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RESEARCH ARTICLE

The Effect of Logistics Innovativeness on the Relationship Between Logistics Capabilities and Logistics Performance: An Empirical Analysis of 3PL Firms

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ABSTRACT

Logistics services within the supply chain are carried out by Third-Party Logistics (3PL) companies. Logistics capabilities constitute the basic capabilities of 3PL companies. Logistics performance levels depend on logistics capabilities and logistics innovativeness levels. This study has two main aims. The first aim is to determine whether there is a significant relationship between the logistics capabilities of 3PL companies and their logistics performance. The second aim of the study is to determine whether there is an intermediary effect of logistics innovativeness. Two research models and two hypotheses were formed in the study. The sample area of the research consists of 3PL companies operating in Artvin. Scales with proven reliability and validity were used to create the research data set. 224 data of the research were collected between May 2021 and December 2021. Covariance-based structural equation modeling (CB-SEM) was applied in the research. As a result of the research, it has been determined that logistics capabilities have a significant effect on logistics performance and logistics innovativeness has a full mediating effect in this relationship. As a result of the research, suggestions were presented to 3PL companies and managers. In addition, the limitations of the study are explained in the last section.

Keywords: Logistics Capabilities, Logistics Innovativeness, Logistics Performance, 3PL Firms, Structural Equation Modeling

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1. Introduction

Resource-based theory points out that firms should focus on their core competencies to improve their competitiveness and gain competitive advantage over rival firms (Grant, 1991). At this point, companies operating in different industrial fields are making efforts to develop their basic skills. Logistics capabilities, which are beyond the basic capability of many, have started to be carried out by Third-Party Logistics (3PL) companies over time. 3PL companies act as the "orchestrator" that ensures harmony between activities within the supply chain (Zacharia et al., 2011). To acquire sustainable competitive advantage, the effective use of logistics capabilities, which are included in dynamic capabilities, is required (Sandberg and Abrahamsson, 2011). Huang and Huang (2012) considered logistics capabilities to be the ability of logistics service providers and explained them as defining, utilizing, and assimilating all existing internal and external resources to increase customer service quality.

With the revelation of the strategic importance of logistics activities, the necessity of evaluating the performance of logistics activities has emerged (Stank et al., 2005; Fugate et al., 2010). Logistics performance measurement is basically explained as determining the efficiency and productivity levels in logistics activities (Mentzer and Konrad, 1991). It is also stated that logistics performance measurement is among the components that make up organizational and firm performance (Chow et al., 1994). In the literature, logistics capabilities are handled with different approaches and their effects on logistics performance are examined (Lynch et al., 2000; Shang and Marlow, 2005; Ralston et al., 2013; Karagöz and Akgün, 2015; Kirono et al., 2019). In addition, there are studies that deal with logistics performance measurement with different measurement approaches (Korpela and Tuominen, 1996; Qureshi et al., 2009; Liu and Lyons, 2011). The logistics performance measurement method based on the evaluation of the logistics performance of the employees and managers of their companies is known as the logistics performance measurement based on scales. In this context, scales have been developed in the literature to determine the logistics performance of companies (Wang et al., 2018; Zhang et al., 2019).

Innovative steps to develop logistics capabilities have revealed the concept of logistics innovativeness (Flint et al., 2005). Logistics innovativeness benefits companies in improving their logistics capabilities (Kara and İpekçi, 2021). At the same time, it is a driving force in increasing logistics performance. Considering these benefits of logistics innovativeness, it can have an active role in the relationship between logistics capabilities and logistics performance. Based on this evaluation, the aim of this research is to explain the relationship between the logistics capabilities of 3PL companies and their logistics performance, and to determine whether logistics innovativeness has a mediating effect. For this purpose, two research questions were formed within the scope of the research. The research questions are:

- *Research question 1*: Do logistics capabilities have a significant positive effect on logistics performance?

- *Research question 2*: Does logistics innovativeness have a mediating role in the relation of logistics capabilities and logistics performance?

To answer the research questions, an empirical study of 3PL companies operating in the province of Artvin was conducted. The variables discussed within the scope of the research are explained conceptually and theoretically in the second part of the paper. In the third part of the paper, the literature review of the relations between the variables, the framework of the research and the hypotheses of the research are presented. The research methodology, the scales and the sample area are presented in the fourth part. In the fifth part, the findings of the research are given. The results of the research are presented in the sixth part. In the seventh part, the limits of the research and the conclusions obtained as a result of the research are presented.

2. Theoretical background and conceptual framework

2.1. Logistics Capabilities

Logistics activities are cost elements that have a direct impact on the product sales price (Goor et al., 2008). This situation requires businesses to attach more importance to logistics processes to manage price-oriented competition. Logistics is also of great importance in the supply chain management planning process with the information obtained, as well as dealing with the product movement (Heizer et al., 2019). Businesses' logistics capabilities are also critical in planning supply chains and cost management.

Logistics capabilities cover all the elements that enable the resources of the enterprises to perform well (Christopher, 2016). Logistics capabilities also focus on raising the level of customer services (Fernandes et al., 2018). Businesses consider many different performance criteria during the evaluation of logistics capabilities. Various performance criteria such as on-time delivery, vehicle occupancy rates, loss and damage rates are used in logistics performance measurement and monitoring. Logistics capabilities should also be addressed according to the field in which the business operates. For this reason, logistics capabilities should be evaluated in terms of businesses that produce logistics services and need logistics services through outsourcing. In the literature, it is mentioned that logistics capabilities are handled differently in production enterprises and 3PL companies (Yorulmaz and Birgün, 2016).

