Int. j. adv. multidisc. res. stud. 2025; 5(2):1459-1463

Received: 14-02-2025
Accepted: 24-03-2025

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Improving the Efficiency of a Freight Forwarding Company by automating the logistician's workplace

[1] Kravchenya Irina, [2] Dauhulevich Volha

[1, 2] Department of Road Transport and Traffic Management, Belarusian State University of Transport, Gomel, Republic of Belarus

Corresponding Author: **Kravchenya Irina**

Abstract

The paper presents a specialized software product for automation of the logistician's workplace, which will improve the efficiency of road freight transportation. The system of databases that store information about users is designed. An application was developed to automate document flow in freight transportation, which will reduce the time to complete tasks, increase KPIs of all participants of the transportation process and improve the quality of customer service.

Keywords: Logistician's Workplace, Freight Forwarding Company, Software Product, Automating Technological Processes, Road Freight Transportation

1. Introduction

In the context of growing competition, increasing the efficiency of logistics processes is becoming important for freight forwarding companies engaged in freight transportation.

One of the most significant trends in logistics is the automation of management processes and data processing performed by a freight forwarding company in the course of providing road freight forwarding services.

Implementation of automated systems allows to significantly reduce time for routine operations, improve accounting accuracy and minimize the probability of human errors. This contributes to improving the quality of customer service, reducing costs and increasing the company's overall competitiveness in the market. In a rapidly changing market environment, freight forwarding companies that implement innovative technologies gain significant advantages over their competitors.

The documentation process for road transport of goods involves completing various forms, certificates, declarations and other documents required for customs clearance, freight control and security. This process is often labor-intensive and prone to human error, which can lead to delays in cargo delivery, fines and loss of customers.

To solve the above problems, it is proposed to develop a specialized software product capable of automatically filling in the necessary documents based on the provided data on freight, route and other parameters. This software should be designed taking into account the specifics of freight transportation and include the following features:

- **Integration with databases.** The software product should have access to information about freights, customers, vehicles and other relevant data for automatic filling of documents.
- **Automatic data recognition.** The use of machine learning and natural language processing technologies to recognize and interpret information from provided documents and databases.
- **Document Generation.** The software product must generate the necessary documents in accordance with the requirements of international standards and legislation.

Automating the technological process of documentation for road transport of goods offers a number of significant advantages:

- **Increased efficiency.** Reduction of time spent on document processing due to automatic filling and generation.
- **Reducing the risk of errors.** Eliminating human error when completing documents, reducing the likelihood of delays and fines.
- **Improving data accuracy.** The use of automatic data recognition and validation helps to improve the accuracy of information in documents.

- **Cost Reduction**. Reducing labor costs and increasing the speed of the clearance process, which saves the company's resources.

The purpose of the work is to develop a software product to automate the workplace of the logistician, which will increase the efficiency of road freight transport.

2. Development of a software product for automation of the logistician's workplace

2.1 Database architecture development

For the software product that automates the logistician's workplace, a database system has been developed to store information about users.

For electronic storage of documentation, it is reasonable to use non-relational databases.

MongoDB, a document-oriented database management system that does not require a table schema description, was used in the work. It is a classic example of NoSQL-systems, which uses JSON-like documents and database schema and is written in C++.

Fig 1 shows the graphical scheme of links between the databases of the developed software product.

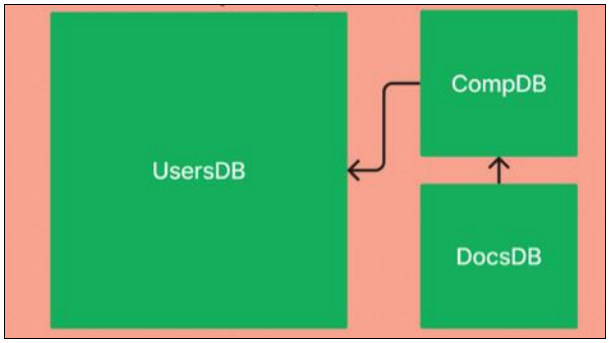

Fig 1: Database linkage diagram

The database of the developed software product ‘UsersDB’ stores information about users. Fig 2 shows the database scheme ‘UsersDB’ in graphical form.

