
Identification of Innovativeness Provided by Logistics Service Providers

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Abstract:

Purpose: The aim of the study is to identify the types of innovations implemented by logistics service providers (logistics operators 3PL and integrators 4PL), influencing the creation of logistics services in modern supply chains.

Design/Methodology/Approach: The article presents the results of empirical research covering the issues of implementing innovative solutions in logistics services provided by service providers. Based on the results of the study, it was found that the dynamically changing conditions of the economic and political environment, progressing globalization and growing customer requirements have determined logistics service providers to go beyond the implementation of traditional, individual logistics services, e.g., such as transport, warehousing, to expand the range of offered and implemented services, thus implementing innovation in logistics services.

Findings: It was identified that the role of logistics service providers offering a wide range of services for the proper integration and monitoring of logistics processes as part of outsourcing is played by logistics service provider operators ((3PL), logistics operators and integrators (4PL)).

Practical Implications: Findings show a wide variation in the innovation implementation by logistics service providers. The main findings indicate that 3PL and 4PL companies are the leading service providers implementing innovations in the provided logistics services. No less important findings show that by far the largest group of the surveyed companies were suppliers of a few simple logistics services (transport, forwarding, distribution or supply logistics, etc.). Nevertheless, also this group is entering the next stage of improving and developing the offer of services and implementing innovative solutions to compete on the market.

Originality/Value: In conclusion, it is worth emphasizing that the results of the study show that in the contemporary dynamically changing global economy, the activity in the field of innovation implemented by logistics service providers is becoming the leading driving force of competing not only individual enterprises but also supply chains and networks.

Keywords: Logistics service providers, 3PL, 4PL, innovations, supply chain.

JEL codes: L9, O31, R41.

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1. Introduction

Today, the outsourcing of logistics services is carried out by highly specialized companies in the implementation of innovative logistics services, such as, logistics operators (3PL - Third Party Logistics) and logistic process integrators (4PL - Fourth Party Logistics). Liu and Wang (2009) and Zacharia, Sanders, and Nix (2011) emphasize that outsourcing of logistics services allows enterprises to focus on their key competences, improves the quality of service, reduces transport costs, enables access to more diverse and scarce resources, and benefits from the relationships that are created and developed in the supply network by logistics partners, thus increasing the effectiveness of the entire supply chains.

Moreover, Gourdin (2006) indicates that each implemented innovation improving the quality of logistics services in the existing logistics chains should be characterized by certainty (the supplier should meet all customer expectations in accordance with the order), a specific time of implementation (clarifying the operating time affecting costs - often an important factor in the selection of a logistics operator), the functionality of the operation (including the possibility of technical cooperation, etc.), efficient communication (monitoring the flow of loads, materials, goods, payments, information management), honesty (fairly presenting the possibilities and then performing the services in accordance with the declarations). Logistics operators and integrators focus on meeting these criteria, creating added value for themselves and their customers (Gourdin, 2006).

Contemporary publications, both Polish and foreign, often touch upon selected aspects relating to the innovation of logistics service providers. For example, Wallenburg and Lukassen (2011) indicate the need for more intensive research in this area. On the other hand, Wagner and Sutter (2012) emphasize that research on innovations in logistics services is still at an early stage of their recognition. For this reason, after a systematic review of the literature, the aim of the study was determined, which was to identify the types of innovations implemented by logistics service providers (logistics operators and integrators), influencing the creation of logistics services in modern supply chains. The goal set in this way was accompanied by the following research questions:

- 1) What kind of innovation is most often implemented by logistics service providers?
- 2) What range of services are currently offered and implemented by logistics service providers for their clients?

2. Methodology

The study was carried out as part of the grant received in the FUTURE group: "Sustainable development and the society of the future". The study was preceded by a systematic review of the literature according to the procedure proposed by

Tranfield, Denyer, and Smart (2003), who indicate its three basic stages. In the first stage, the author defined a detailed plan of the literature review, defined the aim of the research, and asked research questions. The second stage included the selection of basic literature, selection of publications for analysis, and development of the publication database. The second stage of the systematic literature review procedure focused on the following activities, for example selecting digital full-text databases and determining the scope of database search (full-text databases were selected, such as, DOAJ (Directory of Open Access Journals), Emerald Insight, JSTOR, SinceDirect, Scopus®, Springer Nature Journals and Willey). The publications available in the Polish BazEkon and Ceon database were also analyzed, the EBSCO Discovery Service tool was used to search for publications, to improve the research process). The bibliometric analysis stage, including the analysis of the number of publications and citation analysis, was carried out using the tools provided in the following selected full-text databases: Springer (Citations.Springer.com), Scopus® (CiteScore) and the scholar.google.com database. The third stage is the presentation of the results of the review (treated as a report).

