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ANALYSIS OF THE TRANSPORT PROCESS IN THE WORK OF A SELECTED LOGISTICS OPERATOR

Agnieszka GASCHI-UCIECHA

Silesian University of Technology, Faculty of Organization and Management; Institute of Logistic;
agnieszka.gaschi-uciecha@polsl.pl, ORCID: 0000-0003-2908-3842

Purpose: The main purpose of the article is to analyse the transportation process, using a selected logistics operator as a case study.
Design/methodology/approach: Qualitative research methods, including participant observation and interviews, were used to analyse the organisation of the transport process. Selected methods and techniques were also employed, including process mapping and TUL analysis.
Findings: TUL's analysis revealed that loading and unloading activities, as well as driver waiting times, were longer than anticipated, significantly prolonging the entire transportation process. This led to delays on subsequent routes, negatively affecting the timeliness of deliveries and relations with carriers and drivers.
Originality/value: The results of the research can be useful for improving the transportation process for the research subject.
Keywords: transport, transportation process, logistics operator, process mapping, TUL analysis.
Category of the paper: research paper.

1. Introduction

The most fundamental service offered in the logistics market is transportation, which is required to move goods from one location to another in order to fulfil specific requirements. The intensive development of transportation services is driven by the dynamic growth of domestic and international goods exchange and the increasing specialisation of labour.

On the one hand, transport plays a key role in the national economy by enabling the efficient and effective functioning of all its sectors. This is because the economy is placing an increasing number of tasks on transport due to the growing volume of production, as well as the level of specialisation and cooperation in production. Conversely, further development of production would not be possible without the development of transportation. These relationships are important because transport should precede the development of other sectors of the economy.

An excellent distribution system and a high level of customer service nowadays rely on efficient transportation processes. Thus. the organization of transportation is fundamental to the functioning of supply chains. It is the logistics operators who take responsibility for planning and optimizing the flow of goods, ensuring continuity and timely delivery.

With these considerations in mind, the main purpose of the article is to analyze the transportation process by a selected logistics operator using selected research tools. In addition, the study uses qualitative research such as participatory observation and interviews.

2. Theoretical treatment of transport - selected issues

2.1. The essence of a logistics operator

It is not easy to give a clear definition of a logistics operator due to the complexity of the activities it conducts, however, it is an enterprise that, acting on behalf of another entity, organizes and then supervises the flow of information and goods, as well as coordinates the processes of the supply chain (Zelkowski, Gontarczyk et al., 2018).

According to I. Fechner (2007), a logistics operator is a service company specializing in providing services that involve taking over from the supplier and/or customer the performance of one or more logistics functions, resulting in the flow of information and goods between the supplier and the customer in any part of the supply chain. In turn, M. Ciesielski (2005) believes that a logistics operator is an enterprise with the highest level of development in the field of transportation and warehousing services, offering packages of services. In turn, W. Rydzkowski (2011) defines a logistics operator as a third-party supplier that performs all or part of the logistics functions of a business. However, B. Skowron-Grabowska (2011) argues that a logistics operator is a contractual service provider focused on maximizing the use of its assets and optimizing operational activities. Through its capabilities, it engages in both domestic and international cooperation.

Today, logistics operators are referred to as global service providers, as well as small and medium-sized small companies engaged in transportation, freight forwarding or warehousing (Zelkowski, Gontarczyk et al., 2018). However, it should be noted that as the size of a service provider grows, the scale of its impact on its own environment increases, its creative capabilities grow. This is particularly evident in supply chains and logistics networks, in which they play different roles (Izdebski, Jacyna-Gołda, Markowska, Murawski, 2017).