Fig 2: ‘UsersDB’ database structure

A separate database is allocated for account parameters. This is done to provide the possibility of extending the functionality in the future. At this stage of development, it is assumed that there is one collection ‘Users’, which stores documents describing the user: identifier, user email address, password, user subscription level (its presence, subscription level, provision or restriction of the program functionality).

The ‘CompDB’ database (Fig 3) stores data on companies added by users.

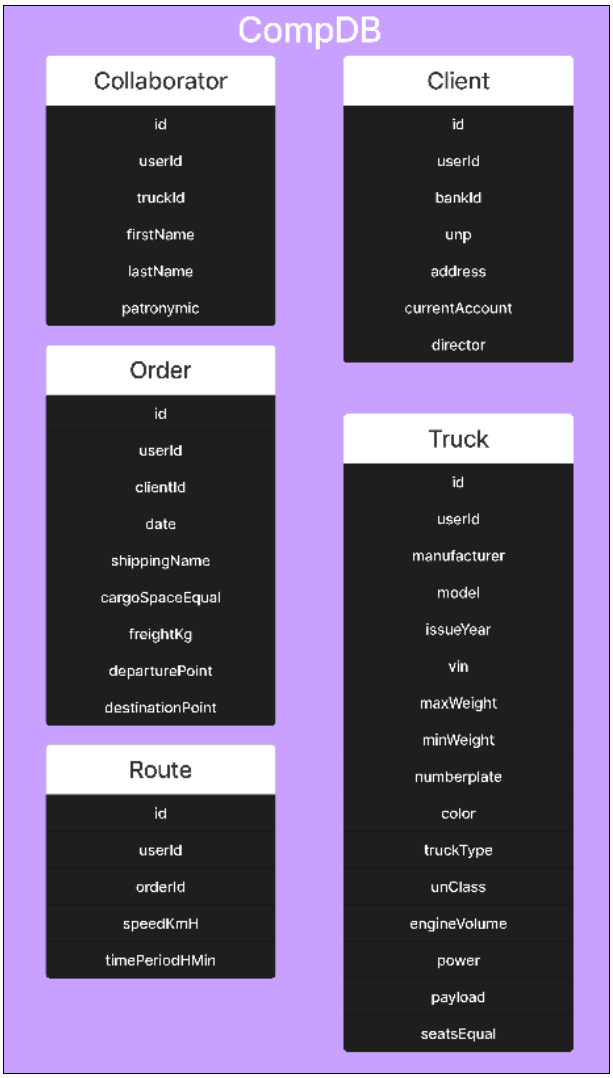

Fig 3: ‘CompDB’ database structure

The ‘CompDB’ database contains 5 collections of documents.

The ‘Client’ collection is a set of documents with data on clients with whom the carrier works. The document in this collection contains information about client details.

The ‘Order’ collection represents a set of documents with data about the carrier's orders.

The ‘Collaborator’ collection represents a set of documents with the data about the carrier's employees.

The ‘Truck’ collection is a set of documents with data about the company's rolling stock.

The ‘Route’ collection is a set of documents with the data about the routes the carrier worked or works on.

The database ‘DocsDB’ (Fig 4) stores information about the user's documentation: invoice (‘Invoices’), CMR consignment note (‘CMR’), packing list (‘Packing List’). For each type of document there is a separate collection in the database.

Fig 4: Graphical representation of 'DocsDB' database collections

As a result, a database was developed for an information system, which is an automated workplace of a logistician and designed for software with client-server architecture and microservices.

2.2 Frontend development

The developed Frontend application is responsible for the client part.

