MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL AVIATION UNIVERSITY
Faculty of Transport, Management and Logistics
Logistics Department

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«03» June 2024

QUALIFICATION PAPER

(EXPLANATORY NOTES)

OF GRADUATE OF ACADEMIC DEGREE

«BACHELOR»

THEME: ***«Organization of business processes of a logistics company in conditions of digitalization»***

Speciality 073 «Management»

Educational Professional Program « Logistics »

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I certify that in this qualification paper there are no borrowings from the works of other authors without appropriate references *Mariia OCHICHENKO*
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Kyiv 2024

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ АВІАЦІЙНИЙ УНІВЕРСИТЕТ
Факультет транспорту, менеджменту і логістики
Кафедра логістики

ЗАТВЕРДЖУЮ
В.о. завідувача кафедри логістики
Світлана СМЕРІЧЕВСЬКА
(підпис, власне ім'я та прізвище)
«03» червня 2024 р.

КВАЛІФІКАЦІЙНА РОБОТА

(ПОЯСНЮВАЛЬНА ЗАПИСКА)

ЗДОБУВАЧА ОСВІТНЬОГО СТУПЕНЯ

«БАКАЛАВР»

ТЕМА: «**Організація бізнес-процесів логістичної компанії в умовах цифровізації**»

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Засвідчую, що у цій кваліфікаційній роботі немає запозичень з праць інших авторів без відповідних посилань *Марія ОЧІЧЕНКО*
(підпис) (власне ім'я та прізвище здобувача)

Київ 2024

NATIONAL AVIATION UNIVERSITY
Faculty of Transport, Management and Logistics
Logistics Department

Academic Degree Bachelor

Speciality 073 «Management»

Educational Professional Program « Logistics »

APPROVED
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«13» May 2024

TASK

FOR COMPLETION THE QUALIFICATION PAPER OF GRADUATE

Mariia Ochichenko
(name and surname)

1. Theme of the qualification paper: «Organization of business processes of a logistics company in conditions of digitalization» was approved by the Rector Directive №624/ст. of April 24, 2024.

2. Term performance of the work: from May 13, 2024 to June 16, 2024.

3. Date of submission paper to graduation department: June 03, 2024.

4. Initial data required for writing the paper: general and statistical information about international cloud logistics and supply chain management software market, information and production indicators of the company LLC «ZAMMLER Ukraine», financial indicators of the «ZAMMLER Ukraine» projects, project, literary and Internet sources.

5. Content of the explanatory notes: introduction, the concept of cloud computing in the logistics industry; utilization of cloud computing models in logistics and supply chain management; the essence of project management tools; analysis of the international logistics software market; Characteristics of ZAMMLER Ukraine; Project description; Implementation of a cloud-based software for enhanced operations of logistics service provider ; Calculation of the efficiency of the proposed project solution; conclusions and appendix.

6. List of obligatory graphic matters: tables, charts, graphs, diagrams illustrating the current state of problems and methods of their solution.

7. Calendar schedule:

№	Assignment	Deadline for completion	Mark on completion
1	2	3	4
1.	Study and analysis of scientific articles, literary sources, normative legal documents, preparation of the first version of the introduction and the theoretical chapter	13.05.24-16.05.24	Done
2.	Collection of statistical data, timing, detection of weaknesses, preparation of the first version of the analytical chapter	17.05.24-20.05.24	Done
3.	Development of project proposals and their organizational and economic substantiation, preparation of the first version of the project chapter and conclusions	21.05.24-26.05.24	Done
4.	Editing the first versions and preparing the final version of the qualification paper, checking by standards inspector	27.05.24-29.05.24	Done
5.	Approval for a work with supervisor, getting of the report of the supervisor, getting internal and external reviews, transcript of academic record	30.05.24-02.06.24	Done
6.	Submission paper to Logistics Department	03.06.24	Done

Graduate_____
(signature)

Supervisor of the qualification paper _____
(signature)

8. Consultants of difference chapters of paper:

Chapter	Consultant (position, surname and name)	Date, signature	
		The task was given	The task was accepted
Chapter 1	Associate Professor, Molchanova K.M.	13.05.24	13.05.24
Chapter 2	Associate Professor, Molchanova K.M.	17.05.24	17.05.24
Chapter 3	Associate Professor, Molchanova K.M.	21.05.24	21.05.24

9. Given date of the task May 13, 2024.

Supervisor of the qualification paper: _____ Kateryna MOLCHANOVA
(signature of supervisor) (surname and name)

Task accepted for completion: _____ Mariia OCHICHENKO
(signature of graduate) (surname and name)

ABSTRACT

The explanatory notes to the bachelor thesis "Organization of business processes of a logistics company in conditions of digitalization comprises" 90 pages, 19 figures, 23 tables, 65 references.

KEY WORDS: SOFTWARE, CLOUD COMPUTING, LOGISTICS MANAGEMENT, LOGISTICS SERVICE PROVIDER, CLOUD-BASED LOGISTICS SOFTWARE, PROJECT DEVELOPMENT.

The basic principles of data collection, structure, and management in the logistics company are considered in the bachelor thesis.

The theoretical part covers the essence of cloud computing concept and its utilization in the logistics industry as well as software-as-a-Service application in logistics. The analytical part is devoted to the comprehensive analysis of the logistics company, namely its general characteristics, economical and financial state. Development of the investment project to optimize the operational activity of the company is represented as well.

The subject of the investigation is the organization of the cloud-based software adoption project for a logistics company on an example of ZAMMLER Ukraine company.

The object of the research is the organization of logistics operations in the logistics company ZAMMLER Ukraine.

Methods of research are analysis, synthesis, induction, deduction and generalization.

Materials of the thesis are recommended to be used in scientific research, educational process, and for experts in logistics project management and software development field.

CONTENTS

NOTATIONS

API – Applied Program Interface
CRM – Customer Relationship Management
CSR – Corporate Social Responsibility
EDI – Electronic Data Interchange
FMM – Fleet Management Module
IaaS – Infrastructure as a Service
IoT – Internet of Things
LSP – Logistics Service Provider
OBD – On-board Diagnostics
PaaS – Platform as a Service
PoD – Proof of Delivery
RFID –Radio Frequency Identification
SaaS – Software as a Service
SCM – Supply Chain Management
TMS –Transportation Management System
WMS –Warehouse Management System

INTRODUCTION

We are living in a world where the rapid evolvement of technologies is the key driver of operations efficiency within every company. The word “digitalization” is typically associated with Industry 4.0 which represents a paradigm shift marked by the integration of digital technologies, intelligent systems, and data-driven processes. This transformative era is characterized by the synergy of physical and digital realms with the usage of technologies like Internet of Things (IoT), artificial intelligence, advanced robotics, and cloud computing. The last one has become the cornerstone of the successful management of business processes in every industry.

As a response to the increasing demand for cost- and time-efficient solutions for managing operations, the number of new cloud computing services rapidly increases. The remarkable interest in the adoption of cloud solutions is noticeable among logistics companies, the key aims of which are the proper handling of increasing demands from customers, as well as managing the pressure of prices and fuel costs. Cloud-based software offers a centralized storage system for inventory, shipping, and receiving data, minimizing reliance on paper records and simplifying the monitoring and management of inventory levels.

Additionally, cloud-based software enables real-time visibility into shipment statuses, facilitating automated tracking and tracing to enhance the precision of delivery times and minimize the necessity for manual intervention. Lastly, cloud-based solutions provide analytics and reporting tools, empowering managers to optimize their logistics operations. The latest Logistics Trend Radar report, published by DHL, signified the importance of cloud computing as one of the key transformation trends that will support in development of the new process models in the mid- and long-term perspective.

The intensive implementation of cloud solutions in the activities of logistics companies in Ukraine should be based on the experience of world-renowned logistics service providers (LSPs) since improper use of cloud computing services can lead to

data breaches & loss, security threats, operational disruptions, and financial implications.

As cloud technologies are showing rapid advancement within a relatively short period, small and medium-sized companies tend to lose revenue as well as the market share due to the lack of qualified specialists. Therefore, it is crucial to provide adequate training to staff for efficient utilization of cloud technologies and leveraging their full potential. For instance, UPS, one of the largest and most trusted global shipping and logistics companies, through the implementation of the Google Cloud Platform, designed cloud routing software that saved the company up to $400 million a year and reduced fuel consumption by 10 million gallons a year. American Multional Delivery company FedEx implemented Microsoft Azure cloud. With the utilization of this platform, FedEx takes a proactive approach to monitoring potential risks to packages throughout the delivery route, including factors like weather disruptions or traffic delays. The near real-time information offers customers visibility into the status of their supply chain, empowering them to plan actions and explore alternatives. FedEx can then assist in executing these plans to ensure the shipment stays on track.

The relevance and degree of scientific development of the problem shows that the necessity of implementing cloud-based software in the operations of ZAMMLER Ukraine is evident in the context of the rapidly evolving logistics industry.

The object of the study was the organization of logistics operations in the logistics company ZAMMLER Ukraine (LLC "ZAMMLER UKRAINE").

The subject of the research is the process of organization of cloud computing processes of LLC “ZAMMLER Ukraine”.

The aim of the thesis is to study theoretical aspects and develop practical recommendations for increasing the efficiency of logistics operations by implementing cloud computing solutions in logistics company LLC “ZAMMLER Ukraine”.

The goal of the thesis can be achieved with the proper execution of following tasks:

– the analysis of literary sources was done and views of scientists on the definition of "cloud computing" were generalized;

– the main features of "cloud software" were highlighted;

– deployment models of cloud computing and their utilization in logistics and supply chain management were characterized;

– the object and subject of the management system of LLC “ZAMMLER Ukraine” were analyzed;

– financial and economic analysis of the results of the economic activity of LLC “ZAMMLER Ukraine” were carried out;

– comparative analysis of leading cloud softwares in the logistics industry in Ukraine and abroad was conducted;

– project proposals for improving the efficiency of logistics processes within ZAMMLER Ukraine thanks to cloud solutions were developed;

– efficiency of the proposed project solution was calculated;

During the process of writing the thesis, materials from the foundation's internal reporting, data from statistical directories, and materials from practitioners in the field of logistics and management, published in periodicals, monographs, textbooks, and electronic sources, were used.

CHAPTER 1
THEORETICAL BASIS OF CLOUD COMPUTING SOLUTIONS IN LOGISTICS OPERATIONS

1.1 The essence of cloud computing in the digitalization of the logistics industry

The logistics ecosystem has grown increasingly complex, with the inclusion of new participants like logistics service providers becoming an integral component. Information technology systems play a pivotal role by enabling the access, analysis, and processing of information to boost decision-making processes. The beginning of 1960 is considered to be the start of the so-called "Logistics 2.0" era, i.e. the start of digitalization in Logistics & Supply Chain Management. Gartner defines digitalization as "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities". Digital transformation does not only mean the usage of technological devices and the pushing of paperless processes. It implies a variety of changes in a company's strategy, processes, and organizational culture through the usage of technology [1].

Along with the latest trends in logistics, for example machine learning and artificial intelligence, Big Data Analytics and cloud computing solutions have been actively implemented by various companies since 2011.

Study by the National Institute of Standards and Technology claims that cloud computing can be defined as a model for enabling the on-demand network access to a shared pool of different computing resources that can be provisioned and released effortlessly and without/ minimum interaction with a service provider [2]. The idea of cloud computing came to life even before the Internet was created. In 1997 the first person who used the term 'cloud computing' was the professor assistant Ramnath Chellapa during a lecture at the University of Southern California [3] in which he

introduced cloud computing in a way that cloud computing is going to be driven by economic reasons instead of being limited by just technical factors. Important to note that Salesforce was the first company that make a successful practical implementation of a cloud enterprise-level application

In 2021 429 middle-sized and large logistics companies were surveyed by Statista [4] to find out the level of the adoption of 4.0 technologies. Cloud computing took a prominent place being adopted by 54 % of the queried companies and is expected to have the greatest impact on organizations worldwide (see Fig.1.1) The global cloud logistics market size was estimated at USD 17.31 billion in 2022 and is according to forecasts, it will grow at the annual growth rate (CAGR) of 13.3% from 2023 to 2030 [5].

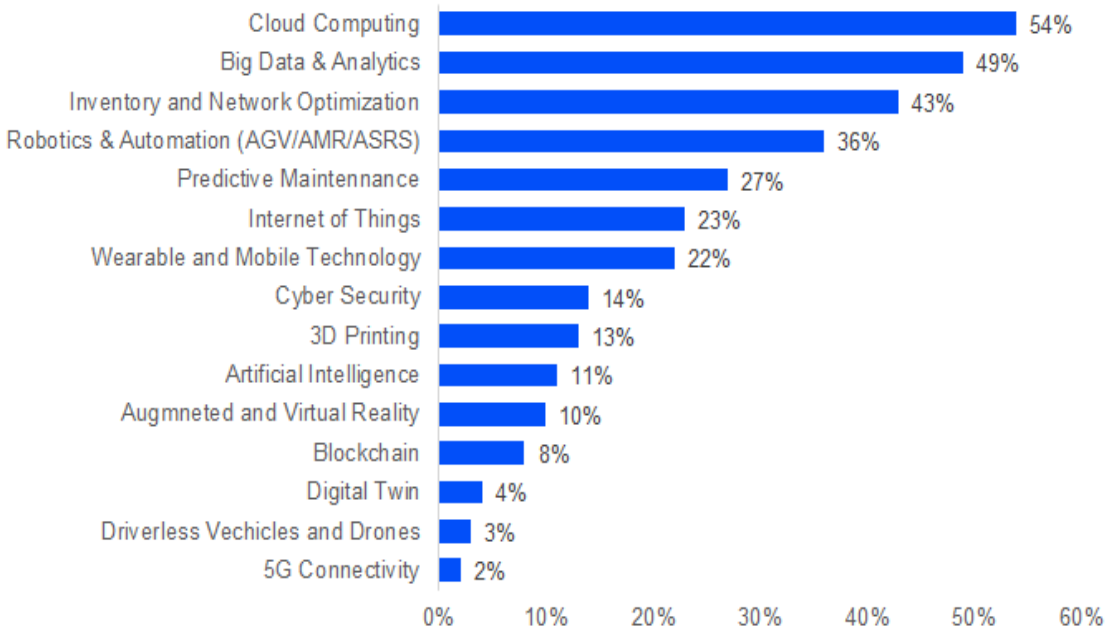


Figure 1.1 – Adoption of cutting-edge technologies by supply chain companies in 2021

Source: [65]

According to Glöckner and Franczyk [6] Cloud Logistics is a model inspired by cloud computing. It aims to make logistics resources, for instance, transportation, warehouses, and specialized knowledge, easily accessible through a shared and

virtualized network. This model follows the key features of cloud computing but is adapted for the more physical nature of logistics. This includes factors such as location dependence, the importance of knowing the current location, and a slower response time for the allocation of physical resources.

The utilization of cloud computing in logistics for users in the logistics field is that the data can be stored on a certain web server where they can be managed and processed in an unlimited amount forming a data pool, external employees can gain access to this data - download or edit the necessary documents. The cloud system is composed of 4 essential characteristics that can be observed in Figure 1.2.

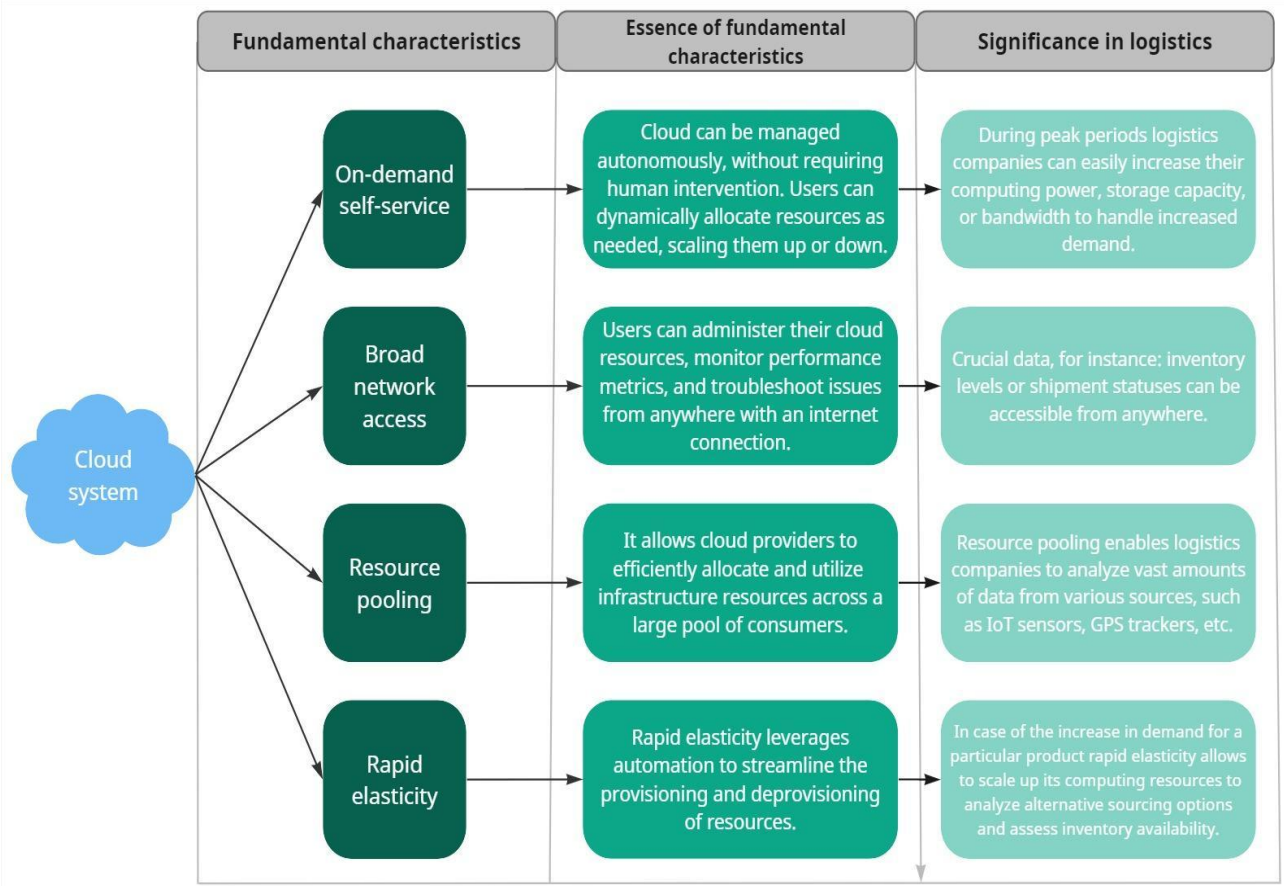


Figure 1.2 – Essential characteristics of cloud system and its significance in logistics operations

Source: compiled based on materials [10, p.23-32]

The modern logistics process involves cloud integration, where every employee can access the database from anywhere in the world. For example, cloud-based fleet management software helps drivers stay up-to-date on transit route details.