The main function of logistics is to carry out the movement of products, and when it is evaluated in terms of production companies, logistics becomes a whole with storage, stock management, order management and other value-added services. At this point, the logistics capabilities of 3PL companies involved in the execution of logistics services are also important. Huang and Huang (2012) describe the logistics capabilities of 3PL firms as service, innovation and flexibility. Mentzer et al. (2004) also classified logistics capabilities into four main groups: "demand management capability, supply management capability, information management capability and coordination capability." Although logistics capabilities are handled with different classifications in the literature, the main feature that should be in logistics capabilities is to keep up with changing environmental conditions and to create an advantage over competitors. In addition, logistics capabilities

are expected to have the characteristics of using the resources of the enterprises correctly and benefiting from organizational capabilities (Gligor and Holcomb, 2012). The aim of this study is to explain the relationship between these capabilities and performance by accepting logistics capabilities as the basic capabilities of 3PL companies.

2.2. Logistics innovativeness

The concept of innovation first comes to mind as introducing new products in terms of technology. But innovation is conceptualized beyond the boundaries of "technological innovation." Rogers (1995) suggests that the concept of innovation can take place in three forms. These are *idea*, *practice* and *purpose*. It is also suggested that these forms of innovation can occur at all levels, from the individual to the unit stage. But the indispensable feature of innovation is that it is "new." When the theoretical foundations of the innovation concept are examined, it is seen that more than one theoretical approach explains the innovation concept (Grawe, 2009). "The knowledge-based view" explains that firms need information to gain competitive advantage (Turner & Makhija, 2006). With the "idea" form of innovation, companies can gain competitive advantage by generating knowledge. "The dynamic capabilities framework" suggests that companies create value with their dynamic capabilities (Teece et al., 1997). With the "practice" form of innovation, companies gain competitive advantage by producing new technologies. "The Schumpeterian innovation framework" argues that large firms are more powerful in creating innovation and can use this as a competitive advantage (Schumpeter, 1942). With the "purpose" form of innovation, companies can become a pioneer in the market by making innovation a goal.

"The resource-advantage theory" argues that innovation practices take place to gain competitive advantage (Grawe, 2009). In order for companies to take advantage of the resources they have, they need to transform their resources into a more powerful and competitive form. Renewing logistics resources and capabilities with innovation practices provides companies with logistics advantages. At this point, the concept of logistics innovativeness emerges. In the literature, the concept of logistics innovativeness is discussed with two different approaches. These are logistics innovativeness obtained with cognitive applications and logistics innovativeness obtained with non-cognitive applications (Cui et al., 2012). Flint et al. (2005) argue that logistics innovativeness takes place in line with a specific purpose and within a specific program. Wagner and Franklin (2008) explain that logistics innovativeness takes place to find solutions to the difficulties encountered as a result of changes in customer demands and needs, and that this process does not have a cognitive infrastructure.

Cui et al., (2012) point out that there are many factors that affect logistics innovativeness. These factors are categorized as antecedents, successors, and barriers. Antecedents affecting logistics innovativeness are "knowledge, networking, technology (Chapman et al., 2003), financial reasons (Soosay and Hyland, 2004), customer orientation, supply chain management and innovation management (Flint et al., 2008), customer and competitor orientation (Grawe et al., 2009)." The successors of logistics innovativeness are competitive advantage (Persson, 1991), differentiation advantage (Twede, 1992),

operational service quality (Richey et al., 2005), effective logistics service provision (Panayides and So, 2005) and customer loyalty (Wallenburg, 2009). The barriers affecting logistics innovativeness are the lack of innovation of supply chain members (Gellman, 1986), irregular cooperation, closure and lack of diversity.

In this study, the innovation approaches of logistics service providers in logistics services are discussed within the concept of logistics innovativeness. At this point, the concept of logistics innovativeness has been accepted as innovative ideas, practices and purposes in logistics activities. At the same time, logistics capabilities constitute the basic capabilities of 3PL companies. The "Resource-Based View" argues that companies should focus on their basic resources and capabilities to gain competitive advantage (Barney, 1991). Thus, it is necessary to consider logistics capabilities as a precursor to logistics innovativeness. Logistics performance of 3PL companies are accepted as outputs of both logistics capabilities and logistics innovativeness. In addition, the concept of logistics innovativeness is considered a mediating variable in the theoretical and conceptual framework of this study.

2.3. Logistics Performance

Many businesses in different sectors look for ways to strengthen their position in the market by carrying out long and short-term performance measurements. Although performance measurement started as the analysis of production systems, it is possible to measure performance in different units thanks to many different methods developed today. Businesses can measure performance on different criteria such as cost, profitability, efficiency, quality and customer service level (Işığıçok, 2005). Businesses also determine their logistics performance with financial and non-financial performance measurement methods. While financial performance measurements take place in areas such as budgeting, cost estimation methods and task cost, non-financial performance measurements occur in areas such as delivery times, quality, customer service and inventory turnover (Andersson et al., 1989). Performance measurements are carried out based on the criteria determined by the enterprises. The fact that businesses serve in different sectors and have different goals prevents the performance criteria from being generalizable (Chow et al., 1994). However, there are criteria commonly used in performance measurement in the literature. Hotrawaisaya et al (2014) show cost, time and reliability criteria among these criteria. In addition to these general performance measurement criteria, there are also basic criteria used in logistics performance measurements. Bakan and Şekkeli (2015) (2015) explain these criteria as order cycle times, compliance with delivery dates, service with optimum stock level, transportation tariffs, minimum damage and high coordination.

