions, a Conclusions and proposals and a list of sources used.

Chapter 1 Theoretical foundations of organizing the transport process at an enterprise

1.1. Concept, goals, and objectives of transport and transportation

Currently, there are many definitions of the term "logistics". The most accurate description is the following definition: logistics is a concept of business processes based on the interconnection of individual elements into a single process, reclining inappropriate costs and expenditures of enterprise resources. Transport, in turn, is a branch of material production, which is engaged in the organization of cargo transportation and transportation of passengers. Based on the data on the structure of social production, transport is referred to the sphere of production and material services [Avtomobil′nyy transport v Ukrayini, 2016].

The costs associated with the creation of any product or service consist of the cost of production of the product or the provision of services and the costs associated with the implementation of a set of works from the moment of purchasing the resources to the moment the goods are shipped to the consumer. The main part of the cost of a product or service is the markup (“transition cost”) of each link in the chain: PRODUCER = CONSUMER. From the primary source of resources (raw materials) to the consumer, the movement of the material flow occurs with the involvement of various vehicles. Such costs can be up to 50% of the total logistics costs.

Transport logistics is the process of moving the required volume of goods to the appointed place and time, with the choice of the optimal route and minimum costs. In practice, transport is a system, which, in turn, consists of subsystems:

- Public transport;
- Transport for special purposes.

Public transport is a sector of the national economy that meets the needs, in general, of the sectors of the national economy and the population in the transportation of goods and the carriage of passengers. It serves the sphere of circulation and the population and

has a second name - mainline transport. This type of transport covers all possible types of transport: air, road, rail, sea and river, pipeline transport.

Transport for special purposes (not general use) is internal production, it also includes all types of vehicles that belong to the enterprise and is usually an element of production systems [Kal′chenko A. H., 2006].

Currently, the increase in the level of efficiency of transportation is associated with the technical improvement of the rolling stock of the transport of enterprises, as well as loading and unloading facilities, since the introduction of advanced technologies and the improvement of the process of organizing the transportation of goods. Typical technical improvements will allow:

- To increase the speed of movement of the rolling stock;
- Increase the size of consignments for transportation of goods;
- Reduce downtime during loading and unloading operations, etc.

The main task of this technology is to reduce the labor intensity of operations and the duration of transportation of goods, due to the reduction of operations and stages of the transportation process. In other words, during the transportation process, it is necessary to eliminate useless operations and make the process more purposeful.

It is worth considering the essence of the technology of transporting goods, it is determined by two basic concepts: stage and operation.

The stage represents a set of operations with the help of which it is possible to carry out a particular process. Operations are a homogeneous, indivisible part process of (logistic) transportation, aimed at achieving a given goal and performed by one or more specialists.

The technology of the process of transporting goods is characterized by the following features:

- Coordination of movement and phasing;
- Unambiguity of the performed actions;
- Separation of the transportation process [Mishchenko M. I., 2010].

Each operation means the approach of the control object to a given goal and provides the transition from one operation to another. Each of the operations is a kind of

introduction to the subsequent operation of the stage. The more accurately the description of the process of transporting goods corresponds to the subjective logic, the higher the likelihood of increasing the efficiency of the personnel involved in organizing the process. Thus, each technology should be able to provide unambiguous actions when performing the necessary operations and stages. If the execution of one of the operations is rejected, there is a reflection on the entire technological chain. Next, consider the diagram of the cargo transportation process, Figure 1.1.

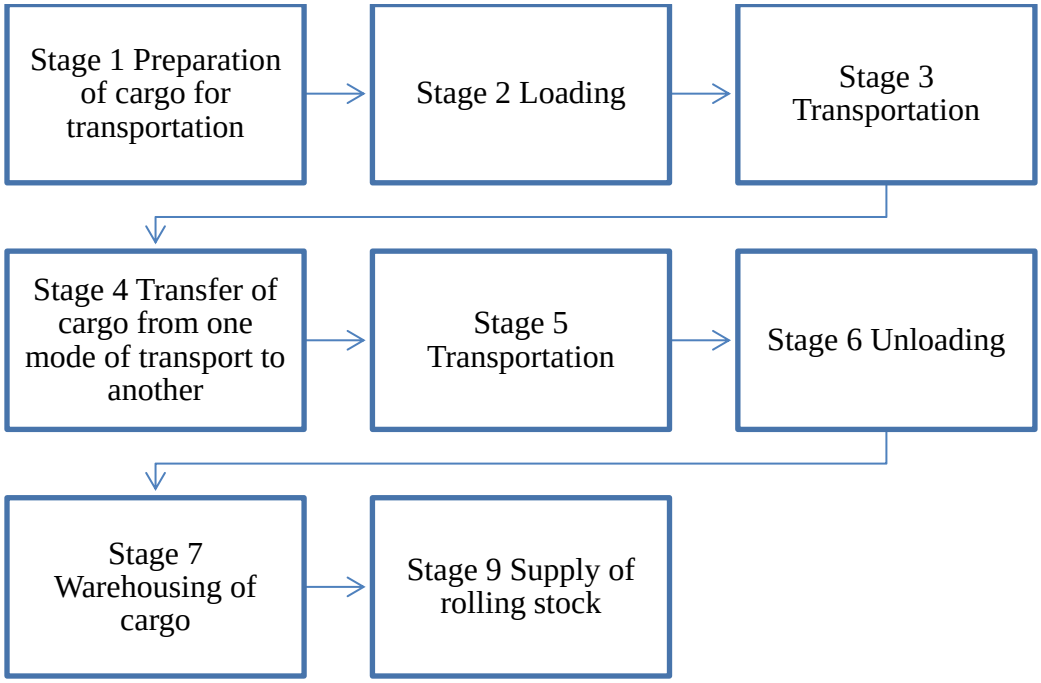


Figure 1.1 - Technological diagram of the process of transporting cargo by various modes of transport

Sourse: [Preyher D. K., 2012]

The production process of transporting goods, covering the stages of supplying the vehicle rolling stock for loading, transportation and shipment is a cycle of the transport process.

Based on the data in Figure 1.1, it becomes clear that the transportation of cargo is carried out in sequential repetitive production cycles. The rhythm of such cycles is determined by their frequency, which depends on the size of the average duration of one cycle. The cycles are distinguished by a high level of dynamics, continuity of state change and composition change.

With individual shipments, the cycles can fluctuate in time, but in any case, the cycles have a beginning and an end.

Each of the repeated cycles consists of a large number of separate stages, which are interconnected and unidirectional, since the ultimate goal for them is to achieve a spatial change in the location of the load. Thus, the complex of these cycles turning into a transportation cycle is a transportation process.

The basic principles and main tasks of transport logistics should be considered. The tasks of transport logistics include:

– Provision of a unified technological transport and storage process;
– Creation of transport systems, as well as transport corridors and chains;
– Joint planning process for production, transport and warehouse processes;
– Determination of the most rational transportation route;
– Determination of the required type and type of vehicle.

As for the principles of logistics, in practice there are twelve principles:

1. The fundamental principle of transport logistics is the creation, analysis and improvement process, based on the methodology of general cybernetic systems theory. Important points of the systematic approach when creating transport logistics are:

– The main purpose and functioning of the TL system;
– Elements that make up the TL system to achieve a given goal;
– The structure required for the TL system to achieve a given goal;
– The process of interaction between the TL system and external systems;
– Uninterrupted operation of the TL system, which is aimed at achieving a given goal;
– The final result of the activity of the TL system, compared with the set goal.

2. The principle is that the main thing in the transport process is taking into account the needs of the transport services market, and these include:

– Provision of a large range of services, in comparison with competitors;
– Delivery of goods according to an established clear schedule;
– Organization of multimodal transportation by various types of vehicles according to uniform transport documentation;

– Registration of the necessary transport documentation by a transport company (freight forwarding company).

3. This principle provides for the possibility of providing the customer (consumer) with the necessary high quality transport service in the required amount, at a specific time and place with the best price for the customer.

4. The fourth principle of TL reflects the priority of the actual provision of transport services over the technical ability to provide services in a larger volume, but practically not implemented due to the lack of the required volume of orders for the transportation of goods. In other words, a transport company may have more vehicles and more, if possible, to transport goods, but at the same time not have a sufficient number of service customers, due to poor organization of advertising work to promote services in a competitive market, as well as due to the established high tariffs for transportation of goods. This situation in transport logistics is recognized as ineffective and says that it is necessary to pay more attention to work related to attracting customers.

5. This principle of transport logistics is that the need to choose not a high, but the optimal level of customer service, you should choose a reasonable compromise solution for the level of transport service, it should not be low and not high, so as not to lose customers and the cost of the service should not be overpriced. An effective solution in this case is the organization of a flexible system for the provision of services of different levels of service for each client, in other words, for different segments of the transport services market.

6. The sixth principle states the need to analyze the need to provide transport services at the initial stage of cargo turnover (the point of the transport process at which there is a need to transport goods).

7. The seventh principle of transport logistics is that in the process of planning a separate link in the logistics process, it is necessary to consider the link not separately, but it is necessary to analyze the influence of the studied link on the transport logistics system as a whole.

8. The following principle proposes for a transport company to calculate the cost of each operation of transport services, and includes:

– Delivery of an unloaded vehicle for loading;
– Loading one pallet or pallet unit into the vehicle;
– Transportation of one ton of goods over a distance of one kilometer;
– Loading and unloading of one ton of cargo from the vehicle at the warehouse.

9. This principle consists in the implementation, according to the existing possible competitive options for the transportation of goods, technical and economic calculations and full justification in order to be able to offer the customer the most effective option and conditions for the transportation of goods. These calculations and justifications will allow transport companies to quickly offer a profitable option for both parties, since the data can be stored in the company's common database and used in subsequent activities.

10. The tenth principle of TL invites transport companies to develop a strategy for several years ahead and adhere to it in relations with other companies, government agencies, as well as between divisions and individual employees of the transport company.

11. The principle is that it is necessary to collect and use reliable and complete information by a transport company about shippers and consignees in their region, about competing enterprises in the multimodal transport market, about transport legislation and government agencies, etc.

12. The last principle of TL proposes to create and maintain business partnerships between transport companies and enterprises that are participants in the transportation processes, based on mutual interests [Osnovy ekonomiky transportu. 2011].

Summarizing the studied material, we can conclude that transport logistics is nothing more than the movement of the required volume of goods to a specified point and time, using the optimal route at the lowest cost.

1.2. Characteristics of logistics development in developing counntries

At the present stage of development, logistics concentrates in itself operations that are associated with the process of goods movement, management, warehousing and storage of stocks, material and technical supply and transportation of goods. Today, logistics has acquired a commercial character, in other words, the activity is aimed at

obtaining maximum profit. In addition to a commercial nature, logistics acquired technological features, within which the process of improving transportation technology, arrangement of warehouse facilities and information support of the company takes place. It should be noted that functional logistics, which is of a commercial nature, belongs to foreign companies, and therefore logistics is understood as a process of managing the economic flows of a company that arise in the process of moving goods and services from production to consumption. Logistics implies the use of various logistics tools in the market of goods and services in the process of creating and implementing a logistics chain.

Considering logistics services from the perspective of the value chain of foreign companies, services can be subdivided into infrastructural, social, production and resource services. It can be concluded that logistics can be:

– Infrastructural, in other words, can create general conditions for the normalized functioning of the enterprise;

– Social - ensures the creation and development of the human capital of the enterprise;

– Productive - contributes to the improvement of the technologies of the production process of the enterprise;

– Resource - capable of meeting the needs of the enterprise for the needs of various types of resources, including material, financial, informational, etc.

One of the derived links in the value chain of foreign enterprises is the distribution of logistics services in accordance with their role in the production process of the enterprise. Commercial intermediation services are applied at the following stages:

– Production (provision of resources, covered by procurement logistics);

– Distribution (the process of moving finished products to the market, acts as distribution logistics);

– Exchange (represents ACTs of sale and purchase of goods, acts as a type of commercial logistics);

– Consumption (production consumption, is used when commercial intermediation can be a form of entrepreneurial logistics) [Pavlov V. I., 2005].

Intermediary logistics operations have a steady growth trend in the modern economy. In addition to the fact that there are differences between countries in the

organization of the process of commercial intermediation, there are also common features; there is a stable trend of commercial intermediation to improve the process of serving the market. Today, in the United States of America (USA), up to 20 types of heterogeneous intermediary structures are distinguished, given the specialization of goods, the number of structures exceeds a thousand. So, in Japan, there are and operate about one hundred twenty thousand firms and other intermediary structures with a total number of employees not exceeding nine hundred thousand people, about 60% of the total sales of industrial and technical products fall to their share. It is also worth noting that the role of commercial intermediaries in providing producers and consumers of goods with logistics services related to warehouse processing of products, sorting, packaging, etc. is increasing. In the United States of America, commercial intermediation in the logistics system includes the following:

- International and domestic forwarding and transport companies;
- Independent agents and brokers;
- Associations of shippers, etc.

With an increase in the role of purchasing and sales organizations of manufacturers of goods and consumers, the degree of difference in the goals of commercial divisions of industrial enterprises and independent organizations of intermediaries decreases, interaction in the interests of manufacturers of goods increases, taking into account the growth of competition in the sales market. For example, in America, independent resellers account for 53% of total sales of industrial goods, while wholesalers of industrial enterprises account for 41%. The expansions of the automation of the integration forms of their functioning, formed on a long-term basis or on a shareholder basis, are both short-term and long-term.

The external environment of commercial intermediation of foreign companies is considered as a kind of aggregate of “subsystems of a supersystem”, such is the national economy. The most significant subsystems are: economic (production, infrastructural, scientific and technical potential of the national economy), which provides an environment for commercial intermediation.

In cargo transportation, on the example of foreign companies, an important role is played by the promotion of commercial products from the manufacturer to the final consumer. Transport infrastructure is the subject of transport logistics study. Much attention in cargo transportation is paid to the continuity of supply and is characterized by the discrepancy in the time spent on transportation. Continuity reflects the dependence of a large number of factors, for example, with low uninterrupted transportation, it is necessary to create safety stocks to protect the enterprise from service disruptions.

Much attention of the logistics systems of foreign enterprises is focused on maintaining a balance between transportation costs and the quality of services. When forming a logistics system in foreign transport companies in the transport infrastructure, it is customary to take into account:

– Determination of the location of infrastructural objects occurs with the help of a complex of transport needs and at the same time there is a limitation of alternative transportation methods;

– Transportation costs are not reduced only to the cost of transportation;

– Efforts aimed at integrating transport capacity into the logistics system of foreign transport companies will be useless in case of uneven delivery [Solovyova O. O., 2007].

