

IMPROVING THE QUALITY OF SERVICES IN A LOGISTICS COMPANY USING THE PARETO ANALYSIS

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1. **ABSTRACT:** The objective of the paper is to analyze and improve the quality of shipping services within a logistics company operating in Romania, using the Pareto analysis as a decision-making tool. The paper reviews the theoretical aspects regarding the quality of services, followed by a case study consisting of applying the Pareto principle and method to the maritime transport service offered by the logistics company. The most important problems faced by the company in shipping were identified based on the customers' complaints, followed by the application of the Pareto analysis. The results show that the most significant problems reported by the 60 customer complaint forms were incomplete documentation, exceeding transport time, and incorrect placement of cargo. The Pareto analysis revealed that if the company focuses on solving these critical issues, around 70% of the company's current problems can be solved, leading to increased quality of services and increased customer satisfaction, consequently.

2. INTRODUCTION

For an organization supplying products or services, it is essential to achieve and maintain the quality of the products and services supplied, in the quantities, at the prices/rates, and within the deadlines agreed with the customer's representatives, at the level of the customer's requirements, but also with maximum efficiency and effectiveness [1]. Therefore, the quality of service is one important means to successfully compete in the service sector.

A service is not a tangible good, and measuring its qualities is complex. In addition, a service is produced at the moment of delivery to the customer, as its quality can only be controlled once the customer tests it. Service delivery is about the provider system and the firm's competitive strategy [2]. Customer satisfaction is a key factor in shaping customers' future purchase intentions [3]. Therefore, it can be affirmed that a company's success in business depends on the quality of all activities directly or indirectly related to providing services [4].

3. QUALITY OF SERVICES

Quality in services consists of three components: the level of service offered, corresponding to the strategies adopted by the company, customer expectations and the actual service provided, as received by the beneficiary. The best-known authors in the field of service, Leonard L. Berry, A. Parasuraman and V. Zeithamal [5], have identified five global dimensions of service quality:

Quality characteristics of the tangible part - the tangible part of a service is what you "see"; i.e. the buildings, equipment, and appearance of the contact staff, which are physical indicators expressing the nature of the service itself. Because services are processes and not objects, it is difficult for customers to perceive them mentally and impossible to capture them physically. Therefore, customers tend to look for the quality characteristic of the tangible part associated with the service itself, in order to be able to appreciate it and compare it with other services or to their expectations.

Credibility - it means that the company keeps its promise to its stakeholders, i.e. delivering the promised service properly and efficiently. Errors in service delivery are costly, they cannot be separated, they always destroy customer confidence in the institution, and excuses are of limited value.

Friendliness - it expresses the willingness to serve customers promptly and efficiently.

Safety - it refers to the level of competence and attention to detail and customer concerns that the service provider gives, and that gains the confidence of the customers. When service providers are knowledgeable and attentive, customers are "reassured" that they are working with the right company.

Empathy - It is more than professional courtesy, it is a "commitment to the client", a willingness to understand the client's exact needs and find the precise answer to them. Empathy also means providing a caring, customized service that meets the customer's needs.

4. IMPROVING THE QUALITY OF SERVICES OF DB SCHENKER GBS

4.1. General description of the company

DB Schenker GBS is the leading global logistics and transportation provider, supporting contract logistics, and supply chain management, as well as industry and commerce in the global exchange of goods through road, rail, air, and sea freight almost everywhere in the world [6].

With around 21,500 employees in 430 locations, DB Schenker is the European leader in road transport. The international unit connects the most important economic regions in more than 40 European countries with a network of around 32,000 regular general cargo services every week.

As declared by the company website [6], DB Schenker offers customers time and cost-optimized services for groupage, part or full general cargo transport. The dense European network allows the company to offer services from a single source and to meet uniformly high, certified standards.

As a leading player in the air and sea freight market, DB Schenker is one of the largest freight forwarders in the world, being present in more than 800 locations worldwide with around 13000 employees, operating around 1200 charter flights per year via first-class airlines and connecting hubs on all continents. DB Schenker is considered the leader in innovative airfreight concepts.