Today, businesses focus on their core competencies and carry out their logistics services through 3PL companies. At this point, the logistics performance levels of 3PL companies directly affect the general performance of the enterprises. Considering the role of 3PL companies in the supply chain, even if the basic capabilities of the enterprises are successful, the supply chain performance level cannot be successful if the logistics performance level of the 3PL companies is not at the desired level. Performance criteria expected from 3PL companies are timely, complete and error-free deliveries, frequent

deliveries, the lowest level of damaged orders and high vehicle occupancy rates (Slack, 1994).

With increasing competition conditions, businesses and 3PL companies are triggering efforts to determine the current logistics performance situations. This situation has led to the emergence of companies that measure logistics performance. There are also differences in logistics performance measurement criteria and the methods of companies that carry out logistics performance measurement. The company Datapine explains its logistics performance measurement indicators as follows: "Shipping time, order accuracy, picking accuracy, delivery time, pick and pack cycle time, equipment utilization rate, transportation costs, warehousing costs, pick and pack costs, use of packing material, number of shipments, inventory accuracy, inventory turnover, inventory to sales ratio" (Datapine, 2021). Opsdog, on the other hand, explains the 5 simplest logistics performance measurement indicators as follows: "Customer Backorder Rate, Inventory Accuracy, Inventory Turnover, Transportation Cost per Mile, Perfect Customer Order Rate" (Opsdog, 2021). This situation shows that there are differences in logistics performance measurement methods in the literature and in practice. However, in this study, the Survey-base technique was used to determine the logistics performance of 3PL companies. For this reason, the study aimed to determine the logistics performance success status of 3PL companies according to the perceptions of employees with the help of a questionnaire.

3. Literature review and hypotheses development

Logistics capabilities unify and integrate the company's other capabilities. They play an important role in improving the logistics performance of companies (Gunasekaran and Ngai, 2003; Hua et al., 2016). Karagöz and Akgün (2015) examined the effect of logistics capabilities of international logistics companies operating in Turkey on their logistics performance. It was concluded that logistics capabilities have a significant effect on logistics performance. Chu et al (2018) stated that the various logistics capabilities of logistics companies operating in China are insufficient and therefore their logistics performance is not at the desired level. Lyu et al. (2019) considered the "Logistics infrastructure," "Logistics location," "Logistics knowledge" and "Logistics information" capabilities of companies as logistics resources and examined the impact on the operational performance of companies. As a result of this research, they concluded that "Logistics infrastructure," "Logistics location" and "Logistics information" resources have a significant effect on operational performance. Bin Mohamad Makmor et al. (2019) explained the variables that affect the logistics performance of 3PL companies operating in Malaysia as "Management Commitment," "Skills and Knowledge" and "Financial competency." At the same time, they explained that these factors should be considered in the evaluation of the logistics performance of 3PL companies. Yudistira et al. (2019) concluded that the collaboration variable has a positive and significant effect on the logistics performance variable in freight forwarding companies. At the same time, it was concluded that logistics capabilities have a partial mediation effect in this relationship. Hua et al. (2016) found that logistics service ability has an intermediary effect on the effect of logistics capabilities on logistics performance in the sample area of logistics companies

operating in China. Wang (2020) interpreted logistics capabilities as "*operation flexibility - focused capability*, *innovation - focused capability* and *process optimization - focused capability"* in their study on the logistics capabilities of courier companies operating in Australia. In a study conducted on a sample from the Hopa Sarp customs gate, Tuygun Toklu (2021) concluded that the "tangibles" variable of customs significantly affects the total service quality of customs, the "Overall Service Quality" variable significantly affects the logistics efficiency of customs, but the "Logistics Efficiency" variable does not significantly affect logistics performance. In a study conducted with a sample from IKEA, Hellström and Nilsson (2011) explained that creating innovation in packaging, which is among the logistics activities, plays an active role in increasing the success of logistics and supply chain activities. Using a sample of 123 3PL firms, Karia and Wong (2012) found that logistics capabilities have a significant effect on firms' innovation performance. Mohd et al. (2017) stated that the logistics capabilities, information technology applications and innovation capabilities of logistics service providers operating in Malaysia have a positive and significant effect on the performance of logistics companies.

Studies dealing with the effect of logistics capabilities on logistics performance in the literature mostly explain that logistics capabilities have a significant effect on logistics performance. In relatively few studies is it seen that logistics capabilities do not have a significant effect on logistics performance. In addition, in the literature, there are studies that deal with the relationship between logistics capabilities, logistics performance and innovation of companies in the sample areas of 3PL firms. However, no research has been found that deals with the logistics of innovation and aims to explain the mediating role of innovation in the relationship between logistics capabilities and logistics performance. Therefore, this study aims to fill this gap in the literature by determining the effect of logistics capabilities on logistics performance and the mediating role of logistics innovativeness in this relationship. In this context, our research models are presented in Figure 1 and our hypotheses are as follows:

H1: Logistics capabilities have a significant effect on logistics performance.