The specific content of the transport terms of the transaction depends on the following factors:

– Basic terms of delivery;

– Type of vehicle;

– Method of cargo delivery;

– Transport specifics of the goods.

A complete list of issues related to transportation is described in the sales contract under basic delivery conditions, which imply the transfer of goods from the manufacturer to the consumer.

Operations that are directly related to the delivery of goods in international trade have their own cost and, as a result, can affect the pricing of products. Many goods become uncompetitive in foreign markets due to high delivery costs. Transport tariffs, tariffs for warehousing, loading and unloading operations and other operations related to

delivery are invariably added to the price of products and can completely negate all intentions for its successful implementation in various markets.

It should be noted that foreign countries resort to using the system of charging for the use of highways.

Sokolova E. E. believes that to ensure the unhindered movement of goods and services at the level of cooperation between countries, international companies require the use of logistics schemes. Modern international logistics has specific differences from the movement of material flows at the national level [Sokolova O. Ye., 2020].

Siriychik T. highlights the key features of the use of logistics schemes [Syryichyk T., 2010]:

– foreign trade operations, as a rule, are associated with large volumes of trade turnover, which make it possible to compensate for considerable expenses, including customs clearance;

– international markets are characterized by a high level of uncertainty and commercial risks;

– a large number of intermediary links complicates the interaction of participants in the transport process in the logistics chain.

In order to solve this problem, the EU countries created and officially approved a road construction plan, which over time transformed into the European Agreement on International Highways.

However, even today there remains an unresolved problem associated with the unequal demands of world trade and the capabilities of the logistics infrastructure of some states.

According to Krikavsky E.V. and Dorokhovsky O.M. , the road transport sector has more and more significant restrictions on access to the EU market than other transport subsectors (maritime, rail and air transport) [Dorokhovskyi O.M.., 2012; Krykavskyi Ye., 2012].

In addition to highways, international transport logistics uses railway infrastructure for cargo transportation, the main advantages of which are low cost and flexibility. Many developed countries today are implementing programs to modernize railway infrastructure,

using innovative technologies to develop new railways, junctions, electric trains, locomotives, etc.

Braginsky V.V. researched that the central role in the development of international transport logistics belongs to water infrastructure [Brahynskyi V. V., 2014]. In European countries today, the state of waterways is characterized as unsatisfactory and underdeveloped, which hinders the development of water transport, including logistics in general. However, maritime transport remains a critical way to deliver goods that are Ukraine's main exports – primarily metallurgy, agricultural, mining and chemical products. Europe has ten large river ports, whose cargo turnover averages more than 50 million tons per year.

The most dramatic position in the context of international transport logistics belongs to air cargo transportation. Cargo transportation by this method is only advisable when it is necessary to deliver cargo as quickly as possible, since the price of this service is extremely high. Even in the last century, air transportation was in demand, but today many logistics companies refuse to provide this service, focusing on more profitable passenger air transportation.

According to Anderson B., Villa J.C., the problems of the logistics system in the EU countries are showed on Figure 1.2.

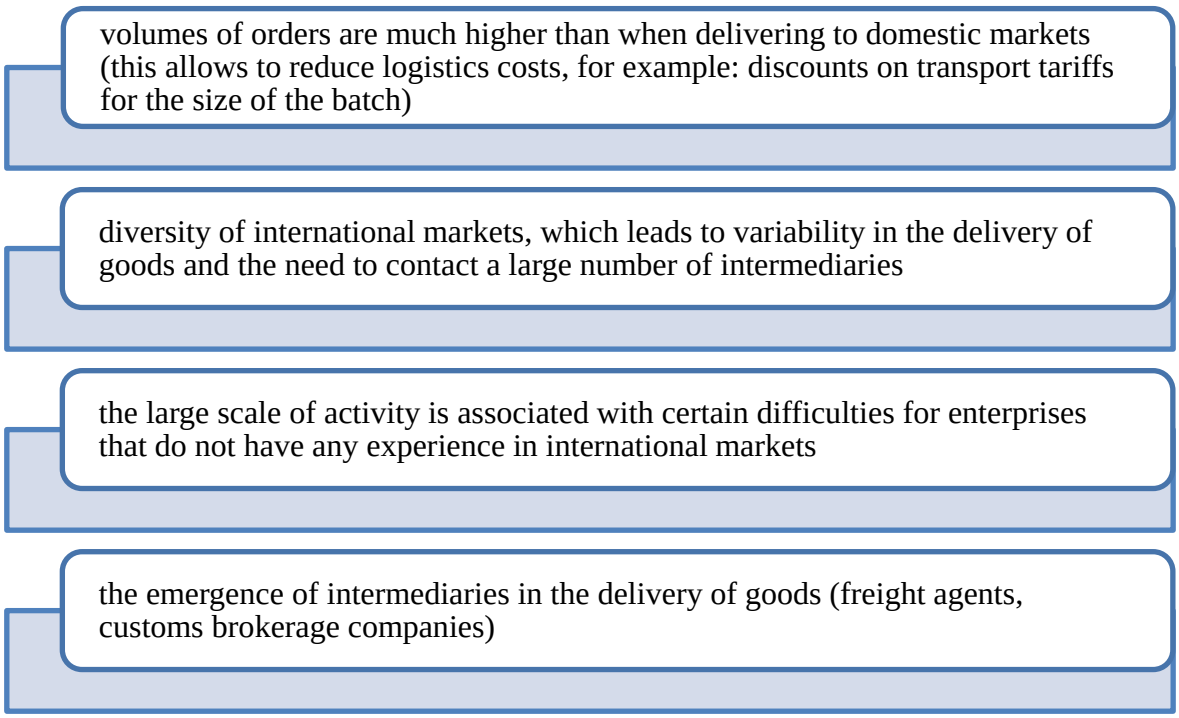


Figure 1.2 The problems of the logistics system in the EU countries

Source: [Anderson B. & Villa J. C., 2015]

To best address the above challenges, companies must have a thorough understanding of the complexity and variety of operations they will encounter.

As can be seen from Table 1.1, each of the EU member states collects according to certain criteria, which differ from each other. After analyzing the data, you can classify the countries according to the increasing load on carriers: Australia, Italy, Czech Republic and Germany.

Table 1.1

Specific features of the EU countries' charging systems

Characteristic	Austria	Germany	Italy	Czech
Billing	Total mileage			Collection
Type of transport system	> 3,5 tons	> 12 tons	all	> 3,5 tons
Road network	motorways and some roads	motorways	5.6 thousand km of motorways 740 km	express roads, highways
Tariff differentiation	vehicle class along the axes		vehicle class for axle emissions,	
	type of road, time of day		Times of Day	weight

Thus, we can conclude that the development of logistics in foreign countries is much higher than the level of development of logistics in our country, but it is worth noting that the logistics business processes of foreign countries do not have special ones, differ from the logistics business processes in our country.

1.3. Technological trends analysis in logistic

Today, the automotive industry plays an important part in the economies of the world, because it ensures the supply of goods. Therefore, we propose to identify the main factors influencing the automotive industry (Fig. 1.3).

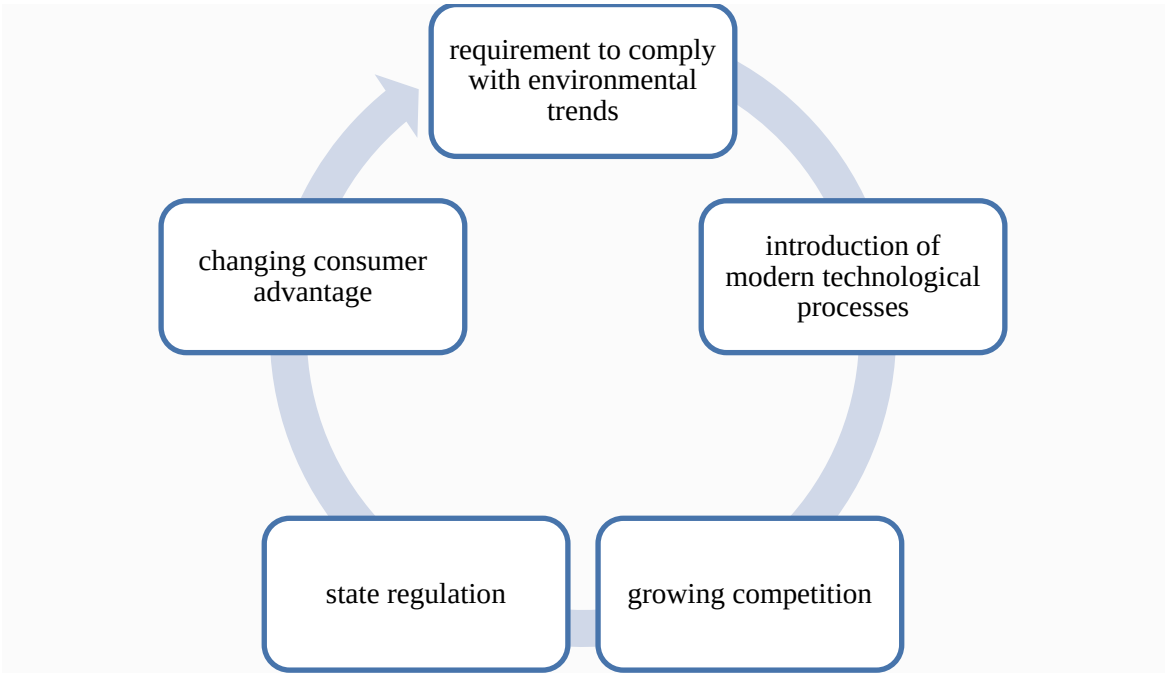


Figure 1.3 The main factors affecting the automotive industry

Source: [Makarenko M. V., 2013]

The automotive industry supply chain consists of many interrelated processes that form the supply chain from suppliers at different levels to the end user. The main participants in the supply chain model are shown in Figure 1.4.

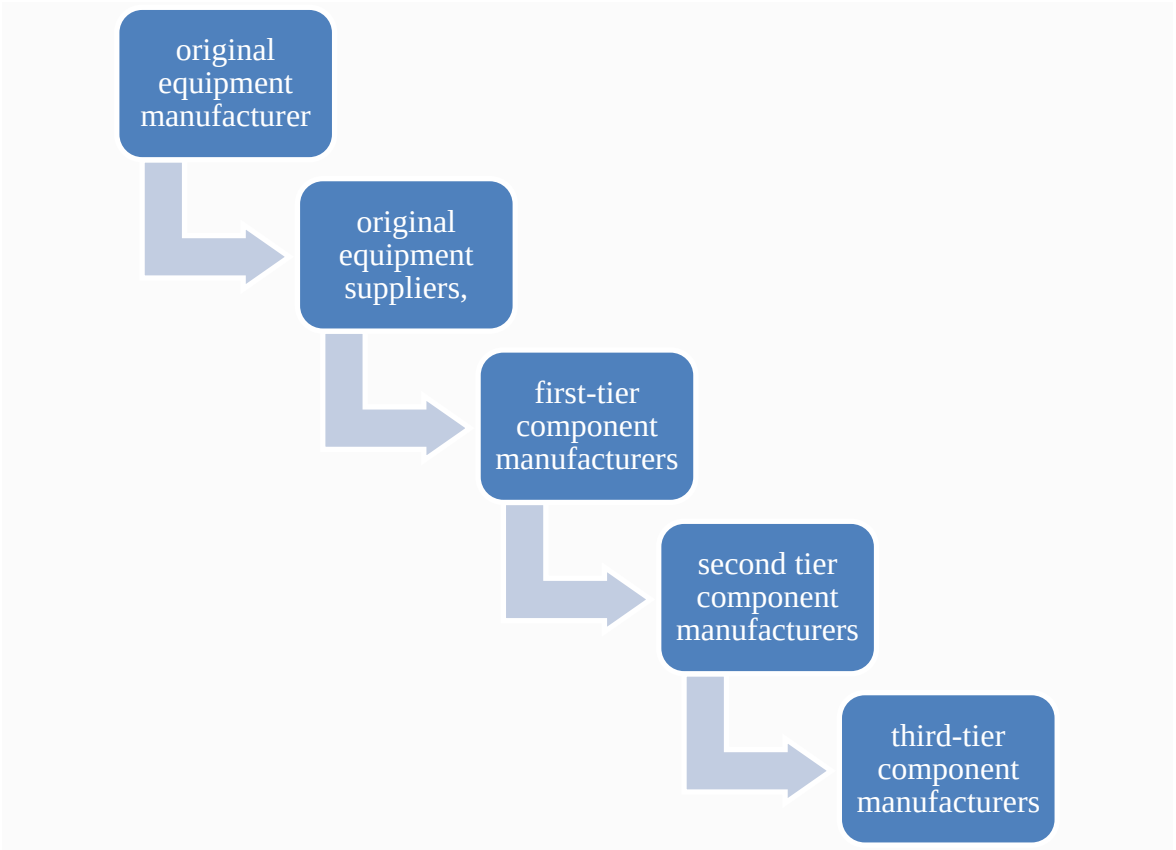


Figure 1.4 Key players in the automotive supply chain model

Source: [Transport na pidpryyemstvi, 2005]

The supply chain structure consists of distribution channels, operational processes, and planning and strategy processes.

Automotive factories are usually divided into four main workshops. First, the entire process of car production begins with a press shop, where the sheet metal blank is changed into the required shape in a state of plastic deformation using a stamp and a mechanical press. Automotive body shop, the so-called "automobile body shop", in which an automobile frame is created using automated systems [Transportna polityka Ukrayiny, 2010]. Each of the car frames is given a unique code - the Vehicle Identification Number (VIN). In the paint shop, a number of technological operations are carried out for the preparation and subsequent coating on the surface of the car body in accordance with quality requirements. At the final stage, the car enters the assembly line, where other parts are added to the body manually and using machinery, after which the car is refueled and moves off the assembly line into the loading zone.

The hierarchical network of suppliers is divided mainly into three levels, where the 1st level suppliers are global manufacturers of finished modules (for example, dashboards, engines, seats, etc.) with their own production or assembly facilities. Tier 1 suppliers are usually located in close proximity to car manufacturing plants, taking into account the logistics path in terms of supply specifications. For example, "Just-in-Sequence" (JIS) or "Just-in-Time" (JIT) delivery principles ensure that the necessary parts arrive on the assembly line in advance according to the production sequence at a predetermined time [Kengpol A., et al., 2014].