The results of a systematic review of the literature allowed for the development of a measuring instrument, i.e., a survey questionnaire. The CATI survey among 151 companies was preceded by a pilot survey. The pilot study was carried out on a sample of companies that are logistics service providers, operating in sections H of the Polish Classification of Activities, i.e., Transport and warehouse management. Sample selection was used - purposive sampling with sample size 18 companies ($n = 18$) that support logistics processes in modern TSL supply chains (transport-forwarding-logistics) operating in Poland.

The pilot study was carried out in the period from December 2019 to January 2020. The respondents in the pilot study did not comment on the constructed measuring instrument. The survey questionnaire consisted of closed questions, arranged in such a way as to arouse the respondent's interest, therefore from the easiest to the most difficult questions. A 7-point Likert scale was used (from 1 "completely disagree" to 7 "completely agree"). In the final part, the so-called metric questions relating to the characteristics of the surveyed enterprise (year of establishment of the enterprise, form of business activity, number of employees, range of services provided). The analysis of the survey results was performed using SPSS Statistics version 26 and a Microsoft Excel spreadsheet.

The CATI survey was started at the beginning of May 2020, which lasted until the end of June 2020. A total of $n = 151$ respondents were collected. The same criteria were used in the selection of the sample as in the pilot study (targeted selection, companies that are logistics service providers, operating in sections H of the Polish Classification of Activities, i.e., transport and warehouse management). When dividing the types of innovations, a typology was used according to the methodology proposed in the third edition of the Oslo Manual, covering four types

of innovations, technological innovations (aimed at improving technologies, including replacing them with new ones), product innovations (introducing new products / services to the market, modernizing existing products / services), organizational innovations (improvements in the company's operations, e.g., modification or changes in structures) and marketing innovations (activities in the field of improving marketing activities, organization management methods). The variables in each type of innovation were based on the publications accepted for analysis, resulting from the systematic literature review. Although the research was conducted in Poland, companies with a global reach participated among the companies participating in the research. Because the respondents are assured that the conducted research is anonymous, the data of enterprises cannot be disclosed in the pages of the article.

3. Innovations in LSP Short Theoretical Background

Innovation in management, considered one of the main paradigms of modern theory, perceived as a key source of economic development, is now the subject of an in-depth analysis of many theorists and is widely described in both world literature. Evolutionary changes in the reality of management were included in the literature on the subject several decades earlier by J.A. Schumpeter. Schumpeter (1912), whose work had a significant impact on the theory of innovation. Based on economic sciences, he formulated 5 cases in which new combinations of various natural elements and human productive power, i.e., innovation, appear. Innovation in J.A. Schumpeter's reasoning is treated very widely. It covers not only technical activities but also economic undertakings, e.g., gaining new markets, changing organization (Wasielewska-Marszałkowska and Samek, 2020).

Like Schumpeter, innovation was widely viewed by Ph. Kotler and M.E. Porter. Ph. Kotler points out that innovation is any good, service, or idea that is perceived as new (Kotler, 1994). M.E. Porter, who indicates that innovation is the improvement of a product, process, new forms of distribution, and management concepts. Tidd, Bessant, and Pavit (2005) presented the concept of typologization of innovation, describing it as "4P of innovation". In the concept of this classification, the authors distinguished four key innovations:

1. product innovation - meaning changes to a product or service,
2. process innovations (process) - defining changes in the methods of producing and delivering products to the market,
3. position innovations - changes in the context in which products/services are introduced,
4. innovations of the paradigm (paradigm) - concerning changes in the basic mental models that constitute the framework of the organization's activities.

In turn, in the Oslo Manual (2005), four types of innovations were adopted, which cover a wide range of changes in the activities of companies, they were divided

into, product innovations, process innovations, organizational innovations, marketing innovations.

Based on the definition of Tidd *et al.* (2005), service sector innovation can also be described in terms of technological innovation or non-technological ("soft") innovation. Technological innovation often leads to new products or services in some form, while "soft" innovation focuses on organizational issues and processes that improve management practices, streamline organizational structures, customize services, improve networking, improve distribution, accelerate procurement, and facilitate financing are some of those mentioned (Howells, 2000). Innovations in logistics services are often non-technical, although technology can activate and/or improve the process. Unlike the product industry, these non-technical service enhancements do not necessarily involve formal research and development (R&D) (Pilat, 2001). Service innovation is essentially a valuation activity (Slater and Narver, 1995) that drives market orientation and performance.