H2: Logistics innovativeness has a mediating effect in the relationship between logistics capabilities and logistics performance.

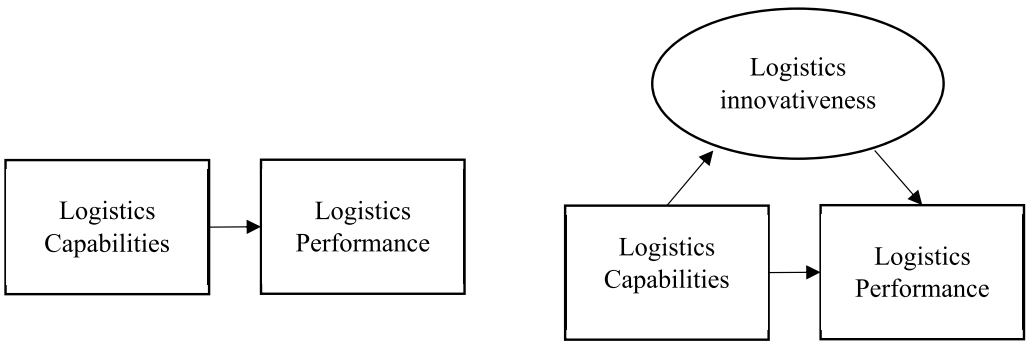


Figure 1. Research models.

4. Methodology

4.1. Questionnaire design

To explain the relationship between logistics capabilities and logistics performance and to reveal the mediating role of logistics innovativeness in this relationship, scales with proven validity and reliability in the literature were used. Wang et al.'s (2018) logistics capabilities scale was developed. The logistics capabilities scale was applied in a study conducted with a sample from Australian logistics courier companies. It consists of one dimension and a total of 8 items. The reliability and validity values of the scale are at acceptable levels (Cronbach alpha=0.89, CR=0.91, AVE=0.62). In addition, all the factor loads of the items are greater than 0.70.

The logistics innovativeness scale was developed by Anderson and West (1998). The logistics innovativeness scale was adapted by Ralston (2013) and applied to logistics and supply chain managers. It scale consists of one dimension and a total of 5 items. The reliability and validity values of the scale are at acceptable levels (Cronbach alpha=0.96, AVE=0.82). In addition, all the factor loads of the items are greater than 0.70.

The logistics performance scale was developed by Wang et al (2018). The logistics performance scale was implemented in Australian logistics courier companies. It consists of one dimension and a total of 9 items. The reliability and validity values of the scale are at acceptable levels (Cronbach alpha=0.94, CR=0.95, AVE=0.66). In addition, all the factor loads of the items are greater than 0.70.

In the research, demographic questions (Gender, Marital Status, Age, Education Status, Tenure, Logistics Sector) were asked of 3PL employees. Afterwards, the scales were arranged in the 5-point Likert Scale format and a questionnaire was administered ("1" =Strongly disagree to "5" =Strongly agree).

This research was conducted in accordance with the "Ethics Committee Decision" of Artvin Coruh University, dated 06.04.2021 and numbered 8616.

4.2. Sampling

Artvin is a city located in the northeastern region of Turkey. In terms of logistics, Artvin province has various advantages. HopaPort harbor is in the Hopa district of Artvin province. Artvin is also home to Sarp customs, which is the gate on the land border with Georgia. Artvin, which is on the transit route of highways from Turkey to Georgia, Russia, Armenia and Central Asian countries, is also in an active position in road transport. On the other hand, there is no rail transport in the area. The fact that Artvin is in a valuable location in terms of logistics causes an increase in the number of internationally operating 3PL companies in this region. In this study, logistics capabilities, logistics performance and logistics innovativeness levels of 3PL companies operating in Artvin province are discussed. There are 62 transport companies registered with the Hopa Chamber of Commerce and Industry (Hopa, 2021). In addition, HopaPort provides "bulk solid cargo, general cargo, project cargo, container, tank terminal, grain terminal and cement terminal

services (HopaPort, 2021)". Customs services are also carried out at the Sarp customs gate. The aim of this research was to determine the logistics capabilities, logistics performance and logistics innovativeness status based on the attitudes of logistics company employees. Surveys were prepared and sent to 3PL companies operating in the province of Artvin. The data set was collected between May 2021 and December 2021. The frequency status of the data set obtained from successfully completed questionnaires is shown in Table 1. When Table 1 is examined, 27% of the respondents are female and 73% are male. About 40% of the employees are single. Approximately 65% of the total participants are in the 30-50 age group. It has been observed that there is a low education level. Looking at the sectoral distribution, it is seen that approximately 60% of participants work in companies that provide road transport services.