The installation and use of cloud software does not require large investments in the purchase of actual equipment. Cloud solutions will typically be more affordable and efficient, and easier to integrate with existing systems than on-premise software. Therefore, the cloud itself can be called an impeccable system that combines all logistics operations within the company into a single system [7].

The Ukrainian cloud market, unlike the US or EU markets, is currently in the "latent phase" of development - demand formation and accumulation of primary experience of consuming cloud solutions, but according to forecasts, already in 2024, it will demonstrate growth characteristic of the cloud markets of developed countries.

Logistics companies usually face different challenges in their daily operations, among them the most common are transportation cost challenges, the need for business process improvement, service optimization, and supply chain visibility [8].

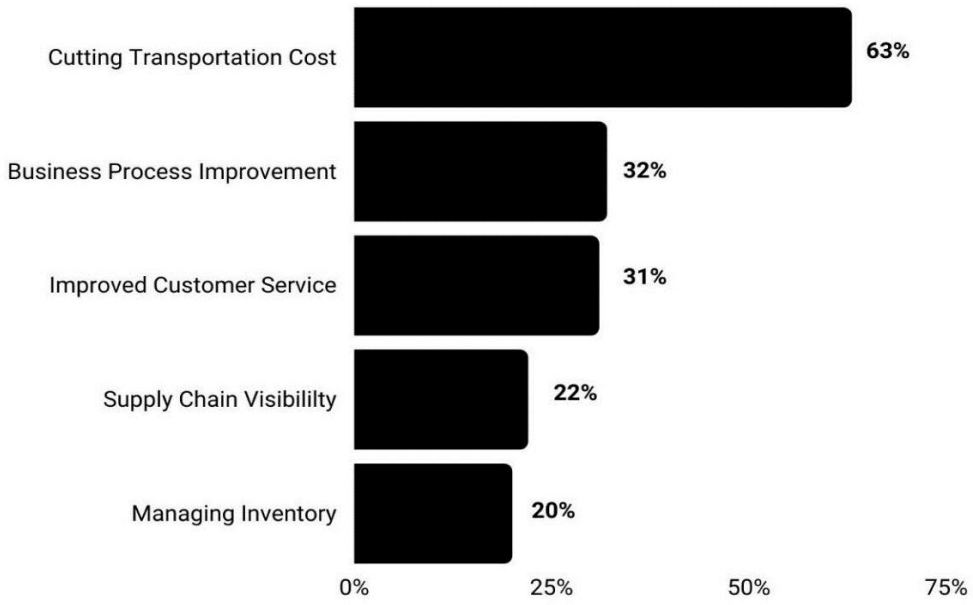


Figure 1.3 – Share of top challenges logistics companies face

Source: [8]

The share of common logistics issues that 3PL usually faces, can be seen in Figure 1.3. This has increased the demand for cloud solutions that can greatly contribute in dealing with these issues. The benefits that cloud technologies can provide to companies are numerous, however, there are still providers who are afraid to take the first step, since costs of setting up cloud platforms are high.

There are two types of software: on-premise (traditional) and cloud software. On-premise and cloud software has a difference in its location. For example, on-premise software is installed and runs on a company's hardware infrastructure, while cloud software is stored and managed by a cloud service provider and all the necessary data can be accessed via the Internet. The disadvantage of the on-premise software is the high cost of installation, maintenance, and upgrading of the hardware, whereas with the utilization of the cloud software, these costs can be avoided [9]. A comprehensive comparison of software types can be seen on Table 1.1.

Table 1.1 – Key differences between Cloud SaaS and On-premise SaaS

Difference category	Cloud SaaS	On-premise SaaS
Cost of installation	Low. There are no big investments, usually the only payment is the subscription fee.	High. Requires additional investment and hardware to install the ERP.
Maintenance cost	No maintenance cost.	Maintenance cost is often annual.
Updates	Included in the subscription fee.	Included in the maintenance fee, sometimes requires an extra fee for additional hardware.
Deployment	Cloud server	Local server

The end of the Table 1.1

Accessibility	Can be accessed by the user from anywhere.	Impossible to access the software outside the office.
Implementation	Short time of implementation, no additional hardware is required.	The long time of implementation usually depends on the current infrastructure of the company and the efficiency of the IT department.
Data security	Vendors have control over possible malfunctions.	Depends on the efficiency of the IT department of the company.

At the same time, with the correct utilization of the cloud software, a large number of logistics processes can be optimized, namely:

- import and export processing
- customs brokerage
- container management
- warehouse management
- transport management
- customer relationship management (CRM)
- invoicing and financial accounts
- order management for purchase

As it can be observed, using the cloud software, it's easy to track shipments, view and print documents, request quotes, generate reports, manage accounts, and maintain visibility through one centralized platform. Logistics companies decide to move to the cloud from the financial perspective, as usually, cloud software does not require large investments, additional hardware, licensing fees, or lengthy implementations. Warehousing, production, and packaging data is immensely significant for the logistics industry. This data helps identify market trends, consumer preferences, and competitor behavior [10]. Enabling the cloud to manage logistics and data warehouses simplifies the process by creating a central checkpoint. Cloud offers

scalability, which means even smaller businesses can use technology on a pay-per-use basis.

With the pay-as-you-go – a scalable payment model that allows to lower business costs overall – logistics companies can access the exact resources they need This helps logistics organizations to avoid over or underspending on their technology needs [11].

1.2 Service and deployment models of cloud computing and their utilization in logistics and supply chain management

Cloud computing services offer various service types catering to different needs and requirements of businesses. The three primary service types in cloud computing are IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service), and SaaS (Software-as-a-Service) can be observed at Table 1.2.

Table 1.2 – Main service models and their application in logistics

	Type of Service	Definition	Application in logistics
Service Models	SaaS (Software-as-a-Service)	The client can use the provider's applications that are installed on the cloud infrastructure. Consumers can access the software from different client devices through the website. No management or control of the underlying cloud infrastructure is required.	SaaS logistics software typically includes features for inventory management, warehouse management, transportation management, and supply chain analytics. It can automate order processing, shipping, tracking, and reporting, improving efficiency and reducing operational costs.

The end of the Table 1.2

	PaaS (Platform-as-a-Service)	The consumer is offered a framework where he can develop his applications, and customize and deploy them within the platform [10].	For instance, PaaS Vendor RedwoodConnect 2.0 provides a flexible infrastructure to Logistics Service Providers that allows it to seamlessly integrate both APIs (Application programming interface) and EDIs (Electronic data interchange) to connect with applications.
	IaaS (Infrastructure-as-a-Service)	IaaS provides the possibility for a consumer to use cloud storage, a network where the consumer can deploy the cloud software, which usually includes various operating systems and applications [14].	Maintaining reliable and resilient IT infrastructure is crucial for ensuring uninterrupted logistics operations. IaaS providers offer built-in features such as automated backups, redundant storage, to protect against data loss and downtime.

Source: compiled based on materials [14, p. 61-67]

Based on the type of deployment model, the cloud can be categorized as follows:

Public cloud. This type of cloud provides easy access for clients. It makes a public cloud well-suited for commercial purposes of load management. Another advantage of this type of cloud is that it is very affordable in terms of its services. IBM, Google, Amazon, Microsoft are examples of companies offering public cloud installations [12].

Community cloud. The type of cloud is used exclusively by a community of consumers from organizations that have shared concerns. Usually, one or more organizations own, manage and operate community clouds. Besides this, it can exist on or off-premises [13].

Private cloud. In this cloud, everything is managed exclusively by one organization comprising multiple consumers. The owner can be the organization itself

or a third party. For instance, UPS created and operates a private cloud environment known as "UPS Smart Logistics Network," which powers its end-to-end supply chain management and logistics operations. At the same time, DHL Supply Chain utilizes its product as well – a platform called ‘DHL Control Tower" to orchestrate and optimize its supply chain activities [12].

Hybrid cloud. this type of cloud comprises the combination of two or more clouds, in most cases having Public and Private environments. For instance, databases are stored in the private cloud, while software is installed in the public cloud which can consist of an on-premises infrastructure and such cloud applications as Amazon Web Services (AWS) or Microsoft Azure.

1.3 Peculiarities of the Software-as-a-Service application in logistics

Ensuring timely delivery of the correct products to customers, precisely where and when they're needed, requires optimizing warehousing, distribution, transportation, and fulfillment processes across various channels. Nowadays, demand-driven and customer-focused supply chains mean the continuous interaction of suppliers, distributors, and logistics providers.

In order to handle the competition with other logistics players on the market, the company needs distribution networks that always have available stock, so orders can be fulfilled on a global scale, while the company will quickly respond to the needs of individual customers. For businesses of varying sizes and across diverse sectors, their success depends on accommodating consumers and partners according to their preferences, which includes delivering products and services through their favored channels [15].

As the complexity of supply chains grows rapidly, businesses have to respond correspondingly by automating such operations as material handling, order fulfillment, shipments, and import/export processes. Cloud-based software unifies transportation,

trade, and warehouse activities to help businesses meet their strategic objectives. The integration of software at the company should ensure that the business requirements are met by IT solutions [17]. Implementation usually involves 4 important phases that can be observed on Figure 1.4.

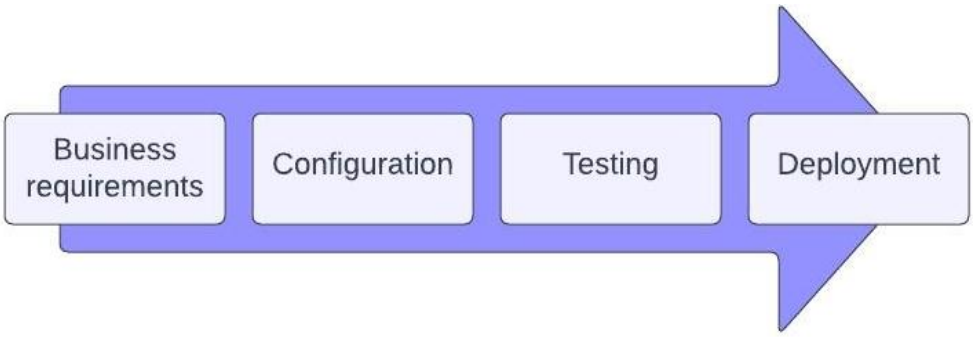


Figure 1.4 – The phases of the software implementation

Source: compiled based on materials [14, p. 61–67.]

Cloud-based software usually comprises 10-12 modules with some that can be either added or removed according to the client's vision and preferences. These modules can be observed on Figure 1.5. One of the core modules that is present in each cloud software is the Transport Management System (TMS).

A Transportation Management System (TMS) is a software platform created to empower shippers with tools for overseeing and tracking their supply chains. TMS offers capabilities and support for various stakeholders across the supply chain including transportation, warehousing, carriers, vendors, purchasing, customer service, sales, and finance. TMS provides a single platform to streamline all logistics activities of the order, both inbound and outbound [18].

There are two main types of TMS: "On-premise software" and "Cloud-Based Software as a Service (SaaS). The difference between these types is that the on-premise (traditional license model) requires shippers to install and maintain software on their servers, whereas Cloud-based SaaS TMS is run on a single server cloud that can be used simultaneously by a community of shippers.

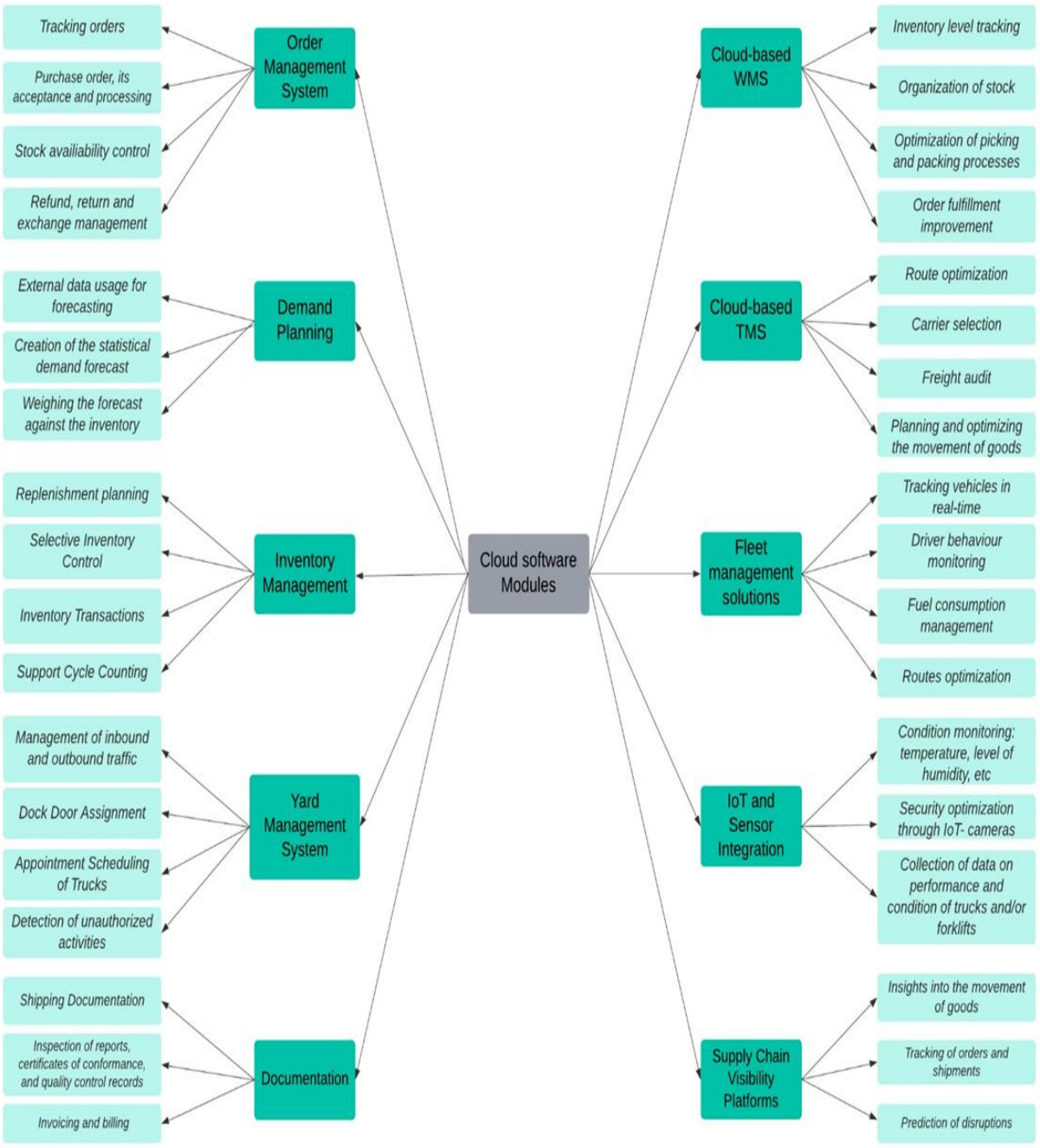


Figure 1.5 – Common modules of cloud logistics software

Source: compiled based on materials[16]

This type of TMS can be accessed without the installation of the software[20].

One of the main benefits of TMS utilization is increased visibility. Shippers can observe the activity of shipment and in case of heavy or light dock volumes make the corresponding preparation and scheduling of labor. The end customer receives the tracking link for location updates on shipments. The usage of TMS is also advantageous from the operational side when an employer can select the carrier and

track the order cycle including the audit and payment. In 2018 logistics companies saved on average 11 % when choosing to outsource more of their operations through SaaS and saw an average of 6% industry cost reduction [21].

The key function of TMS is automation. Usually, it is done by retrieving the data from the supplier's/ retailer's side to TMS, so the carrier will see an accurate interface. It minimizes the probability of manmade errors [19]. Moreover, automation also excludes manual processes, providing the ability to follow the Standard Operation Procedure (SOP):

1) Rating - employee enters necessary shipment details and receives rates from the carrier base

2) Booking - after the selection of the carrier based on their rates, loads are booked through TMS

3) Tendering - emailed/EDI/API tenders, and customized tender documents.

4) Tracking - loads are updated by carriers and can be visible in TMS

5) Invoicing - invoice is automatically generated after the data has been entered to the TMS, and can also be canceled or adjusted [19].

Another core module is the Warehouse Management System (WMS). Warehouse Management System is an informational system dedicated to managing entire high–volume warehouse operations in a real-time mode. These systems are made to optimize the supervision on handling and storage of products [22].

WMS enables quick receipt and picking up of goods at the warehouse. This system controls the quantity and quality of goods and chooses the storage location. Through the proper utilization of the system, the company can benefit from increased turnover [24]. What is more, using such software helps to optimize tasks and resolve them according to the priority automatically defined by WMS. As a result of implementing the WMS system, enterprises can more easily organize, supervise, and control all processes that are connected with the movement and storage of goods and materials.

WMS provides a large amount of benefits, namely:

– Storage space usage optimization;

– Full control of orders;

– Reduced amount of manmade mistakes;

– Reduction of time of ordering and delivering goods;

– Stock turnover increase;

– Preparation of different warehouse documents, for instance, dispatch documentation[23].