4.2. Presentation of the company DB SCHENKER GBS BUCHAREST SRL

DB SCHENKER GBS is the number one freight forwarder in Romania, with branches in Bucharest, Cluj-Napoca, Arad, Iasi, and Constanta, with more than 60 working points in all regions of the country. The company offers a full range of road, rail, air, and sea transport services, logistics or customs services, and port operations in its terminal.

4.3. Description of services offered

The main services offered to customers are: shipping, chartering, provisioning of sea and river vessels; cargo handling, shipping; sorting, packaging, distribution of goods; storage and warehousing.

Taking into consideration the nature of the activity, the logistic services of DB SCHENKER GBS BUCHAREST SRL can be classified into three categories: services related to the storage activity, services related to the distribution activity, and services related to the transport activity [7].

DB SCHENKER offers a wide variety of transport and import-export services [6]:

- *Road transport:* with 430 road transport branches across Europe, DB SCHENKER's transport products and services use an extensive and dense network. Road haulage services ensure the safe delivery of loads, regardless of destination. The road fleet can deliver any goods to any location.

- *Air Freight:* DB SCHENKERjetcargo: has 3 customized packages: SCHENKERjetcargo business, DB SCHENKERjetcargo economy and DB SCHENKERjetcargo special.

- *Rail transport:* DB Schenker is the leading global provider of integrated logistics services and Europe's largest rail operator in terms of volumes transported. The company offers transport services by single wagon or groups of wagons to any import, export, transit, or local destination, and full trainload rail transport - the efficient, fast, and environmentally friendly solution for transporting very large quantities of freight.

- *Maritime transport:* DB SCHENKEROcean product range offers a variety of services that meet the needs of the maritime supply chain. Each service has been designed to meet high standards for door-to-door delivery transport services and all the elements in between.

- *Customs formalities and services:* Although customs restrictions across Europe are a thing of the past, there are still countries in Eastern Europe with strict rules on freight transport. DB SCHENKER GBS has all the necessary knowledge about import and export customs clearance. In Romania, the operation is carried out in the Free Zones of Giurgiu, Curtici - Arad and Brăila, the Free Port of Constanta, where warehousing services are offered, in covered areas or on platforms, handling, sorting, packing, and other related services

- *Contract logistics:* DB Schenker acts as a contract logistics partner for companies in all key markets. The international network covers more than 750 locations in over 50 countries, with a total storage area of over 8 million square meters. The company covers all phases of the supply chain, from supplier to customer delivery, from reverse logistics to aftermarket support in various industries [6].

4.5. Evolution of financial indicators

The evolution of important financial indicators of DB SCHENKER GBS can be seen in Table 1:

Table 1. Evolution of financial indicators of DB SCHENKER GBS Bucharest SRL

<i>Year</i>	<i>Turnover (EUR)</i>	<i>Net Profit (EUR)</i>	<i>Debt (EUR)</i>	<i>Fixed Assets (EUR)</i>	<i>Current Assets (EUR)</i>	<i>Equity capital (EUR)</i>	<i>Employees (average)</i>
2022	30232285.4	1103443	3578367.2	996472.6	12904010.4	290622	940
2021	26390357	1222706	2932546.4	593907.8	10381571.2	290622	933
2020	24976070	1420884.8	4368227.4	410854.6	10313494.2	290622	877

Source: [8]

The analysis of the financial indicators shows a growth in turnover over the last three years, as the company grew rapidly. However, the declared net profit decreased in 2022 as compared to the previous years.

Another key aspect is the development of human resources within the firm. The company witnessed an increase in its number of employees in the last two years, with more than 900 people currently working for it.

5. IMPROVING SERVICE QUALITY IN DB SCHENKER GBS USING THE PARETO ANALYSIS

5.1. Research objectives

The research problem consists of investigating the effectiveness of maritime transport services provided by DB Schenker GBS Bucharest SRL by identifying key issues and implementing Pareto analysis for quality improvement.

