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INVESTIGATING PROBLEM ISSUES IN CUSTOMER SERVICE USING COMBINED TRANSPORT

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Abstract. With the growth in the number of shipments and the increasing costs of transport and air pollution caused by transport activities around the world, the past decade has seen a search for alternative freight transport methods to reduce these factors. Scientific background and assumptions: it is argued that in combined transport, the transit time is the same as in single mode transport; customers' needs have increased. The research object of the article: the operation of combined transport and its impact on the quality of customer service. The analytical and scientific part analyses the concept of logistics, its operational processes, as well as presents the main components of the activity in theoretical and scientific aspects, which are used to carry out other analyses of the scientific literature on customer service, combined transport activity, which are necessary for the research. The research part, which is based on the collected statistical data, best practices in foreign countries and an expert survey, seeks to identify the real issues of combined transport and the areas that affect customer service. The results section presents the developed model regarding the solution that can be applied to eliminate or reduce and improve customer service performance in a combined transport mode.

Keywords: combined transport, customer service, interaction between customer service and combined transport, model.

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Introduction

Logistics focuses on the movement of goods, but its impact is much broader. Business success in logistics means greater efficiency, lower costs, higher production rates, better inventory control, more efficient use of warehouse space, higher customer and supplier satisfaction, as well as better customer experience (Jenkins, 2024). Inventory management is concerned with maintaining sufficient stocks to meet customer needs while reducing balance sheet costs (Benotmane et al., 2018). Transport is one of the most important activities carried out by logistics companies and is also one of the most resource-intensive and revenue-generating logistics segments (Sarder, 2020). Packaging in supermarkets is very important for the customer as it is one of the main reasons why customer chooses a particular product; packaging that customers see on the shelf and are fascinated by because it looks attractive and encourages them to buy the packaging (Singh, 2022). The elements of customer service inherent in logistics operations are distinguished, including fulfilment, speed, quality and cost (Querin & Göbl, 2017). Customer service starts with the entry and execution of a product order, from stock building to the final transport of the product to the desired location (Sarder, 2020). Further sections describe the different elements of customer service.

Table 1. Scientific definitions of combined transport (compiled by the authors)

Author, year	Definition
Intermodal..., 2020)	Combined transport is a mode of transport that uses standardised cargo containers – containers, swap bodies and semi-trailers, which can be easily transferred to other different modes of transport such as ships, trucks or trains to be transported to their destination.
Yeager, 2020	Combined transport refers to the carriage of goods by two or more modes of transport. By loading goods into containers or semi-trailers, consignments can move seamlessly between lorries, trains and cargo ships.
Fang et al., 2020	The development of combined transport not only helps to reduce societal problems such as energy depletion and environmental damage caused by transport, but also helps to reduce transport costs, improve transport efficiency and optimise transport services.
Wisetruangrot, 2020	Combined transport companies can increase their credibility by picking up and controlling loads on time from the point of loading to the point of unloading, by showing an interest in solving any problems a customer may encounter while waiting for their cargo, and by performing transport services properly to ensure that all customers receive their goods on time.

Combined transport – Positive and negative features. The aim of this paper is to determine how the performance of combined transport affects the quality of freight transport in relation to customers. In order to obtain the results, it is mandatory to look at the positive and negative aspects of the combined transport operations in the supply chain and the positive or negative effects on customer service caused by the combined transport processes (Table 1).

Advantages of combined transport. Reduced transport costs. Combined transport is mainly associated and combined with rail and road transport. By using combined transport, companies can save much more of their resources in terms of the length of the journey and the distance between the consignor and the recipient of the product or raw material. This means that the longer the transport distance, the greater the savings. Significant cost savings in this case can range from 10% to 40% and are usually associated with:

- Lower fuel consumption. As mentioned above, combined transport activities are mainly carried out by rail, as rail transport is the most economical mode of land transport, which reduces the fuel consumption and CO_2 emissions of road transport (Magill, 2019);

Reduced freight preparation, handling and transhipment charges. Combined freight transport of products or raw materials does not involve the goods being transferred from a container, semi-trailer or other transport container until they reach their final destination (McGuire, 2021).

Infrastructure development. Analysing infrastructure development, it is important to note that the growth of combined transport is leading to an increase in the number of combined transport terminals and their facilities, which creates opportunities for terminals to handle larger volumes of incoming freight, and this, in turn, generates greater economic value for the state through the terminal's payment of taxes for handling and other activities (Dewitt & Clinger, 2000).

Risk reduction. In terms of the advantages of combined transport, this type of transport is safer than other modes of transport, especially when the activity is carried out by a combination of rail and road transport (LaGore, 2020).

Negative attributes of combined transport. In order to ensure the highest quality of freight transport for the customer, it is necessary to assess the influencing negative aspects.

Transit time. When planning a combined transport operation, shippers and customers need to plan more for both the transport time and their own production, if the cargo is raw materials or other manufacturing goods, as the transit time is much longer than the usual time it would take for the truck to arrive (Ratemo et al., 2015).

Table 2. Scientific definitions of customer service (compiled by the authors)

Author, year	Definition
Grant, 2024	Customer service is a direct, one-to-one interaction between the consumer buying the product and the company selling it.
Antania, 2024	Customer service is the support that is offered to customers from the moment they first contact the company to the months and years that they use the company's services.
Savage, 2021	Customer service is defined as the help and advice that a company provides to people before, during and after they buy a product or service.
Rajnerowicz, 2024	Customer service is the set of actions a company takes to help its customers. It usually involves interacting with customers.

Technical fixing and handling work. In combined transport, loading operations are more time-consuming and create a number of technical obstacles, as the loaded cargo in semi-trailers or containers is not properly secured (Yang, 2021).

These technical obstacles can result in a semi-trailer or container not being accepted at the terminal until everything is in order, which can mean that, for example, a properly arranged load will be delivered too late and its departure time will be delayed until, for example, the departure of the next train (Abramovič et al., 2012).