Table 1: Frequency of the sample

Gender	**No**	**%**	**Marital Status**	**No**	**%**
Woman	66	27	Married	149	61
Man	178	73	Single	95	39
Total	244	100	Total	244	100
Age	**No**	**%**	**Education Status**	**No**	**%**
18-30	46	18.8	Pre-high school and high school	132	54
31-40	89	36.5	Associate degree	61	25
41-50	72	29.5	Undergraduate	39	16
50 +	37	15.2	Postgraduate	12	5
Total	244	100	Total	244	100
Tenure	**No**	**%**	**Logistics Sector**	**No**	**%**
0-5	98	40.1	Transportation	143	58.6
5-10	78	31.9	Warehousing and Packing	33	13.5
10-20	46	18.8	Customs	47	19.2
20 +	22	9.2	Others	21	8.7
Total	244	100	Total	244	100

5. Findings

5.1 Reliability and validity of the scales

To determine the logistics capabilities, logistics innovativeness and logistics performance of 3PL companies operating in Artvin, scales with proven validity and reliability in the literature were used. In order to carry out the reliability, validity and relational analyses of these scales, first of all, the normal distribution of the collected data set should be revealed. The Kolmogorov and Smirnov normality test results of the data set collected within the scope of our research and the skewness and kurtosis values of the data are shown in Table 2. When the skewness and kurtosis values of the scales are examined, it is observed that the values are between -1.5 and +1.5. This explains that the data set used in the research is normally distributed (Tabachnick et al., 2007). The findings of the multivariate normality test are shown in Appendix-1. When the "Multivariate c.r." is examined, it is seen that there is no normal distribution. Therefore, generalized least squares are applied instead of maximum likelihood in the measurement model.

Table 2: Kolmogorov-Smirnov normality test, Skewness and Kurtosis Values

Scales	N	Mean	SD	Kolmogorov-Smirnov Z	Asymp. Sig.	Skewness	Kurtosis
Logistics Capabilities	224	4.27	0.56	1.918	0.001	- 0.419	- 0.538
Logistics innovativeness	224	3.88	0.63	2.174	0.000	- 0.670	0.700
Logistics Performance	224	3.68	0.76	2.099	0.000	- 0.666	0.258

Kaiser Meyer Olkin (KMO) and Bartlett's Test of Sphericity tests were conducted with the help of the SPSS package program to test the validity of the scales based on the data set we obtained from our research sample area. According to the test results, Bartlett's Test of Sphericity values of all scales is below 1% significance level. At the same time, according to the KMO test results, the values of all scales are above 80%. These obtained values are shown in Table 3. Tabachnick et al. (2007) explains that Bartlett's Test of Sphericity values below 1% and KMO test values above 60% are sufficient for the scales to be valid. At this point, it is understood that the scales of logistics capabilities, logistics innovativeness and logistics performance are at an acceptable level of validity.

Table 3: KMO and Bartlett Tests

		Logistics Capabilities	Logistics Innovativeness	Logistics Performance
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.914	0.848	0.937
Bartlett's Test of Sphericity	**Approx. Chi-Square**	1114.214	372.299	1273.585
	df	28	10	36
	Sig.	0.000	0.000	0.000

Since the items of the scales are in English, they were translated into Turkish before they were applied to the sample area. Turkish items were checked by the translators. Subsequently, the survey administration was carried out in Turkish. For this reason, it was necessary to perform exploratory factor analysis (EFA) of the scales. EFA analysis findings of logistics capabilities, logistics innovativeness and logistics performance scales are shown in Table 4. It was understood that all the factor loads of the expressions belonging to the scales were greater than 0.60 and each scale consisted of one dimension. It is known that factor loads greater than 0.32 are sufficient in social science research (Büyüköztürk et al., 2017). At this point, it can be stated that the internal consistency levels of the scales are acceptable and reliable.

In addition to EFA, Confirmatory factor analysis (CFA) results were obtained with the help of the AMOS package program. Table 5 shows the estimates values, standard error values and model fit values of logistics capabilities, logistics innovativeness and logistics performance scales. When all estimates' values were examined, it was understood that all of them were above 60%. At this point, it is understood that the internal consistency is at an acceptable level (Tabachnick et al., 2007). It is also seen that all the Structural equation model (SEM) fit values are within the acceptable level. The reliability levels of the scales, namely Cronbach's alpha values, were determined with the help of SPSS and are presented in Table 5. Cronbach's alpha values for logistics capabilities, logistics innovativeness and logistics performance are 0.914, 0.828 and 0.926, respectively. For

Table 4: Exploratory factor analysis results of LC, LI and LP scales

Items	Factor Loads	Eigenvalues / Total Variance Percentage	AVE / CR
LC5- "My firm is capable of maintaining consistent on-time delivery for all customers."	0.881	5.107 / % 63.84	0.638 / 0.933
LC4- "My firm is capable of maintaining a low freight damage / loss rate."	0.841		
LC6- "My firm is capable of handling problems and complaints."	0.828		
LC3- "My firm applies protection for freight safety and risk."	0.816		
LC1- "My firm applies simplification of operations."	0.794		
LC2- "My firm is capable of maintaining consistent on-time delivery for all customers."	0.758		
LC8- "My firm is capable of offering routine services."	0.748		
LC7- "My firm has skilled and qualified personnel."	0.713		
LI4- "My company uses materials that consume less energy and fewer resources."	0.783	2.989 / % 59.77	0.597 / 0.881
LI2- "Our logistics employees take the time needed to develop new ideas."	0.781		
LI1- "Our logistics employees are open and responsive to change."	0.779		
LI3- "Our logistics employees cooperate in order to help develop and apply new ideas."	0.769		
LI5- "Our logistics employees provide practical support for ideas and their application."	0.753		
LP6- "My firm has high customer satisfaction."	0.866	5.699 / % 63.32	0.633 / 0.939
LP4- "My firm has a low rate of customer complaints."	0.828		
LP3- "My firm has less damaged / lost freight."	0.827		
LP2- "My firm has a low frequency of disruptions / delays."	0.826		
LP9- "My firm maintains accurate billing / transit/ delivery information."	0.799		
LP1- "My firm maintains low operating costs."	0.786		
LP7- "My firm has a short customer response time."	0.781		
LP5- "My firm has on-time and accurate delivery."	0.763		
LP8- "My firm has a reputation in the industry."	0.670		