The research aim is to evaluate the maritime transport services offered by DB SCHENKER GBS Bucharest SRL, focusing on identifying significant problems impacting service quality and proposing optimal solutions through Pareto analysis methodology.

The research objectives include:

- To conduct a comprehensive analysis of the maritime transport services provided by DB SCHENKER GBS Bucharest SRL.
- To identify and prioritize the key problems affecting the quality of maritime transport services through Pareto analysis.
- To propose and prioritize optimal solutions to address the most critical issues identified through the Pareto analysis.

By addressing these objectives, the research aims to contribute valuable insights into optimizing maritime transport services offered by DB SCHENKER GBS Bucharest SRL, ultimately enhancing customer satisfaction and competitiveness in the market.

DB SCHENKER GBS ships more than 5,500 containers every day to ports around the world, proving that it is a leading carrier in the field of maritime freight transport. According to the analysis of the most useful service improvement methods, it was concluded that the Pareto method is the most suitable for identifying the critical problems that the company is facing. On a

general level, applying this method can significantly improve the performance of the organization and the way customer services are delivered [9].

5.2. Research methodology

The study employed a quantitative methodology. The research method was the ended-questions survey. The research instrument consisted of a brief questionnaire employing variables such as the frequency of use of the shipping service, the customers' opinions on the impact of different factors (price, time, safety) on the quality of service delivered by the company, and the main customers' complaints regarding the maritime transport service offered by the company. For the present paper, only the customers' complaints were analyzed using the Pareto method.

Research method: In order to find the critical factors that have the most negative influence on the company's performance, the Pareto analysis was carried out. The Pareto Analysis, based on the Pareto Principle (80/20 rule), identifies problems and their frequency and emphasizes the optimal solutions [10]. The advantages of the Pareto method are that it helps solve a problem efficiently by identifying and ranking its main causes in the order of their importance, and shows where managerial efforts should be directed, thus improving the use of scarce resources [11]. The method allows the prioritization of the identified problems within the company. It makes it possible to highlight the critical, most important 20% of the causes, which generate circa 80% of the problems the company is facing [12]. Pareto Analysis also offers a visual representation of problem areas, facilitating clear communication and decision-making [13].

Other quality improvement methods include the Ishikawa diagram and the SERVQUAL method. The Ishikawa Diagram (Cause-and-effect or Fishbone diagram) is a graphical tool used to identify and visualize potential causes contributing to a specific problem or outcome. It categorizes potential causes into major categories such as people, process, equipment, environment, and management (the 5M's), facilitating a structured analysis of root causes [14]. It helps organize potential causes systematically, but it can become unnecessarily complex. Additionally, it does not prioritize causes based on their relative impact.

The SERVQUAL method is a framework used to measure and manage service quality by assessing customers' perceptions and expectations across various dimensions. It involves surveying customers to measure the perceived quality of service along dimensions such as reliability, responsiveness, assurance, empathy, and tangibles, enabling companies to identify areas where the perceived service can be improved [15]. However, interpreting and acting on survey results effectively can be challenging, due to the complexity and specificity of the questionnaires used.

Given the short analysis of other available quality assessment methods, it was considered by the authors that the Pareto method can help attain the objectives of this paper the best and can deliver the best results.

Data collection: the questionnaire was applied online, using Google Forms.

Research sample: the questionnaires were filled in by 60 of the most important customers, after the completion of their shipping transport in Mannheim, Germany. The most important customers filling in the questionnaires and complaint forms were:

- Roche: a company offering products and services covering the full spectrum of healthcare from prevention, treatment, and post-treatment follow-up. It has a range of products for patients, doctors, and hospitals.

- Bosch: Robert Bosch GmbH is a German company founded in Stuttgart in 1886 by Robert Bosch. The company's areas of activity are systems and components for the automotive industry, manufacturing of consumer products (power tools, household items), industrial construction engineering services, packaging technology, etc.

- Corning: Corning Incorporated is an American multinational technology company that specializes in glass, ceramics, and other related materials and technologies, including advanced optics, primarily for industrial and scientific applications.