Cargoes not being accepted for combined transport according to specifications. There are cases where the specifications of the goods do not allow them to be transported by combined transport (Galierikova & Sosedova, 2018).

Cargo volumes. Combined transport is one way to reduce the cost of transporting freight. However, it is not cost-effective for operators who transport partial loads by combined transport (Ratemo et al., 2015).

The differences between customer service and customer experience. Understanding the specifics and subtleties of customer service and customer experience is crucial to understanding what customer service is. First and foremost, customer experience is a phenomenon that describes everything that a customer has done or experienced in their interactions with the company providing the service. Customer service is only part of the customer experience. In fact, the need for customer service arises when a customer encounters problems in the execution of customer experience actions (Karp, 2024).

Personalised customer service. Customers and consumers want more than a nice interaction and a smile – they want a personal experience (Hult & Morgeson, 2023).

High morale among service staff. While it is sometimes difficult to protect customers from negative attitudes from customer service staff, it is imperative that service staff develop a neutral attitude and are able to do their job properly (Hult & Morgeson, 2023).

Privileges and offers. It is also important for customers to receive not only the product and services they have ordered, but also additional benefits that encourage them to use the company's services even more often (Hult & Morgeson, 2023).

Efficient customer service. The waiting time for a product or service is one of the main factors determining customer satisfaction. The shorter the response or service time, the more satisfied the customer is.

The concept of customer service does not end with the suggestion of a solution to a problem. Experienced staff know how often customers are affected (Hanif et al., 2010).

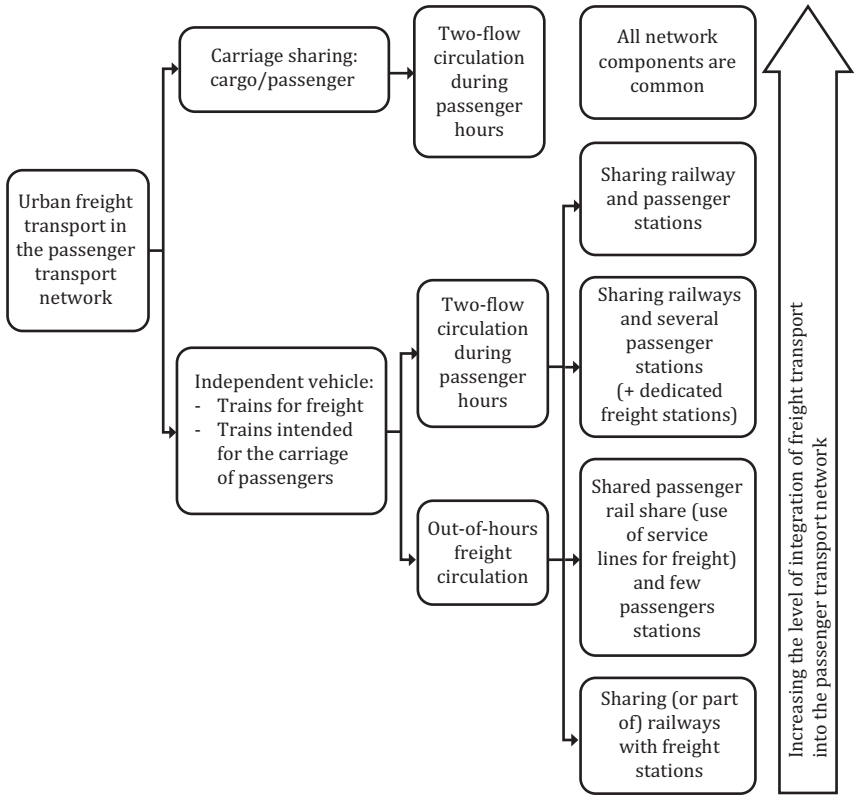

Figure 1. Flow management and control model for combined transport terminals (Behiri et al., 2016)

Analysis of scientific models of customer service problem areas in combined transport. The literature on combined transport provides scientific models on how combined transport operations could be improved to improve customer service quality. These are models that can be used to optimise the performance of the mode in order to obtain the highest possible quality of use of the mode, while avoiding technical disruptions to the movement of goods and other unforeseen problems. Factors such as distance, congestion, fuel consumption need to be taken into account in order to select the most suitable routes for each stage of the journey (Vela, 2023).

The Route Optimisation Model identifies that proper management and control of terminals is essential. To analyse this area of combined transport, a model developed by researchers is presented to show how terminal activities should be separated in order to avoid downtime and congestion (Figure 1).

The effectiveness of the model results in adequate flow management (Pedersen et al., 2005). This theoretical model leads to the fact that ensuring smooth movement within terminals facilitates the planning of arrival and departure schedules, handling operations and the management of loading and unloading volumes.

The literature theoretically proposes that information systems in combined transport terminals collect data on incoming and outgoing freight and intelligently compare it with the freight specifications filled in the system (Balster et al., 2020).

Formulating scientific issues. The literature reviewed indicates that the transport sector and its activities are closely linked to customer service and quality, and that combined transport is not the most reliable mode of freight transport in order to ensure a high quality of freight transport. In terms of theoretical ways of addressing service quality problems, the following main solutions can be identified:

1. Longer transit times for deliveries may lead to the choice of combined transport as a mode of transport that does not cause delays in the transport of goods;
2. In combined transport, it is difficult to track the actual location of the cargo, so to improve customer service, companies providing combined transport services should provide GPS tracking services so that customers can be assured of the movement of their cargo;
3. Information technology deployment and its use in combined transport processes;
4. Expansion of the infrastructure of the combined transport terminals by increasing the number of terminal staff and installing additional equipment in the terminals to ensure a stable and secure operation.