Tier 1 vendors have their own Tier 2 vendors who procure parts for these modules, such as welded seat frames. Basically, these are companies with their own production or assembly plants set up near tier 1 suppliers. Tier 3 suppliers are manufacturers of raw materials and companies with manufacturing facilities for manufacturing simple parts and individual components (for example, plastic, metal, and aluminum parts) that meet the needs of Tier 2 suppliers and provide some supplies to Tier 1 suppliers. level. The original equipment manufacturers reduced the number of their direct suppliers and convinced them

to actively participate in product development. Tier 1 suppliers are included in OEM product development and innovation process projects, meaning they make their own engineering and design decisions to establish a local engineering or development center. Today, OEMs outsource not only production but also the development of complete modules to suppliers of several of their own brands. Thus, engineering service companies play an important role in the development of new vehicles. Engineering firms often become third party collaboration partners between equipment suppliers and manufacturers to develop new products [Eurostat, 2022].

The automotive supply chain includes all business management activities for the interaction between the sales channel, distribution, warehousing, production, transportation and suppliers, as well as related functions and objects in the transformation of goods and services from the stage of raw materials to assembly modules and finished products, delivery their end user - the customer.

Internal logistics is aimed at the formation of purchases, transportation, inventory control with information systems, planning, production, inspection and delivery of goods in a single process. External logistics combines joint operations with subcontractors, distributors, warehouse management, distribution networks, service providers, contractors and consumers [Lobovko V., 2022].

The modern automotive industry is made up of many links that are in turn part of the supply chain. Participants in automotive supply chains are hierarchically distributed in accordance with the direction of specialization of the production of component parts. Globalization, the division of industries and their creation in the territories of countries using low-skilled labor have influenced the creation of effective tools for managing logistics processes in supply chains in order to form productive interaction between all links in the chains [Roekelvan W. S., 2018].

It is believed that the use of innovative technologies in supply chain management will help companies get the maximum effect at the lowest cost. Modern technology innovations, such as artificial intelligence, aim to reduce the time to supply the necessary parts and optimize production in such a way as to limit downtime and, accordingly, achieve the maximum economic benefit for all participants in the supply chain.

Manufacturing processes in the automotive industry are changing because Industry 4.0 provides valuable tools to deal effectively with these changes, as well as to find maximum efficiency in order to further lead in a globally competitive market. Manufacturing processes and systems are smarter, allowing for high quality standards and foreseeing maintenance needs, as this is the only way to maximize component improvement from the start of the process [World Bank, 2020].

The digitalization strategy is applied transversally to all processes, from those more related to production to those related to engineering, procurement, human resources or finance. Digitization is undoubtedly one of the main levers to strengthen business and increase competitiveness in an industry that provides huge opportunities for the future. An important prerequisite is increased flexibility, which allows production facilities and processes to be quickly adapted to changes in production and customer series.

There are programs being implemented in the near future with specific projects in the field of production planning and the sharing of robotics in the automotive industry [Updated National Transport Strategy of Ukraine, 2020]. Improvement of quality control, preventive maintenance and internal logistics can be considered as priority tasks implemented in industrial centers. An example would be the use of tools to collect thousands of online machine data so that a problem can be detected and corrected before the part wears out. We can also note the work on the implementation of technical control systems that help to achieve a level of absence of defects in components. In internal logistics, which is one of the central axes of an organization's production processes, materials are constantly moving from the reception and storage of raw materials to the storage and dispatch of finished products. Managing these flows in real time using technologies such as RFID has a clear advantage in process optimization and safety, which allows to optimize logistics in factories and avoid production line downtime [L. Kharsun, 2016].

The automotive industry is undergoing a fundamental change in the way it operates as global supply chains are pushed to their limits by complications in international trade agreements and as OEMs increase their focus on new energy vehicles. The logistics digitalization revolution allows automakers and service providers to remain agile and

ahead of the curve. The main transformers today are data and the digital rethinking of the supply chain, which is driving a significant increase in trade. This data is generated by an environment rich in sensors. The World Economic Forum predicts that in ten years there will be a trillion sensors for every product moved, including parts and vehicles, and the logistics assets that move them. All of them will transmit data to a connected platform, which will allow the machines to communicate with each other. This level of digitalization will drastically change the way the automotive industry does business [Savin, S, et al., 2018].

Next, we propose to characterize in detail the basis of artificial intelligence technologies used in the automotive industry to optimize the supply chain (Table 1.2.)

Table 1.2

Artificial intelligence technologies for supply chain optimization in the automotive industry

AI technology	What's give for supply chain optimization
Digital Twin	Allows you to keep a holistic view of the processes in the supply chain in order to minimize all risks as much as possible; Optimize partnership conditions to synchronize collaboration throughout the network structure of the supply chain. Develop maintenance programs to ensure the smooth operation of vehicles, production and other equipment Optimize systems to simplify products, assets, and movements for maximum performance. Responsive and quickly transmit real-time data Time to allow SC managers to make decisions quickly and accurately.
Supply Chain Control Tower	Provides visibility among supply chain counterparties, including suppliers, contract manufacturers, carriers, 3PL providers, etc. Possibility of cooperation of counterparties of the chain in real time. Fix supply chain disruptions before they disrupt chain business partners. Inferred and attributive analytics and decision support using advanced predictive methods, artificial intelligence and multi-agent systems. Self-correcting supply chain with optimal decision making and machine learning.
Augmented	You can simulate logistics processes in a warehouse, conduct test

Reality	measurements, redesign zones - all this is virtual. Augmented reality main and frontal displays allow forklift drivers and other warehouse handling equipment to efficiently reroute goods on the go without additional distractions for drivers.
Internet of Things	The Swisslog Smart LIFT real-time positioning system guides, controls and tracks every movement of the vehicle Technology consolidates supply based on priority factors; Redirects the product immediately if this occurs necessity;

Source: [Their Participants, 2021; Revenues from the artificial intelligence, 2018; Blumberg Capital, 2018; Survey Says, 2019; Iakovenko V. S., 2010]

The use of these technologies allows you to optimize the supply chain in the automotive store and get the maximum savings in both money and time for all stakeholders.

Digital technology will turn international trade into a fully automated process, with sensors relaying data to participating partners. Over the next two years, sensor technologies are expected to proliferate to allow parts owners to better track their shipments, which, along with IT management of this data, will contribute to greater transparency. This means the ability to move part of the cargo, for example from China to Europe, without human intervention. In this, an important system-forming problem is the purity of the data, that is, it is very important to have a clean process for analyzing the gigantic amount of data that is now available, and based on it, plan your activities with high accuracy.

An example of how automation technology is helping OEMs achieve greater productivity and savings in the aftermarket is the use of an automated warehouse robot. This automated heavy hauler is based on the "goods to people" concept for robotic technology and is used by e-commerce giants like Amazon and Alibaba for e-commerce warehousing. The use of new technology increases the productivity and accuracy of the selection, allowing you to get double the efficiency and productivity compared to the old manual process, which is easy to set up. The system can dynamically add or remove robots or shelves depending on business volumes, which allows us to talk about its scalability [Skitsko, V. I., 2018].

In addition to the use of robots, the IT strategy also includes digital projects such as smart glasses and voice interaction, image recognition for damage monitoring, AI-enabled vehicle deliveries, real-time route visualization, and strategic warehouse network design.

Advanced automakers are building a digital workforce and programming robots to solve repetitive tasks, such as gathering information along the next trajectory, from production bots to thinking bots and eventually analysis bots.

The leading role in the "destructive transformation" of the automotive industry belongs to China. Today, several examples of Logistics 4.0 innovations can be seen in some areas of the automotive industry. In addition to the automated heavy load carrier already in use in daily work, the use of a camera worn by operators to record parts operations can be noted [Lopatin A. & Ishchenko N., 2021]. Videos are automatically uploaded to servers where they are processed using image recognition artificial intelligence. Videos are divided into multiple images, and detail information is identified, tracked and retrieved, and easily searched through the online archive. An automated process saves time and effort in recording, providing and posting the necessary information about parts, and also allows you to control quality. These include a huge amount of work on data, tracking and improving visibility in the supply chain. For example, the development of a cloud service that provides real-time visualization of routes and complete transparency of deliveries. The system allows you to track the original shipment of parts, reflecting each delivery terminal in the shipment process .

The discussed changes in the digitalization of the automotive industry provide the basis for the next part of the study. The use of artificial intelligence in the supply chain allows companies not only to automatically manage the movement of goods but also to minimize downtime and inefficient routes. The next part of the bachelor's work is to introduce artificial intelligence into the logistics processes of the company under study.

Chapter 2 Analysis of the use of digital technologies in ФОП «ЧЕРНЕНЬКА»

2.1. General economic characteristics of enterprise

ФОП «Черненька» is an operating retail trade enterprise specializing in trading in clother.

Organizational structure of ФОП «Черненька», presented in Figure 2.1

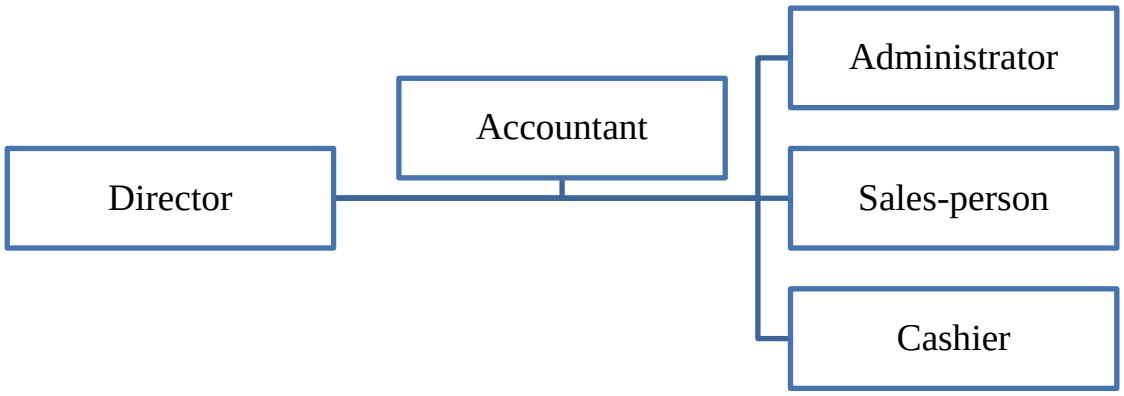


Figure 2.1 – Organizational structure of ФОП «Черненька»

Source: [ФОП «Черненька», 2023]

According to the given organizational structure, the main activity is carried out by the director, who organizes the work and ensures the economic efficiency of the activity and monitors the quality of customer service; directs the work of company personnel to ensure the safety and maintenance of premises and property in good condition in accordance with the rules and regulations of operation; ensures profitable housekeeping, timely and high-quality provision of a range of services to the client.

Next, we will evaluate the overall structure of the composition of employees of ФОП «Черненька» (see Table 2.1).

There are more administrative staff than maintenance staff, this is explained by the fact that the sale of clother requires qualified specialists who can organize the process from purchase to sale to the end consumer.

Table 2.1

Employee structure ФОП «Черненька»

Category of staff	Number of staff					
	2019		2020		2021	
	persons	%	persons	%	persons	%
Service staff	9	25,71	8	23,53	9	25,71
Administrative staff	21	60,00	21	61,76	21	60,00
Leaders	5	14,29	5	14,71	5	14,29
Total	35	100	34	100	35	100

Source: developed by the author based on enterprise data

The activity of any enterprise is associated with the processes of fixing the facts of economic life, for the needs of which the accounting system is intended as a set of measures for collecting, registering, summarizing and systematizing information [[ФОП «Черненька», 2023]]. This task is entrusted to the accounting department and the economic department of the enterprise.

Next, we will evaluate the main indicators of the financial condition of ФОП «Черненька»'s activities for the following main groups of indicators: financial stability, liquidity, profitability and business activity.

Table 2.2

ФОП «Черненька» financial strength analysis

№	Indicator	2020	2021	2022	Change, + / -		Change, %	
					2022/ 2021	2021/ 2020	2022/ 2021	2021/ 2020
1	Autonomy coefficient	0,57	0,51	0,48	-0,03	-0,19	-5,88	-27,14

2	Debt to equity ratio	0,74	0,78	1,08	0,30	0,04	38,46	5,41
3	Equity concentration ratio	0,67	0,61	0,58	-0,03	-0,06	-5,88	-10,53
4	Financial dependency ratio	1,74	1,95	2,08	0,13	0,21	6,67	12,07

Source: developed by the author based on enterprise data

The debt-to-equity ratio in 2020 was 1.08. This value is normal, because the company has a sufficient amount of capital to develop its activities. The coefficient of financial dependence during the period under review grew, this indicates an increase in the dependence of the enterprise on external sources of financing.

The autonomy coefficient during the period under review corresponded to the standard. The equity concentration ratio indicates that ФОП «Черненька» has its own funds to repay borrowings. The value of the coefficient can be considered satisfactory.

Next, we will analyze the liquidity and solvency characteristics of ФОП «Черненька» (see Table 2.3).

Table 2.3

ФОП «Черненька» liquidity and solvency analysis

№	Indicator	2020	2021	2022	Change, + / -		Change, %	
					2022/ 2021	2021/ 2020	2022/ 2021	2021/ 2020
1	Total liquidity ratio	1,98	1,99	2,03	0,04	0,01	2,01	1,02
2	Current liquidity ratio	2,64	2,72	2,86	0,14	0,08	5,14	3,03
3	Absolute liquidity ratio	0,11	0,26	0,34	0,08	0,15	30,77	136,37
4	Share of working capital in assets	0,55	0,59	0,63	0,04	0,04	6,78	7,28
5	Share of stocks in current assets	0,14	0,19	0,21	0,02	0,05	10,52	35,71

Source: developed by the author based on enterprise data

From the data in Table. 2.3 it can be seen that the overall liquidity and current liquidity ratios for the analyzed period corresponded to the normative values. The absolute liquidity ratio did not meet the normative values, which is negative. The share of working

capital in assets shows a declining trend in 2021, and the share of inventories in current assets is similar. We explain this by an increase in receivables in the current year.

Next, we will analyze the characteristics - the profitability characteristics of ФОП «Черненька» (see Table 2.4).

Table 2.4

ФОП «Черненька» Profitability Analysis

№	Indicator	2020	2021	2022	Change, + / -		Change, %	
					2022/ 2021	2021/ 2020	2022/ 2021	2021/ 2020
1	Profitability of sales	0,97	0,98	0,99	0,01	0,01	1,02	1,03
2	Return on equity	0,59	0,60	0,71	0,11	0,01	18,33	1,69
3	Return on assets	0,22	0,23	0,35	0,12	0,01	52,17	4,55

Source: developed by the author based on enterprise data

From the data in Table. 2.9 shows that all profitability indicators show a growing trend. This is explained by the fact that in 2020 the company received a net profit, and in 2021, the net profit increased further. We characterize this dynamics as positive.