These three companies, along with other smaller customers, provided most of the complaints that were analyzed in this study.

5.3. Identification of problems reported by customers regarding the quality of service in maritime transport

From the feedback advanced by the customers, it can be concluded that DB SCHENKER GBS faces various problems that pose difficulties in the transport of goods by sea (Table 2):

Table 2. Problems reported by customers of DB SCHENKER GBS

<i>Crt. no.</i>	<i>Reported problems</i>
1	Incorrect placement of dangerous/non-hazardous goods
2	Exceeding transport time
3	Incomplete documentation for the transport of goods
4	Poor communication between the client and the import/export team
5	Poor ventilation of goods
6	Essential systems for improving navigation safety
7	Total cost of transport

Source: authors' contribution

5.4. Identification of the causes of each reported problem

1. Incorrect placement of dangerous/non-hazardous goods: Most of the time, goods destined for loading on ships travel long distances to the port of loading by various means of transport and are often repeatedly handled and stored in port warehouses or on quays until the arrival of the ship that will pick up the goods. Throughout this period, the packaging and even the goods themselves may be damaged, which is why special attention should be paid to the condition of the goods during loading [16].

During transport, several factors tend to change the positions of the goods in the containers; therefore, for groupage transport, it must be taken into account when packing that the goods will undergo multiple handling and that the packaging must provide adequate protection for the goods transported [17]. The goods may only be mixed with other types of goods if they are not dangerous. It is mandatory to inscribe on the package the general nature of the goods, the principal markings necessary to identify them, an express statement as to the dangerous nature of the goods, the number of packages or pieces, and the weight of the goods or their quantity otherwise expressed, as provided by the shipper [18].

2. *Exceeding transport time:* Delivery delays exist when the cargo has not been delivered within the agreed time or if the documents have not been completed on time. If either of these situations happens, the company bears the related costs.

3. *Incomplete documentation for the transport of goods:* The goods should be released to the beneficiary under the conditions stipulated in the bill of lading only if the beneficiary has the original bill of lading received from the bank which ordered the payment to be made to the account of the concerned importer. The company may experience poor management of daily work documents.

4. *Poor communication between the client and the import/export team:* The connection between the customer and the import/export team is made through the Technical Support department in Germany. Therefore, the response time to customers' complaints is quite long, leading to customer dissatisfaction. For example, sometimes the container number or the number on its seal can be changed, but the customer does not receive the updated document in time.

5. *Poor ventilation of goods:* Because the ship crosses different temperature zones, the cargo will be subject to large differences in humidity, which can degrade it. This is why special care must be taken to ventilate the cargo during the voyage [19].

6. *Essential systems for improving navigation safety:* The sealed container(s) intended for carriage will leave the country of origin only after its representative at the port of loading receives the written instructions for the transport documents (bill of lading and cargo manifest). Based on these instructions, the sealed container(s) will be loaded on board the means of transport. DB SCHENKER GBS can be accounted liable only for damages caused by its own mistakes, that can be imputed to it and its predecessors. If the seal/container is damaged, it can be replaced after checking the goods.

7. *Total cost of transport:* There are numerous factors that may increase the cost of transport [20]. However, any financial, material, or other consequences due to the delay in loading the goods and the delay in their departure from the country of origin, as a result of the Customer's late transmission of written instructions for the preparation of transport documents, shall be borne entirely by the Customer. The transport price does not include additional insurance for the goods (CARGO insurance).

Table 3 shows the number of complaints DB Schenker GBS faces in maritime transport. This analysis was carried out by analyzing the customers' complaints after the completion of 60 sea shipments:

Table 3. Number of reported customer complaints

<i>Crt. no.</i>	<i>Customer complaints</i>	<i>Number of complaints</i>
1.	Incomplete documentation	18
2.	Exceeding transport time	15
3.	Incorrect placement of goods	9
4.	Poor customer-team communication	7
5.	Increased costs	6
6.	Incomplete safety systems	3

7.	Incorrect cargo ventilation	2
	Total	60

Source: authors' contribution

The most common problem faced by the company is incomplete documentation, followed by delays in transport and incorrect placement of goods in the third place. The three problems are closely related to human resources because unfinished or incompletely completed documents lead to high costs for the company.