The Frontend application contains the carrier profile pages, orders for freight services, carrier's cash flow, vehicles and objects.

Fig 5 shows the variants of the carrier profile pages. In it you can change the account, language and theme.

The 'Finance' page shown in Fig 6 is a list of transactions from the carrier's current account. The list shows the date of the transaction, the name of the organization that received or transferred the money, and the amount of the transaction.

The orders page is shown in Fig 7. The page contains information about the order, the name of the cargo, the date of the order, the name of the customer's legal entity, the freight rate and the order status - 'paid' / 'not paid'.

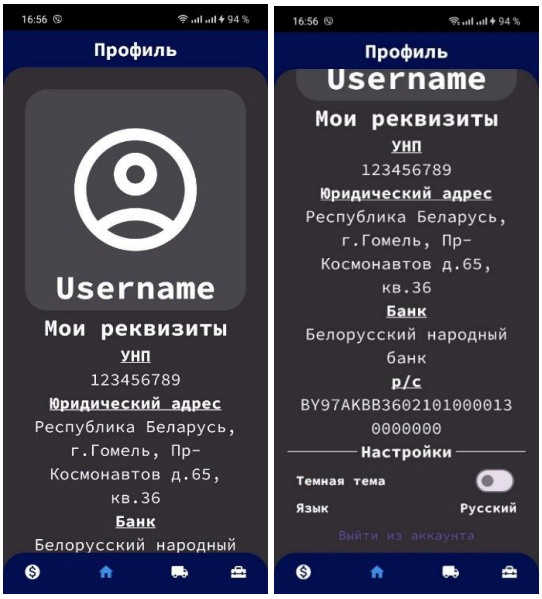

Fig 5: Carrier profile page variants

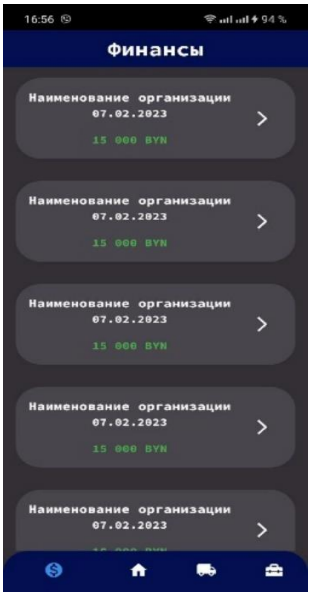

Fig 6: The carrier's cash flow page

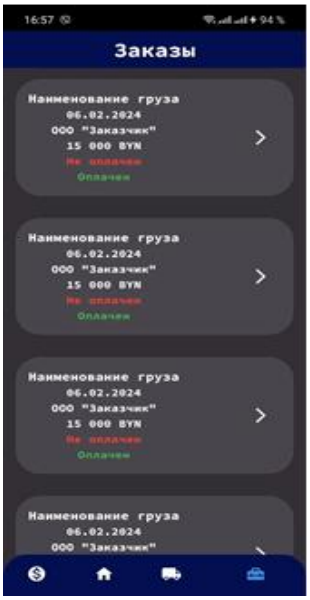

Fig 7: Order page for freight transport services

Vehicles page (Fig 8) is a list of the carrier's vehicles. The vehicle model, registration number and its status, vehicle availability for order fulfilment are indicated.

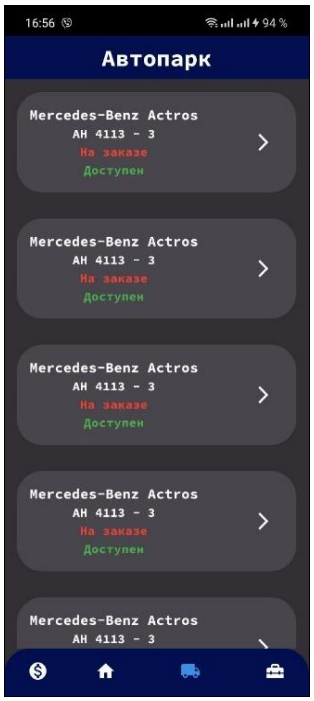

Fig 8: Carrier's vehicle page

Object pages have been developed that contain information about the order, the customer, and the vehicle.