Next analyze the indicators - indicators of ФОП «Черненька»'s business activity (see Table 2.5).

Table 2.5

Analysis of business activity ФОП «Черненька»

№	Indicator	2020	2021	2022	Change, + / -		Change, %	
					2022/ 2021	2021/ 2020	2022/ 2021	2021/ 2020
1	Total turnover of capital	2,75	2,81	2,83	0,02	0,06	0,71	2,18
2	Rotation of mobile devices	16,86	17,19	17,68	0,49	0,33	2,85	1,96
3	Rotation of accounts payable	7,98	8,30	7,25	-1,05	0,32	-12,65	4,01
4	Rotation of accounts receivable	12,68	10,73	12,11	1,38	-1,95	12,86	-15,38

5	Circulation of own capital	1,97	2,10	2,63	0,53	0,13	25,24	6,60

Source: developed by the author based on enterprise data

From the data in Table. Table 2.5 shows that the total capital turnover for the operating cycle turned over very little, only 2.81 times in 2021 and 2.83 times in 2022. The same applies to the rotation of equity: 2.10 times (2021), 2.63 times (2022).

The rotation of mobile funds showed a good and growing result in the reporting year against the previous one. The rotation of accounts payable in 2020 amounted to 7.98 times, which is 0.32 times less than in 2021. We characterize this trend as satisfactory. The rotation of receivables is growing in 2022, which means that the company is returning its investment in funds.

Let us analyze the indicators characterizing the profitability of the enterprise under study (see Table 2.6).

Table 2.6

ФОП «Черненька» profitability analysis

№	Indicator	2020	2021	2022	Change, + / -		Change, %	
					2022/ 2021	2021/ 2020	2022/ 2021	2021/ 2020
1	Profitability of assets	0,54	0,60	0,78	0,18	0,06	30,00	11,11
2	Profitability of investment activity	0,59	0,63	0,71	0,08	0,04	12,70	6,78
3	Operating profitability	0,88	0,89	0,98	0,09	0,01	10,11	1,14

Source: developed by the author based on enterprise data

From the data in Table. 2.6 shows that the profitability of all indicators showed a positive trend in 2022 compared to 2021. The enterprise in the current year received a large net profit, this was reflected in all, without exception, indicators of its activities.

The analysis showed that there are groups of indicators that showed good results (corresponding to standard values) during 2020-2022, however, there are groups of indicators that showed not very good value in 2022.

Consequently, a highly qualified team of professionals working at ФОП «Черненька» is continuously working to increase the well-being of its customers, expand the scope of its activities in order to maximize its own profits.

ФОП «Черненька» is also actively involved in charitable activities, the implementation of local and state programs for economic, social and cultural development.

2.2. Assessment of the logistics transportation management system at the enterprise

During the systematization of the information received and the analysis of logistic processes in the ФОП «Черненька», the main problems were identified and proposals were formulated to improve the operation of the enterprise and increase the efficiency of logistic activities:

1. Overloading of some departments, their performance of functions unusual for them, including the lack of proper paperwork and transportation control.

This problem can be corrected by delineating functions between managers, or by creating special joint working groups. It is also necessary to recruit personnel for the accounting department to process primary documentation.

2. The general level of training, efficiency and culture of the personnel is rather low. This raises problems with customers due to the downtime of vehicles waiting to be unloaded.

It is necessary to train new employees, introduce a mentoring system and tighten the penalty system.

3. Not all clients have an established electronic document management system. In this case, it is necessary to debug the system with customers, since this will lead to savings in the time of performing warehouse operations, in particular, on acceptance and shipment of goods.

4. Not all processes at the enterprise are documented, parts of instructions are missing. This, in turn, complicates the work of staff, which leads to temporary downtime and waste of unnecessary resources and time to correct errors.

Therefore, it is necessary to formalize and prescribe all existing business processes in the enterprise.

Based on all of the above, we can conclude that the company

ФОП «Черненька» has a number of problems and weaknesses in management. In order to get things working, more attention must be paid to human resource management, which in turn will help reduce and prevent possible confrontations with clients. It is also necessary to prescribe clear job descriptions and formalize all business processes of the enterprise. It very important to follow the rules of working with clients, because customers is the main resources for ФОП «Черненька». All of the above proposals, to one degree or another can help to improve the efficiency of logistics processes and all activities of the company as a whole.

Currently, the economic situation of the enterprise cannot be called stable. The crisis phenomena strongly affected the work of the company, if in 2018 there was a significant decrease in traffic volumes, and then at the very beginning of 2020 the volume of work increased slightly. The incoming orders were difficult to fulfill due to the lack of working capital. The company was saved by a small profit shown at the end of 2018, which turned out to be very important in obtaining a loan when information on turnover was provided. In February 2019, the company received a loan in the amount of EUR 500,000, part of which was used to pay off debts to carriers. The rest of the funds were directed to the working capital fund. The funds from this fund helped to establish the current activities of the company and were mainly spent on prepayment to carriers, since it seriously reduced the cost of transportation [ФОП «Черненька», 2023].

Depending on the customer's requirements and the conditions of transportation, ФОП «Черненька» uses several operating schemes (Figure 2.2).

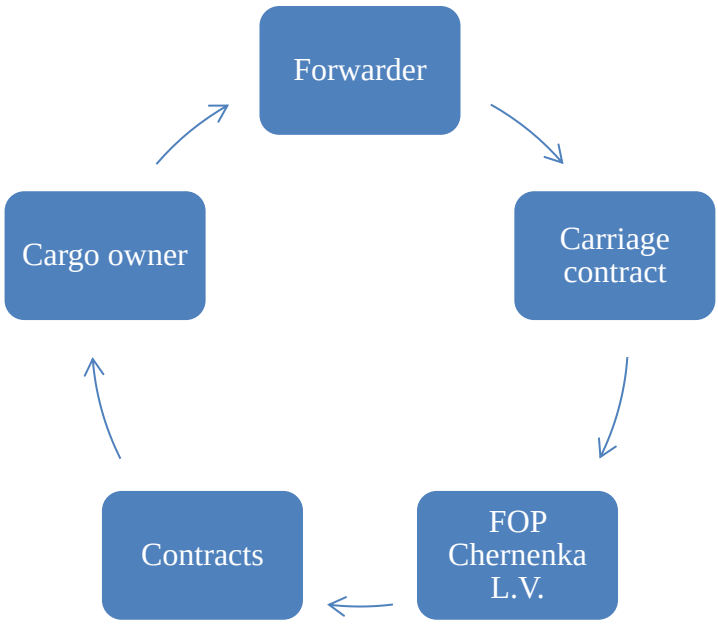


Figure 2.2 - Relationship of the freight forwarder with the cargo owner and ФОП «Черненька»

Source: [ФОП «Черненька», 2023]

In the first scheme - “freight forwarder”: transport intermediary - freight forwarder - acts in the interests of the cargo owner or persons interested in the cargo; the object of work and services of the forwarder is the cargo.

In the first scheme of work with the customer, a contract for freight forwarding services is concluded, and the forwarder concludes contracts with carriers specifically for the carriage of goods. This scheme is most used in the work of ФОП «Черненька»

The next scheme is an "agent": a transport intermediary - an agent - acts in the interests of the carrier; the object of the agent's work and services is a vehicle.

In the second scheme of work, the agent, based on the carrying capacity of the carrier, selects various goods for the transportation and at the time of the Conclusions and proposals of the contract acts as a third party and receive remuneration from the carrier. This scheme is rarely used in life, because carriers, not wanting to pay agency fees, find loads themselves, and sometimes on not quite favorable terms.

After analyzing the considered schemes of work, we can make an unambiguous Conclusions and proposals that the area of intersection of the main economic interests of participants in trade and transport relations is formed between cargo owners and freight

carriers, between cargo owners and freight forwarding companies, between forwarding enterprises and carriers. First of all, the customer and the actual executor of the order are on economically opposite poles: the client wants to save money on the transport component in the total cost of production, and the freight carrier, acting as a transport service, wants to sell services as expensive as possible. Due to these factors, the forwarder is obliged to agree on the economic, technical, technological and legal requirements of both parties at the stage of organizing the transportation. In addition, the freight forwarder plays the role of an independent arbiter in the event of any irregularities in transport. Its function is to professionally find compromises in the ratio of price and quality of the transport process for each party to the contract [ФОП «Черненька», 2023].

Each participant in transport interaction is distinguished by the requirements, goals and economic interests presented in table 2.7

Table 2.7

Behavior of transport market participants

Market participants	**Economic function in the supply chain**	**Economic interest in cooperation**	**Technological requirements for the transport process**	**Resolving controversial issues**	**Actions in controversial situations**
Customer	Formation of demand for transport services	Minimization of transport costs	Formed depending on the type of cargo	For the benefit of yourself	Exposing penalties
Carrier	Formation of proposals for transport services	Profit maximization of road transport enterprises	Formed depending on the technical capabilities of the vehicle	For the benefit of yourself	Exposing penalties
Forwarder	Transport market monitoring (supply / demand tracking)	Reconciliation of economic interests	Are consistent with the parameters of the cargo and those. capabilities of the vehicle	Finding a compromise	Finding a compromise

Source: [ФОП «Черненька», 2023]

The enterprise has to seek transport services from transport bakeries. It often happens that there is only one sender of goods, but there are several consignees; in such situations it is much more difficult to find a carrier.

ФОП «Черненька» has been cooperating with certain transport companies for a long time, or the clients themselves send a car. Nevertheless, the company admits the possibility of considering new commercial proposals from transport companies.

Cooperation between ФОП «Черненька» and a transport bakery always begins with a request, delivery calculations and brief information about the enterprise necessary to enter the transport bakery into the database of potential partners:

ФОП «Черненька» has the right to dispose of cargo, interrupt transportation, change the route and address of cargo delivery. The bakery loses administrative rights after the consignment note falls into the hands of the consignee; from that moment on, only the consignee can change anything in the delivery.

Every year at ФОП «Черненька», the costs of providing services of transport and forwarding companies increase, this leads to the fact that it will be more profitable for the company to purchase its own fleet of vehicles.

The results of the questioning of the priority of customer requirements give the following results (Figure 2.3).

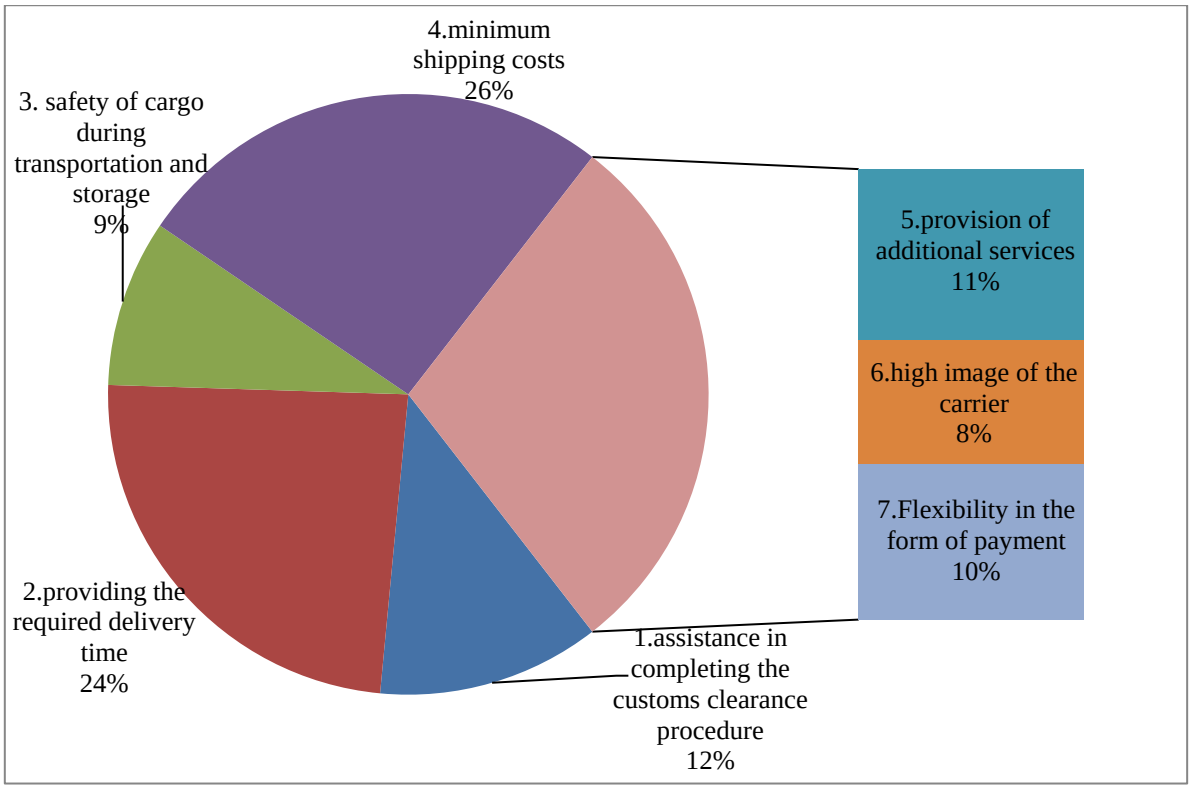


Figure 2.3 - Diagram of priorities of customer requirements for the services of a ФОП «Черненька»

Source: [ФОП «Черненька», 2023]

Logistics is important for customers, because it is thanks to logistics that he will be able to receive the ordered clothes and satisfy his needs accordingly.

For customers, the nature of the goals and their significance may differ at different times. With a stable demand for products, the factor of the total cost of delivery is often more significant than the factor of the delivery time. However, with a sharp increase in demand for products, customers are always willing to pay more for urgent delivery. Depending on the type of cargo transported, the degree of urgency of delivery or, for example, requirements for safety during transportation, may change.

Monitoring factors affecting the level of a company's logistics is an important component of managing logistics processes and increasing their efficiency. This approach involves systematic analysis and assessment of various aspects that may affect the performance of a company's logistics tasks [ФОП «Черненька», 2023]

Monitoring the level of customer satisfaction allows you to identify possible deficiencies in logistics processes that affect the quality of service. Customer feedback is an important tool for improving logistics strategies.

