

LFMEA METHOD FOR THE IDENTIFICATION OF KEY DETERMINANTS TO IMPROVE THE EFFICACY OF A LOGISTICS OPERATOR IN TRANSPORT PROCESSES

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Abstract

The authors took a challenge to analyse the possibility of the application of a FMEA method for improving the efficacy of logistics operator's activity, especially executed logistics processes. Searching for methods and tools for improving the efficiency of logistical processes requires both the development of new solutions and the appropriate modification of existing solutions. A good example is LFMEA, which requires specific assumptions for a proper analysing and evaluating logistical processes. The effectiveness of this method depends on the criteria and constraints that should be defined for a particular logistics operator. The LFMEA method can play an extremely important role in identifying and categorizing existing knowledge deficits that strongly determine the level of efficacy of logistics processes. The study was undertaken in Deutsche Post DHL, one of the key LSP operators. The study proved that the efficacy of a LSP operator could be significantly improved by using a LFMEA method to identify and to analyse transport processes. The study indicates that in a selected LSP operator, further improvements in its activity requires a deep analysis to identify deficits and determinants affecting transport processes and to undertake actions minimalizing their negative influences.

Keywords: Transport processes, logistics operator, LMFEA method

1. INTRODUCTION

The measurement and evaluation of logistics processes is a complex, time-consuming and capital-consuming undertaking, that is an individual problem of every business to be solved which requires discipline and consistency, mainly in monitoring data needed for an analysis. To achieve the highest possible performance, a decision-making process should, as far as possible, be targeted at a set of objectives that is the base for a rational decision-making stage and enables a rapid reaction to changes.

Adequate management of logistics processes requires knowledge of how to measure the efficacy of their realisation and the assessment, together with identifying the causes of internal and external errors affecting processes effectiveness, which is the source of knowledge in an enterprise about many aspects of its activity. Analysing the causes of errors provides information on solutions that generate costs, opportunities and threats, and non-value for your business. Properly defined causes make it possible to decide about the areas that need modification and develop strategies for improvement of logistics processes.

The improvement of functioning of a logistics operator, in the context of a more efficient realization of logistical processes, should result in the increase of a logistic customer service level, which includes a set of components and interrelated activities undertaken by a company to meet customer's requirements for the transaction to be finalized [1]. Logistics customer service is a metaprocess that affects the communication between a manufacturer and a customer, and is also crucial for the future of the logistics operator.

The article is focused on analysing key determinants affecting the efficacy of a logistics operator by making use of a LFMEA method. The study concerns one of key LSP operators on a Polish market. The area of an analysis was transport processes and their influence on the activity of a selected logistics operators. The study was based on the analysis of source materials and direct interviews with engineering and managerial staff of a selected company. The study results indicated crucial determinants affecting the functionality of an analysed operator and necessary actions to improve its efficacy.

2. LSP SECTOR IN POLAND

Fulconis et al. [2] proposed a general, adequate definition of LSP (Logistics Service Provider). They defined LSP as a firm ensuring the performance of logistical activities on behalf of a manufacturer or a large retailer. But there immediately followed three LSP families, depending on the complexity of their service offer, not on their strategic position in supply chains: (1) conventional LSP, simply executing physical operations related to transport, handling and storage of customers' work-in-process components or finished goods along a supply chain; (2) value-added LSP, which additionally includes the management of manufacturing operations (e.g. some form postponement activities), administrative operations (e.g. invoicing) and information operations (e.g. tracing and tracking); and (3) dematerialized LSP, which owns almost no physical resources, but builds a customized service offer for their customers by involving the resources from different partners [3].

In Poland logistics services sector is relatively young. Its beginnings are the 90's of 20th century, and the greatest dynamics of development was observed after the accession of Poland to the European Union. As in other European Union countries, two main types of companies that provide logistics services dominate on the Polish TSL market. The first group are companies that focus on providing transport and/or freight forwarding services (and cargo logistics services). The second group includes 3PL logistics operators offering a wide range of services adapted to customers' needs with advanced logistics and warehousing networks and using modern ICT tools [4]. Due to estimates, in Poland there are thousands of carriers transporting parcel goods and massive goods. They usually provide services to small and medium-sized loading companies, as well as they hire their fleet for large forwarding/logistics companies. This group also includes smaller shippers. They carry out their activities with the use of rolling stock of small carriers or using their own car fleet. Only a part of small carriers or forwarders can compete effectively with large logistics companies.

A very important part of the Polish logistics market, which in Europe is, one of the fastest growing, contract logistics and e-commerce. This year Europe's e-commerce market will exceed half a trillion euros (455 billion euros in 2015). The online commerce in Poland grew by 17.8% in 2015, which is an impressive value against the rest of the EU. The value of the Polish e-commerce market reached 36 billion PLN in 2016. It is becoming increasingly clear that Poland is becoming one of Europe's key logistic centres - many warehouses are transferred from Western Europe and Scandinavia to Poland. The development of contract logistics also supports such phenomena as: an increased demand for personalized products, omnichannelling, and e-commerce, m-commerce and modern technology development [5].