1. Research methodology

Description of the study. The analysis of the scientific literature shows how combined transport processes can affect freight transport, its quality, the overall supply chain and customer service and satisfaction when the customer is the main recipient of the product or service, and how the customer reacts to delays in raw materials or other components for the production of its product when all these are transported by combined transport.

The aim of the study. To carry out a study on the quality of customer service when combined transport modes are used in freight transport, to identify the reasons for the inefficiency of the quality of customer service when combined transport is used, and to provide solutions and suggestions having analysed the factors that cause the effect of the negative quality of customer service.

The subject of the research. The activities, processes and impact of combined transport on the quality of customer service are investigated and analysed with practical examples.

Methodology

Methodology can be broadly defined as the general principles of knowledge. However, this concept is treated differently in different sources. For example, there is a methodology that deals with general scientific principles and forms of enquiry. Another methodology is the methods and ways of knowing in a particular scientific field. In a given field, methodology can be said to be a system of knowledge about the process of scientific knowledge, the methods and the methodology of specific research. There may also be a methodology related to research methods and techniques. In this case, it means that any scientific research needs to be methodologically justified, i.e., to correctly formulate the topic, discuss the research concept, hypothesis, research methods, etc. (Kardelis, 2002).

Qualitative research methods, in the most general sociological sense, refer to the nature of qualitative analytical research and the expression of its results, in which the main emphasis is placed on drawing on the tools of theoretical sociology, traditional philosophy, logic, the apparatus of their categories and concepts, historical comparison, individual observation, interviewing, intuition, the use of official and personal documents, and the means of justifying journalistic and artistic statements, conclusions and recommendations (Gaižauskaitė & Mikėnė, 2014; Rupšienė, 2007).

It is also important not to forget that research consists of quantitative research methods. Quantitative methodology is the dominant research framework in social sciences. It refers to a set of strategies, techniques

and assumptions used to study psychological, social and economic processes through the exploration of numeric patterns. Quantitative research gathers a range of numeric data. The collection of quantitative information allows researchers to conduct simple to extremely sophisticated statistical analyses that aggregate the data (e.g., averages, percentages), show relationships among the data or compare across aggregated data. Quantitative research includes questionnaires, structured observations or experiments and stands in contrast to qualitative research. Qualitative research involves the collection and analysis of narratives and/or open-ended observations through methodologies such as interviews, focus groups or ethnographies (Coghlan & Brydon-Miller, 2014).

Combined transport deployment in European countries: Statistical overview

By its scientific definition, statistical analysis is used to find precise amounts of data and to build models of demand and variability to describe the variability in the results of data sets or experiments (Hassan, 2022). The most typical graphs in descriptive statistics are the scatterplot, the bar chart, the rectangular chart and the histogram (Čekanavičius & Murauskas, 2023).

First of all, four countries – the Netherlands, Belgium, France, Spain – have been selected for the statistical analysis of the data, where the demand for combined transport activities is analysed. For this reason, using data from the European Union's Eurostat (Eurostat, 2022; Freight transport statistics, 2020; Forth, 2021), statistics have been compiled on the percentage of each country's mode of transport used, whether it is road transport, which provides speed and reliability, or combined transport, which generates lower transport costs and reduces CO_2 emissions. The data is presented in Figure 2.

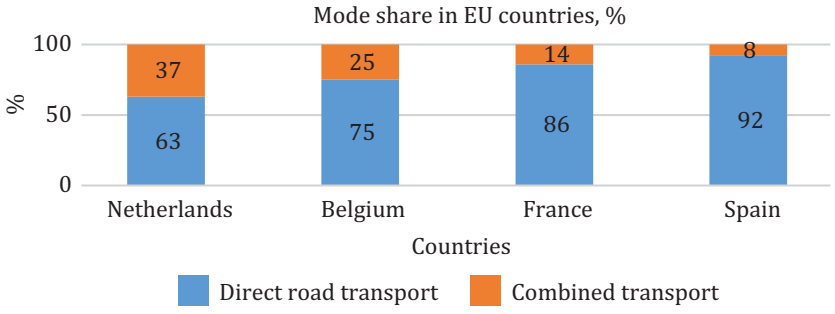

Figure 2. Mode utilisation rate in the EU countries (compiled by the authors based on (Corselli-Nordblad & Jere, 2022))

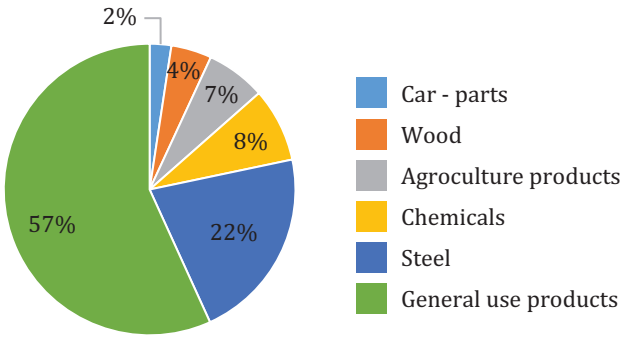

Figure 3. Freight volumes transported by combined transport (compiled by the authors from (Freight transport statistics, 2020))

Looking at other countries and considering the distances to the terminals as the reason, it is clear that each country, increasingly distant from the intermodal hubs, is using this mode of transport less and less in its supply system: Belgium – 25%, France – 14% and Spain – a very low 8%. As regards Spain's low use of combined transport, another reason is given. The nearest combined transport centre to Spain is located in France, in the town of Perpignan, which is situated in southern France.

The analysis of Eurostat data has taken the same freight modes in each country and averaged them (Freight transport statistics, 2020).

Similar reasons prevail in the transport of timber, agriculture and chemicals. One of the least transported products by combined modes is timber – only 4%. This is due to the fact that combined transport is highly exposed to natural disasters. The moisture generated by the transport of grain is likely to cause the products to rot and make them unusable once they reach the consignee (Abualigah et al., 2023).