The customer page displays information similar to the carrier profile.

The page with information about the vehicle contains information about the vehicle, the history of completed orders, validity dates of transport documentation.

The page with order information contains the following information: name, cost, weight and volume of freight; number of cargo places; tare type; loading and unloading date; freight rate.

The transaction information page contains information about the sender's bank, the customer who sent or received the funds, and the recipient's bank.

Android Studio software and Dart programming language with flutter framework were used to develop the client part of the application.

The development of pages for each object allows systematizing information and making it available to users. This contributes to increasing the efficiency of carriers' work and improving interaction with customers.

Overall, the development of the proposed Frontend of the application has the potential to improve user experience, increase the efficiency of business processes and strengthen the application's position in the transport services market.

2.3 Backend development

Backend development for mobile applications is performed on the .NET Core platform.

.NET Core is a cross-platform framework that provides developers with powerful tools for creating and deploying applications on Windows, Linux and macOS operating systems.

The use of .NET Core in Backend development is due to its flexibility, performance and extensive developer community.

Before developing the server part, the functionality and performance requirements of the mobile application were analyzed. This includes identifying the required API services, components and services to provide interaction between the client and server parts of the application.

ASP.NET Core, based on .NET Core, acts as a key tool for implementing API services. This framework ensures security, scalability and performance of the developed applications.

Security is one of the priorities when developing the Backend of mobile applications. .NET Core provides various mechanisms to ensure security, including authentication, authorization and protection against various types of attacks.

Once the Backend is implemented and tested, its deployment is done. This can be done either on dedicated servers or in cloud environments, depending on the performance and scalability requirements of the application.

Thus, Backend development for mobile applications on .NET Core platform requires a comprehensive approach including requirements analysis, selection of suitable technologies, implementation, testing and deployment. Properly designed and implemented Backend-parts ensure reliability, performance and security of the mobile application.

3. Conclusions

Automation of the logistician's workplace allows to increase the transparency and overall efficiency of logistics processes, reduce the impact of the human factor on the company's performance, as well as improve the level of service, optimize the number and composition of personnel.

Development of a specialized software product to automate the document flow of a transport and logistics company increases the KPI of all participants in the transportation process and implies the performance of certain actions without the participation of a company employee, improves the quality of customer service, reduces costs and minimizes risks associated with the execution of documentation.

4. References

1. Abdulla MF, Musa H. Mediation Model of Logistics Service Supply Chain (LSSC) Factors Affecting Organisational Performance. International Journal of Sustainable Construction Engineering and Technology. 2022; 12(5):294-310.
2. Deng X, Wang L, Gui J, Jiang P, Chen X, Zeng F, et al. A review of 6G autonomous intelligent transportation systems: Mechanisms, applications and challenges. Journal of Systems Architecture. 2023; 142:102929.
3. Gizetdinov R. Automation and digitalisation of transport forwarding services or logistics. Infrastructure Asset Management. 2024; 11(2):100-107.
4. Hyland MF, Mahmassani HS, Mjahed LB. Analytical models of rail transportation service in the grain supply chain: Deconstructing the operational and economic advantages of shuttle train service. Transportation Research Part E: Logistics and Transportation Review. 2016; 93:294-315.
5. Kozhukhovskaya L, Baskov V, Ignatov A. Modular Management of Indicators of Efficiency and Safety of Transportation Processes. Transportation Research Procedia. 2017; 20:361-366.