5.5. Analysis of the reported problems

The elements analyzed in the PARETO diagram concern the problems existing in DB SCHENKER GBS SRL shipping company.

The next step of the Pareto analysis involves calculating the cumulated frequencies and the corresponding percentages for the reported customer complaints (Table 4):

Table 4. Pareto analysis of the reported customer complaints of DB SCHENKER GBS

<i>Crt. no.</i>	<i>Complaints</i>	<i>Frequency of complaints</i>	<i>Cumulated frequency</i>	<i>Percent</i>
1.	Incomplete documentation	18	18	30%
2.	Exceeding transport time	15	33	55%
3.	Incorrect placement of cargo	9	42	70%
4.	Poor customer-team communication	7	49	82%
5.	Increased costs	6	55	92%
6.	Incomplete safety systems	3	58	97%
7.	Incorrect cargo ventilation	2	60	100%

Source: authors' contribution

As can be observed from Table 4, the results obtained using the Pareto method show that the first two reported problems, namely incomplete documentation and exceeding the transport time account for the majority of customers' complaints (55%).

The elements of the analysis can be better observed on the Pareto diagram. The complaints listed in Table 4 are plotted as follows (Figure 2):

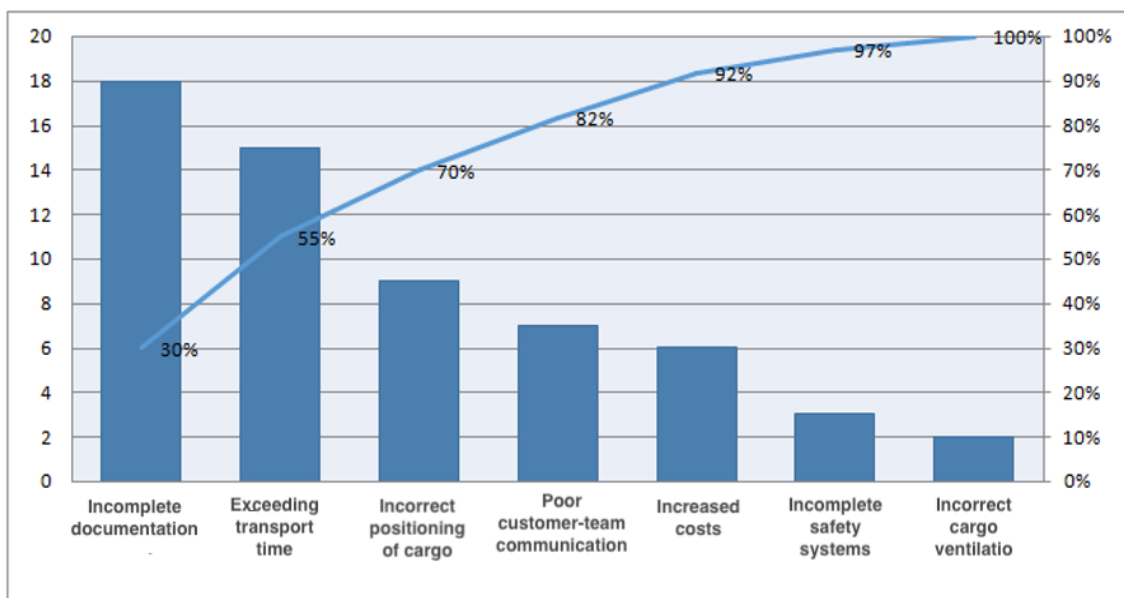


Figure 1. Pareto diagram of the reported problems existing in its maritime transport activity

The main benefit of the Pareto principle is its ability to emphasize, in a scientifically proven way, the main causes of a problem, which, solved as a priority, generates the greatest effects. It highlights the critical few causes among the many causes possible and it focuses the efforts of the managerial team on the ones that matter. Therefore, the Pareto analysis proves to be a very effective managerial decision-making tool, helping managers select and prioritize the most important problems.