With the utilization of WMS, logistics processes are accomplished by creating task queues that include various warehouse operations. This can help to minimize the empty cycles of forklift trucks. Additionally, the benefits of cloud-based WMS are that they allow fast deployment, reduced maintenance costs, and lower IT costs compared to the on-premise WMS. What is more, cloud-based WMS can be adjusted (for example: additional features) according to the client's preferences.

A possible module of the cloud software can be the Fleet Management Module (FMM). As part of the SaaS, the Fleet Management Module provides the ability to determine the best option to fulfill shipments in a single system by using either a private fleet or the external capacity – third-party fleet provider. The main objective of FMS utilization is the reduction of the overall operating costs and minimizing CO2 emissions at the same time[27].

Fleet managers face various challenges, for instance, high maintenance costs or unpredictable fluctuations in the car market. Fluctuations in fuel costs are another major challenge that can be overseen with FMS. With the utilization of this module, fleet managers can evaluate fuel options through cost-benefit analysis to determine the best choice for their fleet. With the help of valuable information such as the location of transport taken from GPS trackers, operational processes can be improved[26].

A fleet management system operates primarily through the interaction of devices installed on each vehicle in a fleet, alongside software hosting an online dashboard. Usually, to obtain the data of the vehicle, on-board diagnostics (OBD), radio frequency identification (RFID) tags, fuel monitoring systems, and temperature sensors are used. FMS also implies the utilization of mounted dash cams for hazard detection and the prevention of collision. From these devices, fleet managers can obtain such information

as the driven distance, idle time, safety metrics, vehicle condition, and rate of fuel consumption. This information is then processed and transferred to the fleet management system where it is stored and displayed for analytical purposes [28].

Benefits of the utilization of the FMS include saved time in dealing with administrative tasks. FMS automates each process that is connected to the filing of documentation, contacting multiple drivers for status updates, or documenting detailed operations.

The difference between the FMS and TMS is that the FMS focuses on the freight shipping process, whereas the TMS supports the entire transportation and logistics process (see Table 1.3). It implies that the key difference between a TMS and an FMS is that a TMS solves planning and execution, whereas an FMS focuses only on fleet operations enabling visibility of the movement of the transports.

Table 1.3 – Key differences between FMS and TMS modules as the part of cloud software system

	FMS module	TMS module
Focus	Fleet controlling and shipping. Suitable for companies that solely want to manage freight shipments.	Focuses on the entire transportation process of the logistics operations. Suits businesses that deal with the entire supply chain process.
Functionality	Specialized on freight delivery with a focus on carrier selection, route optimization, documentation management.	Provides a broader view of transportation, freight management, and analytics.
Can be integrated with	TMS, shipping module, yard management module, etc.	Procurement, order management, warehouse, and inventory management modules to provide a more comprehensive approach.

Source: compiled based on materials [29]

Based on this, it is better to choose the FMS module for companies located in countries where there are frequent cases of theft of vehicles and/or cargo inside, as this system provides an opportunity to easily track the exact location of the vehicle [29].

TMS, on the other hand, is better used by companies that want to eliminate problems with transport planning, managing customer expectations, and consolidating and tracking orders. TMS in this case makes it possible to optimize the process of order fulfillment and perform more work in a shorter period.

Chapter 1 Summary

The theoretical chapter of the thesis delves into the role of cloud computing in the digitalization of the logistics industry. It begins by defining digitalization and its transformative impact on business models, processes, and organizational culture. Cloud computing emerges as a key technological enabler within the logistics ecosystem, alongside other cutting-edge trends like machine learning and artificial intelligence. Ukrainian cloud market was described as well, unlikely US and EU market,

The main aim of cloud logistics is to virtualize resources and enhance accessibility within the industry. In this chapter we discussed the essential characteristics of cloud systems and their significance in optimizing logistics operations.

Moreover, in the chapter we explored different service and deployment models of cloud computing, highlighting their utilization in logistics and supply chain management. Service models such as SaaS, PaaS, and IaaS offer varying degrees of flexibility and control, catering to diverse business needs. Deployment models range from public and private clouds to hybrid and community clouds, each offering unique advantages and considerations for logistics applications.

A deeper focus is given to the Software-as-a-Service (SaaS) application in logistics, emphasizing its role in streamlining warehousing, distribution, transportation, and fulfillment processes. Modules like Transportation Management System (TMS), Warehouse Management System (WMS), and Fleet Management Module (FMM) are discussed in detail, showcasing their functionalities and benefits for logistics operations.

CHAPTER 2
ANALYSIS OF THE PREREQUISITES FOR THE ORGANIZATION OF THE COMPANY'S LOGISTICS BUSINESS PROCESSES IN THE CONDITIONS OF DIGITALIZATION

2.1 General characteristics of the company

For the Major-related training, ZAMMLER Ukraine was chosen, but firstly ZAMMLER GROUP has to be described. ZAMMLER GROUP is an international logistics group of companies that provide services in the fields of automotive, marine, aviation, and railway transportation, customs broker clearance, as well as storage services.

ZAMMLER Ukraine is a 3PL operator that undertakes the organization of transport and logistics services, from transportation or cargo transportation and delivery of processed and packaged cargo to the end consumer. Detailed information about the company is present at Table 2.1.

Table 2.1 – General information about ZAMMLER Ukraine

№ з/п	Indicator	Information about the company
1	2	3
1	Full name of the legal entity and abbreviated if available	ZAMMLER UKRAINE LIMITED LIABILITY COMPANY (LLC "ZAMMLER UKRAINE")
2	Organizational form	Limited liability company
4	Name of the legal entity	LLC "ZAMMLER UKRAINE"
5	EDRPOU	39536321
6	Location of the legal entity	04116, KYIV city, PROVIANTSKA street, building 3

The end of the Table 2.1

7	List of founders (participants) of the legal entity, including the shares of each of the founders (participants); surname, first name, patronymic, if the founder is a natural person; name, location and identification code of the legal entity, if the founder is a legal entity	Viktor Mykolayovych Shevchenko 03115, Kyiv, str. Lvivska, building 11, sq. 128 Contribution amount: UAH 2,314,987.50, 30% Oleksandr Dmytrovych Ageev 03040, Kyiv, str. Demiivska, building 55, sq. 167 Contribution amount: UAH 1,543,325.00, 20% LIMITED LIABILITY COMPANY "FINANCIAL COMPANY "ATLANTIS CAPITAL" / 04071, Kyiv, str. Kozhum" Yatska, building 12-A Contribution amount: UAH 1,543,325.00, 20% Oleg Boykovich Rachov 02232, Kyiv, str. Zakrevskogo, bldg. 71, sq. 112 Contribution amount: UAH 2,314,987.50, 30%
8	Data on the size of the authorized capital (authorized or combined capital) and the date of completion of its formation	UAH 7,716,625.00
9	Types of activities	52.29 Other auxiliary activities in the field of transport 45.20 Maintenance and repair of motor vehicles 46.19 Activities of intermediaries in the trade of a wide range of goods 49.41 Freight road transport 50.20 Freight sea transport 50.40 Freight river transport 51.21 Cargo air transport 52.10 Warehousing 52.24 Transport handling of goods 68.20 Leasing and exploitation of own or leased real estate
10	The date and number of the entry in the Unified State Register of state registration of a legal entity	13.03.2007 (17 years 1 month) Record number: 10741450000037456

Source: [43]

The first company of the ZAMMLER UKRAINE LLC group was founded in 2007, the central office is located in Kyiv. The group includes 4 companies represented by 12 offices.

In addition, the group includes three more companies abroad:

- Ningbo ZAMMLER Trading (founded in 2013);
- ZAMMLER Poland (founded in 2014);
- ZAMMLER Kazakhstan (year of establishment – 2020);

The company is also the founder of fulfillment services - a comprehensive solution for online stores in Ukraine. Currently, Nataliia Artiukh is the head of ZAMMLER Ukraine.

Since the logistics operator's business directly depends on the consumers of its services, almost everyone calls customer orientation one of its main competitive advantages. So, in this way, ZAMMLER Ukraine defined for itself a strategy of customer focus and constant expansion of the geography of representative offices.

The enterprise's organizational setup has a linear structure that offers a lot of benefits. It usually follows a transparent chain of command which makes it easier to understand responsibilities within the organization[36].The organizational chart can be observed at Figure 2.2.

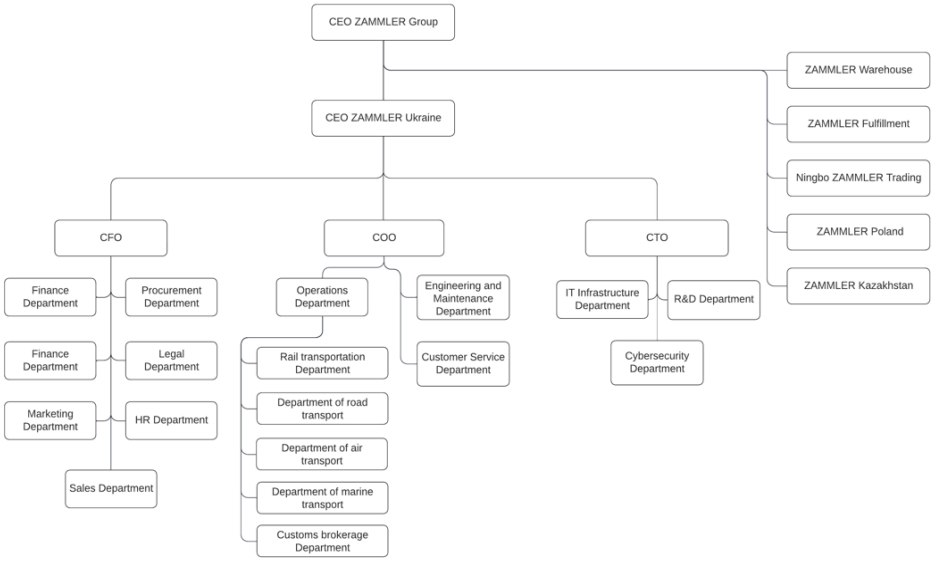


Figure 2.2 – Organizational chart of ZAMMLER Ukraine

Source: compiled based on materials [40]

Besides this, in such a type of structure, employees usually have more autonomy when making decisions, because this authority is also given to lower levels of the organization. As a result, this leads to higher levels of employee engagement and job satisfaction.

As for the services, ZAMMLER Ukraine suggests a great assortment of warehousing, transport, and customs clearance solutions. Among the services, ZAMMLER Ukraine provides the following list:

– Transport service;
– Cross-docking;
– Automobile transportation of goods;
– Shipping;
– Air freight;
– Customs brokerage services;
– Freight rail transportation;
– Export-import services in China;
– Warehouse Logistics;
– Personal Area.

Many years of experience in the field of logistics have already proven that ZAMMLER can cope with even the most difficult tasks related to the transportation of goods, ensuring the quality and integrity of delivery.

It is important to note that ZAMMLER owns various types of transport, which allows this logistics company to be a leader in solving client needs. ZAMMLER Ukraine carries out transportation of freight by road, sea, and rail with air transports currently being suspended due to the full-scale Russian invasion, at the same time we can observe types of trasnportation..

Types of transportation services provided by ZAMMLER Ukraine are shown at the Table 2.3.

Table 2.3 – Types of transportation services provided by ZAMMLER Ukraine

Rail transportation	**Road transportation**
- Ownership of 3000 rolling stock items - Transportation of dangerous cargo - Transportation of goods in refrigerated wagons - for goods that require a special temperature regime - Direct contracts on all types of rolling stock with the Transport -Logistics Center of PJSC «Ukrzaliznytsia» - Controlling and consultation during the preparation of shipping documents	- Ownership of the vehicle fleet that consists of more than 200 trucks - The company offers vehicles with diverse load capacities (3t, 5t, 20t), enabling them to fulfill orders of varying volumes to suit client requirements. - Transportation within Ukraine as well as international cargo delivery - Direct less-than-truckload (LTL) transportation, offering the option of freight consolidation at ZAMMLER's European warehouses - Vehicles are equipped with GPS-navigation systems for the real-time tracking
Sea transportation	**Air transportation**
- Tracking of the cargo location - Door-to-door delivery - Container shipping - The most suitable shipping line selection - Provision of temporary warehouse storage facilities in Poland, China, and Kazakhstan	- Operating from the Boryspil International Airport, the representative office specializes in airfreight services. - Ensuring the safe delivery of cargo to and from any location worldwide is ZAMMLER Ukraine's top priority. - Guaranteed express shipping according to delivery schedules.

Source: compiled based on materials [40]

Besides transportation services, ZAMMLER Ukraine provides as well contract logistics services that include warehousing, fulfillment, and cross-docking. ZAMMLER guarantees the reliability and quality of each warehousing operation, which contributes to cost reduction at all stages of distribution and logistics operations.

ZAMMLER Ukraine takes a prominent position in providing logistics services within Ukraine and beyond its borders with a total area of 75 000 thousand square meters both owned and rented[41]. Detailed information about leading logistics operators providing warehousing services can be observed at Table 2.4.

Table 2.4 – Powerful logistic operators providing warehousing services in Ukraine

Name of activity	**Area, thousand square meters**	**Type of service**
Zammler	75	local
Kuehne + Nagel	67	international
Raben	53	international
Ekol	58	international
FM Logistic	55	International
УВК	50	local
Logistic Plus	27	local
NP Logistics	27	local

Source: [41]

ZAMMLER owns three warehouses of the class “A”, all located in the Kyiv region and equipped with WMS-System. Besides this, the logistics company owns one warehouse of class “B” in Odessa equipped with a WMS system. The biggest advantage of this warehouse is its convenient location within the city, with a railway line, which provides a possibility of transshipment for multimodal transportation, the total front of the carriage is 7 units. Additionally, ZAMMLER owns 4 warehouses of class “B” that are located in Lviv, Dnipro, Khmelnytskyi, and Uzhorod. All mentioned warehouses have WMS systems as well as loading and unloading equipment[42].

Warehouses have convenient access to roads and anti-dust flower covering. To ensure smooth and trouble-free handling of goods at warehouses, ZAMMLER

incorporated a sprinkler fire extinguishing system and a round-the-clock security system with video surveillance. In addition to this, ZAMMLER has technical equipment with the required number of modern handling instruments, such as pallet jacks and forklifts, conveyor systems, etc [41]. Warehouse services of ZAMMLER comprise:

–unloading & loading operations and cargo handling;

–permanent or temporary storing of goods;

–sorting of goods as well as picking, packaging, and labeling service;

–preparation for transportation, inventory, and cross-docking;

–supplying containers and various packaging materials for storage and transportation upon client request;

–offering pallet rental services with subsequent return of the reusable packaging using own resources;

–handling the preparation of required documentation and reporting tasks.

Another part of the contract logistics, namely fulfillment, is offered by ZAMMLER as well. ZAMMLER Ukraine provides first-class quality logistics operations for the online store, which affects the business in a positive way. While the online store focuses on the selection of suppliers and marketing, the logistics operations of this store are executed by outsourcing[40]. ZAMMLER Ukraine provides a great variety of fulfillment operations, among them the most often used are receiving goods from the supplier, storage, order picking & packing, delivery to the door by the selected shipper, documentation, and returns processing.

The benefits of outsourcing fulfillment by ZAMMLER Ukraine speak for themselves. Each online store gets its own customized solution as well as a personal manager. Besides this, ZAMMLER executes fulfillment activities at a low error rate (0.02%) and optimizes operating costs and capital costs of warehouse rental. The order fulfillment process of ZAMMLER Ukraine is depicted on Figure 2.5.Cross-docking is another service that ZAMMLER offers to its clients.

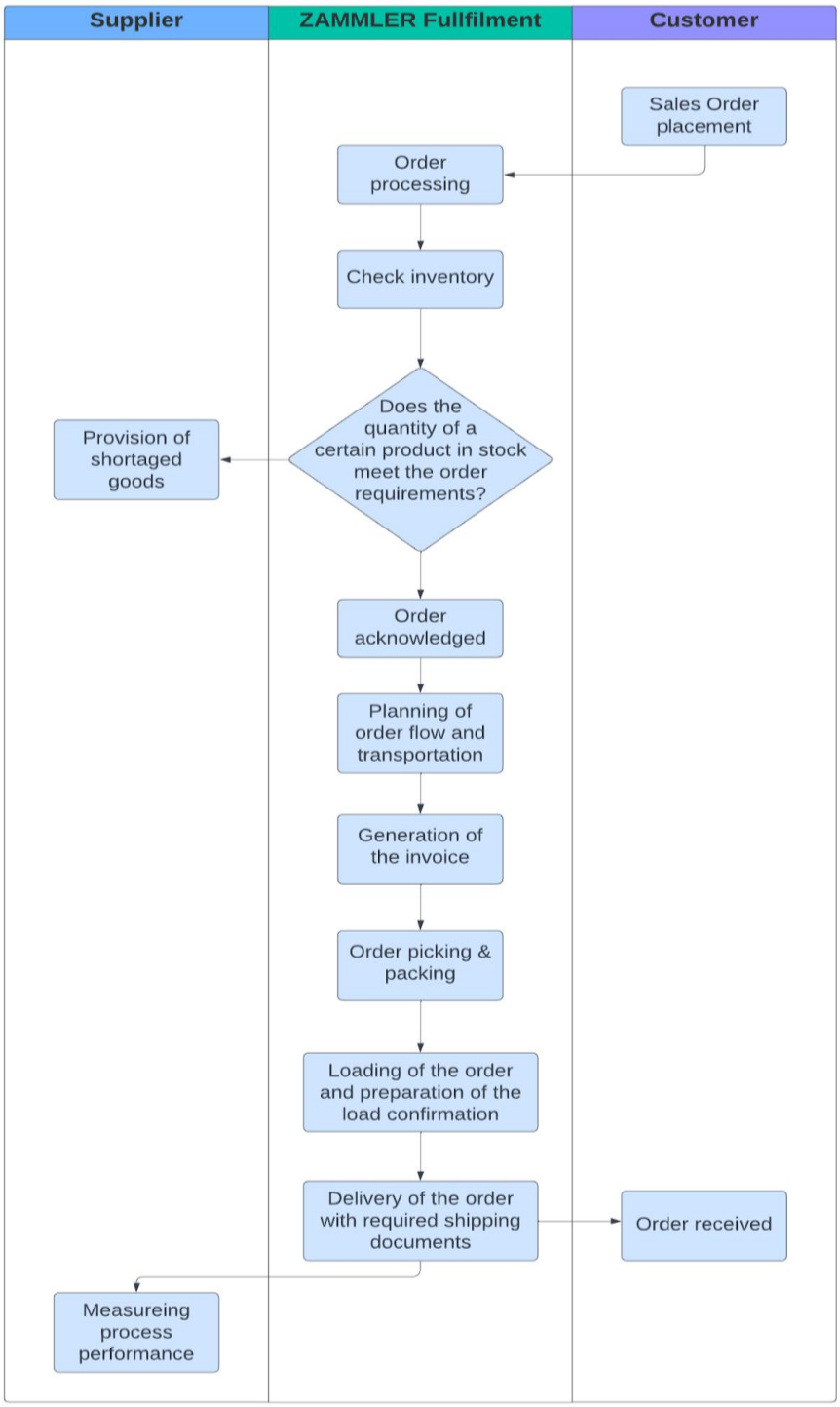


Figure 2.5 – Order fulfillment flow at ZAMMLER Ukraine

Source: compiled based on materials [40]

Cross-docking involves shipping and moving goods directly to customers without storing them in a warehouse, which minimizes delays. This method is especially beneficial for entrepreneurs who buy goods in bulk and need to deliver them

to customers within tight deadlines.Cross-docking comprises several ways of being utilized:

− Transferring goods between different modes of transport, involving the reloading of goods from one vehicle to another, often of varying types. For instance, from containers to trucks or vice versa.