Despite the common element of providing logistics services, not every service provider is characterized by an equally broad package of services. Taking into account the complexity and scope of the logistics service, logistics operators can be divided into (Fechner, 2007; Rydzkowski, 2011):

1. First Part Logistics (1PL) – an internal entity of the company, which operates on the premise of so-called logistics self-service, where it performs simple logistics services.
2. Second Part Logistics (2PL) – a third-party entity that performs basic logistics services, i.e.: transportation, shipping, warehousing.
3. Third Part Logistics (3PL) – a third-party entity to provide contract logistics services in all important areas of business such as receiving goods from the supplier, warehousing, picking, packing, delivering to the recipient. 3PL companies take over part of the contracting party's logistics process. They engage their own resources and those of other service providers to provide basic services, such as freight.
4. Fourth Part Logistics (4PL) – An external entity entrusted with the full logistics service. The principal delegates tasks and coordination of the entire logistics process to him. 4PL companies appoint 2PL and 3PL cooperators.
5. Fifth Party Logistics (5PL) are providers of integrated logistics services, i.e. they manage the supply chain at a strategic level and focus on providing logistics solutions throughout the supply chain, develop flexible supply chains of a network nature. 5 PL operators operate based on 3 PL and 4 PL methods, and additionally control and coordinate supply chain operations using advanced information technology and e-business interfaces.

Despite differences in logistics operators' operating models, key areas of their business can be distinguished. These include warehouse space management and rental, inventory control, order picking and preparation (including labelling and packaging), and product transportation and distribution. The latter involves managing a fleet of vehicles that serve the entire distribution network, starting from the warehouse (Dyczkowska, 2018).

Characteristics of transport services – selected issues

Transportation plays a significant role in the economy, and enables the smooth operation of other service departments and contributes to the country's economic development. Its development is closely linked to economic development. More efficient transportation means economic growth, while its deficiencies are barriers to economic development (Urbanyi-Popiolek, 2013). In addition, transportation involves the provision of services for a fee, resulting in the movement of people and cargo and the provision of directly related ancillary services (Jaczewska, 2017). With the development of the economy, especially transportation needs, the need to expand and improve the movement system was born, which in turn was the reason for creating demand for diverse transportation services (Kubicki, 2011).

From an economic point of view, "transportation is a production process through which people - under conditions of resource limitation - make movements of people, things and energy in space in order to satisfy their various needs and desires" (Szczepaniak, 2002). Thus, if transportation is a production process, it results in a product, which in this case is a transportation service (Przybylska, 2011). Thus, in order for a transportation service to be realized, it is necessary for a number of elements to work together, such as means of transportation, appropriate infrastructure, human resources and a set of rules governing how transportation services are provided.

There are a number of activities associated with the implementation of transportation services that make up the transportation process. According to M. Stajniak (2007), a transport process is a series of complex organizational, executive and commercial activities aimed at moving cargo or people from one or more starting points, called sending points, to one or more end points, called receiving points, by appropriate means of transportation. Figure 1 shows the elements of the transportation process.