As shown by the Pareto diagram of DB SCHENKER GBS's maritime transport activity, the first four reported problems of account for more than 80% of the dissatisfaction of customers. Incomplete documentation, extended transport time, incorrect placement of cargo, and poor communication between the customers and the import-export team are the main causes of customer complaints. If the company manages to solve these problems, more than 80% of the customer issues with the company will be solved effectively.

Solving the first three causes (incomplete documentation, exceeding transport time, and incorrect placement of cargo) can solve around 70% of the company's current problems. As demonstrated by the Pareto analysis, improving the quality of DB Schenker GBS's maritime transport activity should focus on the root causes that prove to generate the most dissatisfaction among the clients.

6. RECOMMENDATIONS FOR IMPROVING THE QUALITY OF SERVICES

The maritime transport activity of DB Schenker GBS, being of the greatest economic importance for the company, needs to run effectively and therefore can benefit from the improvement solutions promoted as a result of this analysis.

The most important problem the company faces in its maritime transport services is the one of *incomplete documentation*. Some of the most common causes for this problem can be the short processing time for the transport data, leading to erroneous transport documents, negligence of the employees regarding the transmission of updated documents to customers or various authorities in time, or even the loss of official documents before loading cargo onto the ship.

The problem of *exceeding transport time* is usually generated as a result of a few main factors: transport or customs documents not sent on time, generating delays in the transport chain that increase the time of the overall transport process, and bad weather conditions which force the company to adapt and cause the transport time to exceed the initial timeline.

The third problem is *cargo mispositioning*, which is an extremely important issue, especially for dangerous/hazardous goods shipments. The adequate placement of cargo is paramount because several factors tend to change both the stacking and the condition of the goods. Thus, during transport, the ship is subject to rolling (left-right oscillations) and pitching (longitudinal oscillations) movements which can be very violent. If the cargo is not properly secured, it can break loose and roll inside the ship, causing ship and cargo damage, or it can remain on one side of the ship, endangering its stability.

Also, documentation of dangerous/hazardous goods transport is extremely important to comply with regulations and to avoid and mitigate major risks and incidents, both for the company and its clients. Improving these three main causes will have a major impact on customer satisfaction, with the number of complaints decreasing significantly over time.

It can be observed that one common important problem concerns employees' performance, and therefore training. In this very particular and highly competitive industry sector, one relevant solution would be to provide additional theoretical and practical training for employees through specialized courses on transport documentation and customs formalities, so that they can better handle the intricate and specific travel documents on time and with professionalism.

Another mitigating solution would be to invest in the purchase and implementation of customized software, to make it easier and partially automated for DB Schenker GBS employees to prepare documents for freight shipments. The software should allow for the filling in of the designation of the cargo in the program, careful checking of each type of shipment, and strict placement of the goods.

Another recommendation would be to take measures to counteract the problems arising from bad weather that affect the company's operations, which could include training weather staff to liaise directly between ship and port, and efficiently plan alternative routes if the weather proves to be bad.

6. CONCLUSIONS

This research aimed to analyze the maritime transport service of DB SCHENKER GBS Bucharest SRL by identifying the most important problems, based on customers' feedback, and finding optimal solutions to improve its quality of service. The study reviewed some of the theoretical aspects regarding the quality of services, followed by the case study consisting of the application of the Pareto method to highlight the problems that the company is facing in its maritime transport service. Seven major complaints were advanced by the questioned customers. The authors detailed the main causes for each of these complaints and then applied the Pareto method to investigate which of the seven were the critical ones.

Following the analysis, the most significant problems reported by the 60 customer complaint forms were incomplete documentation, exceeding transport time, and incorrect placement of cargo. The paper also advances recommendations for improving the quality of services and mitigating solutions for the major drawbacks identified in the analysis.

The performed Pareto analysis revealed that if the company focuses on solving these critical issues, around 70% of the company's current problems can be solved, leading to increased quality of services and higher customer satisfaction.

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