− Consolidation of goods from various manufacturers for delivery enables the combination of products from different suppliers into a single shipment, which is then dispatched to the customer.

− Distributing a large shipment of goods to retail outlets. Cross-docking facilitates the reception of bulk shipments from manufacturers, which are then divided into smaller batches for delivery to various retail locations.

In 2023, ZAMMLER passed the recertification audit of the quality management system and received a new certificate to the international standard ISO 9001:2015[42].

This certificate serves as validation for the reliability of the company's control systems and services, aligning them with international standards. This certificate stands out among others because of the challenging recertification process, which involves 3 assessments and is important for the maintenance of ZAMMLER’s competitiveness on the local and global scale.

ISO 9001:2015 encompasses various facets of company operations, including resource allocation, personnel training, and management, service process oversight, employee satisfaction, and both routine and emergency procedures, among others.

The ISO 9001:2015 certificate means that ZAMMLER is committed to meeting international standards[40].

Core parameters of ZAMMLER Ukraine encompass such activities as the high-service level of providing logistics services and as a result maximization of customer satisfaction.

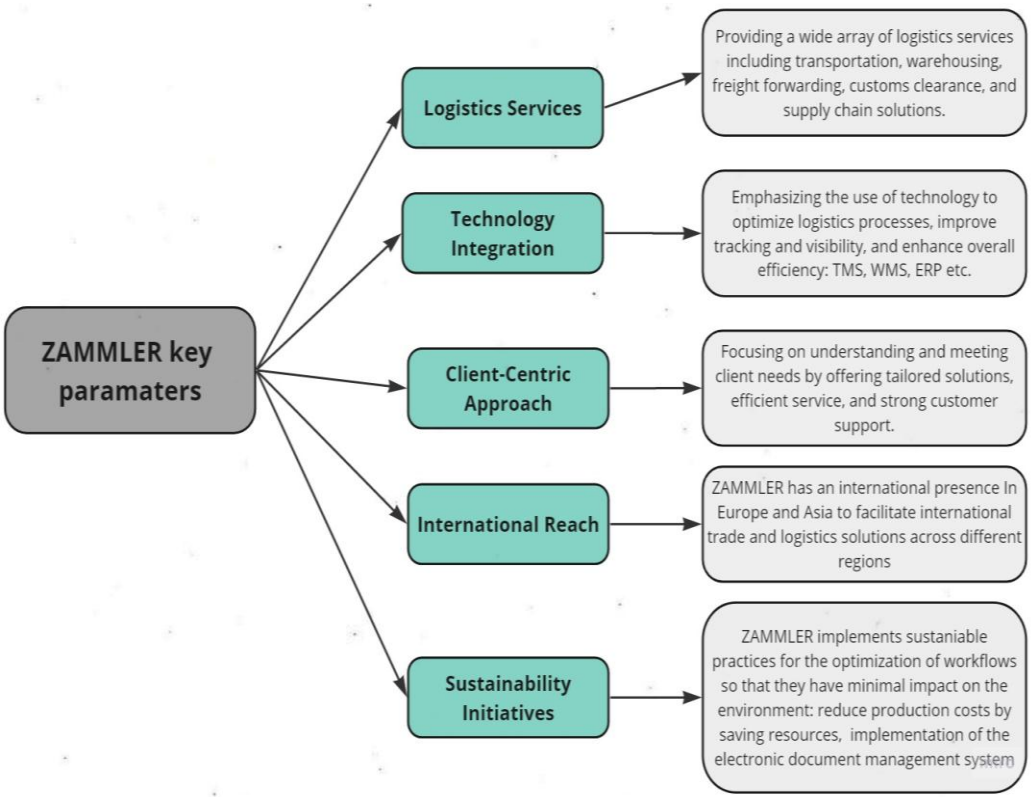


Figure 2.6 – Key parameters of ZAMMLER Ukraine

Source: developed by the author

Additionally, ZAMMLER Ukraine implements best practices of Corporate Social Responsibility (CSR) to benefit its brand image and reputation as well as reach a higher position in sustainability through cost savings and efficiency measures.

These parameters define ZAMMLER's core activities, strategies, and solutions in the logistics and supply chain domains, emphasizing their commitment to efficient, customer-oriented, and technologically driven services.

To estimate strengths, weak spots, and opportunities, a SWOT analysis of ZAMMLER Ukraine was done (Figure 2.7). By conducting a SWOT analysis, ZAMMLER Ukraine obtains valuable insights into its current position in the logistics provider market, identifies areas for possible enhancements, and develops strategies to leverage strengths, mitigate weaknesses, capitalize on opportunities, and manage threats effectively and efficiently.

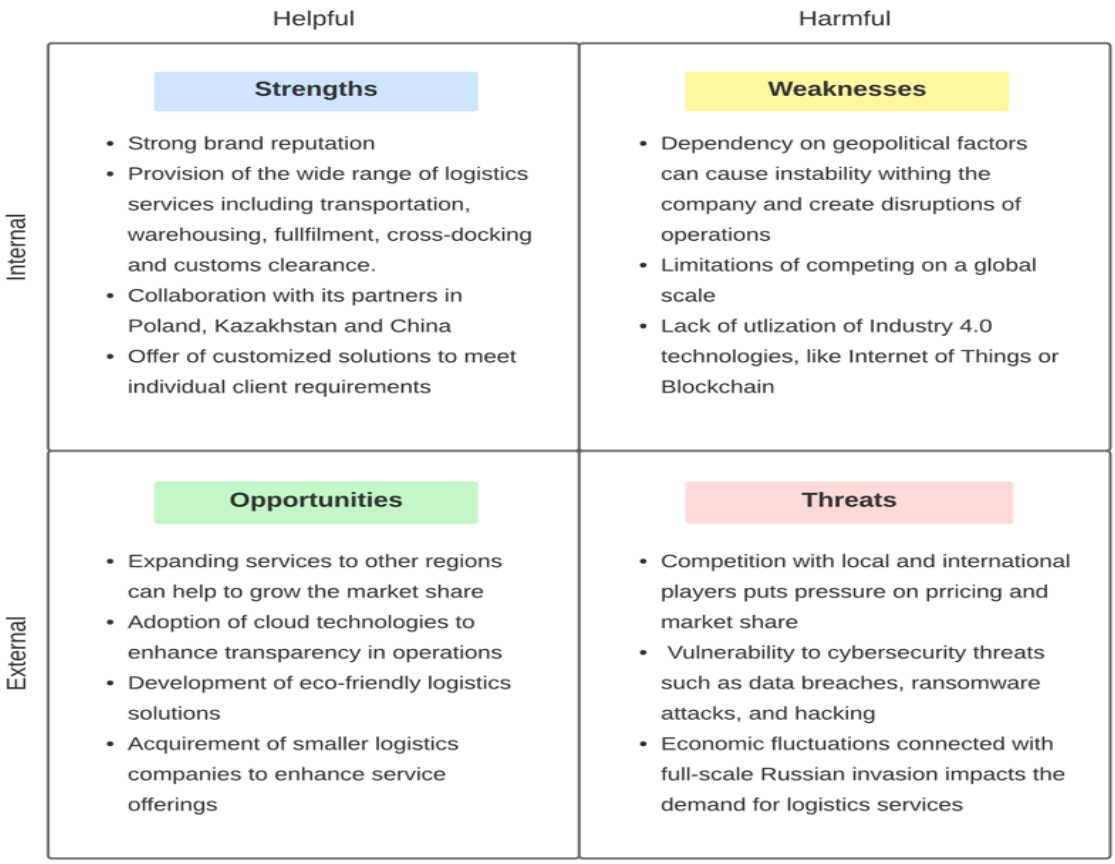


Figure 2.7 –SWOT-Analysis of ZAMMLER Ukraine

Source: developed by the author

ZAMMLER Ukraine provides a great range of logistics services to diverse companies, offering tailored solutions to meet the specific needs of each client. These clients include retailers and e-commerce companies, manufacturing and industrial sectors, the automotive industry, healthcare, and pharmaceuticals, as well as technology and electronics companies.

According to the updated report of ZAMMLER, the list of the key accounts includes Adidas, AlbaFood, British American Tobacco, BSH, Veon, DeLonghi, Karcher, Lifecell, Ontex, Otis, Puma, Huawei, Schneider Electric Ukraine, Siemens, Vitmark, Puratos, CHUMAK, Husqvarna, Eskaro Ukraine, Gorenje, Wrigley, JYSK, Billa, IDS, Argo, Babyzone Fashion Club, MARS[40].

The most significant clients for ZAMMLER for the year 2021 became Husqvarna (a Swedish company with a specialization in outdoor power products and

equipment), Kärcher (a German company specializing in cleaning systems and solutions), and LC WAIKIKI (Turkish clothing retailer).

As for ZAMMLER's main competitors, it is essential to highlight such companies as Raben, Autolux, Meest Group, and Gunsel that operate in the Ukrainian logistics and supply chain sector and pose a competitive challenge to ZAMMLER.

Besides this, it has to be highlighted that ZAMMLER typically engages in a range of projects related to expanding its services, improving operational efficiency, embracing new technologies, and often focusing on sustainability. Areas of ongoing projects include expansion and infrastructure development, which means the development of initiatives to expand its logistics network, potentially involving the establishment of new warehouses, distribution centers, or transportation routes.

In 2022, ZAMMLER invested $34 million in a logistics complex near Kyiv. The main objective of the investment was the construction of the class "A" warehouse. Total costs of the project were estimated at $34 million, while 20% of the amount ($6.8 million) is ZAMMLER Ukraine's investment. The project's expected payback period was estimated at 8.5 years, as well as the internal rate of return was calculated at 15.5%, and the profitability ratio is 8.6%[44].

The constructed complex has a total area of 59.4 thousand square meters with office space of 1.8 thousand square meters and a mezzanine 9 thousand square meters. The facility will be located on ZAMMLER's plot of land with an area of 10.25 hectares, with access to the M-01 Kyiv-Chernihiv highway. The construction period of the complex is 1.5-2 years. Besides this, it was also highlighted that the adoption of the project will increase the share of ZAMMLER in the market of 3PL services.

2.2 Analysis of the economic and financial state of the company's activity

A business entity, functioning as an economic system, acts as a crucial link where primary production objectives are achieved. This entity's financial and economic well-being is evaluated through a set of metrics that indicate its current and potential financial capabilities. This evaluation extends to both the business itself, its capital investments, and its fiscal responsibilities.

The financial condition of the enterprise shows at what level the enterprise is provided with financial resources that are necessary for the implementation of economic activity, it is the sufficient supply of these resources that allows the enterprise to make timely cash payments for obligations. [46].

After all, high indicators of the realization of services and their lower cost mean higher profitability and profit of the company and, therefore, its better financial position. At the same time, if the non-observance of the work plan leads to an increase in the cost of services, then there is a drop in the amount of turnover and profit.[47].

To assess companies' financial and economic health, it's important to utilize a variety of indicators. The primary objective of such diagnostics is to estimate the financial stability and operational efficiency. This assessment relies on foundational documents, up-to-date accounting records, business plans, balance sheets, and other financial statements. Determining the enterprise's financial status necessitates utilizing specific indicators, along with established rules and methodologies for their evaluation.

By diagnosing the financial and economic health of " ZAMMLER Ukraine" LLC, existing challenges and potential obstacles can be identified, thereby drawing the attention of the company's management. Analysis of assets of “ZAMMLER Ukraine" is carried out in Table 2.5.

Table 2.5 – Analysis of assets of “ZAMMLER Ukraine”

Indicators	2023	2022	2021	2023/2022		2022/2021	
				+,-	%	+,-	%
Intangible assets	2 326,80	2 611,00	2 795,20	-284,20	-10,88%	-184,20	-6,59%
Unfinished capital investments	0,80	12,90	12,90	-12,10	-93,80%	0,00	0,00%
Fixed assets	27 558,30	33 395,80	30 458,40	-5 837,50	-17,48%	2 937,40	9,64%
Long-term financial investments	14 396,30	26 156,00	26 552,90	-11 759,70	-44,96%	-396,90	-1,49%
Total non-current assets	44 282,20	62 175,70	59 819,40	-17 893,50	-28,78%	2 356,30	3,94%
Inventories:	11636,6	9171,6	268,2	2465	26,88%	8903,4	3319,69%
Accounts receivable for goods, works, services	67144,1	94648,2	54580,4	-27504,1	-29,06%	40067,8	73,41%
Accounts receivable for settlements with the budget	49,6	12,2	15,8	37,4	306,56%	-3,6	-22,78%
Other current receivables	4443,9	12947,7	4389,4	-8503,8	-65,68%	8558,3	194,98%
Money and their equivalents	26395,2	28484,4	1788,6	-2089,2	-7,33%	26695,8	1492,55%
Expenses of future periods	1027,2	1086,4	1069,9	-59,2	-5,45%	16,5	1,54%
Other current assets	1580,4	2129,3	1207,4	-548,9	-25,78%	921,9	76,35%
Total current assets	112277	148479,8	63319,7	-36202,8	-24,38%	85160,1	134,49%
Balance	156559,2	210655,5	123139,1	-54096,3	-25,68%	87516,4	71,07%

Source: developed by the author

The decrease in intangible assets from 2022 to 2023 is significant, with a decline of 284.20 UAH. This reduction suggests a potential write-off or impairment of

intangible assets. ZAMMLER is recommended to investigate the reasons behind this decline and consider strategic investments in intangible assets to support future growth.

Besides this, the sharp decrease in long-term financial investments must be highlighted. According to analysis, there was a decline of 11,759.70 UAH (-44.96%). This decline can occur because of the reallocation of investment funds or potential losses in the investment portfolio. It is recommended that ZAMMLER reviews its investment strategy and considers diversification in order to mitigate risks.

The total assets decreased by 54,096.30 UAH (-25.68%) from 210,655.50 UAH in 2022 to 156,559.20 UAH in 2023. This decline is primarily driven by reductions in both non-current and current assets. It is recommended that ZAMMLER Ukraine emphasize the improvement of asset efficiency, as well as the optimization of resource allocation, and enhance operational performance to reverse this trend and strengthen its balance sheet. Below the analysis of asset's indicators was calculated (Table 2.6)

Table 2.6 - Analysis of assets' indicators

Indicators	**Formula**	**2023**	**2022**	**2021**	**Deviation**	
					2023/ 2022	**2022/ 2021**
Share of intangible assets in the structure of non-current assets	$\frac{Intangible\ assets}{Non-current\ assets}$	5%	4%	5%	1%	-1%
Share of tangible assets in the structure of non-current assets	$\frac{Tangible\ assets}{Non-current\ assets}$	95%	96%	95%	-1%	1%
Fixed assets turnover	$\frac{Net\ sales}{Fixed\ assets-accum.dep}$	-22,73	34,49	8,96	-57,22	25,53

The end of the Table 2.6

Depreciation trend	(Depreciation for the reporting period - Depreciation for the base period) / Depreciation for the base period	46%	55%	37%	-9%	17%
Return on assets (ROA)	$\frac{Net\ income}{Average\ total\ assets}$	1,72	1,06	0,79	0,65	0,27

Source: developed by the author

The share of intangible assets decreased slightly from 4% in 2022 to 5% in 2023, marking a deviation of +1%. Conversely, the share of tangible assets decreased slightly from 96% in 2022 to 95% in 2023, indicating a slight shift towards intangible assets. This deviation of -1% means an adjustment in asset composition.

The fixed assets turnover ratio saw a substantial decline from 34.49 in 2022 to -22.73 in 2023, marking a deviation of -57.22%. This significant negative deviation indicates a drastic decrease in the efficiency of utilizing fixed assets to generate revenue, possibly signaling operational inefficiencies or underutilization of assets.

While the depreciation trend decreased slightly from 55% in 2022 to 46% in 2023, marking a deviation of -9%, it remains relatively high. This suggests ongoing depreciation of assets, albeit at a slightly slower rate, which necessitates careful asset management to ensure optimal utilization and maintenance.