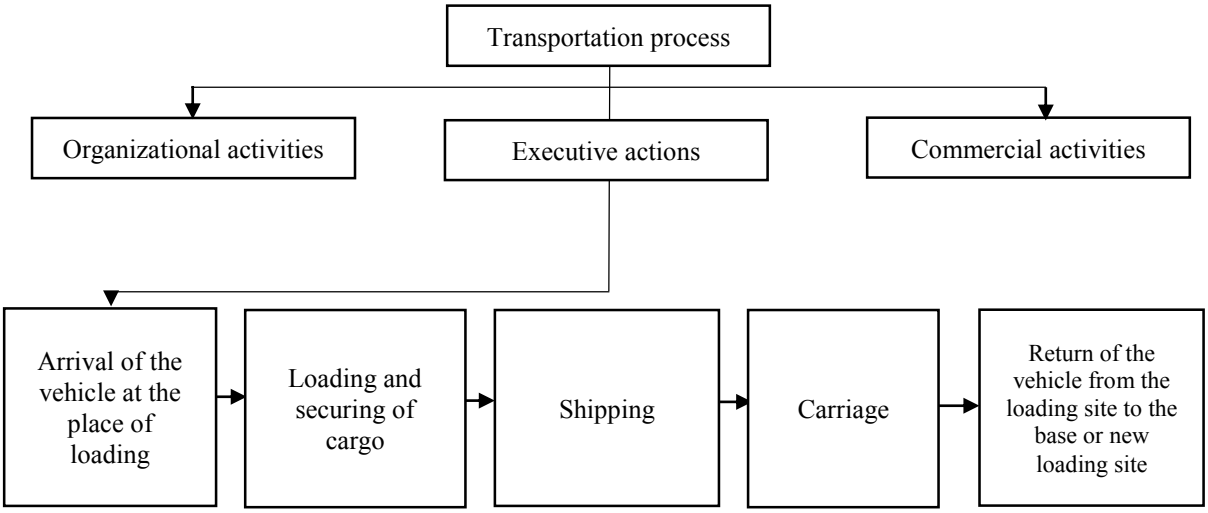


Figure 1. Elements of the transportation process.

Source: Stajniak, 2007, p. 11.

Organisational activities may include planning transport routes and preparing transport documents. Executive activities concern the carriage process itself and include activities directly related to the use of the vehicle, such as loading and unloading. Commercial activities, on the other hand, cover all matters relating to transportation fees (Gaschi-Uciecha, 2018).

3. Metodology

Qualitative methods such as participatory observation and interview were used to analyze the transportation process of the selected logistics operator. As Pegani (2023) points out, the qualitative approach in scientific research is characterized by greater efficiency and allows in-depth coverage of the issue under study. In addition, it allows for the acquisition of richer empirical material, which promotes a comprehensive analysis of a given phenomenon (Pegani, 2023).

The study also used:

- Process mapping - makes it possible to visualize the activities that make up the organization of the transportation process, which in turn allows to identify potential areas of disruption. In addition, it approximates the structure of individual activities, their interrelationships and interconnections, facilitating a holistic understanding of the analyzed process (Biesog, Wyrób-Wróbel, 2012).
- TUL (transportation, transshipment, warehousing) analysis - is used to assess the efficiency and cost structure of transportation, logistics and warehousing processes. It focuses on three key areas: transportation, warehousing and maintenance. It makes it possible to identify areas in need of optimization, which promotes cost reduction and increases the overall efficiency of operations (Starkowski, 2017).

4. Analysis of a selected transport process – a case study

The logistics operator under study is responsible for organising the transportation of goods, i.e. providing a transportation service. As an intermediary, it is responsible for delivering products to the location specified by the customer. Participants in this process include the customer, the shipping company (divided into the forwarder and accounting departments) and the transport company (including the carrier and driver). These entities must work closely together for the process to run smoothly.

According to the contract, the customer assigns a given number of orders to the freight forwarding company for execution. First, the logistics operator checks whether any of the fixed drivers are available to carry out a specific route, taking into account their working hours, individual conditions for transport and additional requirements, such as the type of trailer or its load capacity. If such a driver is found, the freight forwarder contacts them directly to verify their capabilities. Once the two parties have reached an agreement, the working hours are set.