No less important is the consideration of innovation for logistics service providers through networks of relationships. Logistics companies must attach great importance to relationships and networks. Critical links exist with other companies both in the supply chain and with companies outside the supply chain. Logistics companies should develop and maintain long-term strategic alliances with partners to improve efficiency in product handling, product tracking, information flow technologies, and other product and process advances.

This, in turn, increases customer satisfaction and business performance (Epatko, 1994; Schilling and Hill, 1998; Vonderembse and Tracey, 1999; Shin *et al.*, 2000). Van Klink and Visser (2004) present logistics innovations as development and implementation of new elements in logistics management. This can take the form of new processes, new products (logistics concepts), new positions in the supply chain, and the transition to new supply chains (market innovation). Flint *et al.* (2005) argue that 'Entry-to-complex' logistics services are considered new and useful for a particular purpose.

This target can be internal with innovation improving operational efficiency or external related to innovation, customer driven. Daugherty, Chen, and Ferrin (2011), on the other hand, emphasize the key aspect relating to the company's ability to create new innovative logistics services.

It should be concluded that the above-mentioned definitions complement each other in the sense that they emphasize various forms that can be taken by logistic innovations, they maybe process, organizational or technological innovations, etc. No less important are the goals of logistics companies aimed at implementing logistics innovations. These goals may focus on improving operational efficiency or may be focused on customer satisfaction, thus gaining a competitive advantage

(Bouchette *et al.*, 2018). Concerning logistics innovations, it should be emphasized that logistic innovations cannot be reduced to a simple innovation focused on innovations in services, these innovations have a wide scope, ranging from the scope of its implementation in logistics services to the extent to which its effects will spread.

4. Innovations Implemented by Logistics Service Providers - Selected Results of Empirical Research

Key conclusions in response to the research question: What kind of innovation is most often implemented by logistics service providers?

The conceptualization of the variables relating to innovation was based on the results of a systematic literature review. Eight variables were classified as the type of technological innovation (Table 1). The measurement was made using a 7-point Likert scale where 1 - I strongly disagree; 7 - I strongly agree. To answer the research questions, statistical analyzes were carried out using the IBM SPSS Statistics version 26 package. Basic descriptive statistics, analysis of correlation with the Kendall's Tau b, and Spearman's rho coefficients were calculated using it. The significance level was set at $p > 0.05$ *.

Concerning the results of the research on technological innovations, the most frequently implemented ones were, the use of GPS solutions (over 62%). Moreover, the respondents maintained that the technologies and IT tools used in their enterprises enable the processing, retrieval, and secure transmission of any information for customers (38.4% of the respondents). The correlation analysis showed a statistically significant relationship at the level of $p < 0.05$ *, between the variables: 1) technological innovations: In the services provided, our company uses solutions based on GPS and 2) technological innovations: We use IT support systems in the provided services for clients. A similarly statistically significant relationship at the adopted level of $p < 0.05$ * was shown by the results of the analysis of the correlation between successive variables.

For example, the following variables: 1) technological innovations: In the services provided, our company uses solutions based on GPS and 2) technological innovations: We use ERP system solutions in 100% of the services provided to clients. It can be concluded that enterprises implementing one technological innovation increase the readiness of logistics service providers to implement further technological innovations.

Another important conclusion from the analysis of the research results indicates that RFID technologies and solutions are, to a lesser extent, implemented technological innovations. Table 1 presents the results relating to the highest indications of respondents in the field of implemented technological innovations (according to the 7-point Likert scale).

Table 1. Technological innovations most often implemented by logistics service providers

Variables	N	%
We use IT support systems in our customer services.	52	34,4
In the services provided, our company uses GPS-based solutions.	95	62,9
Our company uses barcode solutions in our services.	32	21,2
Our company uses RFID-based solutions.	12	7,9
ERP solutions are used in 100% of our customer services.	21	13,9
We use a CRM system to serve our customers.	26	17,2
Our it technologies and tools enable you to process, retrieve, and securely transmit any information to your customers.	58	38,4
In the logistics service of our customers, we use TMS tools.	29	19,2

Source: Own study based on the study.

Concerning the results of research covering product innovations implemented by logistics service providers, it should be noted that the vast majority of these are innovations in the field of real-time shipment tracking (26.5%), apart from this service, respondents also indicated the distribution management, planning and optimization service delivery costs, customs clearance, and labeling services.