3. FACTORS AFFECTING THE EFFICACY OF TRANSPORT PROCESSES IN A SELECTED OPERATOR DETERMINED WITH A LFMEA METHOD

The study concerns Deutsche Post DHL, which is an international leader in providing services in a TSL sector. The company has an extensive network of connections, a variety of fleet and many years of experience in freight and forwarding. These factors contributed to the perception of DHL as the global leader in logistics services. Express delivery business activity is dynamic and consistent, as this sector, which is at the forefront of the world's strongest pillars, is strongly linked to other industries. There are six specialized companies on the Polish market under the Deutsche Post DHL brand [6]:

- DHL Global Forwarding Ltd. - offers freight services, warehousing and distribution,
- DHL Exel Supply Chain Ltd. - offers contract logistics services,
- DHL Parcel Ltd. - offers services in the field of transport of domestic consignments and economic international consignments in Europe,
- DHL eCommerce Ltd. - it is a subsidiary of DHL Parcel, which established a partnership with the US Postal Service,
- DHL Global Mail Ltd. - offers B2C mail service, operates in Europe, North and South America, Asia and also recently in Australia,

- DHL Express Polska Ltd. - offers services in the field of domestic and foreign shipments, as well as special services. DHL Express Poland operates within a network that covers more than 2,000 regular line connections, with approximately 30% of daily connections. It provides transport services for the sectors of food, textile, paper, electronics and pharmaceuticals.

The study concerns the analysis of transport processes in Deutsche Post DHL making use of the LFMEA method to determine the key determinants of performance efficacy of an analysed logistics operator and to propose necessary actions to improve its functioning. The preliminary research enabled to identify main problems affecting the efficiency of transport processes in DHL Express Poland:

- delivery delays - related to the breach of the principle of timely delivery of the goods,
- damage to the goods - related to the inconsistent delivery of goods in a good condition;
- failure to deliver goods - it can result from breaking a few paradigms of the principle 7W: delivering goods to the right place, to the right consumer.

At the next stage, the LFMEA analysis was performed according to the procedure in the diagram in **Figure 1**. The significance of a problem ("S" in the **Table 1**), the frequency of a problem ("F" in the **Table 1**) and the possibility of its detection ("D" in the **Table 1**) are measurable aspects that characterize identified nonconformities. The measurement system is based on numerical scales defining the priority number (PRN). Each of the criteria is assigned a number from 1 to 10 for the estimated probability of occurrence, significance, and detection [7].