The return on assets (ROA) improved steadily from 0.79 in 2021 to 1.72 in 2023, with a deviation of +0.65% from 2022 to 2023. This positive deviation indicates enhanced efficiency in generating profits from assets, reflecting improved operational performance and profitability.

The analysis of solvency of ZAMMLER Ukraine was calculated and is presented at Table 2.7.

Table 2.7 - Analysis of solvency

Indicators	Formula	2023	2022	2021	Deviation	
					2023 - 2022	2022 - 2021
Equity ratio	$\frac{Total\ Equity}{Total\ Assets}$	0,2	0,2	0,3	0,07	-0,10
Equity multiplier	$\frac{Total\ Assets}{Total\ Stockholder's\ Equity}$	13,8	15,9	10,1	-2,12	5,86
Debt to Capital Ratio	$\frac{Total\ Debt}{Total\ Debt + Shareholder's\ Equit}$	0,98	0,98	0,97	-0,01	0,01
Debt to Equity Ratio	$\frac{Total\ Liabilities}{Total\ Equity}$	4,3	6,2	3,9	-1,98	2,38
Asset Coverage Ratio	$\frac{((\text{Total Assets} - \text{Intang. Assets}) - (\text{Curr. Liab.} - \text{Short term Debt}))}{\text{Total Equity}}$	1,3	1,3	1,4	-0,08	-0,08
Working capital to current assets ratio	$\frac{Working\ Capital}{Current\ Assets}$	-0,05	-0,14	-0,28	0,10	0,14
Equity to Total Debt ratio	$\frac{Total\ Stockholder's\ Equity}{Short\ term\ Debt + Long\ Term\ Deb}$	0,97	0,96	0,77	0,01	0,19

Source: developed by the author

The equity ratio is a coefficient of independence and money related freedom that gauges number of resources that are financed by owners' investments by comparing the entire value within the company to the entire resources. The recommended value of the Equity ratio should be not more than 0,5. The equity ratio of ZAMMLER Ukraine for the period 2021-2023 is within the recommended range.

The equity multiplier is a ratio that estimates the quantity of a company's assets that are financed by its shareholders. This ratio is calculated by making a comparison of total assets with total shareholder's equity[57]. Equity multiplier indicates the company's risk to creditors. For example, if a company relies too much on debt, then eventually it will end up having high debt service costs and will have to raise more cash flows to pay for its operations and obligations [51]. The recommended value of

the indicator is in the range of 1.67-2.5. A high equity multiplier means that ZAMMLER Ukraine is more reliant on debt financing.

Debt to equity ratio is calculated by comparing company's total debt to total equity. The debt-to-equity ratio shows the percentage of company financing that comes from creditors and investors[51]. Debt to equity ratio below 1.0 is relatively safe for the company, however, ratios of 2.0 or higher are considered to be risky. ZAMMLER Ukraine has a debt-equity ratio higher than 2.0 for all 3 years, which means that more financing of the creditor is used than investor financing.

Asset coverage ratio is a measurement of risk that shows a company's ability to pay back its debt obligations by selling its assets. It gives the information to investors of what amount of assets are required by a firm to pay down its debt obligation.The recommended value of the asset coverage ratio should be within the range of 1.5-2.0. The asset coverage ratio of ZAMMLER Ukraine falls within the recommended range for all 3 years.

The working capital to current assets ratio is a ratio that shows whether the company is able to finance its current assets with its working capital or not. It can be computed by dividing the company's working capital by its current assets[52]. The norm for the working capital to current assets ratio is a value of 0.1 or higher. The working capital to current assets ratio was negative since the working capital of ZAMMLER Ukraine was negative. Negative working capital is when a business's current liabilities exceed its current income and assets.

In order to determine the state of the enterprise and assess the probability of bankruptcy, we are going to use Altman's five-factor model.

Altman's five-factor model consists of five indicators characterizing different aspects of the financial state enterprises. In the calculation process, five factors are used, which are the most complete to characterize the financial potential of the enterprise, compared to other probability assessment models bankruptcy. In addition, a significant advantage of this model is the possibility of determining the presence of a crisis early on.

The calculation formula of E. Altman's five-factor model is represented below:

$$\text{Z-score} = 0{,}717*x1+0{,}847*x2+3{,}107*x3+0{,}42*x4+0{,}998*x5 \qquad (2.1)$$

where: x1 – the ratio of own working capital to all assets;

x2 – ratio of retained earnings to total assets;

x3 – the ratio of profit to interest payments to total assets;

x4 – ratio of equity to liabilities;

x5 – ratio of net income to total assets.

Table 2.8 – Calculated ratios for Z-score evaluation

	Formula	Year		
		2023	2022	2021
x1	$\frac{Net\ working\ capita}{Assets}$	-0,03	-0,10	-0,14
x2	$\frac{Retained\ earnings}{Assets}$	0,19	0,12	0,20
x3	$\frac{EBIT}{Assets}$	0,04	-0,05	-0,02
x4	$\frac{Equity}{Liabilities}$	0,31	0,19	0,35
x5	$\frac{Revenue}{Assets}$	2,12	0,93	1,01

Source: developed by the author

Therefore, Z-scores for 3 years of the business activity of ZAMMLER Ukraine are as follows:

Table 2.9 – Calculated Z-scores for the period 2021-2023

	2023	2022	2021
Z-Score	2,5	0,88	1,14

Source: developed by the author

To determine the probability of bankruptcy, we are going to use Table 2.9. As it can be observed ZAMMLER Ukraine was in the “Red Zone” which indicates a high probability of bankruptcy. Recovery from the financial consequences of the global pandemic in 2021 and the beginning of the full-scale invasion in 2022 have caused several crises at ZAMMLER Ukraine, but still company could overcome them and helped the country by providing the logistics complex for non-profit organizations that were delivering humanitarian goods.

Table 2.10 – Altman Z-score ranges

Value of the Z- score	Bankruptcy probability
Z < 1,23	"Red zone" there is a possibility of bankruptcy
1,23 < Z < 2,9	“Gray Zone”, border zone, bankruptcy probability not high but not excluded
Z > 2,9	“Green Zone”, low bankruptcy rate

Source: developed by the author

In March 2022, ZAMMLER's turnover was 70% lower than planned. Sea and air transport were the most affected, but warehousing services and road transport, which make up a large part of ZAMMLER's business, managed to be preserved. In 2023, ZAMMLER Ukraine was able to enter the gray zone which indicates a significant improvement in the company's financial health and means a lower risk of bankruptcy. It implies that the company's financial position in 2023 is more stable compared to the previous years.

2.3 Analysis of the organization of logistics business processes and possible ways of improvement

ABC analysis is a classification method used to categorize a company's resources based on their significance level. This analytical approach can be applied in the field of activity of any enterprise. The ABC analysis implies the understanding of the fact that goods have different degrees of importance for the enterprise. Income (revenue from sales, sales volume) or gross profit is most often used as a parameter for classification[37].

When performing ABC analysis, the following calculations are performed:

1. The amount of contribution is calculated for each item (number of orders, sales volume, profit, etc.).

2. The shares of individual items of the assortment in general are calculated as a result.

3. Assortment positions are arranged in descending order of their share in the overall result.

4. The share is calculated as a growing total. At the same time, to everyone, the previous value of the share of the position in the total result is added a fraction of the next position.

5. Distribution of the analyzed assortment into three distinct groups A, B, and C.

– A - High-value items constitute 20% of the assortment but contribute to 80% of sales.

– B - Intermediate items, representing 30% of the assortment and contributing to 15% of sales.

– -C - Low-value items, making up 50% of the assortment but contributing only 5% of sales.

To perform the ABC analysis, we will use data from the results of cooperation with regular customers of Zammler Ukraine, with whom a long-term contract has been signed. For this, we will take the revenue data for 2023. To apply the graphical method

of ABC-analysis differentiation, it is necessary to construct a Lorentz curve that reflects the dependence between the ordered list of customers and the share of this customer in the overall result by a growing total. ABC analysis by the volume of services provided in 2023 is presented in the Table 2.11.

Table 2.11 – ABC analysis by the volume of services provided in 2023

№	Customer	Revenue, UAH	The share by SKU, %	The cumulative percentage	Group
1	LC WAIKIKI	246495	16,42	16,42	A
2	Husqvarna AB	216296	14,41	30,84	A
3	Roshen Confectionery Corporation	189400	12,62	43,45	A
4	Kärcher SE & Co. KG	165753	11,04	54,50	A
5	PRJSC PHARMACEUTICAL FIRM DARNYTSIA	137297	9,15	63,65	A
6	JSC “Chumak”	76495	5,10	68,74	B
7	Adidas Ukraine	63687	4,24	72,99	B
8	Huawei Technologies Co., Ltd	56828	3,79	76,77	B
9	Puma SE	41730	2,78	79,55	B
10	De'Longhi S.p.A.	33936	2,26	81,82	B
11	Otis Worldwide Corporation	30661	2,04	83,86	B
12	Alba Food Trading BV	28972	1,93	85,79	B
13	Bilotserkivs′ka Ahropromyslova Hrupa Pp	22318	1,49	87,28	B
14	BSH Hausgeräte GmbH	19725	1,31	88,59	B
15	VEON Ltd.	18963	1,26	89,85	C
16	Puratos GmbH	18702	1,25	91,10	C
17	LLC "Silver Line"	17264	1,15	92,25	C
18	British American Tobacco p.l.c.	17235	1,15	93,40	C
19	JV Vitmark-Ukraine, LLC	16426	1,09	94,49	C
20	Ontex Group NV	16080	1,07	95,56	C
21	LLC "ARTERIUM LTD"	16020	1,07	96,63	C
22	Gorenje, d. o. o.	15834	1,05	97,69	C
23	Eskaro Ukraine	14151	0,94	98,63	C
24	LifeCell International	10793	0,72	99,35	C
25	PrJSC MHP	9782	0,65	100,00	C

Source: developed by the author

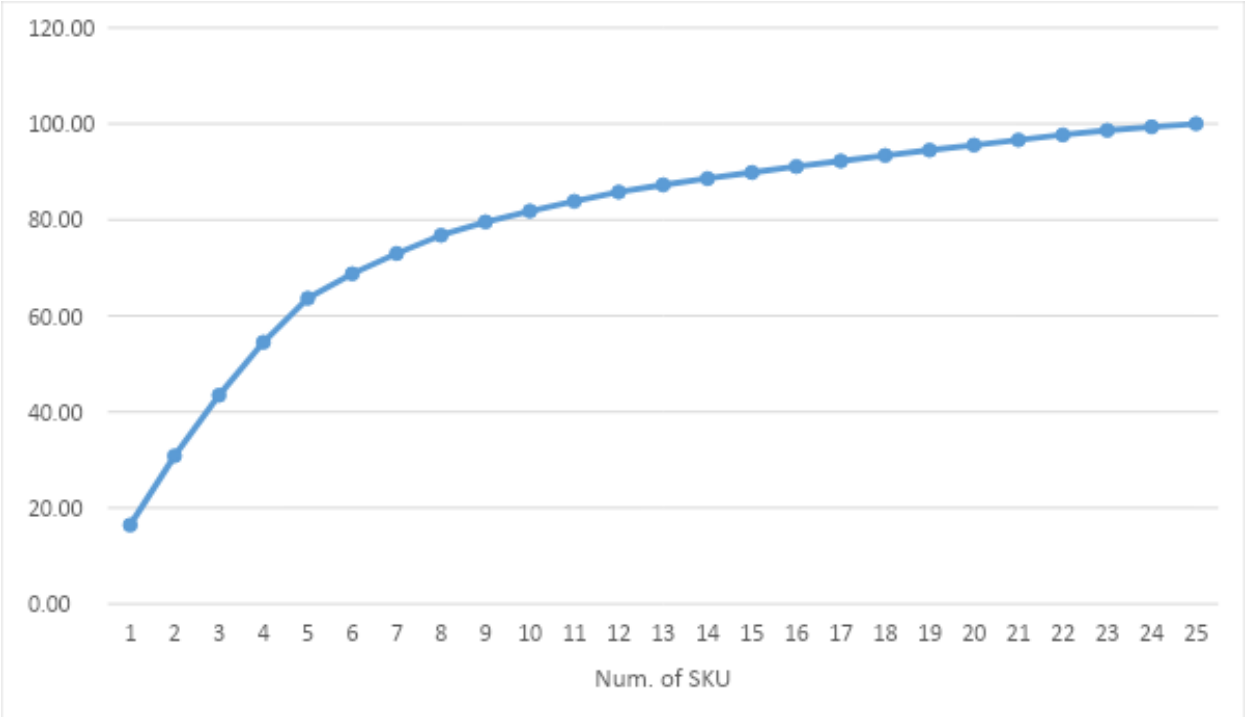


Figure 2.8 – Lorenz curve of ABC analysis

Source: developed by the author

Based on the obtained results from Table 2.11 and the graphical representation in the provided Figure 2.8, we can define what clients belong to which group. It was identified that key customers of ZAMMLER Ukraine are the following companies: LC WAIKIKI, Husqvarna AB, Roshen Confectionery Corporation, Kärcher SE & Co. KG and PRJSC PHARMACEUTICAL FIRM DARNYTSIA. Together these companies contribute to approximately 80% of the total revenue for ZAMMLERr Ukraine.

For group B following companies were allocated: JSC “Chumak”, Adidas Ukraine, Huawei Technologies Co., Ltd, Puma SE, De'Longhi S.p.A., Otis Worldwide Corporation, Alba Food Trading BV, Bilotserkivs′ka Ahropromyslova Hrupa and BSH Hausgeräte GmbH. Moving forward, we proceed to allocate Group B. According to standard recommendations, the subsequent 30% of customers from the total count were considered for Group B.

The remaining companies are categorized under Group C. Despite their combined contribution of only 5% to the company's overall revenue, it's important to recognize that their importance shouldn't be overlooked. Sustained collaboration with

these firms presents an opportunity for future progression to Group B or even Group A.

Alongside the ABC analysis, the XYZ analysis is about determining the forecastability or predictability of customers. Companies usually use this method to understand which groups of clients bring stable income and thus get a portrait of the ideal buyer.

The analysis typically involves three categories:

1) X Category. These are high-value clients who contribute the most value to the business. They may account for significant revenue or have high profitability margins. X-category clients typically receive the highest level of attention from the business.

2) Y Category. Y-category clients are medium-value clients and moderately important to the business. They may generate steady revenue and have some growth potential, but they are not as critical as X-category clients.

3) Z Category. Z-category clients are low-value clients. They are the least significant in terms of value or potential. They may contribute minimal revenue or profitability, or they may require a disproportionate amount of resources compared to the value they bring. While it's important not to neglect Z-category clients entirely, businesses typically prioritize their efforts and resources toward X and Y-category clients[37].

The characteristic based on which a specific position of the client base is assigned to group X, Y, or Z is the coefficient of variation of the classification characteristic for this position. It is calculated according to the formula:

$$\nu = \frac{\sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}}}{\bar{x}} \times 100\% \tag{2.2}$$

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{2.3}$$

where n is the number of periods;

xi – the value of the indicator for the i-th period;

According to formula 2.2, the coefficient of variation is equal to the ratio of the root mean square deviation of the classification feature to its average value.

The XYZ analysis procedure is outlined as follows:

1. Identification of the subject under examination, which in our context pertains to the client base of the company.

2. Determination of a classification criterion. This may encompass factors like transaction frequency, cost price, and gross income, among others. In our scenario, it involves the revenue generated by the company's clients.

3. Determination of the timeframe for conducting the analysis.

4. Computation of the coefficient of variation.

5. Ranking of analysis subjects in ascending order of the coefficient of variation.

6. Categorization into groups. The analysis subjects are segmented into three groups: X, Y, and Z. Typically, items with a coefficient of variation ranging from 0 to 10% are allocated to category X, those between 10 to 25% to category Y, while the remainder are placed in category Z. Revenue and XYZ analysis of ZAMMLER's customers are represented in Tables 2.12 and 2.13.

Table 2.12 –Revenue from customers per quarter in 2023

№	Customer	Revenue, UAH			
		1 quarter	2 quarter	3 quarter	4 quarter
1	LC WAIKIKI	54900	65490	60201	65904
2	Husqvarna AB	55075	53072	51334	56814
3	Roshen Confectionery Corporation	45352	49350	44358	50340
4	Kärcher SE & Co. KG	42467	39438	43590	40258
5	PHARMACEUTICAL FIRM DARNYTSIA	34324	34629	34324	34020
6	JSC "Chumak"	19148	22317	18179	16851
7	Adidas Ukraine	21678	0	21229	20780
8	Huawei Technologies Co., Ltd	15206	13178	17277	11167
9	Puma SE	12653	8639	10294	10144
10	De'Longhi S.p.A.	5907	4671	12789	10569
11	Otis Worldwide Corporation	15902	7804	0	6955

The end of the Table 2.12

12	Alba Food Trading BV	8629	3789	4261	12293
13	Bilotserkivs′ka Ahropromyslova Hrupa Pp	5390	1674	8527	6727
14	BSH Hausgeräte GmbH	2265	1772	8721	6967
15	VEON Ltd.	8586	3752	4708	1917
16	Puratos GmbH	6523	7634	2609	1936
17	LLC "Silver Line"	2479	5621	7316	1848
18	British American Tobacco p.l.c.	6247	3146	7842	0
19	JV Vitmark-Ukraine, LLC	5042	3809	2601	4974
20	Ontex Group NV	2578	7502	3480	2520
21	LLC "ARTERIUM LTD"	4674	6932	2427	1987
22	Gorenje, d. o. o.	3109	3523	4826	4376
23	Eskaro Ukraine	2785	6121	3482	1763
24	LifeCell International	2621	3489	2025	2658
25	PrJSC MHP	3786	1737	2363	1896

Table 2.13 – XYZ analysis of ZAMMLER Ukraine clients for 2023

№	Customer	The var. coef., %	Group
5	PHARMACEUTICAL FIRM DARNYTSIA	0,63	X
2	Husqvarna AB	3,81	X
4	Kärcher SE & Co. KG	4,02	X
3	Roshen Confectionery Corporation	5,37	X
1	LC WAIKIKI	7,28	X
6	JSC “Chumak”	10,54	Y
9	Puma SE	13,77	Y
8	Huawei Technologies Co., Ltd	16,02	Y
22	Gorenje, d. o. o.	17,13	Y
24	LifeCell International	19,31	Y
19	JV Vitmark-Ukraine, LLC	24,3	Z
25	PrJSC MHP	33,02	Z
10	De'Longhi S.p.A.	39,12	Z
13	Bilotserkivs′ka Ahropromyslova Hrupa Pp	45,07	Z
23	Eskaro Ukraine	45,56	Z
12	Alba Food Trading BV	47,95	Z
21	LLC "ARTERIUM LTD"	49,27	Z
20	Ontex Group NV	50,9	Z
15	VEON Ltd.	51,39	Z
17	LLC "Silver Line"	52,03	Z
16	Puratos GmbH	52,33	Z
7	Adidas Ukraine	57,77	Z
14	BSH Hausgeräte GmbH	60,49	Z
18	British American Tobacco p.l.c.	69,78	Z
11	Otis Worldwide Corporation	73,55	Z

The graphical representation of XYZ is depicted in Figure 2.9, illustrating a graph plotting the ranking of the client base against the coefficient of variation values, organized by growth.