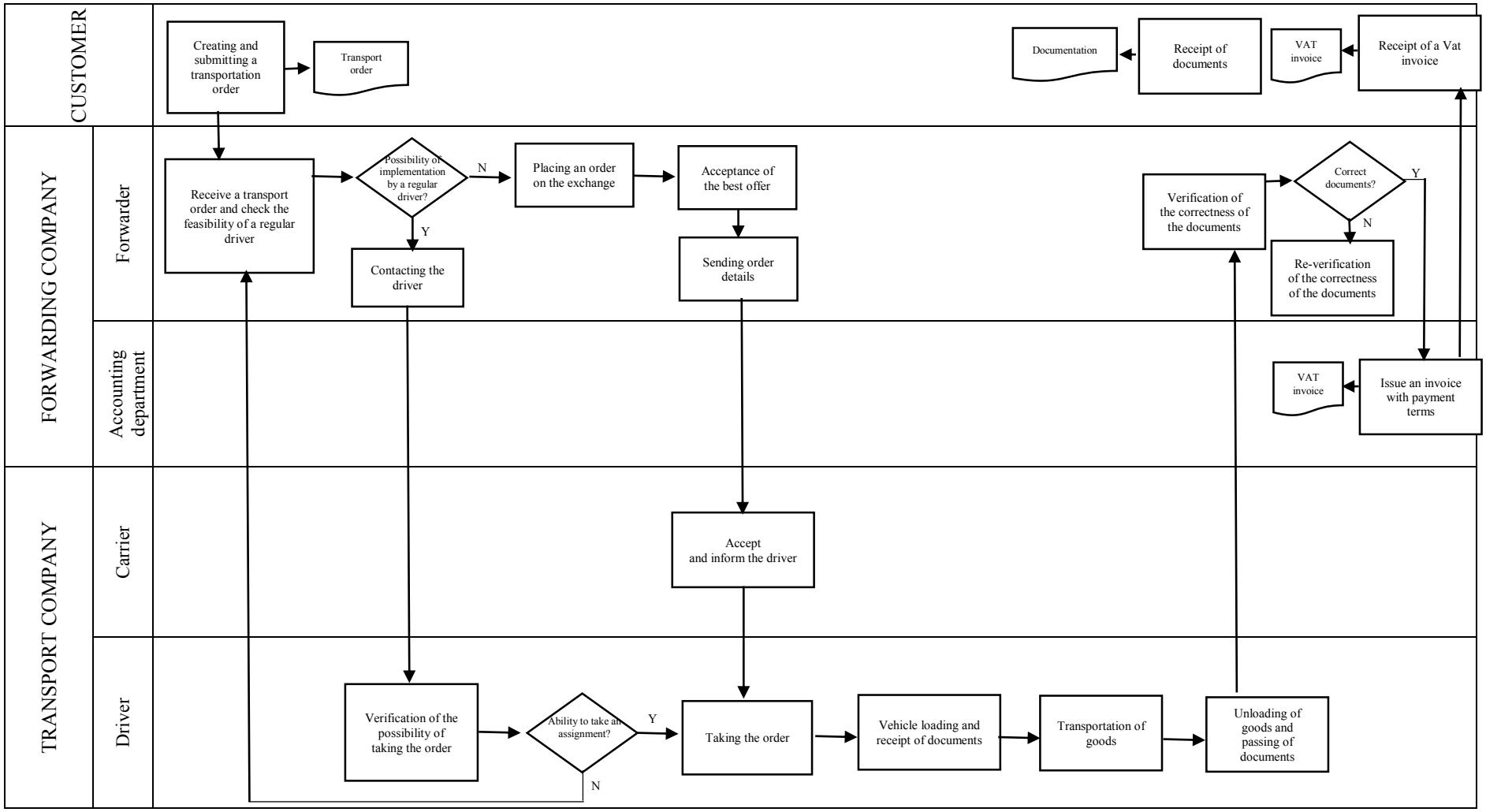
If the driver refuses the load, the freight forwarder looks for another driver. If there is no other regular driver available, the order is sent to the freight exchange. After negotiations, the logistics operator selects the most favourable offer and arranges the details with the carrier, who then communicates with the driver.

The driver then loads the goods and receives the documents, before transporting them to the unloading location, where the warehouseman confirms receipt. The driver is responsible for sending photos or scans of the documents within 48 hours of unloading and for sending the originals by post within seven working days. This applies to both regular and occasional drivers.

This is followed by invoicing of orders and payment of all payments. If either party fails to fulfill all points of the contract, the appropriate amount is deducted from the freight.

Figure 2 shows the implementation of a transportation process using process mapping.

Table 1.
Implementation of the transport process



Source: Osińska (2023).

5. TUL analysis

A motorised TUL (transport, handling and storage) analysis was used to examine the transport process. TUL analysis enables the duration of each stage of the transport process to be detailed and the most time-consuming elements to be identified. This enables the time required to perform a given transport service to be minimised, making it an important tool for forwarders, whose main task is to optimise transport processes.

The transportation process was analysed for the Krakow-Poznan route. In this process, the customer is a food manufacturer, the recipient is a grocery store and the shipping company is the recipient. The analysis was conducted in terms of the duration of each of the four elements of the transport process (i.e. loading/unloading, transportation, cargo control and waiting), comparing the actual and planned times.