The introduction of systematic monitoring of these factors will become the basis for a rapid response to changes in the environment and continuous improvement of the restaurant's logistics system, ensuring a high level of service and competitiveness in the trading business market.

2.3. Analysis of the use of digital technologies in the transportation of products at ФОП «ЧЕРНЕНЬКА»

ФОП «Черненька» is gradually introducing innovative technologies into its activities and moving to a more technological production process, however, given the variability of the Ukrainian economy, the instability of the financial market and the lack of support from the state, fundamental changes are not expected in the near future.

The development of ФОП «Черненька» is characterized by many problems, the most important of which are the lack of government support, economic instability and policy uncertainty. In our opinion, it is the exchange of experience with foreign partners and the use of modern technologies that can become a catalyst for development for ФОП «Черненька». Indeed, as the world rapidly develops, innovative technologies are becoming increasingly popular, which not only speed up all processes in an enterprise, but also minimize costs by introducing the efficient use of resources into each process.

Next, we propose evalue ynamics of indicators of innovative and investment activity ФОП «Черненька» (see Table 2.8).

Table 2.8

Dynamics of indicators of innovative and investment activity of ФОП «Черненька»

№	Indicator	The optimum value	2020	2021	2022	Change, +/-	
						2022/ 2021	2021/ 2020
1	Investment activity ratio	Increase	0,004	0,011	-	-	0,007
2	Share of innovative products	Increase	-	-	-	-	-
3	The share of new technology in the total cost of machinery and equipment	Increase	20%	22%	31%	9%	2%
4	ROI Index	>1	-	-	-	-	-

Source: [ФОП «Черненька», 2023]

From the data in Table. 2.8, the following Conclusions and proposalss can be drawn: the investment activity ratio in 2021 increased by 0.007 compared to 2020. This indicates an increase in investment in the total share of the company's assets. In 2022, because of war in Ukraine compny didn’t makeanyo investments in this period, because its used money on support Ukrainian military.

The introduction of innovations at the enterprise is within the competence of the director and other employees (who wish) who want to contribute to the development of ФОП «Черненька».

Among the main innovations carried out at ФОП «Черненька» for 2020-2022, one can note: the introduction of the IS PRO system and the installation of ArchiCAD software.

The clothing purchasing process is shown in Fig. 2.4.

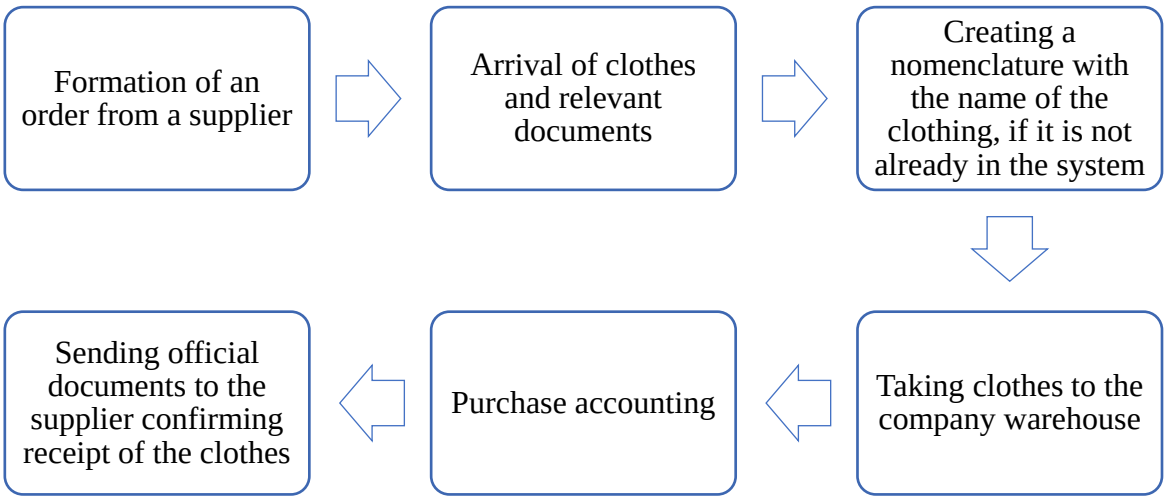


Figure 2.4. Stages of purchasing clothing ФОП «Черненька»

Source: created by the author based on enterprise data

Next we propose to analyze process of ordering goods from suppliers is visualized in Figure 2.5.

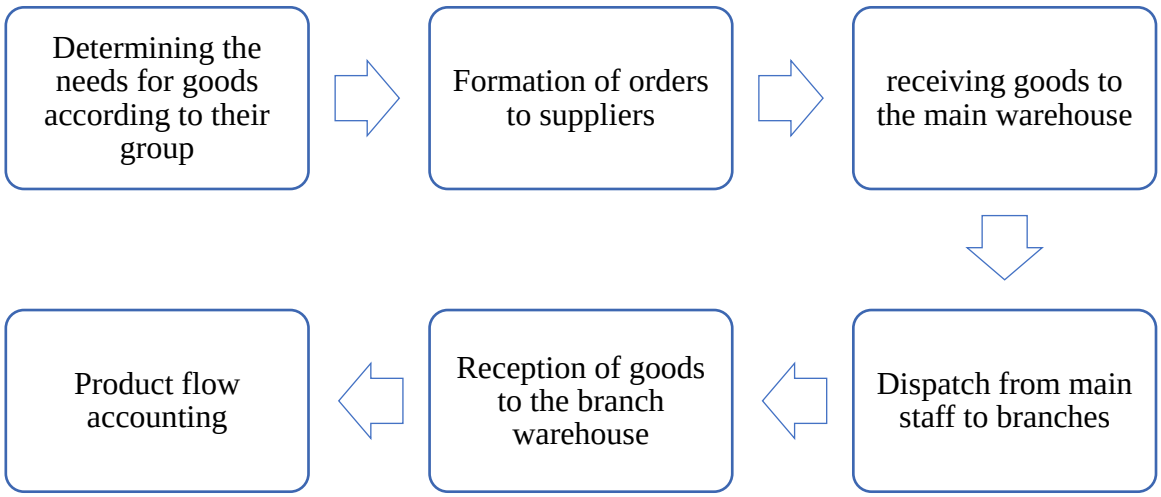


Figure 2.5 – Process of ordering goods to the warehouse of ФОП «Черненька»

Source: created by the author based on analysis of enterprise data

An important point in soliciting goods for the warehouse of branches is to receive feedback from them about inventory and goods that are not in demand, which will influence the next process of purchasing goods.

ФОП «Черненька» actively uses information technology to increase the productivity of its operations.

Due to the large volumes of goods handled by the company, proper business management and accounting software is an integral part of its processes. Without the right software solutions, the company's performance will deteriorate and doing business will become extremely difficult.

To cope with these challenges, an enterprise uses specialized programs aimed at automating accounting and management accounting.

The use of information systems in an enterprise has a number of advantages, such as

– Increased productivity - automation systems reduce the need to manually perform routine tasks, which allows employees to focus on more important aspects of work;

– Reducing errors - the use of software systems avoids mistakes that can occur during manual accounting and data processing;

– Saving time and resources - process automation allows efficient use of time and resources of the enterprise, reducing the cost of operational processes;

– Improving the accuracy and availability of information - accounting systems provide quick access to up-to-date information, which helps in managing the company and making strategic decisions.

At a trading company, information systems are used to keep track of various aspects of the company's activities. Here are some of them:

– Material accounting: information systems allow you to track the supply of clothing, control its balances in the warehouse, and estimate its cost and use.

– Financial accounting: systems help to keep accounting records, including accounting for procurement costs, labor, taxation, and other financial aspects.

– Workforce accounting: information systems allow you to keep records of employees, their qualifications, work schedules, vacations, and remuneration.

– Project management: systems help plan, track, and control the construction of projects, including resource allocation, schedules, and cost.

– Order management: information systems allow tracking orders from customers, controlling lead times and interacting with suppliers.

ФОП «Черненька» actively uses information technology to comprehensively control its operations, including inventory management of clothing in the warehouse, sales, purchases, expenses, income and taxation. These systems enable the company to accurately track financial performance and make informed decisions.

By analyzing this data, the company can effectively respond to market trends, such as increased demand for specific construction materials or services. This allows the company to quickly adapt to changes in demand, optimizing its supply and production of popular services. This approach helps the company to secure competitive advantages and operate efficiently in the trade market.

Summarizing, it can be argued that at present the management of innovative development can be assessed as satisfactory, because the director of ФОП «Черненька» does not stimulate its development.

Chapter 3 Main ways to optimize the transportation of products at ФОП «ЧЕРНЕНЬКА» through the use of artificial intelligence technologies

3.1. Ways to optimize the transportation process for enterprise in the context of digitalization

To optimize transport processes in ФОП «Черненька», we propose to introduce a REST API CRM system, which will not only optimize the processes of clothing delivery, but also reduce transport costs.

Login to the system will be carried out using a login and user password. The registration page for new users of the ФОП «Черненька» is available only on the server side in the Django administrative panel; It is assumed that the introduction of new users will be handled not by managers, but by other employees.

A software product can simply be described as a set of functional modules that represent certain components of a company's real business processes. The system has the following modules: “Clients”, “Contacts”, “Projects”, “Tasks”, “Team”, “Documents”, “Adviser”; In addition to them, there are also the “Home” and “Statistics” pages (Fig. 3.1)

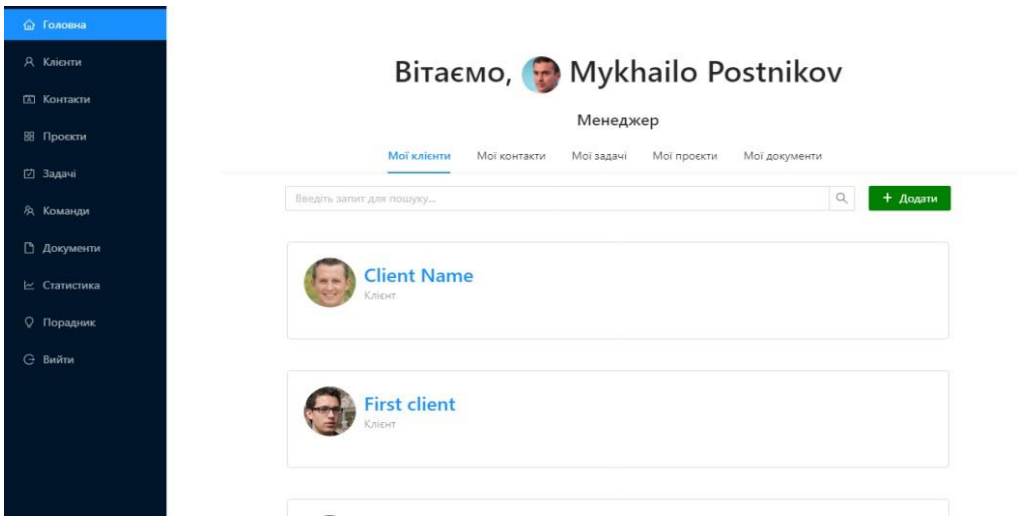


Figure 3.1 Main page of the manager of the ФОП «Черненька»

Source: [made by the author]

The “Clients” module provides the ability to create, edit, view and delete clients of the ФОП «Черненька» . For each client, his photo, name, and VIP status are displayed; general information (type, source, status, manager, dates of creation and update, desire to receive advertising information), contact information and social networks. The history of communications for the client is displayed, aggregated by the history of communications of the client’s contacts, you can also view the client’s contact persons, and projects, tasks and documents associated with this client. It is assumed that each client is assigned to a specific manager, may or may not be a VIP client, may be an individual or legal entity with a specific source from which he came to the company. Also, the client may have many contact persons and contact information (address, postal address, telephone, fax, email, social networks and website) (Fig. 3.2).

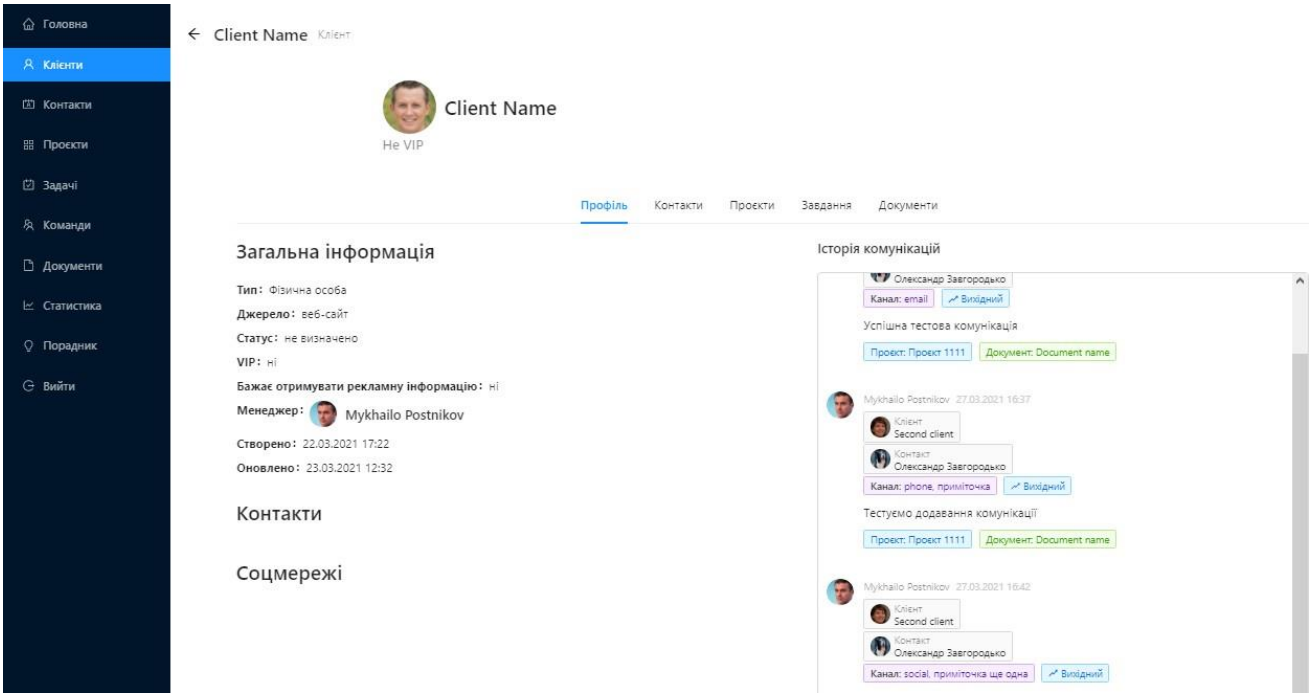


Figure 3.2 Client View Page

Source: [made by the author]

The Contacts module provides the ability to create, edit, view and delete contact persons. Each contact has a specific history of communications between the ФОП «Черненька» and it, first and last name, photo, position in the company (with the client) and contact information (the same as the client) (Fig. 3.3).