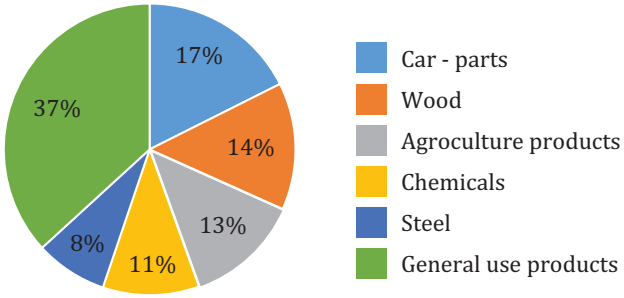

Figure 4. Volumes of freight transported by road (compiled by the authors based on (Statistics Explained..., 2022))

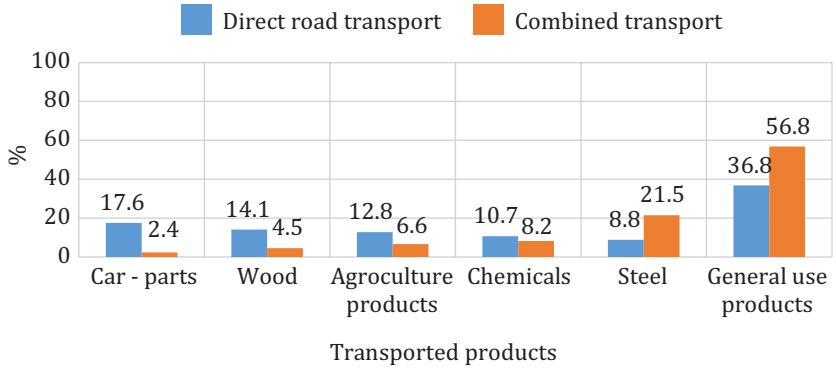

Figure 5. Comparison of the percentage of freight transported by different modes of transport in 2022 (compiled by the authors).

Another part of these statistics is the combined transport of metals and general products. The percentages shown above are further evidence that general cargo is virtually the only type of freight that does not have delivery urgency and can be delayed, accounting for as much as 54%.

If we analyse the largest percentages of volumes, car parts, timber and agri-food products are transported in priority by road transport, unlike combined transport (Figure 3).

For a clearer overall comparison, a graph (Figure 4) has been drawn up for each type of freight, and the volumes expressed as percentages indicate the differences in freight transported.

At the end of the statistical study, the graph below shows, for comparison purposes, the tonne-kilometre freight transport volumes by different modes of transport from 2018 to 2022 (Figure 5).

In 2021, we can see that freight volumes have fallen in both transport modes. There were even shortages of some products in shops and other points of sale during a certain period (Figure 6).

However, in the overall statistics, road transport activity has always dominated at around over 100 billion tonne-kilometres. As a result, it can be concluded that even to this day, combined transport is still underused because of its potential technical problems and physical capacity.

Best practices from abroad. Growing freight transport volumes and increasing pollution have led the world to look for transport solutions that can reduce air pollution and transport freight at the same time in the largest possible volumes. The best practices of foreign countries have been selected for the study in order to identify the ways and possibilities

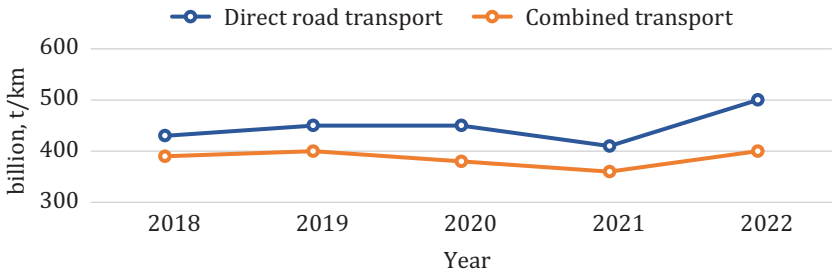

Figure 6. Freight transport volumes in tonne-kilometres from 2018 to 2022 (compiled by the authors based on (Eurostat, 2022))

for European countries to ensure a smooth process of freight transport by combined transport, and to maintain and improve the quality of customer service and the elimination of problematic areas of service in the event of delays and other problematic areas of freight transport by combined transport. The results of the study allow comparing what are the researched, actual and existing problems and what are the ways of their solution, trying to apply the used best practices of foreign countries.

Single-manager combined transport system. The Netherlands, one of Europe's largest flower exporters, has for many years used combined transport to export flowers across Europe, and has had problems with loading containers often not leaving terminals on time, delays due to various technical problems at the terminal or in traffic, and the quality of the flower exports was compromised, with delays leading to inefficient transport, wilting of the flowers, frustration and dissatisfaction of the customers involved in the distribution of the flowers due to spoilage, and the cancellation of the cooperation contracts due to the inadequate quality of the supplies. To address this problem, Flora Holland, one of the largest flower exporters in the Netherlands, has taken the opportunity to develop its own supply system using the following solutions:

- Creating one's own road transport fleet;
- Renting a fixed number of containers;
- Contracting with a local rail terminal for a fixed number of carriages for each departure;
- Setting up own distribution warehouses in each country to which flowers are exported.

These solutions have solved the customer service problems of getting a sensitive cargo such as flowers to the consignees on time and, while maintaining high product quality, to the consignees who sell the product.

Investments in software deployment. In combined transport operations, customer service processes consist of the following main activities:

- Accurate and timely information;
- Timely transport of goods;
- Correct submission of freight documents for combined transport.

The latter is perhaps one of the most important factors behind the integration of document sharing. Previously, all the freight documents required for combined transport operations had to be scanned and sent to the terminals by post or fax machines. As the volume of documents increased over time, the customer's freight documents became increasingly lost in the overall mass of documents being sent. EDI was introduced in the Netherlands, Belgium and Poland. This is a system that allows the work of the cargo documentation of cooperating terminals to be brought together into a single entity.