Loading/unloading refers to any operation involving the use of a forklift to manipulate goods, i.e. loading them onto or removing them from a trailer at the customer's site. These activities should take a similar amount of time. 'Carriage', on the other hand, is a stage of the transportation process covering the period between loading and unloading. It includes the movement of the truck from the loading point to the unloading point. Cargo inspection includes the driver's visual assessment of whether the goods have been loaded correctly, while waiting time is the period during which the driver must wait before driving up the ramp to load or unload.

The TUL analysis in the form of a summary statement for the selected transport service is shown in Table 2.

Table 2.
TUL analysis for a selected transport service - summary statement

Process	Real		Planned		Difference	
	Time (min)	Number of repetitions	Time (min)	Number of repetitions	Time (min)	Number of repetitions
loading/unloading	94	2	90	2	4	0
carriage	648	3	660	3	-12	0
load control	11	2	5	2	-6	0
expectation	182	2	150	2	32	0

Source: Osińska (2023).

As can be seen from the above table, transport and vehicle inspection take less time than was assumed, as evidenced by the negative values in the 'Difference' column. Conversely, handling activities and driver waiting times are longer than planned. Particular attention should be paid to the time drivers spend waiting, as this has significantly exceeded the set value.

The TUL analysis of the performance of the selected transportation service is shown in Table 3.

Table 3.
TUL analysis for a selected transport service - activities performed

Lp.	What?	Where?	Who?	How?	Symbol	Description	Distance [km]	Quantity [t]	Duration [min]			
									■	➡	●	D
1.	Truck	Base	Driver	Car	➡	Getting to the loading site	122			108		
2.	Truck	Parking	Driver	Car	D	Waiting for loading						138
3.	Truck	Customer warehouse	Warehouseman	Forklift	●	Car loading	0,04	24			28	
4.	Truck	Customer warehouse	Driver	Organo-leptically	■	Cargo control		24	11			
5.	Truck	Customer warehouse	Driver	Car	➡	Getting to the loading site	311	24		244		
6.	Truck	Parking	Driver	Car	D	Waiting for unloading		24				44
7.	Truck	Customer warehouse	Warehouseman	Forklift	●	Car unloading	0,05	24			66	
8.	Truck	Base	Driver	Car	➡	Return to base	409			296		
						∑	**842,09**	**24**	**11**	**648**	**94**	**182**

Source: Osińska (2023).

The TUL analysis revealed which elements of the transportation service delivery process take the most time. In the case studied, transportation itself accounts for more than 67% of the total service provision time. The duration of transportation is affected by many factors that directly contribute to delays. These include, first and foremost, traffic volume on the scheduled route, weather conditions and fortuitous events such as accidents. Unfortunately, in addition to determining the fastest and shortest route for a given driver, the freight forwarder has no control over other circumstances in this regard.

In this case, the logistics operator should focus on reducing the duration of the other elements of the transportation service execution process. As the control takes the driver a total of 11 minutes and represents only 1% of the entire process, it was left unchanged in order not to lose its quality and reliability. Therefore, it is recommended that the focus is placed on reducing waiting time and improving loading and unloading procedures.

6. Conclusion

An analysis of the definitions of logistics operators revealed that they are companies that specialise in providing logistics services, including transportation, within the supply chain. They integrate all participants in the supply chain to ensure the smooth flow of goods.

Analysing TUL (transport, handling and warehousing) services has proven to be an effective way of assessing execution times for transport, handling and warehousing processes. Understanding organisational relationships and the sequence of activities that make up a given process enables problems to be identified and specific improvement measures to be implemented.

TUL's analysis revealed that loading and unloading activities, as well as driver waiting times, were longer than anticipated, significantly prolonging the entire transportation process. This led to delays on subsequent routes, negatively affecting the timeliness of deliveries and relations with carriers and drivers.

The proposed improvements included, above all, dialogue with customers and carriers to modernise existing procedures; the automation of warehouse processes; the updating of logistics systems; the reorganisation of communication channels; and additional training for employees.

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