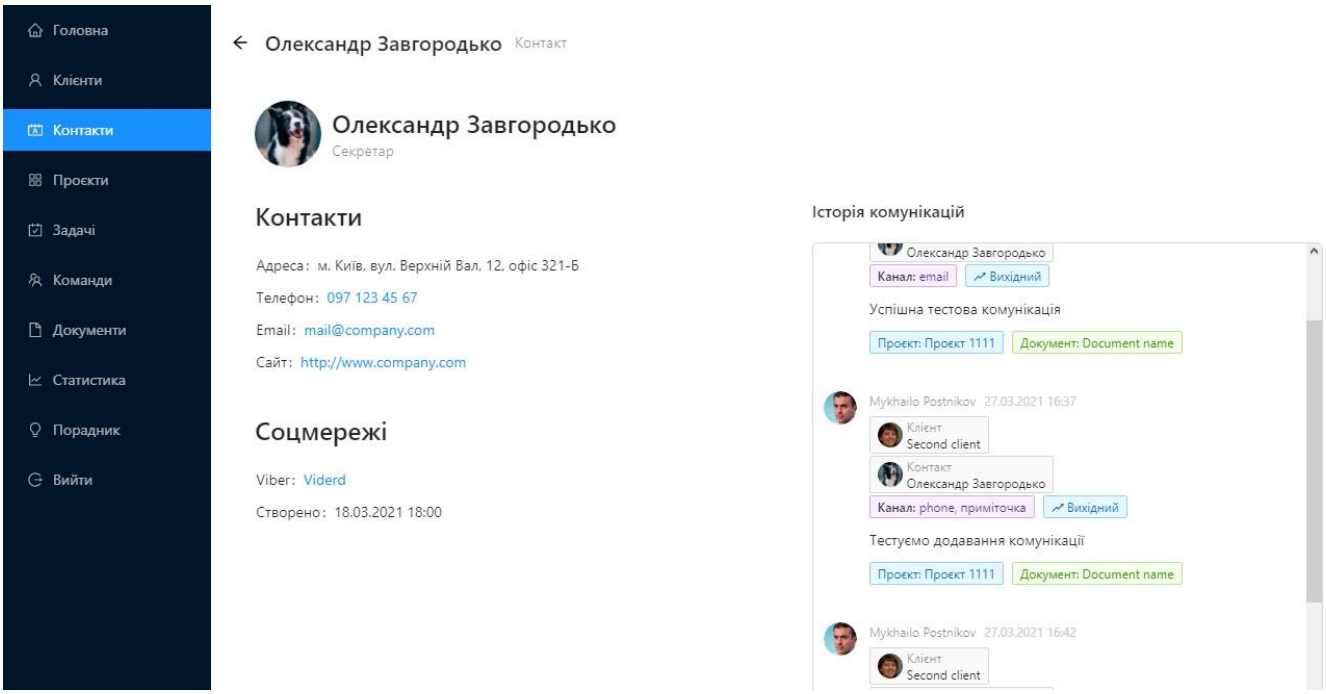


Figure 2.3 Contact Person View Page

Source: [made by the author]

It is important to note that contacts can be added to either an individual or a legal entity; after all, the client's belonging to individuals does not mean that the client cannot have, for example, a secretary acting on his behalf.

The history of communications is displayed in reverse chronological order according to the date of implementation. You can add a communication to the story only from the contact person's page, since communication occurs specifically between the ФОП «Черненька» and the contact person, and not between someone else. A communication has the following properties: implementation date, channel, channel notes, type (incoming/outgoing), communication description, project related, task and document. Related entities were made for convenience in organizing communications in the system, since during communication a specific task, project or document can be discussed, and it is important for the manager to clearly display such information and link it to the corresponding entities (Fig. 3.4.).

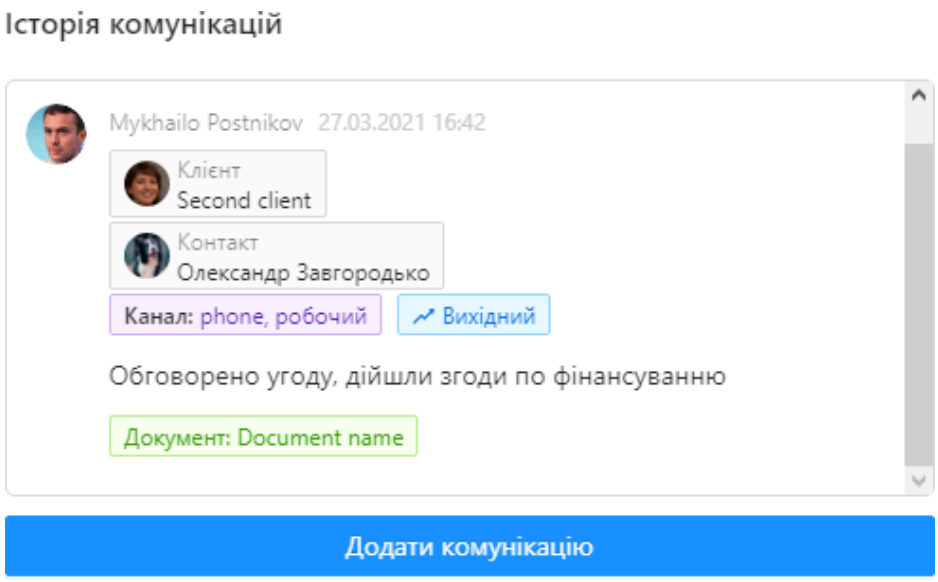
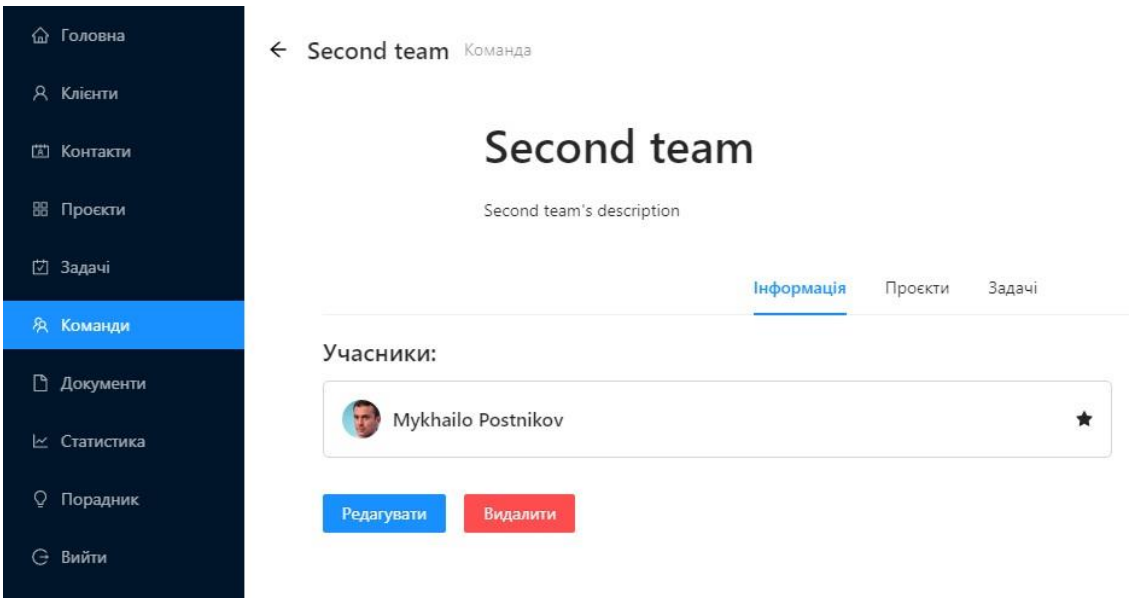


Figure 3.4 Communication History Page

Source: [made by the author]

The “Commands” module allows you to view, create, edit and delete commands existing in the system. The team is the personification of a real development team, which is located in the ФОП «Черненька» , therefore each team has participants and a team leader (displayed in the system as a participant with an asterisk). One person can be in several teams at once; one team can be assigned several projects and tasks for these projects (they can be viewed on the team view page). The team has a name, description and members (Figure 3.5).



Source: [made by the author]

The Projects module provides the ability to view, create, edit and delete projects. Each project necessarily has a client and a team performing it, a title, description and budget. The project also contains a comments section, where comments on all tasks of this project are aggregated. On the project page you can view information about it, tasks, documents and communications related to it. The system displays the status of the project and its budget.

The Tasks module allows you to create, edit, delete and view tasks in the system. Each task has a title, description, completion status, overdue status (or task deadline exceeded), creation date, deadline, budget, project, attached users and comments. Each attached user can mark whether their part of the work has been completed using a special checkbox, while obviously interaction with the checkboxes of other employees is not available. A task is considered completed only if all users attached to it have marked it completed. Using the comment tool, a task is discussed between managers and developers: thus, close interaction between company departments is ensured and the ability to quickly and clearly convey information to both developers and the client. You can also view related documents and communications on the task page.

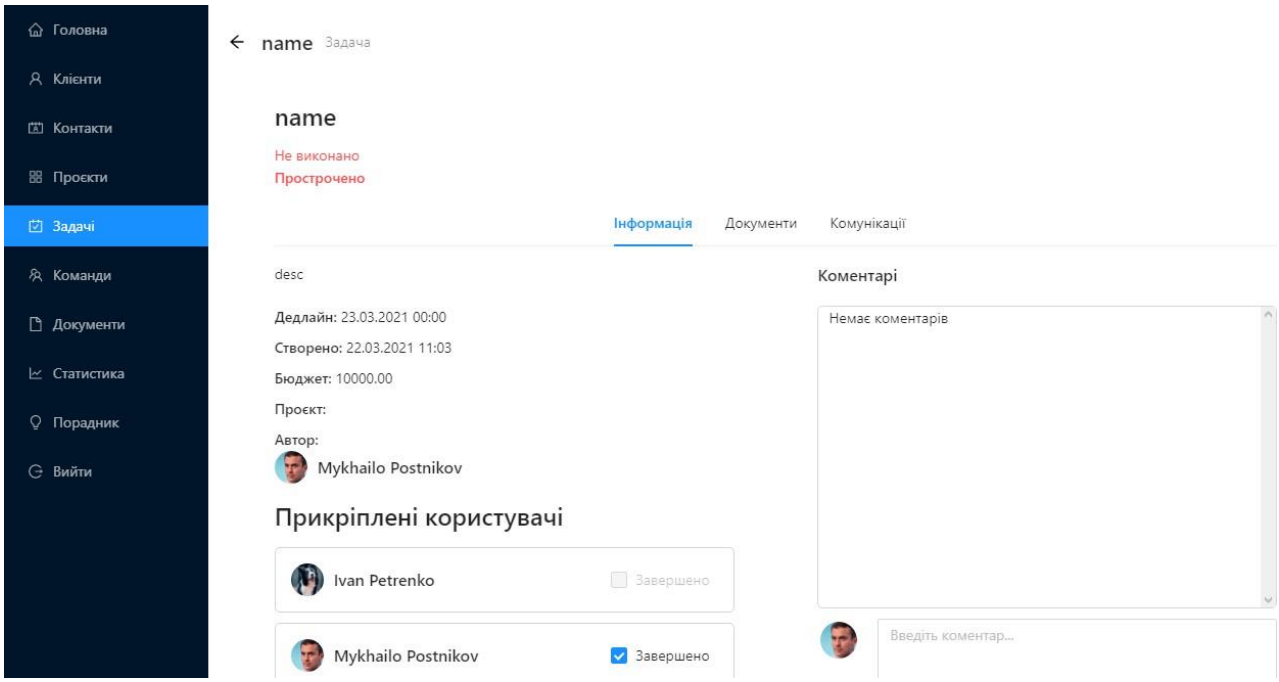


Figure 3.6 Task View Page

Source: [made by the author]

The "Advisor" module provides an interface for creating, editing, deleting and viewing system tips. Each tip has an author, topic, title, text and comments. The advice represents a certain experience accumulated by the company: this could be, for example, experience in solving certain situations with clients, the company's methodology for working with them, or a description of the sequence of actions in case of emergency situations with clients. Advice is stored in the system precisely so that the manager can quickly find the answer to the question he needs. Thanks to comments, you can respond to advice posted by other managers and thus add your own experience to it or start a discussion.

The "Documents" module allows you to create, view, edit and delete documents. Each document has a title, description, author and attached file. A document can also have a client, project, and task to which it will be attached. On the document page you can see the name and size of the file, the history of communications on this document, and download the attached file (Fig. 3.7).

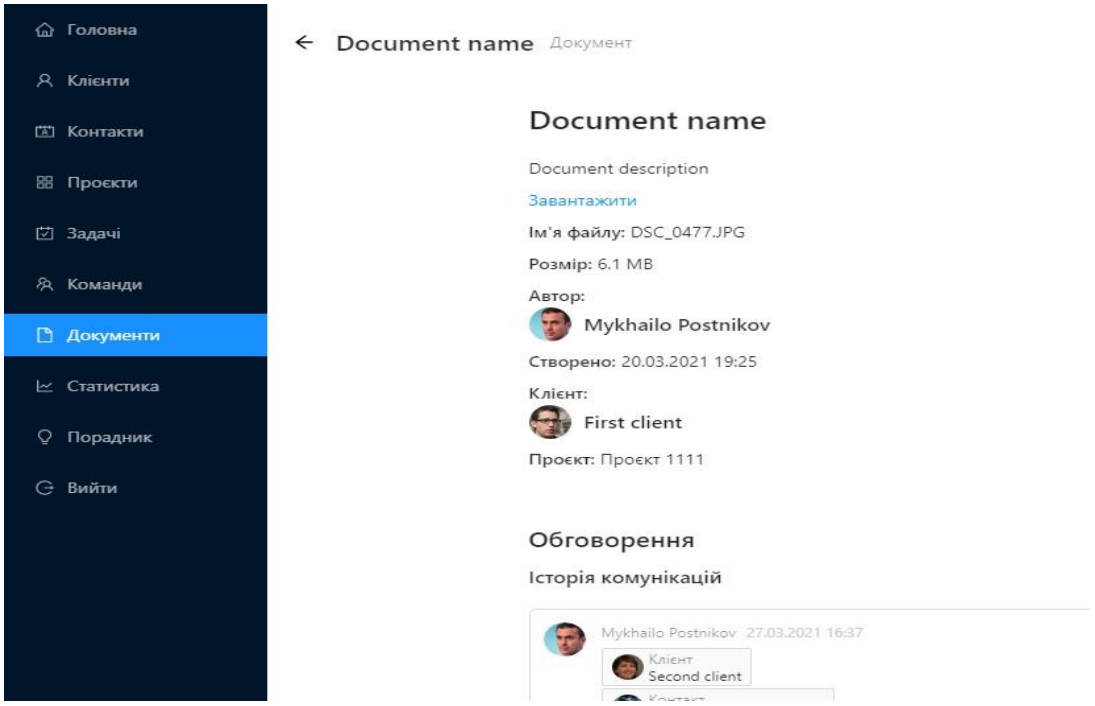


Figure 3.7. Document View Page

Source: [made by the author]

An important point is that a user in the system can belong to either the "Managers" group or the "Developers" group. If the user belongs to the "Developers" group, then after logging in he sees an interface with the modules necessary for his work ("Home",

“Projects”, “Tasks”, “Team”), and does not see other modules. This is motivated by the security principle of the ФОП «Черненька» , which states that the user needs to see only the information he needs, and the user does not need to view unnecessary information.