discriminant validity, the square root of AVE values should be higher than the correlation between variables (Henseler et al., 2015). AVE square root and correlation values are presented in Table 6. Accordingly, discriminant validity is appropriate.

5.2. Test of the research hypothesis

To answer our research questions based on the relationships between logistics capabilities, logistics innovativeness and logistics performance of 3PL companies operating in the Artvin region, it would be appropriate to determine the correlation relationships between the variables. Here, the correlation relationship between the variables included in the research is presented in Table 6. It is clearly seen that the highest correlation relationship is between logistics innovativeness and logistics performance ($r(244)=0.619$, $p<0.01$). It was understood that the relationships between logistics capabilities and logistics performance ($r(244)=0.214$, $p<0.01$) and between logistics capabilities and logistics innovativeness ($r(244)=0.235$, $p<0.01$) were low.

Table 5: Confirmatory factor analysis and Cronbach's alpha results of LC, LI and LP scales

Parameter Estimates	Estimate	S.E.	Fit Values	AVE / CR	Cronbach's Alpha(α)
Measuring Model					
LC1 <--- LC	0.743*	0.124	"X^2 [35.5, N=224] = 16, CMIN/df (2.216)**, CFI (0.982)***, RFI (0.945)***, IFI (0.983)***, TLI (0.969) NFI (0. 969)***, RMSA (0.074)****"	0.583 / 0.917	0.914
LC2 <--- LC	0.712*	0.105			
LC3 <--- LC	0.790*	0.098			
LC4 <--- LC	0.830*	0.115			
LC5 <--- LC	0.879*	0.107			
LC6 <--- LC	0.778*	0.111			
LC7 <--- LC	0.664*	0.142			
LC8 <--- LC	0.689*				
LI1 <--- L1	0.715*		"X^2 [1.1, N=224] = 1, CMIN/df (1.337)**, CFI (0.995)***, RFI (0.965)***, IFI (0.995)***, TLI (0.991) NFI (0.982)***, RMSA (0.039)*****"	0.502 / 0.834	0.828
LI2 <--- L1	0.714*	0.117			
LI3 <--- L1	0.710*	0.098			
LI4 <--- L1	0.720*	0.086			
LI5 <--- L1	0.686*	0.100			
LP1 <--- LP	0.756*		"X^2 [50.1, N=224] = 26, CMIN/df (1.928)**, CFI (0.981)***, RFI (0.946)***, IFI (0.981)***, TLI (0.973) NFI (0.961)***, RMSA (0.065)****"	0.585 / 0.926	0.926
LP2 <--- LP	0.812*	0.102			
LP3 <--- LP	0.814*	0.077			
LP4 <--- LP	0.808*	0.079			
LP5 <--- LP	0.733*	0.071			
LP6 <--- LP	0.833*	0.082			
LP7 <--- LP	0.723*	0.083			
LP8 <--- LP	0.614*	0.076			
LP9 <--- LP	0.768*	0.087			

Notes: "* p<0.01, ** CMIN/df < 3 (Good fit), *** CFI, NFI, RFI, IFI, TLI > 0.90 (Good fit), **** 0.05 <RMSA< 0.08 (Acceptable fit), ***** RMSA< 0.05 (good fit)"

Our first research question is whether there is a relationship between logistics capabilities and logistics performance. Therefore, our first hypothesis was created to test whether logistics capabilities have a significant effect on logistics performance. To test our first hypothesis, an SEM path analysis model covering two variables was established. The result of the path analysis is shown in Figure 2. When Figure 2 is examined, it is seen that logistics capabilities have a significant positive effect on logistics performance ($\beta = 0.46$, $p < 0.01$). In addition, as presented in Table 7, all fit values of the path analysis model are at an acceptable level. At this point, the first hypothesis of our research was supported.

The mediating variable basically creates a change in the effect of the independent variable on the dependent variable. In this relationship, the mediator variable is expected to render the effect of the independent variable on the dependent variable meaningless. In addition,

Table 6: Correlation relations of variables

Variables	Mean	S.D.	LC	LI	LP
LC	4.27	0.56	**0.763****		
LI	3.88	0.63	0.235*	**0.708****	
LP	3.68	0.76	0.214*	0.619*	**0.764****
Notes: * p < 0.01, ** Sqrt AVE					

it is accepted that the effect of the independent variable on the dependent variable is reduced. Baron & Kenny (1986) emphasize that 4 basic conditions must be met to talk about the effect of the mediating variable in model studies with mediating variables. The first condition is that the independent variable has a significant effect on the dependent variable. The first model and research question of our research was carried out to prove the first condition. As a result of the first model analysis, it was found that logistics capabilities have a positive and significant effect on logistics performance.