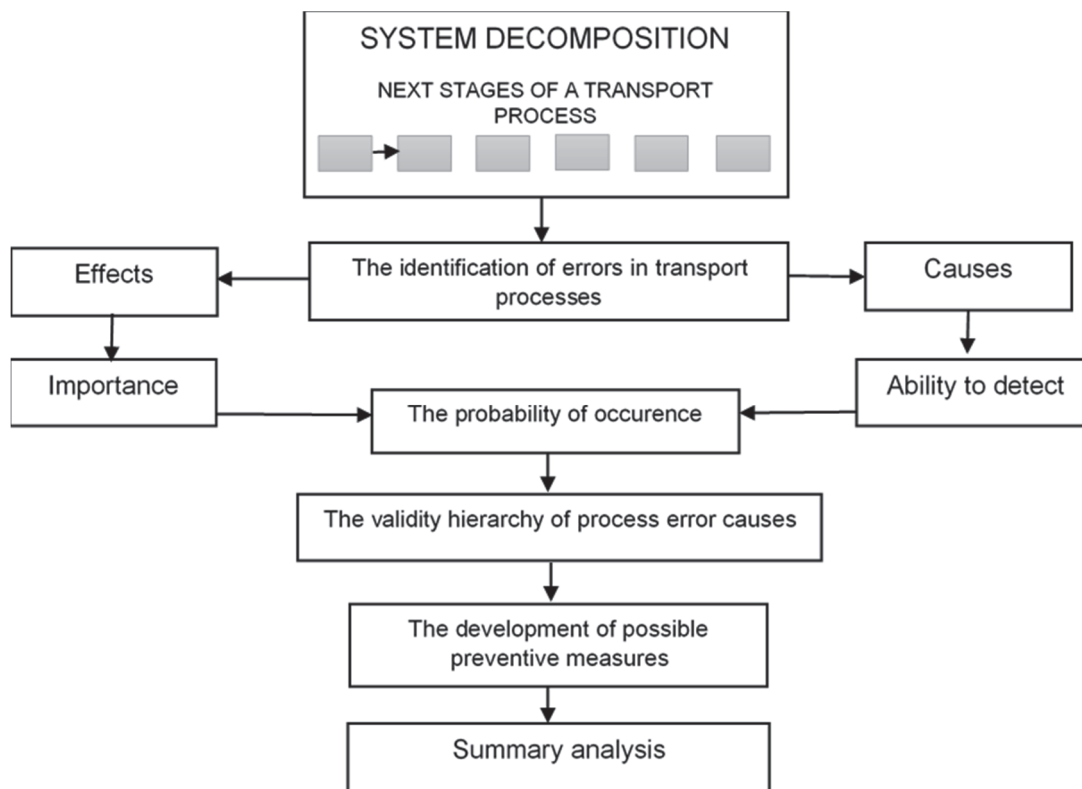


Figure 1 The procedure of a LFMEA analysis
Source: own elaboration based on [9].

As a result of the LFMEA analysis, the main problems affecting the efficiency of a transport process, the potential causes for them, and a priority number for each problem were identified, recommended actions to minimize their negative impacts were proposed, and then the actions were prioritised. **Table 1** identifies the most important causes for transportation problems for which the PRN exceeds 200.

Table 1 The LFMEA analysis of problems in transport processes

Id.	Problem cause	Applied prevention	S	F	D	PRN	The results of undertaken actions				
							Recommended actions to minimize negative effects	S	F	D	PRN
DELIVERY DELAYS											
1.	The lack of willingness to mitigate conflicts within a supply chain	Periodic conversations with contractors (monthly)	6	5	7	210	The choice of a central flow coordinator. The main tasks of the link include controlling the cooperation and eliminating uncoordinated decisions	6	2	5	60
2.	Vehicle defects	Periodic assessment of technical condition of vehicles (annually)	6	7	6	252	Technical evaluation of a vehicle by a courier every time before and after the execution of an order	6	7	3	126
3.	The failure of the obligations of business partners	Complaints of customers	6	6	6	216	The choice of a central flow coordinator. The main tasks of the link include controlling the cooperation and eliminating uncoordinated decisions	6	3	2	36
DAMAGE TO THE GOODS											
1.	Receiving damaged cargo from customers,	Immediate inspection of the status of a shipment by a courier	7	5	6	210	Checking the status of the shipment by a courier in accordance with specific procedures	7	3	1	21
2.	Cargo damages made by a contractor	Periodic checks on contractors	7	4	8	224	The choice of a central flow coordinator. The main tasks of the link include controlling the cooperation of contractors	7	4	3	84
FAILURE TO DELIVER GOODS											
1.	The improper coordination of work	Creating daily reports on an order execution	8	4	7	224	Internal training of managers of individual departments in terms of goal-setting and coordination tasks of employees.	8	2	3	48
2.	Employees' mistakes	Creating daily reports on an order execution and complaints of customers	8	5	5	200	Internal training of employees and daily hand-over of instruction and procedures	8	3	2	48
3.	The inadequate organization of a transport process	Creating daily reports on an order execution by couriers	8	5	6	240	The use a SMED tool to improve a process organization along with the order of performance, as well as to improve the way employees communicate	8	3	4	96

The LFMEA analysis indicated that the most important causes for the mismatch of a transport process are:

- the lack of willingness to mitigate conflicts within a supply chain,
- vehicle defects,
- the failure of the obligations of business partners,
- receiving damaged cargo from customers,
- cargo damages made by a contractor,
- employees' mistakes,

- the improper coordination of work,
- the inadequate organization of a transport process.

The LFMEA analysis enabled to identify the potential sources of nonconformity and areas particularly vulnerable to the emergence of potential errors. These are the elements of a transport process that require a constant control in order to plan, execute, monitor and implement actions to improve the effectiveness of a transport process.

4. CONCLUSIONS

The undertaken analysis of a selected LST operator enables the following conclusions:

1. The development of a LSP market requires more and more sophisticated methods and tools that enable comprehensive analyses and the evaluation of the possibilities of improving logistics operators' performance in transport, distribution and storage.
2. The use of a LFMEA method requires the initial development of criteria and constraints for an application in a specific logistics operator activity process. This approach makes it possible to focus on key performance determinants and significantly improve the reliability of the results of the research analysis.
3. The use of a LFMEA method enabled to identify weaknesses and threats of a transport process, and to identify those elements of the process that require control and improvement.
4. The LFMEA analysis indicated that the most important causes for the delayed supply error are: the lack of willingness to mitigate conflicts within a supply chain, vehicle defects, failure to comply with obligations by business partners. In the case of a "cargo damage" analysis, the analysis revealed that the most important causes were: cargo damages made by contractors and receiving of damaged cargo from customers.
5. The improper organization of a transport process, employees' mistakes, and the inadequate coordination of work are the main reasons for not delivering goods to the addressee are factors which have a key impact on the efficacy of a transport process.

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