Each module also provides the ability to view all entities of that module in a searchable list with page navigation for convenience. It should be noted that such a list for each module will have a different appearance: for example, the “Contacts” module allows you to view the contact person and his contact information, and the “Tasks” module allows you to view important information for each task (Fig. 3.8).

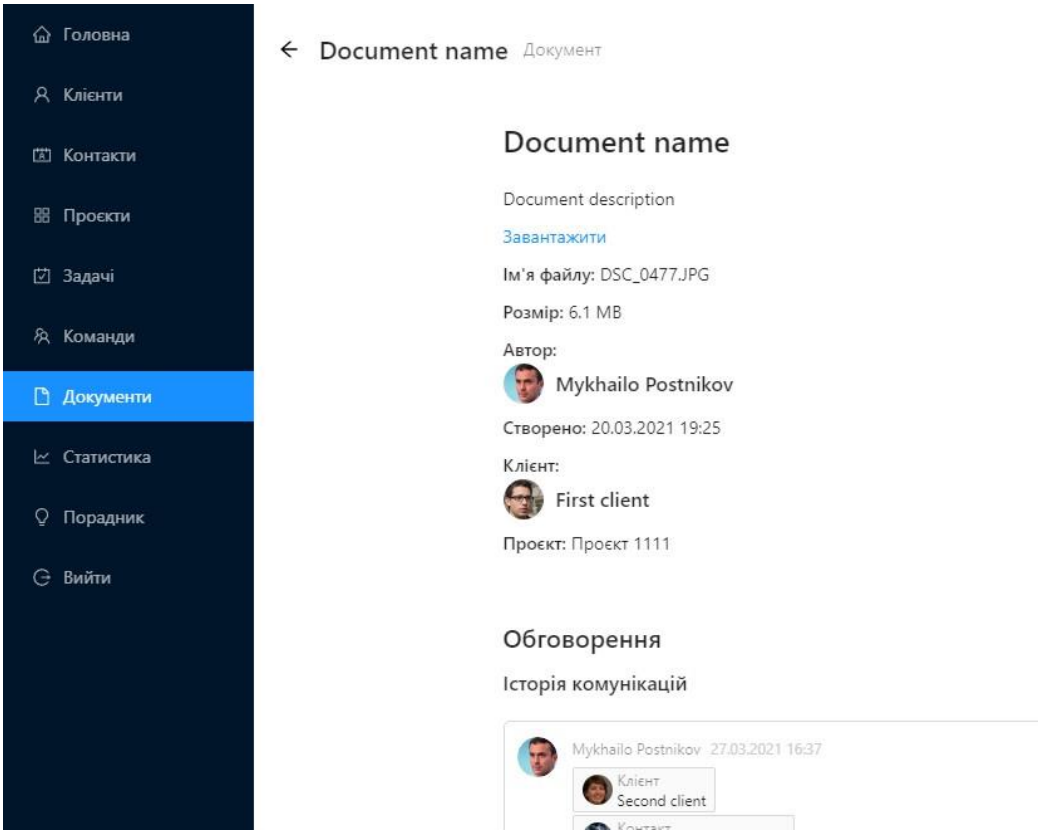


Figure 3.8 Developer Home Page

Source: [made by the author]

By constructing a CRM system in this way, its functionality is fully consistent with the stated requirements and business processes: yes, here you can perform all the manager’s tasks, from creating a client and working with him, to communicating with the development department on certain tasks. The clarity of information presentation, the availability of search and flexible navigation allow the manager to conveniently navigate

the system and quickly find the information he needs. Also, these principles do not allow the manager to “get lost” among the abundance of data and the wide capabilities of the system. Thanks to the use of the REST API for communication between the client and server parts of the system, the versatility of the interface and the ability to integrate the system with other software products by writing special adapters are ensured. In fact, thanks to this, the system can fit perfectly into the microservice architecture of the ФОП «Черненька» .

3.2. Economic assessment of the proposed measures

To increase the efficiency of the ФОП «Черненька» , we propose to combine the existing REST API CRM system, in which to install GPS trackers for the company’s cars for greater control over the transportation of goods from suppliers to the warehouse and clients.

To optimize the delivery of goods, it is proposed to implement the Teltonika FMC650 PROFESSIONAL series GPS tracker into the existing CRM system, which provides the most accurate data on the location of the cargo. Having such information at hand, the head of the logistics service of the ФОП «Черненька» can make operational decisions and save time on cargo delivery. As a result, drivers of the ФОП «Черненька» can make more trips in the same time.

If a GSM network is not available, the Iridium Edge satellite modem can be used to transmit data to the server via the Iridium satellite network. From the North Pole to the South Pole, unlike cellular, the Iridium Connected telematics solution works anywhere in the world. This means that information will be available without interruption, allowing you to always control your fleet.

You can get accurate data about the loaded load using load cells that measure weight. This feature will help you maintain accurate records and prevent theft. If someone tries to steal part of the cargo, the operator will receive information about the difference in the weight of the cargo.

In addition, to protect the cargo of the ФОП «Черненька» , geofences of the vehicle have been installed, that is, a virtual fence or perimeter of the physical location is manually designated. The vehicle will only be allowed to operate in a certain area. When a geofence is entered, an instant message will be sent.

Another security measure is driver identification, so only an authorized person of the ФОП «Черненька» can drive the vehicle. Regarding driver safety, in case of danger, you can press the panic button to request immediate assistance. The fuel monitoring functionality is used to determine the vehicle's fuel level and consumption. In this way, the ФОП «Черненька» can use its resources more efficiently and save money.

FMC650 is a tracker for professional applications with high gain external GNSS and GSM antennas. They are especially suitable for standard equipment and can provide a high-quality network connection. Otherwise, in case of trackers with internal antennas, GPS and GSM signals can be easily blocked by the hard metal surfaces of the car.

The FMC650 is designed for complex solutions where one device can perform multiple tasks. Features such as FMS CAN data (J1939), Fuel CAN data (J1708), satellite Iridium Edge connected via RS232, Dual-SIM, driver identification capabilities using iButton or RFID via 1-Wire and functionality Bluetooth technologies (beacons, temperature and humidity, magnet, motion sensors) will increase the efficiency of your fleet.

The general view of the program will have such an interface (Fig. 3.9).

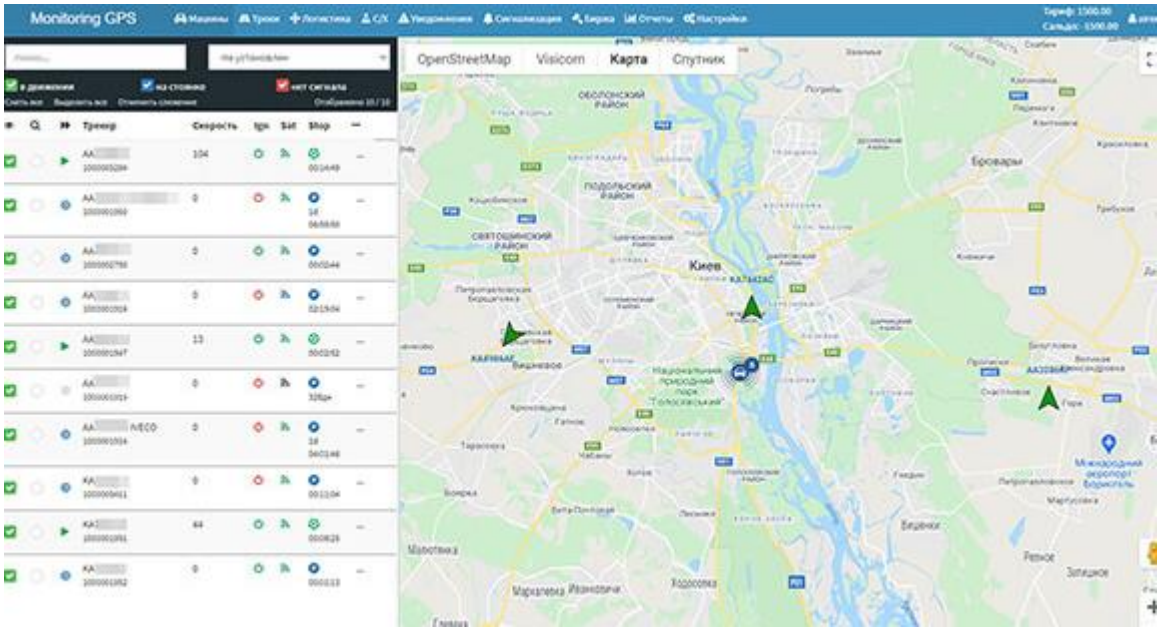


Figure 3.9 GPS tracker interface

Source: [made by the author]

So, the company will receive information about the location of cars and will have data in order to calculate the speed of delivery of goods to customers. Also, by integrating a GPS tracker into an existing CRM system, company managers can quickly and easily find the location of the cargo and inform their client about the planned time of delivery of goods.

After configuration, we check the functionality of the GPS module Fig. 3.10

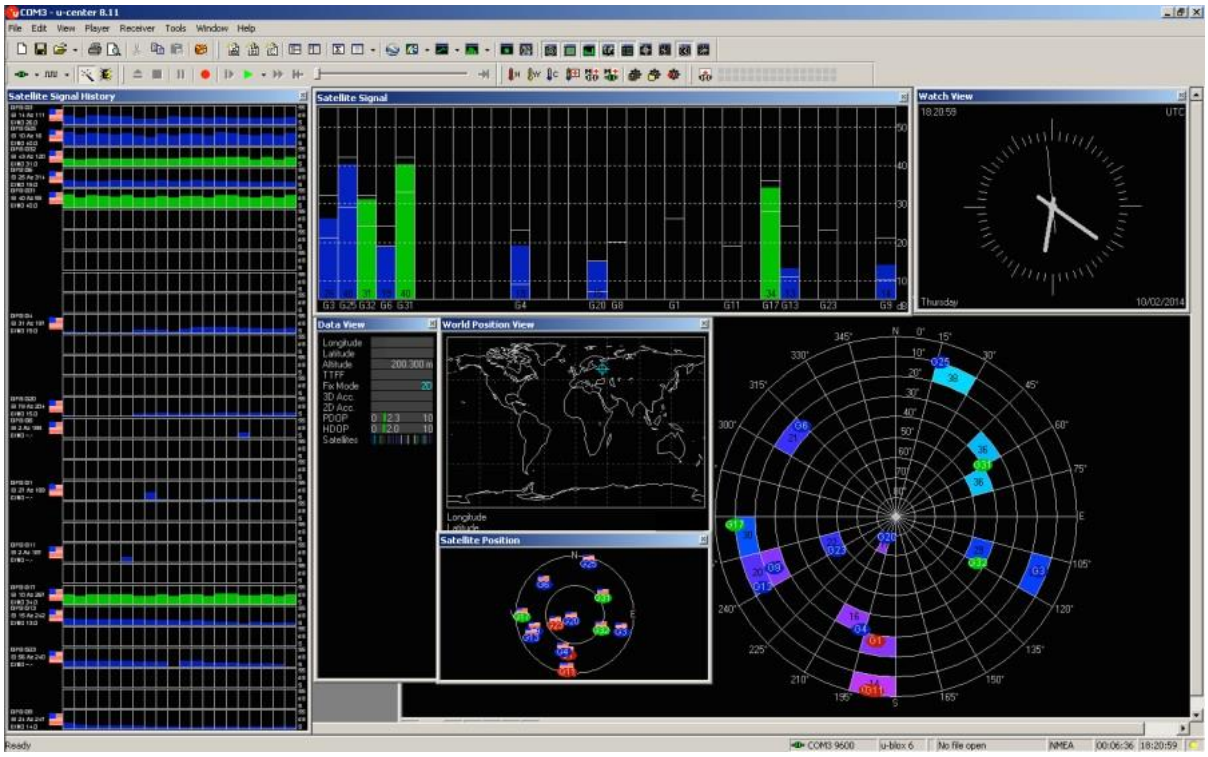


Figure 3.10. Test the number of satellites and signal strength

Source: [made by the author]

We observe a sufficient number of satellites and the signal level from them for the 3D-fix mode to turn on, that is, the coordinates of the module's location are determined.

Based on the results of the GPS tracker settings, correct operation with the CRM system is ensured, the maximum number of satellites is received and only the necessary parameters are displayed. These settings will simplify the creation of program code and relieve both the GPS module and the CRM system from processing unnecessary data.

The main advantages of using a GPS tracker for the ФОП «Черненька» :

– Efficient delivery of goods - made possible by accurate tracking data and instant information, even when the GSM network is not available, which will allow the company to maximize fleet efficiency.

– Maximum cargo protection – use of geofences to ensure that the cargo does not leave the specified area and constant knowledge of the exact weight thanks to load sensors.

– Custom geofences - Set virtual boundaries and receive instant notifications when vehicles deviate from a predetermined route or enter prohibited areas, ensuring compliance with safety protocols and efficient route management.

– Detailed operational information – Gain valuable insights into vehicle usage patterns, idle times and driver behavior to optimize operations and improve productivity.

– Preventative Maintenance Scheduling - Monitors vehicle condition and usage to proactively schedule maintenance, reduce downtime and extend the life of the mining fleet.