Expert survey

All the experts of the eight interviewed companies have been working in the logistics sector for more than 10 years, are in leading positions and have a competent opinion about combined transport activities. This survey was conducted by an interview method in October 2023, talking to each respondent privately. Therefore, none of the opinions expressed are dependent on other respondents.

Qualitative data analysis requires an active role of the researcher throughout its process. A method of qualitative data analysis strongly depends on the chosen methodological perspective. Compared to quantitative data analysis, qualitative data analysis is different in the following aspects:

- Attention is focused on meanings, rather than quantitative variable expressions;
- It is more common to collect a lot of data from a few cases than a little from many cases;
- The phenomenon or process is studied in detail, without preconceived notions, hypotheses, categories;
- The researcher himself is a research tool, not objective instruments, designed to measure specific variables, developer;
- Aims to maintain sensitivity to the context, social circumstances, take into account the factors shaping the researched phenomenon or process factors rather than making universal generalisations;
- Emphasis is placed on ensuring that the opinions and responses of all respondents are independent and that the research is unbiased.

- The aim is to describe the social reality under study in detail, rather than to measure specific, sometimes very specific, variables (Gaižauskaitė & Valavičienė, 2016).

The survey, the results of which are presented below, consists of ten questions focusing on the satisfaction of the experts interviewed and the customers served by their transport companies when their goods are transported by combined transport. As the work investigates the impact on customer service by the interaction of the different modes of transport when transporting goods, the answers obtained give an indication of whether customers are satisfied or dissatisfied with the intermodal mode. The results of the survey are presented according to the survey questions in the graphs (Figures 7–12).

The results of the survey are written down in the table at the end of the survey, which shows exact technical problems, and consequences of using a combined transport mode. These results are based on expressions of respondents and their repetitive utterances. These results will lead us to the creation of model how the activity of combined transport could be improved.

Survey

1. Do you use combined transport services?

Respondents from the transport companies surveyed indicated that they had previously sought to expand their combined transport activities due to the potential for lower transport costs, lower air pollution and the possible development of green logistics. However, companies report that freight transport results in negative customer service outcomes, such as delays, non-compliance with the requirements for combined transport, which leads to high costs for transport companies to implement the necessary compliance.

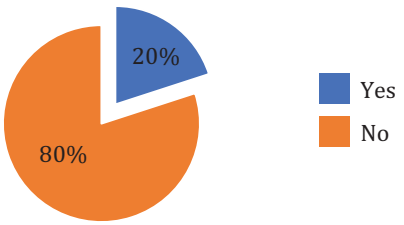

Figure 7. Combined transport usage data, percentage survey results (compiled by the authors)

2. What do you consider to be the positive features of combined transport?

The transport companies surveyed identified four factors, the same ones, which they consider positive for combined transport performance.

These are the four main factors that can make a combined transport activity effective in a transport company's operations, but none of the respondents mentioned that the activity creates a positive effect on customer service.

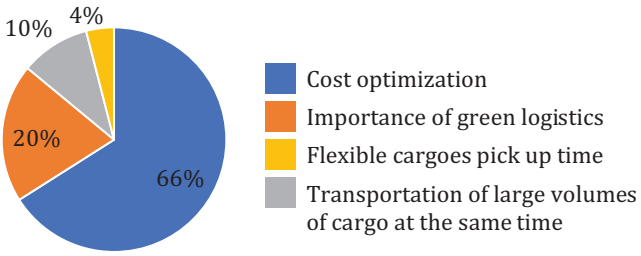

Figure 8. Key positive features of combined transport (survey results, %) (compiled by the authors)

3. What do you consider to be the negative features of combined transport?

The survey shows that as many as 66% of respondents identified delays as the biggest negative feature of combined transport. Another important percentage is the disruption of the registration of loads and semi-trailers at terminals.

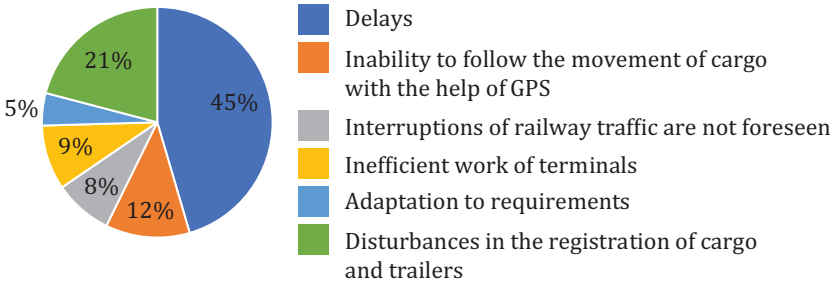

Figure 9. The main negative characteristics of combined transport (survey results, %) (compiled by the authors).

4. **Is it important to inform customers that their goods will be transported by combined transport when providing combined transport services and when accepting orders?**

In the survey, all respondents indicated that "yes", it is absolutely important to inform customers that their freight will be transported by combined transport. Looking at the results of the second question, which accounts for as much as 45% of the delays, the performance of customers who expect to receive their goods on the dates set in the contract, but who receive them several days later due to intermodal disruptions, can become completely unbalanced and unstable, especially for production goods.

5. **What are the main reasons why customers do not trust or refuse possible combined transport services?**

The survey also highlighted the reasons why customers routinely refuse available combined transport services. As can be seen from the responses, the majority of the reasons, as much as 55% of the total, are due to possible delays in combined transport. Another 27% is made up of the reason that tracking is not possible.