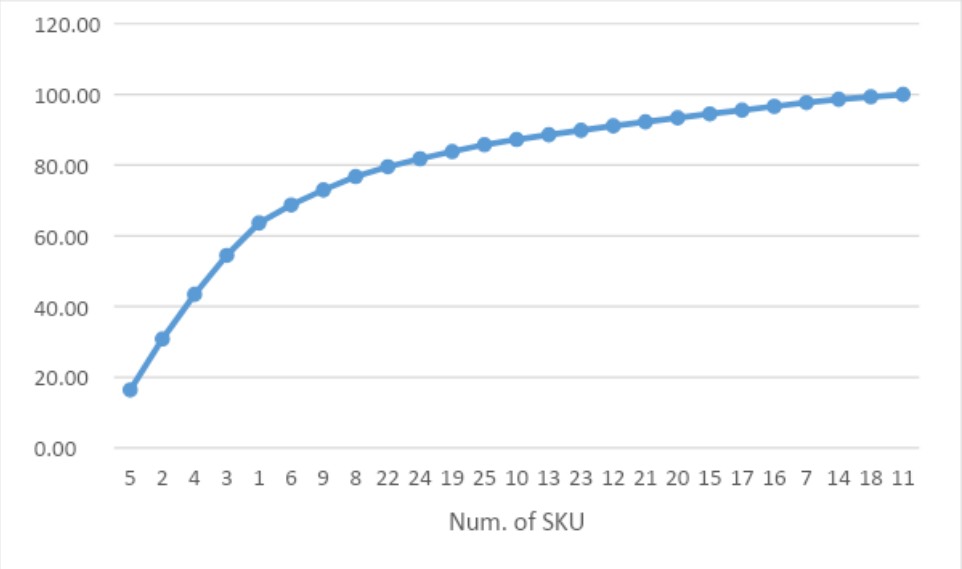


Figure 2.9 – XYZ analysis curve

Table 2.14 – ABC-XYZ matrix

	X	Y	Z
A	1,2,3,4,5		
B		6,8,9,22,24	10,13,19,25
C			7,11,12,14,15,16,17,18,20,21,23

The most important clients are in the AX, AY and BX groups in Table 2.14. These groups imply clients with high profitability, strategic importance, or significant revenue contribution to the business. Therefore, the most valuable clients according to the ABC-XYZ analysis are LC WAIKIKI, Husqvarna AB, Roshen Confectionery Corporation, Kärcher SE & Co. KG, PHARMACEUTICAL FIRM DARNYTSIA. It is necessary to develop an interaction strategy with clients of other groups to increase the company's income level.

Chapter 2 Summary

ZAMMLER Ukraine is a key player in the logistics industry, providing a wide range of services in transportation, warehousing, and customs clearance. Established in 2007, ZAMMLER Ukraine has grown steadily, expanding its reach with multiple offices both within Ukraine and abroad.

ZAMMLER Ukraine offers a wide array of services including transportation by road, sea, and rail, as well as customs brokerage, warehousing, and fulfillment services. With a fleet of over 3000 rolling stock items and a comprehensive network of warehouses equipped with modern technology and security systems, ZAMMLER ensures the safe and efficient handling of goods throughout the logistics processes.

Despite these challenges such as the impact of the global pandemic and full-scale war escalation, ZAMMLER Ukraine has demonstrated resilience and adaptability. Through strategic investments and operational enhancements, the company has maintained its position as a leading logistics provider in Ukraine.

CHAPTER 3
DEVELOPMENT OF PROJECT PROPOSALS TO IMPROVE BUSINESS PROCESSES OF ZAMMLER UKRAINE IN THE CONDITIONS OF DIGITAL TRANSFORMATIONS

3.1 Comparative analysis of leading cloud softwares in the logistics industry in Ukraine and abroad

The cloud logistics software market has witnessed significant growth and evolution in recent years, driven by the increased adoption of cloud computing solutions in various industries. Cloud logistics software refers to applications and platforms designed to manage and optimize different processes of logistics and supply chain management through cloud-based solutions. The Global Cloud Logistics Software market is anticipated to rise at a considerable rate during the forecast period, between 2023 and 2030 [60].

Among the largest software manufacturers that offer cloud solutions prominent places are occupied by Oracle, SAP, Infor, BlueYonder, Epicor, and Verizon, that usually provide services for large enterprises and multinational corporations.

As for the Ukrainian cloud services market, it has grown significantly over the last years, despite the challenging circumstances of the war. Since the beginning of the Russian full-scale invasion, the need for cloud solutions has increased drastically[58].

The demand for cloud software solutions in Ukraine arises from various factors. Firstly, there's a growing inclination among Ukrainian companies to enhance logistics and supply chain operations. Logistics Software aids in achieving these goals by offering real-time insights into inventory, optimizing logistics, and automating essential tasks like order management and procurement. Secondly, businesses in Ukraine seek to elevate their customer service standards, and this goal with the

utilization of the cloud software can be achieved through the provision of precise and timely delivery details to customers.

Despite the challenges, global cloud services leaders such as SAP, Oracle, Descartes Software, Infor and others remained active in the Ukrainian market, providing cloud software services to businessreal tis and government agencies.

Below is the chart of the revenue generated from the utilization of cloud-based logistics and supply chain software by Ukrainian companies (Figure 3.1). Remarkably, it is expected for revenue to grow up to 407,8 million USD in 2028[58].

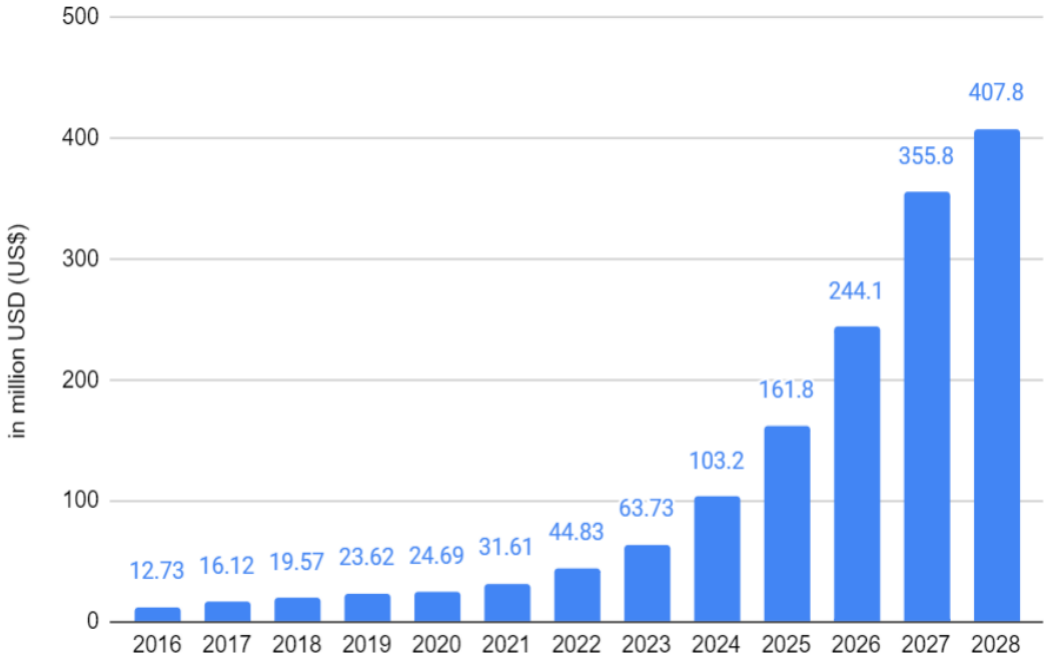


Figure 3.1 – Generated and forecasted revenue of using logistics and SCM software in Ukraine

Source: [58]

Besides this, GigaCloud, Netwave, De Novo, SOFTPROM, and UCloud are national players that made a great impact in shaping the cloud landscape in Ukraine. They make significant investments in expanding infrastructure as well as ensuring secure and reliable cloud solutions. The pie chart of main cloud-based logistics and SCM software providers in Ukraine for the year 2022 is depicted below (Figure 3.2).

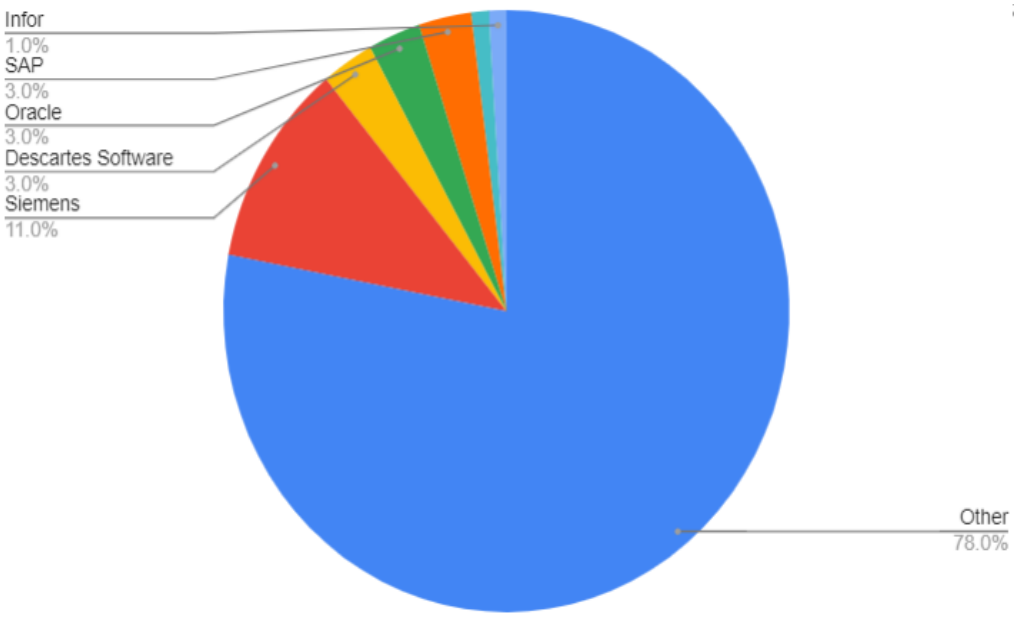


Figure 3.2 – Shares of key players at the logistics software market of Ukraine (2022)

Source:[58]

An example of a successful cloud software implementation is FedEx. In 2029 FedEx integrated 40 Oracle Cloud applications among which Oracle Cloud Logistics as well. By implementing this solution, Oracle could standardize more than 220 operations. Correspondingly, more than 3,000 employees now also use Oracle Cloud applications for data-driven decision-making, as well as access to AI, machine learning, and service automation. In terms of digital operations, FedEx has noticeably reduced the amount of manual tasks[31].

For ZAMMLER Ukraine, the best option will be the choice of software provided by world leaders in the production of cloud solutions, namely the choice is recommended to be done for one of the following vendors: Blue Yonder, Epicor, Infor Nexus, Körber, FourKites, 3PL Central, Manhattan Associates (Table 3.1).

Table 3.1 - Comparative Analysis of cloud softwares for logistics companies

		Suppliers						
		BlueYonder	Epicor	Infor Nexus	Körber	FourKites	3PL Central	Manhattan Associates
Type of service	Transportation management	✓	✓	✓	✓	✓	✗	✓
	Warehouse management	✓	✓	✓	✓	✗	✓	✓
	Inventory management and control	✓	✓	✓	✓	✗	✓	✓
	Real-time reporting	✓	✓	✓	✓	✓	✓	✓
	Risk management and forecasting	✗	✓	✓	✗	✓	✓	✗
	Accounting	✓	✓	✓	✓	✗	✗	✗
	Import/export support	✓	✓	✓	✓	✓	✓	✓
	Yard management	✓	✓	✗	✓	✗	✓	✓
Selection criteria	Type of deployment	Private Cloud	Private cloud	Multi-tenant cloud	Private Cloud	Hybrid Cloud	Public Cloud	Private Cloud
	Suitable for business size	Medium and large-sized	Medium and large-sized	Small, medium and large-sized	Small, medium and large-sized	Medium and large-sized	Small, medium and large-sized	Medium and large-sized
	Customization	Available	Available	Available	Available with additional costs	Available with additional costs	Available	Available
	Implementation costs	$ 700 000 - $ 900 000	$ 100 000 - $ 500 000	Costs information is not provided	$ 50 000 - $ 100 000	$ 150 000 - $ 400 000	$ 50 000 - $ 100 000	$ 100 000 - $ 200 000

According to Table 3.1, best possible software among compared are Epicor, BlueYonder, Infor Nexus, and HighJump. All of them offer comprehensive solutions for warehouse management, supply chain management, and transportation management and provide functionalities such as inventory optimization, order management, and demand planning. Oracle was not included to the table, since the installation costs of various solutions of this software manufacturer are high and its products can be adopted only by large enterprises or multinational corporations.

Although Epicor and BlueYonder comprise all necessary modules, these software vendors are not famous for being utilized by logistics companies, whereas Körber is widely used by LSPs.

Körber takes a prominent place among the compared cloud logistics software as it has all necessary modules included as well and the cost of the installation is one of the lowest. Körber is known as the leader in cloud-based software and offers comprehensive solutions for warehouse, yard, and transport management. Through their continuous investment in innovations and the technological development of software solutions, Körber offers a high level of investment security [27].

One of the clients of the Korber, namely Ferros Puig - a Spanish company dedicated to the storage and distribution of steel products. To improve efficiency and productivity, the company implemented a Warehouse Management System, Transport Management System, and Proof of Delivery as the modules of the Korber software. As a result of the implementation, Ferros Puig can view activities along the entire transport and supply chains, thus ensuring transparency over warehouse and goods movement.

3.2 Development of an investment project to optimize the operational activity of "ZAMMLER Ukraine"

To begin with, a cloud software implementation project requires deep knowledge of the subject and its peculiarities. Cloud failures comprise various factors: 56% were due to inadequate understanding of cloud security and compliance, 55% lacked a clear business rationale for migrating to the cloud, and 44% suffered from insufficient planning. Therefore, the cloud product adoption process should involve first of all the general assessment of the company's capability of the project implementation: which means: assessing readiness for cloud computing, aligning business processes with cloud services, planning for centralized resources, and committing to service level agreements, etc[61].

Chosen manufacturer of the cloud software Körber can greatly assist ZAMMLER Ukraine with operational activities. Below we can observe daily challenges that LSP faces in its logistics activities and offered cloud-based solution provided by Körber.

Table 3.2 – Operational challenges encountered by ZAMMLER Ukraine

Challenges	Cloud-based solution
Monetary losses due to the hard-trackable fleet, lack of transparency, and poor customer communication.	The solution is the implementation of a centralized fleet management cloud system with vehicle scheduling based on history, taking into account the season and other factors.
Monetary losses due to inefficient distribution and improperly planned routes. Hence, LSP fails to increase profits and improve customer service.	Implementation of the cloud-based software module for establishing optimal delivery routes and automated distribution of these routes among available drivers. End users can also have limited access to the system to manage and monitor the shipping process.

The end of the Table 3.2

High cost due to the human factor and man-made mistakes when working with documentation: contracts, invoices, debit & credit notes, receipts, verifications, etc.	The alternative solution would be to digitize the entire logistics process using a cloud-based document management module, mainly aiming to automate paper-based workflows.
The real-time information deficiency about the location of the asset causes monetary losses caused by decreased delivery quality.	Implementation of the GPS tracking system that provides asset tracking function and can also be integrated with third-party API (Application Programming Interface) to receive precise and real-time geospatial information.
In case of different disasters like floods, fire, etc., that can cause inevitable damages, the type of IT infrastructure is crucial in this case. If an on-premise infrastructure is damaged or inaccessible, this can lead to a complete loss of data without the possibility of recovery, which in turn will lead to the suspension of operational activities and large-scale losses to the company.	When data is stored in the cloud, in case of disaster happening, company will not lose the access to the software and no data will be lost. The advantage of cloud infrastructure over on-premise is that the cloud infrastructure is not affected by local issues and employees can have access to data on internet-connected mobile devices from any location.
Monetary losses due to the uncontrollable damage to products and containers.	Managing shipments often implies multimodal transportation, for instance: by sea or by road. Often, damages to products and containers can emerge during a change of the means of transportation. The cloud can serve as a solution to this problem since it can be used as an infrastructure for digital twins of containers and products. In this case, digital twins can assist in simulating the whole route and finding out the exact place where damages occur.

Implementing a cloud software product involves several steps and requires coordination among various roles within an organization. The general outline of the project plan can be viewed at the Figure 3.3.

In order to be able to implement the project in the most efficient way possible, we will use the Gantt chart, which can be used to list down the project's actions. It includes 6 main phases and steps to each phase which are allocated among specialists. The beginning of project execution is planned for a 1st of July, 2024 and the duration is anticipated to be 1,5-2 months.