The results of the correlation analysis showed a statistically significant relationship at the level of $p < 0.05^*$ in several analyzed variables, including variable: We offer distribution management services to our clients and variable: We offer our clients real-time shipment tracking services (ρ Spearman = 0.024). It is also worth emphasizing the strong, statistically significant relationship between the variable: We offer our clients consolidation warehouse services and the variable Our clients are offered real-time shipment tracking services (ρ Spearman = 0.012). The correlation analysis also showed that there is no statistical significance of the relationship between the variables: Our company offers inventory financing services and the variable. We use IT support systems in our customer services. In conclusion, after the performed statistical analysis, in the field of product innovations, logistics service providers place emphasis on providing the possibility of real-time monitoring of services provided by customers. This aspect of the implemented product innovations seems to be consistent with the trends observed by other researchers (not only in the context of the IT gap - see the research by C.J. Langley & Capgemini Consulting).

4.1 Organizational Innovation

Among the organizational innovations, the respondents pointed to the key innovations implemented in terms of the number of branches (branches) of our enterprise ensures 100% of the services offered (49% of respondents). Another organizational innovation implemented by logistics service providers in the provision of services to customers using both their own physical resources and the resources of partners (41.1% of respondents). Equally important organizational

innovations implemented by logistic service providers are the provision of services on a global scale (many continents) (over 12% of indications), and provision of services on an international scale (over 11%). In conclusion, it can be concluded that this group of respondents includes 3PL and 4PL service providers who, in the area of organizational innovation, offer a much wider range of services compared to 2PL companies. 3PL and 4PL service providers have a much wider and denser logistics network, enabling the implementation of customer services on an international and global scale.

4.2 Marketing Innovations

Definitely, most respondents' indications included the implemented marketing innovations in the field of provided services through activities supporting sustainable development implements ecological logistics solutions for customers (e.g., reduction of CO₂ emissions) - over 35%. A similarly high level, as many as 33.1% of respondents indicated the implementation of marketing innovations in information sharing with customers, e.g., for process integration and coordination. Equally important, in the opinion of the respondents, is the implementation of marketing innovation related to the understood CSR - over 15% of respondents indicated that: Corporate Social Responsibility is an indispensable element of the implementation of logistic services for clients of our company.

Figure 1. Key types of innovation implemented by logistics service providers

<p>Technological innovation</p> <ul style="list-style-type: none"> • IT support systems • solutions based on GPS • barcode based solutions • solutions based on RFID • ERP systems • TMS systems • technologies and tools to securely retrieve, process and transmit customer information 	<p>Product innovations</p> <ul style="list-style-type: none"> • consolidation warehouse services • distribution management • labeling • real-time shipment tracking • customs services • planning and optimization of delivery costs
<p>Organizational innovations</p> <ul style="list-style-type: none"> • use of own resources and partners' resources • numerous branches / branches • international range of services offered and provided • global range of services provided and offered • value added services (VAS) 	<p>Marketing innovations</p> <ul style="list-style-type: none"> • sharing information with the client • CSR an essential element in the services provided • ecological activities supporting sustainable development • improvements in distribution services • new management methods (Lean Management, Kaizen)

Source: Own study based on the study.

Most of all surveyed companies indicated technological innovations as key

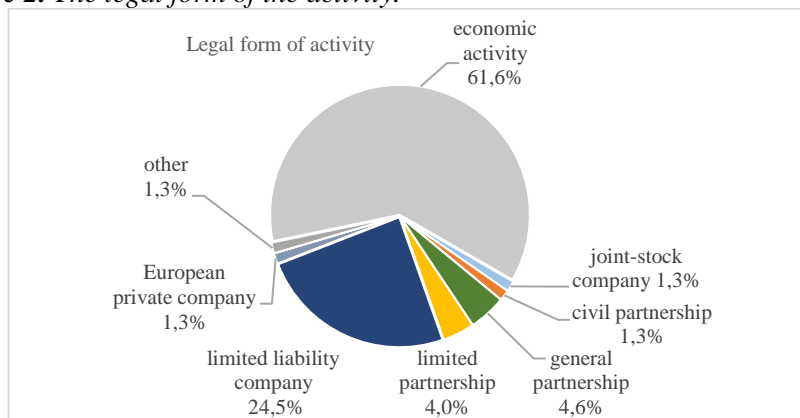
implemented in the logistics service provided (Figure 1). The high quality of the services provided is supported by the introduced technological innovations, in particular through IT, GPS, ERP systems (etc.). Logistics service providers show a high level of openness to implement marketing innovations in the field of CSR and sustainable development in the services offered and implemented for clients. When analyzing the aspect of organizational innovation from the point of view of growing customer requirements, it is important to expand the range of services provided (international and global). The 3PL and 4PL companies turned out to be the most active in this respect. Data analysis confirms that service providers with a low level of activity in implementing innovation preferred to implement cheaper innovative solutions. This aspect of being less active in the implementation of innovative solutions may be associated with a worse financial situation and the company's market position.