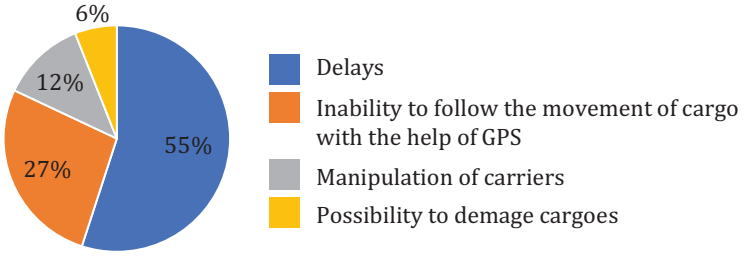

Figure 10. Reasons for perceived customer unreliability of combined transport (survey results, %) (compiled by the authors).

6. **Manipulation by hauliers and possible damage to goods during combined transport transit are also hot issues, accounting for 12% and 6% of the remaining causes, respectively. Respondents indicated that carriers often quote a higher freight price if they state that the cargo will not be transported by combined transport, claiming that the cargo will be transported by a homogeneous mode of transport. How do customers most often express their dissatisfaction with freight delays when this is caused by combined transport operations?**

The survey under analysis is linked to the reaction of customers when their freight is delayed due to combined transport activities, so the survey asked respondents what are the most common reactions and actions of customers that transport companies face when freight is not delivered on time.

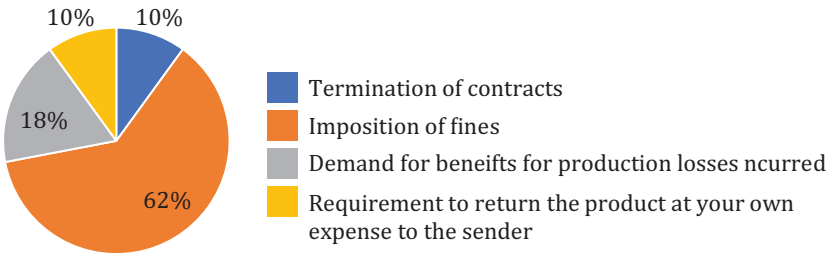

Figure 11. Customer reactions and actions to freight delays (survey results, %) (compiled by the authors)

7. **In your opinion, what are the ways to improve the performance of combined transport in order to meet the needs of customers and to maintain the high level of a transport company in the European transport market?**

The question seeks to find out what can be done to make combined transport operations more efficient and clearer in terms of customer service. Respondents indicated that, in particular, companies providing combined transport services should also take responsibility for, for example, delayed loads, as the current situation is that combined transport companies are not responsible for anything. Many intermodal terminals still do not have official platforms for carriers to self-register their loads at the terminals, and at the moment everything is still done by email.

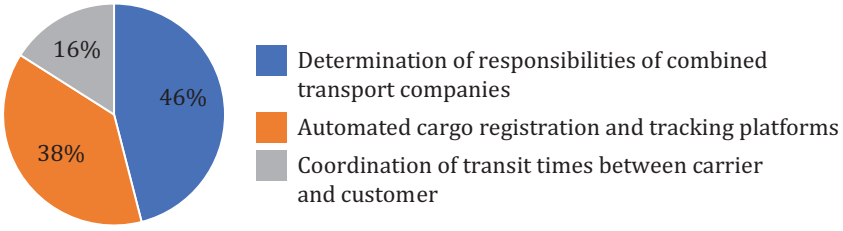

Figure 12. Ways to improve the performance of combined transport in terms of customer service (survey results, %) (compiled by the authors)

8. In your opinion, do the decisions taken to expand the combined transport infrastructure have an impact on the quality of customer service? If so, what should the solutions be?

The experts interviewed pointed out that the development of combined transport infrastructure could have a positive effect on the quality of customer service, but that this was only one part of the overall process of quality improvement. When asked what should be the main development processes and key aspects, the experts stated that the first place to start was, for example, the extension of rail lines and the connection to terminals of other modes.

9. Do you think that the drive to reduce transport costs by using multimodal transport could affect customer relations and create the label of an unreliable transport company in the long term?

To this question, all the experts gave the same answer – "yes, it can, and the important thing is that it is already happening".

According to the experts, solving technical problems is the key to efficient customer service. Unless all possible technical and infrastructural bottlenecks are eliminated, any intermodal network will never work properly and accurately, and this will affect all parties involved in and related to intermodal transport.

10. Having identified the main problems of combined transport, it is reasonable to assume that in order to start improving the efficiency of customer service in combined transport operations, the first place to start is the development and implementation of information technology in combined transport operations. Is this true?

When asked this question, all respondents said that this was true and that it should clearly be the first step in finding solutions to improve customer service performance. Based on the answers and insights provided by the experts, Table 3 classifies the survey data according to the different customer service problem areas in combined transport.

The following phenomena have been identified following the analysis of statistical data and best practices in foreign countries, the expert survey on problem areas in customer service in combined transport:

- Sensitive supply chains or perishable, decaying goods are rarely transported by combined modes due to the high probability of delays;
- Direct road transport is still the leading mode of transport due to its physical capacity – speed – compared to the combined transport turnover (tonne-kilometres);

Table 3. Problem areas of combined transport and their consequences (compiled by the authors)

Technical areas	Products
• Traffic disruption from rail operations. • Combined transport speed. • Terminal congestion. • Non-compliance with the technical requirements for containers and semi-trailers for combined transport operations. • Lack of cargo tracking equipment. • Lack of information systems for cargo registration. • Inefficient terminal management.	• Termination of freight contracts. • Imposing fines for delays in freight. • Loss of customers. • Decline in the quality of a transport company's performance in the transport market. • Continuous disruption to customers due to non-delivery of products.

- Best practices from abroad show that various performance improvement solutions applied to combined transport operations have a positive effect on the quality of customer service;
- Investments in the development of intermodal infrastructure and IT systems are the initial steps in raising performance indicators for the mode under consideration;
- The main problem area for efficient customer service is technical bottlenecks in the mode of transport, such as stoppages in transit due to traffic disruptions and weather conditions. The lack of sufficient and appropriate information technology in the management of the transport mode is also a problem area;
- The issues studied also have implications for the human activity involved in the mode. The problem areas affect the activities of customers and companies, making relationships and further cooperation less and less possible due to the lack of quality customer service.