– Raising safety standards – monitoring driver behavior to ensure compliance with safety regulations, reducing the risk of accidents in challenging mining environments.

– Cost-Effective Fleet Management – Optimizing routes, reducing downtime and proactively managing vehicle maintenance allows FMC650 trackers to significantly reduce costs and improve overall mining efficiency.

The idea of introducing a GPS tracker into the logistics processes of the ФОП «Черненька» showed the logistics department the main shortcomings of the delivery process and optimized costs. It is precisely these technologies that are being introduced in ports and airports, which allows them to work like “clockwork”. The process of introducing a GPS tracker into the logistics processes of the ФОП «Черненька» is shown in Figure 3.11.

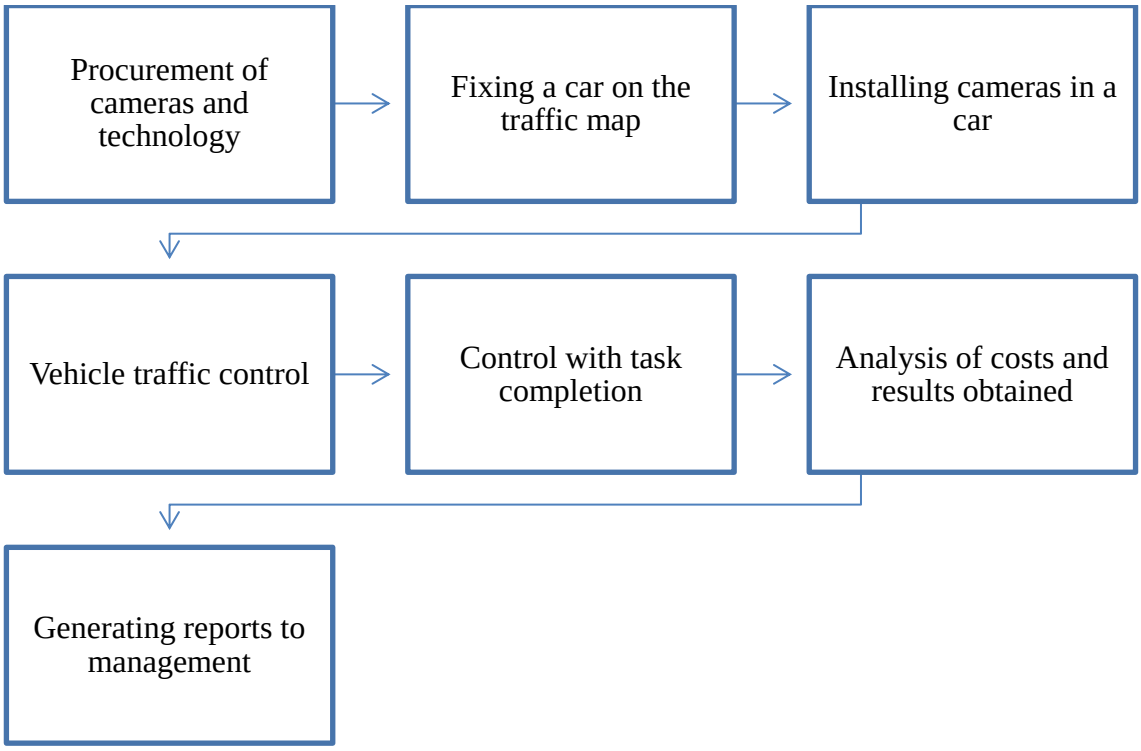


Figure 3.11 – The process of introducing a GPS tracker into the logistics processes of the ФОП «Черненька»

Source: [made by the author]

Consequently, carrying out a GPS tracker minimizes the cost of idle and unnecessary driver stops, and also optimizes and speeds up the process of delivering goods to customers.

To optimize its costs, ФОП «Черненька» introduces innovations in its business processes and its management is constantly working to simplify the work of employees and to achieve cost savings.

Based on the innovations reviewed, I can conclude that ФОП «Черненька» needs to focus on optimizing business processes, logistics and marketing and develops innovations in this direction.

The use of an ERP system will allow managers to effectively plan and control the activities of their segments and departments, which will have a positive impact on the company's overall performance. For example, the sales department can plan the list of products that are in the greatest demand, and in turn, the purchasing department will see

the goods that need to be delivered and purchased in the near future. This is the kind of coordination that the ERP system will provide to the managers of ФОП «Черненька».

The use of GPS systems will allow the logistics department to monitor the movement of vehicles and plan deliveries in such a way as to deliver goods from the warehouse to the store in the best possible way and faster. GPS trackers also allow you to monitor the driver's working hours, which will facilitate the work of the accounting department in calculating his salary.

The use of innovations in marketing will allow ФОП «Черненька» employees to speed up the process of selling products, because the program will automatically select the most popular product among consumers and show the place where it should be placed, which greatly facilitates the work of ФОП «Черненька» merchandisers.

As a result, we can suggest that the company create a portal for its suppliers, which is an innovative solution that will allow the company to receive offers from its suppliers and form them into a common base for a better understanding of their prices and additional services they offer. Such a portal will be beneficial for both ФОП «Черненька» and its suppliers, as the company will receive competitive prices and offers that are in one database, and suppliers can get an effective sales market, such as an ФОП «Черненька» store.

Conclusions and proposals

In this thesis, we explored the impact of digital techonoligies on the formation of supply chains on the expel of Ukrainian company. Summarizing the studied material, we can conclude that transport logistics is nothing more than the movement of the required volume of goods to a specified point and time, using the optimal route at the lowest cost.

Thus, we can conclude that the development of logistics in foreign countries is much higher than the level of development of logistics in our country, but it is worth noting that the logistics business processes of foreign countries do not have special ones, differ from the logistics business processes in our country.

The use of artificial intelligence in the supply chain not only allows companies to automatically manage the movement of goods, but also minimize downtime and inefficient routes.

ФОП «Черненька» is an operating retail trade enterprise specializing in trading in clother. Financial analysis showed that there are groups of indicators that showed good results (corresponding to standard values) during 2020-2022, however, there are groups of indicators that showed not very good value in 2022.

Consequently, a highly qualified team of professionals working at ФОП «Черненька» is continuously working to increase the well-being of its customers, expand the scope of its activities in order to maximize its own profits.

Monitoring the level of customer satisfaction allows you to identify possible deficiencies in logistics processes that affect the quality of service. Customer feedback is an important tool for improving logistics strategies.

The introduction of systematic monitoring of these factors will become the basis for a rapid response to changes in the environment and continuous improvement of the restaurant's logistics system, ensuring a high level of service and competitiveness in the trading business market.

An important point in soliciting goods for the warehouse of branches is to receive feedback from them about inventory and goods that are not in demand, which will influence the next process of purchasing goods.

Summarizing, it can be argued that at present the management of innovative development can be assessed as satisfactory, because the director of ФОП «Черненька» does not stimulate its development.

To optimize transport processes in ФОП «Черненька», we propose to introduce a REST API CRM system, which will not only optimize the processes of clothing delivery, but also reduce transport costs.

Based on the results of the GPS tracker settings, correct operation with the CRM system is ensured, the maximum number of satellites is received and only the necessary parameters are displayed. These settings will simplify the creation of program code and relieve both the GPS module and the CRM system from processing unnecessary data.

Consequently, carrying out a GPS tracker minimizes the cost of idle and unnecessary driver stops, and also optimizes and speeds up the process of delivering goods to customers.

References

Avtomobil′nyy transport v Ukrayini : normat. baza / [uporyad. O. M. Royina]. – 2-e vyd. – Kyyiv : KNT, 2006. – 460 s.

Kal′chenko A. H. Lohistyka : pidruchnyk / A. H. Kal′chenko ; M-vo osvity i nauky Ukrayiny, Kyyiv. nats. ekon. un-t im. V. Het′mana. – 2-e vyd. – Kyyiv : KNEU, 2006. – 283 s.

Mishchenko M. I. Zahal′nyy kurs transportu : navch. posib. / M. I. Mishchenko [ta in.] ; Avtomob.-dor. in-t DVNZ "Donets. nats. tekhn. un-t". – Donets′k : Nord-pres, 2010. – 323 s.

Preyher D. K.Stratehichni napryamy rozvytku transportnoyi haluzi Ukrayiny u pislyakryzovyy period : analit. dop. / D. K. Preyser,O. V. Sobkevych, O. YU. Yemel′yanova; za zah. red. YA.A. Zhalila. – NISD, 2012. – 112s.

Osnovy ekonomiky transportu : pidruchnyk : [dlya studentiv VNZ] / V. I. Shchelkunov, YU. F. Kulayev, L. H. Zayonchyk, V. M. Zahorul′ko ; M-vo osvity i nauky Ukrayiny, Nats. aviats. un-t ; pid red. V. I. Shchelkunova, YU. F. Kulayeva. – Kyyiv : Kondor, 2011. – 392 s.

Pavlov V. I. Transportno-lohistychnyy kompleks rehionu: intehratsiyni protsesy : monohrafiya / V. I. Pavlov, S. M. Bortnik ; In-t rehion. doslidzh. NAN Ukrayiny, Nats. un-t vod. hosp-va ta pryrodokorystuvannya, Ternop. derzh. ekon. un-t. – Luts′k : Nadstyr″ya, 2005. – 256 s.

Solovyova O. O. Zahal′nyy kurs transportu : konspekt lektsiy / Nats. aviatsiynyy un-t ; O. O. Solovyova, L. A. Yashchenko. – Kyyiv : NAU, 2007. – 89 s.

Makarenko M. V. Sotsial′no-ekonomichni aspekty rozvytku pidpryyemstv transportu Ukrayiny / M-vo osvity i nauky Ukrayiny, Derzh. ekon.-tekhnol. un-t transp.; Kyyiv : DETUT, 2013. – 296 s.

Transport na pidpryyemstvi : praktychne kerivnytstvo. – Dnipropetrovs′k : Balans-Klub, 2005. – 176 s.

Transportna polityka Ukrayiny ta yiyi nablyzhennya do norm Yevropeys′koho Soyuzu / za red. Marchina Svyenchitski. – Kyyiv : Analitychno- doradchyy tsentr Blakytnoyi strichky, 2010. – 102 s.

Kengpol A., Tuammee S., Tuominen M. The development of a framework for route selection in multimodal transportation. The Intern. Journal of Logistics Management, 2014, vol. 25, issues 3, pp. 581-610. doi: 10.1108/ijlm-05-2013-0064

Statystychne upravlinnia Yevropeiskoho soiuzu (Eurostat) (2022) Available at: http://eurostatica.com/services/product/ua-eu-prod.php

Lobovko V. (2022) Analyz rinka lohystycheskykh usluh Ukrayni. Trendi, slozhnosty y vozmozhnosty. Available at: https://trademaster.ua/articles/312595

Roekel van W. S.(2018) Improving international logistics performance measurement. Available at: http://resolver.tudelft.nl/uuid:bbec46b9-c6bc-475f-ba61-2f3404bc7178

World Bank. Logistics performance index: Overall (1=low to 5=high). Available at: https://data.worldbank.org/indicator/LP.LPI.OVRL.XQ

Updated National Transport Strategy of Ukraine 2030. Available at: https://mtu.gov.ua/files/Zakypivli/Ukraine%20Transport%20Strategy%20Part%201%20-%20POLICY%20NOTE.pdf

L. Kharsun «Lohistychne obsluhovuvannia tovaropotokiv mizh Ukrainoiu ta krainamy YeS». Available at: http://nbuv.gov.ua/UJRN/EkUk_2016_4_12

Savin, S., Kravchyk, Y., Dzhereliuk, Y., Dyagileva O., & Naboka, R. (2021). Management of the Processes on the Quality Provision of the Logistic Activity in the Context of Socio-Economic Interaction of

Their Participants (2021). IJCSNS International Journal of Computer Science and Network Security, 21(12), 45-52.

Revenues from the artificial intelligence (AI) software market worldwide from 2018 to 2025. , Available at: https://www.statista.com/statistics/607716/worldwide-artificial-intelligence-market-revenues/

Blumberg Capital, Artificial Intelligence in 2019: Getting Past the Adoption Tipping Point, 2019, Available at: https://blumbergcapital.com/ai-in-2019/

Survey Says 18.8 Million Amazon Echo Devices Sold // Voicebot.ai. 2017, Available at: https://voicebot.ai/2017/06/19/survey-says-18-8-million-amazon-echo-devices-sold/

Iakovenko V. S. Vykorystannia zasobiv shtuchnoho intelektu u lohistychnykh systemakh dystry- biutorskykh kompanii/ Redaktsiinyi kolektyv: YuH Lysenko (holova) - chlen.-kor. NAN Ukrainy, 2010. S. 118

Skitsko, V. I. Synerhiia tsyfrovykh tekhnolohii v lohistychnykh systemakh// Investytsii: praktyka ta dosvid. 2018. S. 18-24

Lopatin A., Ishchenko N. Znachennia vykorystannia shtuchnoho intelektu pry vybori postachalnyka u suchasnykh lohistychnykh systemakh. HRAAL NAUKY. 2021. S. 51-54

Sokolova O. Ye. Teoretyko-metodolohichnii osnovy formuvannia transportno-lohistychnoi systemy Ukrainy. Available at: http://ecobio.nau.edu.ua/index.php/PPEI/article/viewfile/182/173.

Syryichyk T. Transportna polityka Ukrainy ta yii nablyzhennia do norm Yevropeiskoho Soiuzu; za red. Marchina Svienchitski. K. : Analit.-doradch. tsentr Blakytnoi strichky, 2010. 102 s. Available at: http://www.undp.org.ua/files/en_76033Transport_System_Reform_Jun2010.pdf.

Dorokhovskyi O.M. Problemy ta perspektyvy rozvytku transportno-lohistychnoi systemy Ukrainy . Экономyka y upravlenye. 2012. №5, pp. 60-65.

Krykavskyi Ye. V. Suchasna lohistyka potrebuie innovatsii. Available at: http://essuir.sumdu.edu.ua/bitstream/ 123456789/28173/1/logist.pdf.

Brahynskyi V. V. Rozvytok transportno-lohistychnoi systemy yak forma realizatsii tranzytnoho potentsialu Ukrainy. Available at: http://www.academy.gov.ua/ej/ej14/txts/Braginskiy.pdf.

Anderson B., Villa J. C.Transportation and trade across international bordersiu Research in Transportation Business & Management. Volume 16, September 2015, P. 1-3.

ФОП «Черненька» Website (2023) Available at: https://youcontrol.com.ua/catalog/fop_details/26843927/