Key conclusions in response to the research question: What range of services are currently offered and implemented by logistics service providers for their clients?

According to the information indicated by the respondents in the part of the company's characteristics, the respondents provided the following information: the year of the establishment of the enterprise, the legal form of the business in Poland, the number of employees for 2019, the scope of activities and services offered, and the scope of the enterprise.

The company with the longest history in the logistics services market was established in 1954, the "youngest" enterprises were established in 2019. The dominant form of the conducted activity (over 61% of indications) is "economic activity", while 24.5% is the legal form of activity "limited liability company" (Figure 2).

Figure 2. The legal form of the activity.



Source: Own study based on the study.

Concerning the scope of activities (offered and performed services), the vast

majority of the surveyed logistics service providers offer a wide range of services, including:

- implementing a service package as a 3PL (8.7%),
- contract logistics (12.1%),
- road transport services as the leading transport sector (over 92%) and forwarding services (62.4%).

Other services indicated by the respondents also included: supply chain management, supply and distribution logistics, rail transport, picking and packing (e.g., pallet picking), courier services, cross-docking, e-market services, one-stop shopping, e-fulfilment, and co-packing (e.g., forming promotional sets, labeling, packaging) (detailed data is presented in Table 2).

Table 2. Range of services offered and implemented

Scope of services (offered and implemented))			
		Total	
		% of N in column	Multiplicity
Scope of services	road transport	92,6%	138
	Forwarding	62,4%	93
	management of traditional logistics functions (e.g. transport and warehousing)	40,3%	60
	distribution logistics	17,4%	26
	supply logistics	16,8%	25
	contract logistics	12,1%	18
	maritime / ocean transport	12,1%	18
	Aviation	10,1%	15
	internal logistics (own manufacturer)	10,1%	15
	specialized logistics operator providing comprehensive services (3PL)	8,7%	13
	rail transport	8,7%	13
	picking and packing (e.g., pallet picking)	8,1%	12
	courier services	8,1%	12
	cross docking	8,1%	12
	support for e-markets	7,4%	11
	one-stop-shopping (integrated package of logistics services of one supplier)	6,0%	9
	supply chain management	2,0%	3
	e-fulfilment	2,0%	3
co-packing (e.g., forming promotional kits, labelling, packaging)	1,3%	2	
Test carried out on sample n=151			

Source: Own study based on the study.

In conclusion, the surveyed companies expand the range of services offered,

meeting the growing expectations of customers. Most often they indicated the leading services: transport services and forwarding services. This does not mean, however, that logistics service providers focus only on the provision of one or two services (Table 2). In conclusion, the development of the range of logistics services depends on some factors that evolve along with the changes taking place in the global economy, as well as in the industry of logistics service providers. Undoubtedly, the range of logistics services offered is determined by the resources, access to logistics infrastructure, and the availability and use of new technologies improving the implementation of logistics services, which support professional logistics services for customers.

5. Discussion

Nowadays, logistics service providers face many new challenges that cover many areas of their operation. The constant growth of technological progress, political changes, changes in market trends make the key solution for logistics service providers to implement innovation as a response to changes in the market environment.

The conducted research enriches the existing knowledge about the implementation by logistics service providers of innovative solutions in the logistics service of today's supply chains. The results of the study confirm the important role of implemented technological innovations. About technology, as they write (Kandampully, 2002; Stock, 1990): "the correct implementation of ICT can be an important source of competitive advantage for companies. This applies in particular to the logistics industry due to its dependence on information for the efficiency of its logistics operations". Technological innovations, including the effective use of technology, including the following systems, automatic identification, GPS, RFID, barcodes as well as systems dedicated to handling the warehouse following customers' orders, affect the efficiency and transparency of logistics services. Logistics service providers should demonstrate a high level of awareness that today's customers are increasingly demanding, and should also be aware of what their businesses expect. Customers expect not only correct service but also that logistics companies follow the prevailing trends in terms of technology, pro-ecological activities as well as the scope and scale of services provided.

In summary, these suppliers gradually become coordinators in individual supply chains and in supply chain networks (Fulconis and Paché, 2018 in Haffer, 2015). Undoubtedly, the importance of LSP services continues to grow due to the growing number of companies and the globalization of their activities. Service flexibility, accuracy and timeliness of deliveries are just prerequisites for competition, while shortening delivery times is a real element of the best logistics networks (Bottani and Rizzi, 2006 via Kumar, 2008).

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