2. Results

2.1. A model for the interaction between customer service and combined transport, solving problem areas

Background to the model. In order to collect data for the third part of the research – the development of the model, the work includes an analysis of scientific literature and theoretical models of solving the problem presented by scientists, as well as research indicating the demand for the use of combined transport and the types of cargo transported, the analysis of best practices in foreign countries to find

solutions to the problem areas through practical examples, and the expert survey, indicating the real problem areas of customer service using combined transport for freight transportation.

The analysis of the scientific literature, presenting the level of research on the problem by other researchers, has shown that the solutions to the interaction between customer service and combined transport are presented as individual solutions to the problem, which can create a positive effect of the activity, but there is no single theoretical solution that can cover all the problems studied. In the second part of the research, on the basis of the theoretical material on the characteristics, positive and negative motives and consequences of combined transport, a study of statistical data on the demand for combined transport and the types of freight transported has been carried out in order to determine whether the theoretical statements on the problematic nature of the mode of transport and the lower use of the mode of transport are consistent and have a basis for analysing the specific areas of concern.

Relevance of the model. The results of scientific theoretical analysis and practical research indicate that multimodal transport is a mode of transport with many constituent operational processes and is often influenced by various factors that cause operational problems in the mode of transport.

Scientific novelty of the model. There are many models of combined transport that have been developed to address the problem areas, but all models are incremental, address separate problems, through separate information delivery approaches, and do not provide a single solution to all problem areas.

2.2. Model for solving customer service problem areas in combined transport

The proposed model for solving and improving the efficiency of customer service problem areas in combined transport is based on the individual solutions to the problem areas in combined transport, on the proposals examined in the literature analysis, on the theoretical models developed by other authors, and on the data collected in the study. Based on the results and conclusions of the study, the assumptions and suggestions for the model have been developed (Table 4).

The results, assumptions and proposals presented in the table and obtained in the research part are possible as concrete solutions to improve the efficiency of customer service in combined transport, combining the existing problem areas affecting customer service and the solutions that are already improving the efficiency of the combined

Table 4. Assumptions and proposals for the model (compiled by the authors)

Findings of the study	Assumptions and proposals
Frequent delays in combined transport due to technical problems, inefficient and non-optimised operation of terminals, provision of information only during working hours	The problem areas in combined transport are infrastructural and technical, creating delays in freight and negatively affecting the quality of customer service. The establishment of 24/7 information management and cargo control units at terminals would enable continuous monitoring of cargo movements, more efficient management of terminal schedules, filing and reporting of changes in cargo movements, either in the systems or directly to customers.
Long chain of communication between the different parties with an interest in the cargo and its disposition	Customer queries and responses are time-consuming to obtain information on the location of the cargo and other ongoing processes. An information system on the status of cargoes, with all the relevant information, would speed up the process of obtaining information.
Information technology innovations facilitate operational management processes in combined transport	The existing separate tools for freight tracking, document management and dispatching, and automatic calculation of arrival times could be combined and used in a single system, giving access to all freight management entities
Ensuring customer service efficiency creates future opportunities	Ensuring quality customer service through properly executed and informed transport operations builds customer confidence and increases the volume of freight flows, allowing the combined transport business to expand.

transport, but operating in separate parts. This assessment and solution are reflected in the model being developed (Figure 13).

The main idea of the proposed model to improve the efficiency of customer service in combined transport is to identify the main problems and the lack of information about them that are the main causes of customer service, and to combine all the information technology tools that provide information about freight transport into a single system so that all the necessary information is always available in one place, easy to access and available at any time of the day.

The model is developed from processes based on information obtained and analysed during the research and is broken down into four distinct phases.

Assessment of problem situations and the need to provide information. The studies carried out have identified the main problem areas in combined transport that require immediate information to be provided

to customers in relation to changes in the timing and occurrence of their freight.

As the analysis of the study shows, the provision of information on problems is currently rather limited – it is done during the working hours of the terminals, which means that the processes are not monitored around the clock. If problems occur at night, information only reaches customers in the morning when terminals start checking the status of the combined transport and its current position, and if something has happened overnight, the consequences and reactions from customers are often negative due to the lack of information. For this reason, tools are provided to help manage the problem areas on the basis of the problems mentioned above.

Integrating and using information technology. In the transport sector, whether combined or otherwise, there are many tools available to help manage transport activities, track and retrieve information. These are tools that can prevent the consequences of delays in freight and the resulting negative customer reactions due to the failure to communicate information in time.