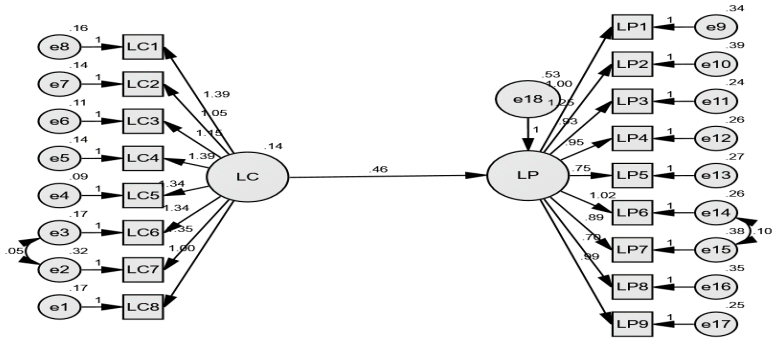


Figure 2. Path analysis model of LC and LP (with generalized least squares).

The second condition is that "the independent variable must have a significant effect on the mediating variable." *The third condition* is that "the mediator variable has a significant effect on the dependent variable." *The fourth condition* is that "the independent variable loses its significant effect on the dependent variable after the mediator variable is included in the model." SEM was created within the scope of the second model of our research. The relationships of the path analysis model are shown in Figure 3. As seen in Figure 3, logistics capabilities have a significant effect on logistics innovativeness ($\beta = 0.35$, $p < 0.01$). This proves that the second condition is fulfilled. The effect of logistics innovativeness on logistics performance is also significant ($\beta = 0.89$, $p < 0.01$). This proves that the third condition is fulfilled. After the mediating variable, logistics innovativeness, was included in the model, the effect of logistics capabilities on logistics performance lost its significance level ($\beta = -0.20$, $p = 0.176 > 0.01$). This proves that the fourth condition is fulfilled. In addition, it is shown in Table 8 that all the fit values of our second research model are at an acceptable level. Thus, it is seen that the significant effect of the independent variable (LC) on the dependent variable (LP) in our first research model

Table 7: LC and LP path analysis model

Parameter Estimates	**Estimate (β)**	**S.E.**
Structural Model		
LP <--- LC	0.46*	0.161
Fit Values		
"X^2 [183.5, N=224] = 116, CMIN/df (1.582)**, GFI (0.903)***, RMSA (0.051)****"		
Notes: "* p<0.01, ** 3 <CMIN/df <5 (Acceptable fit), *** GFI > 0.90 (Acceptable fit), ****0.05 <RMSA< 0.08 (Acceptable fit)"		

disappeared in the second research model. In this case, it is understood that the mediating variable, logistics innovativeness, has a "full mediating effect" on the relationship between logistics capabilities and logistics performance. Thus, our second hypothesis, which we created within the scope of the research, was supported. Sobel test analysis findings are presented in Appendix-2. Considering the Sobel test values ($p<0.05$), the findings obtained by CB-SEM analysis are supported.

6. Conclusion and discussion

The main purpose of this study, which was carried out on logistics service providers, is to deal with the relationship between logistics capabilities, which constitute the basic capabilities of logistics companies, and logistics performance, from the perspective of Resource-view Theory. At the same time, determining whether innovative activities in the field of logistics, which affect the development of logistics capabilities, have a significant effect on logistics performance is another aim of the research. As a result of the research, two main conclusions were reached. The first result is that the logistics capabilities of 3PL companies have a significant effect on logistics performance. The second result is that the logistics innovativeness levels of 3PL companies have a full mediation effect on the relationship between logistics capabilities and logistics performance.

Table 8: LC, LI and LP path analysis model

Parameter Estimates	**Estimate (β)**	**S.E.**
Structural Model		
LI <--- LC	1.07*	0.148
LI <--- LP	0.49*	0.138
LC <--- LP	-0.20**	0.144
Fit Values		
*"X*² [315.3, N=224] = 206, CMIN/df (1.531)***, GFI (0.871)****, RMSA (0.050)*****"		
Notes: "* p<0.01, **p=0.176>0.01, ***3 < CMIN/df < 5 (Acceptable fit), **** GFI > 0.85 (Acceptable fit), ***** 0.05 < RMSA< 0.08 (Acceptable fit)"		

In the literature, it is emphasized that logistics capabilities have an increasing effect on logistics performance (Morash and Lynch, 2002). The fact that the logistics capabilities obtained as a result of this research have a significant effect on logistics performance is in parallel with the results obtained in the literature (Karagöz and Akgün, 2015; Chu et al., 2018). Logistics capabilities are considered among the dynamic capabilities of logistics service providers. The fact that the relationship between the dynamic capabilities of 3PL companies and their performance is significant in the literature (Arun and Özmutlu, 2021) also supports the research result. Based on increasing logistics service performance, 3PL companies should strengthen their cooperation with other companies that demand logistics services (Yudistira et al., 2019). At this point, it can be mentioned that logistics capabilities play an active role in increasing collaborative logistics performance.

Innovative activities that increase the quality and efficiency of logistics services provide added value to companies. 3PL companies need to be more innovative to increase customer expectations and gain competitive advantage against competitors (Chu et al., 2018).