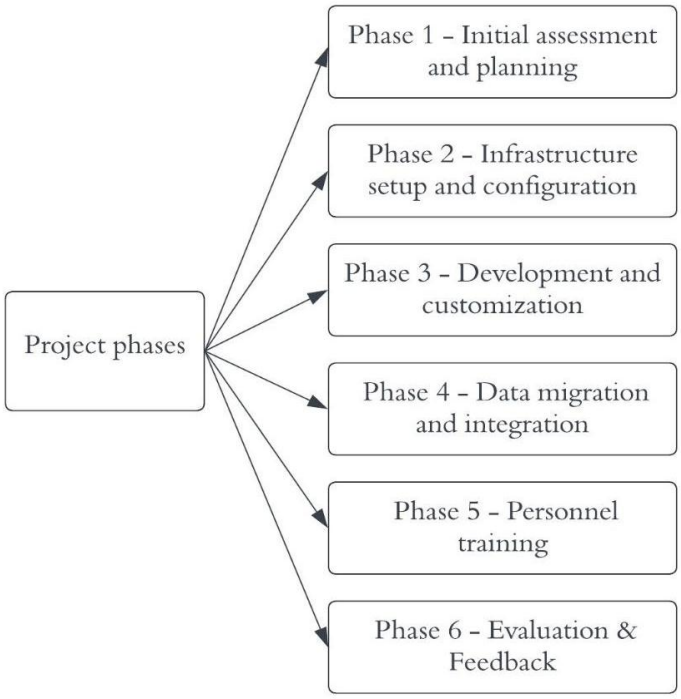


Figure 3.3 – Project plan of the adoption of a cloud-based software

Phase 1- Initial assessment and planning.

The project execution typically begins with an internal meeting when potential risks, opportunities, advantages, and disadvantages of the adoption of logistics cloud software for ZAMMLER Ukraine are assessed.

The project is led by a senior and junior project manager team that establishes goals, schedules, and resource allocation throughout the initial phase of the project. They both collaborate closely with the IT team to assess software requirements, compatibility, and current infrastructure.

The first external meeting with Körber representatives is held during this phase to gather information about particular requirements and software expectations. In addition, legal considerations about the product's adoption should be made[60]. The lawyer of ZAMMLER Ukraine takes the part of the action by preparing the pre-contractual which usually consists of three main parts:

–SoR – Statement of Requirements,

–RfP – Request for Proposal,

–ItT – Invitation to Tender.

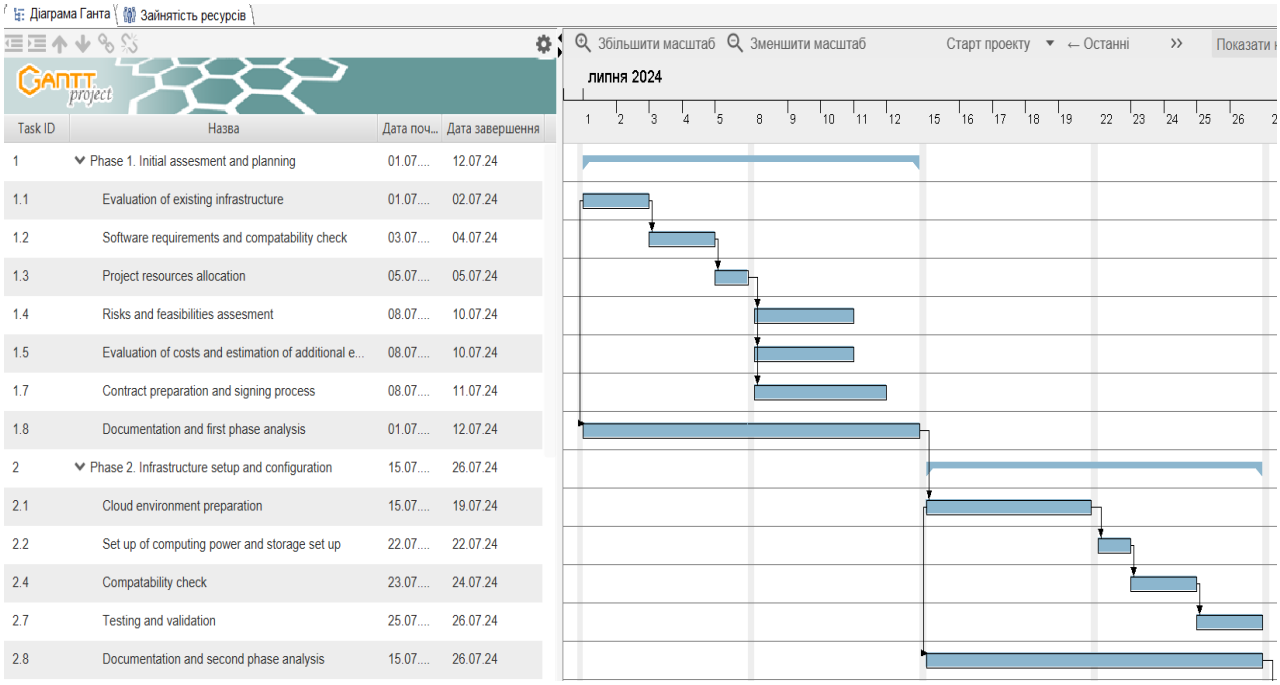
Additionally, such an agreement also has to have a supplier’s agreement as well as change control abstract and progress review meetings.

Phase 2 – Infrastructure setup and configuration.

In this stage, the IT team—whose primary responsibility is setting up the environment, guaranteeing compatibility, and preparing the cloud infrastructure—works closely with the logistics project management team. This phase also involves setting up the environment and allocating resources. It means working with the cloud service provider Körber to prepare the cloud environment. First and second phase of the project can be viewed at the Figure 3.4.

Phase 3 – Development and customization.

During this stage, the software is developed and customized to fulfill particular needs and functionalities. The customization requirement analysis is the first substep, which involves modifying the cloud software to fit ZAMMLER’s unique requirements. Needs. After the required adjustments are done the next step substep follows the process of thorough testing of the customized software to ensure that it meets the specified requirements and functions as expected. This implies the usage of several testing techniques, such as user acceptability testing, integration testing, and unit testing. Debugging, fixing errors, and making necessary adjustments are also done to improve the software’s performance and functionality.



Task ID	Назва	Дата поч...	Дата завершення
1	Phase 1. Initial assesment and planning	01.07....	12.07.24
1.1	Evaluation of existing infrastructure	01.07....	02.07.24
1.2	Software requirements and compatability check	03.07....	04.07.24
1.3	Project resources allocation	05.07....	05.07.24
1.4	Risks and feasibilities assesment	08.07....	10.07.24
1.5	Evaluation of costs and estimation of additional e...	08.07....	10.07.24
1.7	Contract preparation and signing process	08.07....	11.07.24
1.8	Documentation and first phase analysis	01.07....	12.07.24
2	Phase 2. Infrastructure setup and configuration	15.07....	26.07.24
2.1	Cloud environment preparation	15.07....	19.07.24
2.2	Set up of computing power and storage set up	22.07....	22.07.24
2.4	Compatability check	23.07....	24.07.24
2.7	Testing and validation	25.07....	26.07.24
2.8	Documentation and second phase analysis	15.07....	26.07.24

Figure 3.4 – First and second phase of the project's execution

Phase 4 – Data Migration and Integration

This stage comprises activities including requirements mapping, data analysis, and data cleansing to guarantee the integrity and accuracy of data. Eliminating duplication, standardizing formats, and fixing any problems with data quality are all part of this process[28].

Data transformation is an additional step. Transforming data structures or formats are necessary to make them compatible with the new system. This usually comprises organizing, aggregating, or normalizing the data[62].

Data transfer is the next stage after data transformation, and it implies carrying out the migration process by moving data from the current systems to the cloud environment. Third and fourth phases of the project can be viewed at the Figure 3.5.

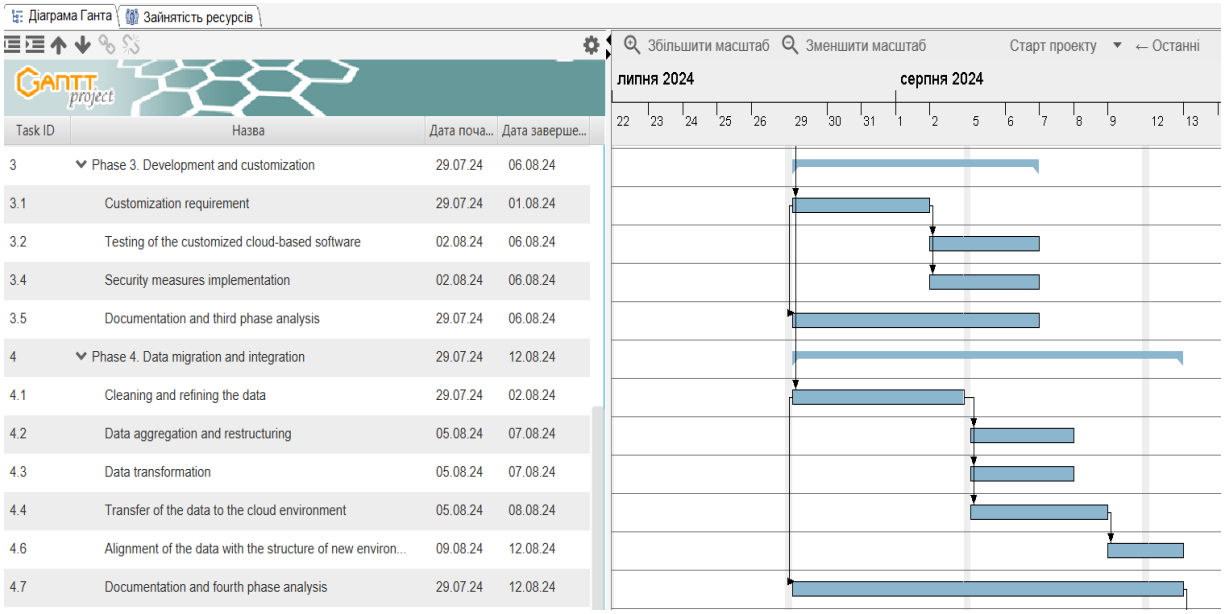


Figure 3.5 – Third and fourth phase of the project's execution

Phase 5 – Personnel training.

This phase involves such steps as the creation of the training plan with customized training modules. In collaboration with the Cloud-Based Software providers & ZAMMLER's IT team, the project management team can develop training modules specific to different user roles and their responsibilities within the software[64].

The project manager has to decide on training methods such as in-person sessions, online tutorials, videos, or a combination based on the workforce's needs. Training can be provided in such forms: role-specific training, onboarding sessions, and hands-on practice.

Phase 6 – Evaluation & feedback.

The last phase of the project involves assessing the success of the implemented project. This assessment involves the evaluation of the project's performance against predetermined objectives, timelines, and budget. Fifth and sixth phase of the project can be viewed at the Figure 3.6.

5	Phase 5. Personnel training	13.08.24	19.08.24
5.1	Creation of the training plan with training modules	13.08.24	16.08.24
5.2	Creation of role-specific trainings	19.08.24	19.08.24
5.3	Creation of onboarding sessions	19.08.24	19.08.24
5.4	Creation of hands-on practice	19.08.24	19.08.24
5.5	Documentation and fifth phase analysis	13.08.24	19.08.24
6	Phase 6. Evaluation and feedback	20.08.24	23.08.24
6.1	Generation of the report	20.08.24	20.08.24
6.2	Project's performance evaluation	21.08.24	23.08.24

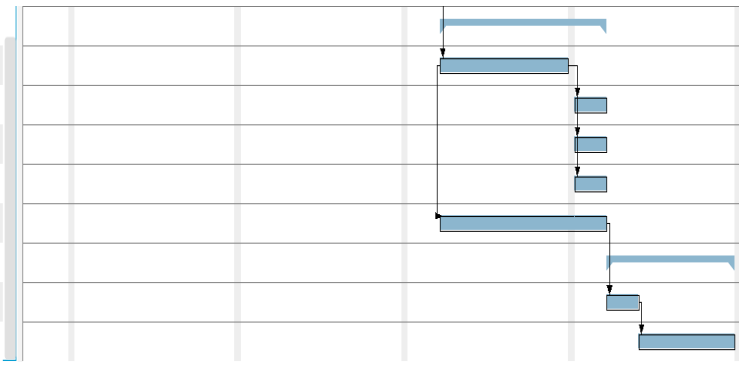


Figure 3.6 – Fifth and sixth phase of the project's execution

As the result of building the Gantt chart, it was evaluated that the duration of the investment project involves the implementation of cloud software backup in the business of ZAMMLER Ukraine within 1 month and 20 days.

Besides this, for the successful execution of the project, it is important to hire proper professionals who will deal with tasks and emerging challenges efficiently. Employees that contribute to the successful adoption of the software are depicted at the Figure 3.7.

A total of 18 people are involved in the project, including:

1) Senior Logistics Project Manager (1 person) is responsible for assigning specialists to corresponding tasks of the project.

2) Junior Logistics Project Manager (1 person) works closely with the Senior Logistics Project Manager and additionally assists the Financial and Data Analyst in the project's performance evaluation against the predetermined objectives, timelines, and budget.

3) Cloud Engineer (3 persons) are allocated for steps "Cloud environment preparation", "Customization of software modules", and "Transfer of the logistic data to the cloud environment".

4) Cloud Security Specialist (1 person) creates security policies to protect data and is allocated for steps " Security measures implementation" and "Alignment of the data with the structure of the new environment".

5) System Integrator (2 persons) has the project's responsibility of the system integrator usually includes data aggregation, transformation, and its transfer to the cloud environment.

6) The Logistics Operations Manager, Inventory Control Specialist, Transport Manager, and Warehouse Manager (1 person each) are involved in the process of transferring data from the on-premise software to the cloud-based. They also contribute to ensuring that the selected software can integrate with other systems used by the logistics company, such as WMS and TMS.

7) Compliance and Legal Expert (1 person) reviews contracts and agreements with cloud service providers to ensure that they align with the organization's compliance requirements and legal standards. They negotiate terms related to data handling, security, confidentiality, and liability.

8) Financial Analyst (1 person) assesses the financial implications of adopting cloud-based software, considering initial investment, ongoing costs, potential savings, and return on investment. They analyze different pricing models, such as subscription-based or pay-as-you-go, to determine the most cost-effective solution[4]. During the execution of the project, the Financial Analyst is responsible for the task " Evaluation of costs and estimation of additional expenses" as well as "Project's performance evaluation".

9) Data Analyst (1 person) monitors KPIs of the project execution and makes the documentation and analysis of each phase of the project.

10) Training specialist (1 person) develops training modules, onboarding sessions, and hands-on practice for ZAMMLER Ukraine employees.

When integrating a cloud solution, the company must also consider the potential risks of moving to a cloud environment. Organizations regularly have concerns about the relocation and utilization of cloud computing due to the possible failure of control over their outsourced assets [61]. This can happen the following way: cloud computing runs the program, a computer program has vulnerabilities, and hackers attempt to misuse those vulnerabilities.

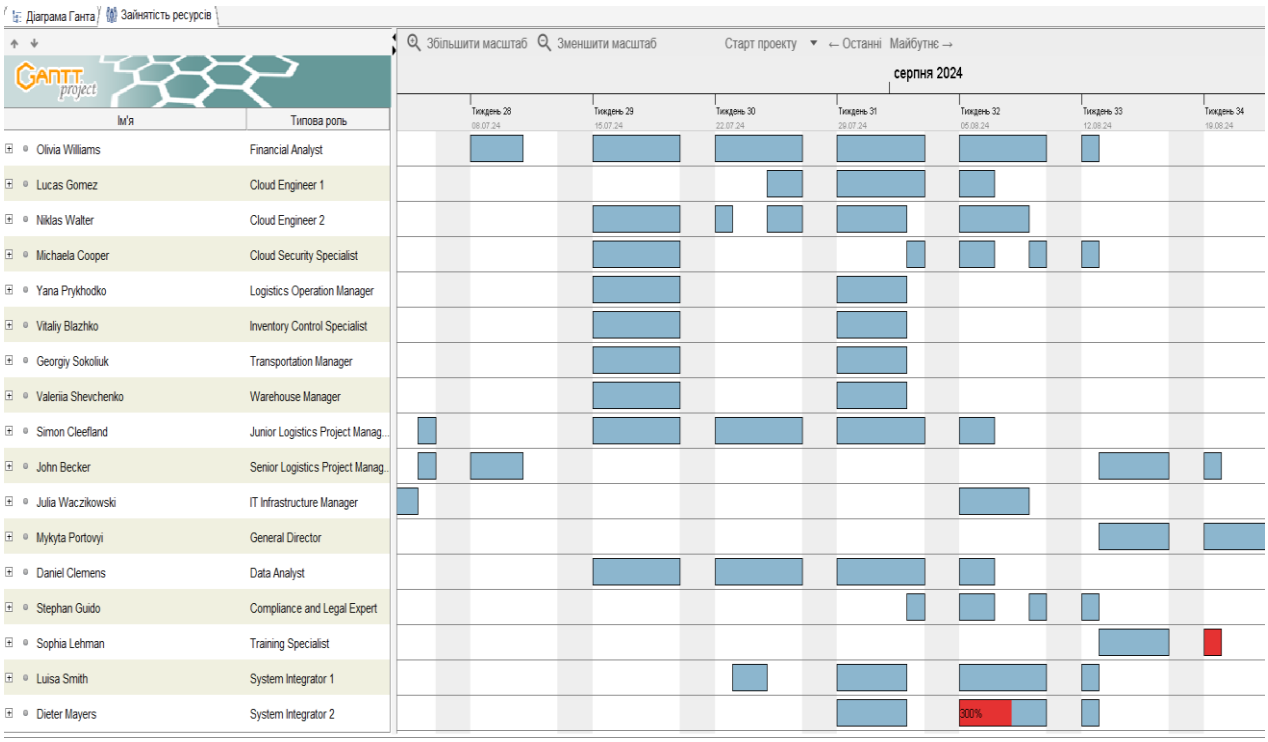


Figure 3.7 – List of assigned professionals in the project

However, unlike information technology in a traditional data center, in the case of cloud computing the responsibilities of possible hacker attacks are distributed equally between the software supplier and client. Therefore, LSP must understand the allocation of responsibilities and trust that the cloud service providers will meet their responsibilities[60].