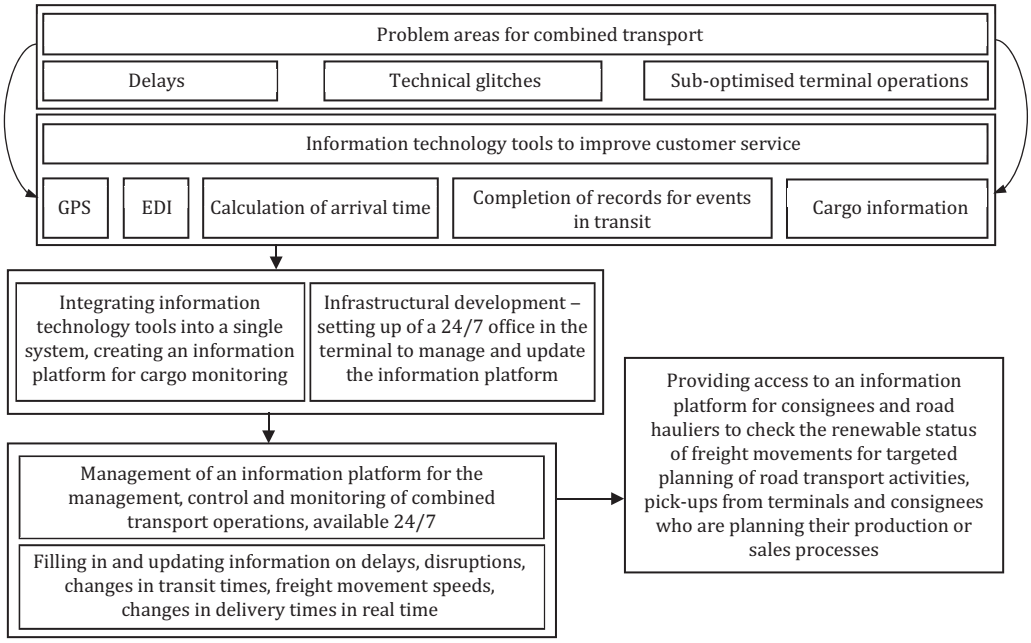

Figure 13. Proposed model for solving customer service problem areas in combined transport (compiled by the authors)

Information technology and terminal development solution. Given the problem areas of the combined transport operation, the customer service and the tools available to address the problem areas, the model develops an IT and terminal development process as a solution to improve the efficiency of customer service. By combining all the available tools into a single entity and thus creating an information platform that is managed, populated and controlled by an established 24/7 terminal cargo management centre, a fast, reliable and clear information environment can be created for customers. The control centre, using existing combined transport management tools, populates the information system with cargo delays, changes and other information related to cargo transport issues. The key principle of the model is that any customer using combined transport services should have access to the information system and be able to monitor the movement of the cargo independently and have information on what is happening with the cargo without having to send separate requests which take a long time to answer and clarify situations.

Providing access to the information platform to consignees and road hauliers. All the information on the information platform, updated 24/7 by the intermodal terminals, is important for road hauliers to plan their pickups from the terminals based on the arrival information provided by the terminals and for the consignees themselves, who normally plan their production or other business processes based on the timing of the arrivals of their goods.

Resource requirements for the implementation of the proposed information system. The proposed model is presented as a process requiring investment in the operation of any terminal. In order to be able to use the proposed model to solve the problem areas of customer service in combined transport, investments are needed that can provide access to all the information technology tools mentioned in the paper to improve the problem.

2.3. Benefits and effectiveness of using the model

The most important feature of the proposed information platform as a solution to solve customer service problems is: to connect all the actors involved in the management and information of the cargo in the combined freight transport process. A flowchart for facilitating the receipt and provision of information is presented in Figure 14.

The visual diagram of the abbreviated communication chain shows that once the information platform is set up and one single piece of information is visible, the customer can use the platform to analyse the information of interest on his/her own, without any additional

queries and saving time. This is a solution that would virtually eliminate unnecessary communication between the customer and the hauliers, saving time for both parties, as communication would be limited to certain extra cases such as:

1. The carrier has booked the wrong departure date on the platform, which means that the cargo will reach the customer-consignee later than the customer needs it for production;
2. The departure of cargo from the terminal is delayed for several days due to technical problems, and the customer needs the cargo much sooner than the new arrival date;
3. Other cases of correction of the data provided are cases where the customer provides the carrier with incorrect cargo data and the cargo is unable to pass the security check on arrival at the terminal due to the incorrect data entered on the platform, so the carrier has to obtain a correction of the cargo from the customer.

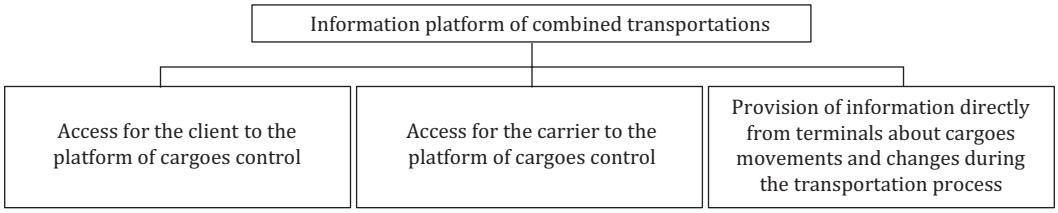

Figure 14. Communication chain after the development of the freight management information platform (compiled by the authors)

Conclusions

The analysis of the scientific literature has shown that there are constant problems in combined transport when serving customers. The analysis of the literature shows that the biggest problems in combined transport are delays, long transit times and lack of use of information technology.

1. To address the problem areas, the researchers identify a number of key plans that can improve the efficiency of customer service in combined transport operations, such as the development of infrastructure and the introduction of information technology. These plans can have a positive effect on the performance of combined transport operations, as the lack of information technology deployment and the lack of the necessary infrastructure cause disruptions in customer service in combined transport.

4. The study on the problem areas of customer service in combined transport identifies the main problems as delays, disruptions during transit, and sub-optimised terminal operations. These problems are expressed as the main reasons why the highest level of customer service cannot be created.
5. Based on the analysis of good practices in other countries and the expert survey, the main measures missing to address the problem areas have been identified.
6. The research carried out has formed the basis for the development of the model. The model consists of the three main problem areas in combined transport and the solutions that are most needed to improve customer service performance.
7. The lack of suitable infrastructure is also one of the problems in the development of combined transport activities. To date, the infrastructure is insufficient to effectively run combined transport services.
8. The model presented here is based on the premise that the use of information technology is essential to improve customer service performance in combined transport. The steps in the development of the model consist of mutually reinforcing parts. The model contains problem areas, information technology tools, process implementation methods and options to solve the problems.
9. Combined transport companies do not have the right communication channels and information technology systems to ensure a smooth operational process. To address this issue, it is suggested that combined transport companies should not only look at the benefits offered, but also at the lack of tools to carry out their combined transport activities, and assess their communication capabilities when trying to attract customers.
10. The integration of existing information technology tools into a single package enables the management of the combined transport operation by providing information on its continuous updates.

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