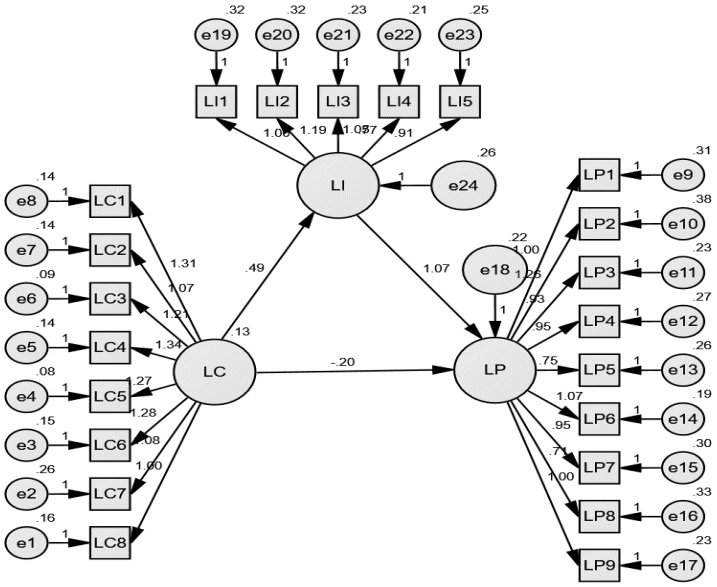


Figure 3. Path analysis model of LC, LI and LP (with generalized least squares)

Logistics innovativeness approaches contribute to the innovation of 3PL companies. These contributions play an active role in improving logistics performance by supporting the development of logistics capabilities. At the same time, 3PL companies need to carry out innovative activities in a systematic structure and keep up with environmental changes to survive (Shen et al., 2009). The finding of the intermediary effect of logistics innovativeness obtained as a result of the research reveals the importance of 3PL companies having logistics capabilities developed with innovative approaches in order to improve their logistics performance. In addition, this study contributes to the literature by examining the relationship between logistics-based talent, innovation and performance.

7. Implication and limitation

Logistics service providers, whose importance is increasing day by day, play an active role in the realization of logistics activities within the supply chain. Logistics companies, which have a complementary role in strong supply chain structures, are expected to improve their capabilities to be effective and efficient and to increase their service quality with more innovative approaches. The findings and conclusions based on the results obtained from this research are discussed at the manager and firm level. 3PL companies should make efforts to improve their logistics capabilities to establish a competitive advantage over their competitors. At the same time, it should carry out innovation activities that accelerate logistics activities and bring them to a more reliable level. Considering the lack of in-organizational R&D units at logistics companies, it is recommended that they cooperate with innovation-oriented companies that consider the development of logistics activities. With this study, it is recommended that managers working in 3PL companies make decisions that aim to develop logistics capabilities with strategically innovative product and process approaches. The existence of logistics innovativeness is necessary in the process of determining the vision and mission of 3PL companies. At the tactical and operative level, it is necessary to establish the necessary administrative structure to

identify deficiencies in meeting customer needs while performing logistics activities and to develop innovation ideas that complement these deficiencies.

There are 3 different limitations of the research. The first of these is the sample area of the research. The sample area of the study consists of 3PL companies in Artvin. When generalizing about the research, the sample should be considered. The second is the period in which the research was conducted. The research was carried out in 2021, when pandemic conditions continued. Re-evaluating the research after pandemic conditions are over and comparing the results will contribute to the literature. The last limitation of the study is the methodological approach of the research. The research was carried out based on the attitudes of the personnel working in 3PL companies. There are different approaches to logistics performance determination in the literature. Reconsidering the research question with these approaches and comparing the results obtained will contribute to the expansion of the literature.

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Ethics Committee Approval: This research was conducted in accordance with the "Ethics Committee Decision" of Artvin Coruh University, dated 06.04.2021 and numbered 8616

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Appendices

Appendix 1: Multivariate normality test findings

Variable	skew	c.r.	kurtosis	c.r.
LI5	-.718	-4.387	.316	.965
LI4	-.839	-5.127	1.439	4.398
LI3	-1.214	-7.416	2.101	6.420
LI2	-.687	-4.197	-.028	-.085
LI1	-1.043	-6.374	1.113	3.401
LP9	-.895	-5.468	.483	1.476
LP8	-.848	-5.181	.904	2.761
LP7	-.749	-4.575	.054	.164
LP6	-.789	-4.822	.090	.274
LP5	-.842	-5.144	.494	1.509
LP4	-.770	-4.707	.207	.631
LP3	-.876	-5.353	.651	1.990
LP2	-.633	-3.866	-.542	-1.657
LP1	-.773	-4.723	.227	.694
LC1	-.929	-5.677	1.297	3.963
LC2	-1.174	-7.176	2.956	9.030
LC3	-.620	-3.790	.115	.352
LC4	-.736	-4.494	.452	1.380
LC5	-.489	-2.988	-.690	-2.108
LC6	-.760	-4.644	.542	1.656
LC7	-.699	-4.273	.091	.278
LC8	-.930	-5.685	.661	2.021
Multivariate			176.211	40.578

Appendix 2: Sobel test findings

	Test statistic	Std. Error	*p*-value
Sobel test	3.12786464	0.09958871	0.00176081
Aroian test	3.10564571	0.1003012	0.00189864
Goodman test	3.15056737	0.09887108	0.00162954