6. Kravchenya I. Automation of Technological Processes when Organizing Road Cargo Transportation. International Journal of Advanced Multidisciplinary Research and Studies. 2025; 5(2):927-931.
7. Kravchenya I. Development of a Simulation Model for the Provision of Freight Forwarding Services by a Logistics Company. International Journal of Advanced Multidisciplinary Research and Studies. 2023; 3(6):1316-1320.
8. Kravchenya I. Improving the Efficiency of a Freight Forwarding Company in the Organization of International Road Cargo Transportation. International Journal of Advanced Multidisciplinary Research and Studies. 2024; 4(2):1005-1008.
9. Kravchenya IN, Harbacheuskaya YV. Simulation Modeling of Freight Forwarding Services Rendered by an International Logistics Company. Modern Engineering and Innovative Technologies. 2022; (1):141-145.
10. Kravchenya IN, Shevchenko DN. Mathematical models in transport systems. Modeling of queuing systems and inventory management tasks. Belarus, BelSUT, 2022, 145.
11. Kravchenya IN. Simulation Model for Improving the Efficiency of Freight Forwarding Services by a Logistics Company. International Journal of Engineering Inventions. 2023; 12(1):9-19.
12. Lebid E, Luzhanska N, Lebid I, Mazurenko A, Halona I, Horban A, et al. Construction of a simulation model of goods delivery in international road transportation taking into account the functioning efficiency of logistics supply chain. Eastern-European Journal of Enterprise Technologies. 2023; 3(123):57-67.
13. Lebid E, Luzhanska N, Lebid I, Mazurenko A, Halona I, Kovtsur K, et al. Selecting a transport and forwarding company for meeting a customer's needs when organizing international road cargo transportation. Eastern-European Journal of Enterprise Technologies. 2024; 3(3(129)):55-66.
14. Lebid E, Luzhanska N, Lebid I, Mazurenko A, Maksym Roi Iryna Mykhailenko Lidiia Yelnikova Oleksii Tihov. Construction of a simulation model of the work of a transport and forwarding enterprise in organizing multimodal cargo transportation. Eastern-European Journal of Enterprise Technologies. 2024; 6(3(132)):6-16.
15. Lebid I, Luzhanska N, Mazurenko O, Kudriashov A, Kravchenya I. Improvement of Customs and Logistics Services in Ukraine. Transport Means. 2021; Part I: 278-283.
16. Luzhanska NO, Kravchenya IM, Lebid IH. Evaluation of the Freight Forwarding Company`s Staffing Efficiency. Modern Engineering and Innovative Technologies. 2020; 13(2):93-98.
17. Manuj I, Sahin F. A model of supply chain and supply chain decision-making complexity. International Journal of Physical Distribution & Logistics Management. 2011; 41(5):511-549.
18. Mazurenko A, Kudriashov A, Lebid I, Luzhanska N, Kravchenya I, Pitsyk M. Development of a simulation model of a cargo customs complex operation as a link of a logistic supply chain. Eastern-European Journal of Enterprise Technologies: Control processes. 2021; 5(3(113)): 19-29.
19. Mnatsakanian M, Shalina K. Organizational and technological problems of intelligent interaction of road and sea transport. Scientific Journal of Polonia University. 2022; 54(5):170-182.
20. Sedláček M. Optimization of Processes in a Freight Forwarding Company Using a Simulation Model. MATEC Web Conf. 2017; 134:00050.
21. Sokolova O, Soloviova O, Boret I, Vysotska I. Development of conceptual provisions to effectively manage the activities of a multimodal transport operator. Eastern-European Journal of Enterprise Technologies. 2021; 1(3(109)):38-50.
22. Wasielewska-Marszałkowska I. Directions of development of new forms of performance of logistics functions by forwarding (freight forwarders) in modern supply chains. Torun Business Review. 2015; 14(1):137-150.
23. Yang N, Ding Y, Leng J, Zhang L. Supply Chain Information Collaborative Simulation Model Integrating Multi-Agent and System Dynamics. Promet – Traffic &Transportation. 2022; 34(5):711-724.