A detailed overview with risks and challenges that can emerge during the cloud software adoption for the LSP can be viewed in Table 3.3.

Table 3.3 – Possible threats of the adoption process of cloud-based software

Threats	Description
Data Security Concerns	Data security might be the biggest concern when companies share their sensitive data with a third-party cloud provider. In case of data loss or leakage, it can lead to severe disruptions in business operations. In order to prevent these problems, it is recommended to follow and implement proper practices and data protection policies for a cloud environment.

The end of the Table 3.3

High Installation costs	When implementing cloud technology, logistics companies fear high installation costs. These costs imply the upgrade of hardware and software as well as the training of employees. Moreover, further maintenance and upgrades require additional investments[60].
Lack of expertise & high complexity	Nowadays, businesses are scared of the complexity of cloud environments and migration processes. Experts in this branch must have experience in dealing with cloud, migration processes, as well as compliance requirements. Unfortunately, the Ukrainian market for specialists in the implementation of cloud technologies in the activities of logistics companies is very limited.
Proper training & resources	Lack of skills can emerge as one of the main reasons for the slowdown of cloud adoption. Cloud environments are difficult to understand and practice. Hence, it is important to hire experts in the cloud computing area as well as provide proper and regular training for employees.

3.3 Calculation of the efficiency of the proposed project solution

The duration of the investment project involves the implementation of cloud software backup in the business of ZAMMLER Ukraine within one month and 20 days. Chosen Provider Körber was chosen over other cloud service providers because it has high-quality cloud solutions for logistics and supply chains of companies of all sizes.

In addition, the cost of the project is relatively low compared to other suppliers. The approximate cost overview can be viewed at Table 3.4. The total sum of the software implementation is $ 122 000,00, however, this value does not comprise miscellaneous and additional expenses that can come up during the software adoption by ZAMMLER Ukraine.

Table 3.4 – Investment costs overview

#	Type of service	Service description	Value
1	Software Licensing and Subscription Fees	Cloud logistics software that includes cloud TMS, WMS, order management, and documentation modules.	$ 50 000,00
2	Infrastructure Setup	Includes expenses for setting up the cloud environment, virtual machines, storage, and networking components.	$ 30 000,00
3	Consulting and professional services	Fees for hiring external consultants, cloud architects, and implementation partners to assist with the project.	$ 20 000,00
4	Employees training	Costs for training staff on the new system.	$ 12 000,00
		Total Value	$ 112 000,00

According to the prepared estimate, investments in the project will amount to USD 122,000,000. The discount rate was chosen according to the National Bank of Ukraine exchange rate of 14.5% as of March 15, 2024.

Expected revenues from the project can be viewed at Table 3.5.

Table 3.5 – Expected revenues from the project

Year	Amount of income, USD, CF_i)
1st	11200
2nd	22400
3rd	33600
4th	44800
5th	56000
6th	67200

The end of the Table 3.5

7th	78400
8th	89600
9th	100800
10th	112000

To begin with, it is necessary to calculate net cash flows according to the following formula:

$$PV = \frac{CFi}{(1+r)^t} \quad (3.1)$$

where CFi - cash flows (income) by year;

r – discount rate;

t – number of the year.

Let’s carry out calculations:

$PV_1 = \frac{11200}{(1+0,145)^1} = 9781,66$

$PV_2 = \frac{22400}{(1+0,145)^2} = 17085,87$

$PV_3 = \frac{33600}{(1+0,145)^3} = 22383,23$

$PV_4 = \frac{44800}{(1+0,145)^4} = 26064,90$

$PV_5 = \frac{56000}{(1+0,145)^5} = 28455,13$

$PV_6 = \frac{67200}{(1+0,145)^6} = 29821,97$

$PV_7 = \frac{78400}{(1+0,145)^7} = 30386,29$

$PV_8 = \frac{89600}{(1+0,145)^8} = 30329,42$

$PV_9 = \frac{100800}{(1+0,145)^9} = 29799,65$

$PV_{10} = \frac{112000}{(1+0,145)^{10}} = 28917,66$

$\sum PV = PV_1+PV_2+PV_3+PV_4+PV_5+PV_6+PV_7+PV_8+ PV_9+PV_{10} =$

$=9781,66+17085,87+22383,23+26064,90+28455,13+29821,97+30386,29+30329,42$

$+29799,65+28917,66 = 253025,78$

Now, the NPV of the project should be calculated using the following formula:

$$NPV = \sum_{k=1}^{T} \frac{P_k}{(1+r)^T} - \sum_{i=1}^{m} \frac{IC}{(1+r)^m}, \quad (3.2)$$

where Pk – annual cash receipts for T years;

IC – investments for m years;

r – discount rate.

$$NPV=\frac{9781,66}{(1+0,145)^1} + \frac{17085,87}{(1+0,145)^2} + \frac{22383,23}{(1+0,145)^3} + \frac{26064,90}{(1+0,145)^4} + \frac{28455,13}{(1+0,145)^5} + \frac{29821,97}{(1+0,145)^6} +$$

$$\frac{30386,29}{(1+0,145)^7} + \frac{30329,42}{(1+0,145)^8} + \frac{29799,65}{(1+0,145)^9} + \frac{28917,66}{(1+0,145)^{10}} - \frac{120000}{(1+0,145)^1} = \$141025,78$$

The obtained results can be viewed below in Table 3.6.

Table 3.6 – Calculation of the NPV of the project at a discount rate of 14,5%

t	I^0	CF^t	$(1+r)^t$	PV^t	NPV
1	2	3	4	5	6
0	-112000		0		-112000
1		11200	1,15	9781,66	-102218,3
2		22400	1,31	17085,87	-85132,47
3		33600	1,50	22383,23	-62749,24
4		44800	1,72	26064,90	-36684,34

The end of the Table 3.6

5		56000	1,97	28455,13	-8229,21
6		67200	2,25	29821,97	21592,76
7		78400	2,58	30386,29	51979,05
8		89600	2,95	30329,42	82308,47
9		100800	3,38	29799,65	112108,12
10		112000	3,87	28917,66	141025,78

A positive NPV implies that the projected earnings generated by the investment exceed the anticipated costs. Therefore, it means an investment with a positive NPV will be profitable. At the same time, an investment with a negative NPV will result in a net loss. After calculating the NPV, we see that during two years, namely the ninth and tenth, the company will receive profits that cover the costs, and therefore the project should be accepted.

Now let's assume a discount rate of 32,5% and calculate the NPV using formula 3.2 in order to then calculate the internal rate of return (IRR).

In this case net cash flows will be calculated as following:

$PV_1 = \frac{11200}{(1+0,325)^1} = 8452,83$

$PV_2 = \frac{22400}{(1+0,325)^2} = 12758,99$

$PV_3 = \frac{33600}{(1+0,325)^3} = 14444,14$

$PV_4 = \frac{44800}{(1+0,325)^4} = 14534,98$

$PV_5 = \frac{56000}{(1+0,325)^5} = 13712,25$

$PV_6 = \frac{67200}{(1+0,325)^6} = 12418,64$

$PV_7 = \frac{78400}{(1+0,325)^7} = 10934,65$

$PV_8 = \frac{89600}{(1+0,325)^8} = 9431,50$

$PV_9 = \frac{100800}{(1+0,325)^9} = 8007,88$

$PV_{10} = \frac{112000}{(1+0,325)^{10}} = 6715,20$

$\sum PV = 8452,83+12758,99+14444,14+14534,98+13712,25$

$+12418,64+10934,65+9431,50 +8007,88+6715,20=111411,07$

Now we are going to calculate the NPV of the project at a discount rate of 32,5% according to formula 3.2.

$$NPV=\frac{6379,49}{(1+0,325)^1}+\frac{9629,43}{(1+0,325)^2}+\frac{10901,24}{(1+0,325)^3}+\frac{10969,80}{(1+0,325)^4}+\frac{10348,87}{(1+0,325)^5}+\frac{9372,56}{(1+0,325)^6}+$$
$$\frac{8252,57}{(1+0,325)^7}+\frac{7118,12}{(1+0,325)^8}+\frac{6043,68}{(1+0,325)^9}+\frac{112000}{(1+0,145)^{10}}-\frac{120000}{(1+0,145)^1}=\$-588,93$$

Now let’s summarize all obtained data in Table 3.6.

Table 3.6 – Calculation of the NPV of the project at a discount rate of 32,5%

t	I0	CFt	$(1+r)^t$	PVt	NPV
1	2	3	4	5	6
0	-112000		0		-112000,00
1		11200	1,33	6379,49	-103547,17
2		22400	1,76	9629,43	-90788,18
3		33600	2,33	10901,24	-76344,04
4		44800	3,08	10969,80	-61809,06
5		56000	4,08	10348,87	-48096,81
6		67200	5,41	9372,56	-35678,17
7		78400	7,17	8252,57	-24743,52
8		89600	9,50	7118,12	-15312,02
9		100800	12,59	6043,68	-7304,14
10		112000	16,68	112000	-588,93

According to the obtained results, a negative value of the project's NPV implies that the project will be unprofitable. So, at a rate of 14,5%, the NPV is positive, and at

a rate of 32,5%, it is negative. Therefore, the internal rate of return IRR will be in the range of 14,5–32,5%.

After the calculation of the project's NPV, we have to calculate IRR. The internal efficiency ratio or internal rate of return on investments (IRR) is calculated according to the formula:

$$IRR = A + \frac{a(B - A)}{(a - b)} \tag{3.3}$$

where A — the value of the discount rate at which the NPV is positive;
B — the value of the discount rate at which the NPV is negative;
a — the value of positive NPV, at the value of the discount rate A;
b — the value of the negative NPV, at the value of the discount rate B.
Let's calculate the value of indicator:

$$\text{IRR} = 14{,}5 + \frac{141025{,}78 \times (32{,}5 - 14{,}5)}{141025{,}78 - (-588{,}93)} = 32{,}43\%$$

Now we are going to calculate the payback period considering the investment amount of USD 112000. Following Table 3.4, the project will bring the income less than investments till the 5th year. Beginning from this year, the project will bring the desired profit to ZAMMLER Ukraine. To make a more precise evaluation, we are going to use Figure 3.7 to determine the discounted payback period. According to the obtained results, the discounted payback period will be 5,2 years.

Following the obtained results, it can be stated that the project is feasible. The project is expected to yield an annual return of 32.43% on the invested capital. As the IRR exceeds the project's required rate of return or the cost of capital, the project is considered to be successful. Specifically, since 32.43% is much higher than 14.5%, the project should provide a return well above the cost of financing it.

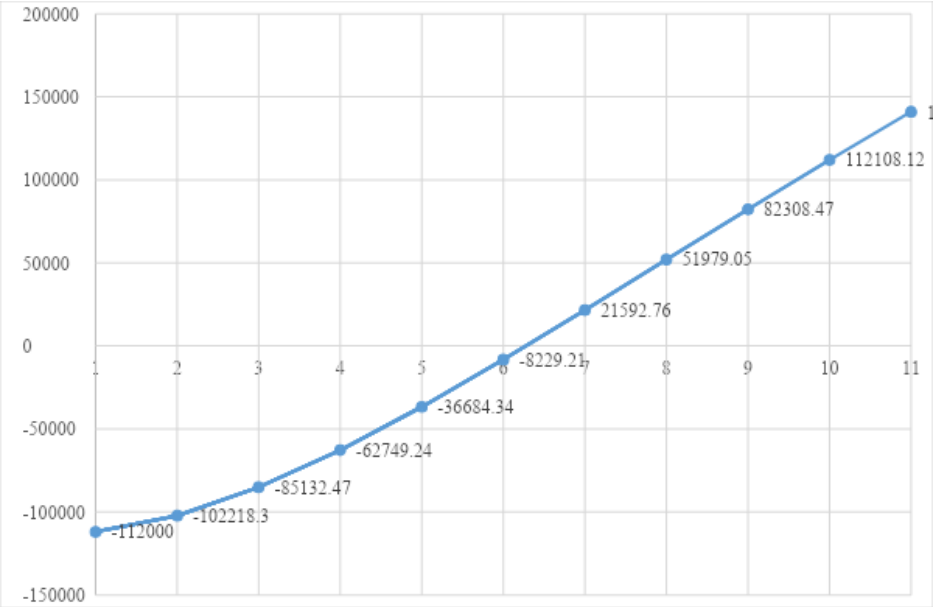


Figure 3.7 – Cash flows for 10 years of the project's payback period

The discounted payback period will be 5,2 years. Using the selection method, it was established that the internal rate of return at which the NPV will be positive lies in the interval between 14.5 and 32.5%.

Chapter 3 Summary

In conclusion, the cloud logistics software market is experiencing significant growth due to the increased adoption of cloud computing technologies. Major players like Oracle, SAP, Infor, and BlueYonder are leading the global market, offering efficient cloud solutions for logistics and supply chain management.

The Ukrainian market, despite the challenges, has also seen a remarkable rise in demand for cloud solutions. This is driven by the need for enhanced logistics operations, better customer service, and the adoption of secure and reliable cloud services by both international and national providers like GigaCloud and De Novo.

For ZAMMLER Ukraine, implementing cloud logistics software from Körber is recommended due to its solutions and cost-effectiveness. Körber's software can

resolve key operational challenges by offering centralized fleet management, optimal route planning, digitized documentation, and real-time asset tracking. The investment project for ZAMMLER Ukraine is projected to take approximately one month and 20 days, involving the process of assessment, planning, infrastructure setup, customization, data migration, personnel training, and evaluation.

Financial analysis indicates that the project, with an estimated cost of $122,000, is expected to be profitable, generating significant returns over 10 years. The Net Present Value (NPV) calculation, using a discount rate of 14.5%, shows a positive outcome, implying the project's feasibility. This strategic move towards cloud integration will not only enhance logistics operations of the company but also ensure greater efficiency, transparency, and resilience against possible disruptions and challenges that ZAMMLER Ukraine might encounter in the future.

CONCLUSION AND RECOMMENDATIONS

The emergence of cloud technologies in the logistics industry has caused an extraordinary demand for various cloud solutions, namely: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Cloud-based Data Analytics, IoT (Internet of Things), Blockchain solutions. Especially, SaaS is utilized widely by logistics companies nowadays. The reason of such an increases adoption of such technologies is that the installation and use of cloud software does not require large investments in the purchase of actual equipment. Cloud solutions will typically be more affordable and efficient, and easier to integrate with existing systems than on-premise software. Therefore, the cloud itself can be called an impeccable technology that combines all logistics operations within the company into a single system. Most common challenges that are faced by LSPs on a daily basis include transportation cost the need for continuous business process improvement, customer service optimization, and supply chain visibility. All these bottlenecks can be eliminated by the implementation of a cloud-based software.

This work comprises the description of business activity of ZAMMLER Ukraine as well as the analysis of the economic and financial state of the company`s activity. ZAMMLER Ukraine is a 3PL operator, that undertakes the organization of transport and logistics services, from transportation or cargo transportation and delivery of processed and packaged cargo to the end consumer. Many years of experience in the field of logistics have proven that ZAMMLER Ukraine can cope with tasks of different difficulty related to the transportation of goods, ensuring the quality and integrity of delivery.

During the assessment of the business activity of ZAMMLER Ukraine, key parameters of the company were defined as well as the SWOT analysis was carried out. As for the assessment of the economic and financial state of the company's activity, it was determined through the analysis of assets indicators and solvency as well as the usage of E. Altman's five-factor model that ZAMMLER Ukraine was on

the verge of bankruptcy in 2021-2022. Recovery from the financial consequences of the global pandemic in 2021 and the beginning of the full-scale invasion in 2022 have caused several crises at ZAMMLER Ukraine, but still the company could overcome them and helped the country by providing the logistics complex for non-profit organizations that were delivering humanitarian goods. Fortunately, In 2023, ZAMMLER Ukraine was able to generate higher revenue and hence significantly improved its financial health.

During the carrying out of the third chapter of the qualification work, a comparative analysis of leading cloud softwares in the logistics industry in Ukraine and abroad was conducted. As result, it was determined that the key players on the global logistics and SCM software market are Oracle, SAP, Infor, BlueYonder, Epicor, and Verizon. As for the Ukrainian market , it has to be emphasized that such national software manufacturers as GigaCloud, Netwave, De Novo, SOFTPROM, and Ucloud are playing the key role in shaping the cloud landscape in Ukraine.

For ZAMMLER Ukraine it was determined that the most suitable cloud software to be implemented is a Körber from the cloud manufacturer Korber Supply Chain. Remarkably, this supplier takes a prominent place among other cloud service providers software as it has all necessary modules included as well and the cost of the installation is one of the lowest. Körber is known as the leader in cloud-based software and offers comprehensive solutions for warehouse, yard, and transport management. Through their continuous investment in innovations and the technological development of software solutions, Körber offers a high level of investment security.

In order to execute the cloud software adoption in the most efficient and cost-effective way, we developed an investment project to optimize the operational activity of “ZAMMLER Ukraine”. The investment project comprises 5 phases that were depicted with the utilization of the Gantt Chart. As the result, it was evaluated that the duration of the investment project involves the implementation of cloud software in the business of ZAMMLER Ukraine within 1 month and 20 days. Additionally, for the successful execution of the project, proper professionals were allocated to each task in the phase accordingly to their qualifications.

To estimate the project’s feasibility, calculation of the efficiency of the proposed solution was carried out. Its results show that the project, with an estimated cost of $122,000, is expected to be profitable, generating significant returns over 10 years. The Net Present Value (NPV) calculation, using a discount rate of 14.5%, shows a positive outcome, implying the project's feasibility.

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