JTAM (Jurnal Teori dan Aplikasi Matematika)
http://journal.ummat.ac.id/index.php/jtam
p-ISSN 2597-7512 | e-ISSN 2614-1175
Vol. 8, No. 3, July 2024, pp. 839-851

Analysis of Critical Criteria for Assessment of Logistics Service Provider Company (Case Study: PT. Pos Logistik Indonesia)

Yenny Suzana[1*], Budi Irwansyah[1], Suparni[2], Wanda Darmawan[3]
[1]Department of Mathematics Education, IAIN Langsa, Indonesia
[2]Department of Tadris Mathematics, UIN Syekh Ali Hasan Ahmad Addary, Indonesia
[3]State High School 2 Percontohan Karang Baru, Indonesia
yenni@iainlangsa.ac.id

Article History:
Received : 23-01-2024
Revised : 23-06-2024
Accepted : 25-06-2024
Online : 17-07-2024

Keywords:
Logistics service provider;
PT Pos Logistik Indonesia;
Criteria selection;
Factor analysis.

ABSTRACT

The quality of services provided by logistics providers has a direct impact on an organization's business. Organizations need to critically evaluate the performance of their LSPs and choose service providers rationally. LSPs understand the importance of service quality to their survival and growth and strive to provide high-quality services. PT Pos Logistik Indonesia (PLI) is a company that operates in the field of Logistics Delivery Services which can include documents, electronic products, logistics, and others. PT Pos Logistik Indonesia (PLI) in Langsa City should have criteria as a logistics service provider to ensure customer satisfaction. This research aims to analyze these criteria through a survey collected from 120 Small and Medium Enterprises (SMEs) organizations in Langsa City that use the services of PT Pos Logistik Indonesia (PLI). Small and Medium Enterprises (SMEs) are individual business entities or legal entities that have small initial capital, or a small value of wealth (assets) and a small (limited) number of employees. Questionnaire strategies were used to identify criteria selection-based sustainable logistics service quality (SLSQ) theoretical framework, that is sustainable transport elements, training, collaboration, sustainable packaging, and sustainable information. The explanatory factor analysis method was employed. The top three ranked criteria for evaluating logistics service provider criteria selection based on sustainable logistics service quality are the trained PLI employees, the sustainable packaging, and the commitment to environmental goals. Through this research, it confirms that sustainable logistics practices can bring value to PLI as LSPs and better improve their performance and customer satisfaction.

https://doi.org/10.31764/jtam.v8i3.21670

This is an open access article under the CC–BY-SA license

A. INTRODUCTION

Logistics has the primary objective or mission in the form of arranging for goods to be delivered at the right time, on the right amount, and on the plan from the company to the customers (Casado-Vara et al., 2019). The logistics industry, as an integral part of the business environment, has attracted much attention. There are many reasons for a company to outsource its logistics because they focus on many of their company's businesses or want to improve the quality of their business. Organizations usually outsource their forward and reverse logistics activities to logistics service providers (LSPs) to focus more on their core competency, reduction in costs, improvements in deliverables, scaling the business to a wider network reach, and improving their supply chain (Sanchís-Pedregosa et al., 2018). Competition

in the logistics industry is getting tighter with the emergence of new entrant companies due to consumers' desire for fast delivery of goods at low costs, this is related to what is called goods transportation. One of the companies that provides logistics activity services in Indonesia is PT Pos Logistik Indonesia (PLI). PT Pos Logistik Indonesia (PLI) is a subsidiary of PT Pos Indonesia and one of the State-Owned Enterprises (BUMN) engaged in logistics. Other services offered by PLI are goods delivery and warehousing. Delivery of goods can be in the form of documents, electronic products, logistics and others (Wibowo & Chairuddin, 2017). This company serves goods delivery throughout Indonesia, both Door-to-Door (D2D) and Port-to-Port (P2P). PLI has a vision "to become the best logistics solutions provider company in Indonesia". Meanwhile, the company's mission is "to be the answer to logistics challenges in Indonesia, by combining the company's capabilities in providing solutions through a national approach synergized with global solutions for the use of appropriate technology, so that our presence not only provides solutions for customers but also provides benefits to investors in improving the Indonesian economy." This company started as a logistics business project in 2004, and developed into a Strategic Business Unit in 2007, then based on a Notarial Deed ratified by the Minister of Law and Human Rights in Decree No: AHU-08351.AH.0101 on 17 February 2012, PLI was officially born as a subsidiary of PT Pos Indonesia (Persero). With its position as a subsidiary, and supported by workers and a professional team in formulating business strategy and positioning, PLI is optimistic that it can operate independently to maximize logistics business opportunities in Indonesia while utilizing the network of PT Pos Indonesia has been established throughout Indonesia, with 4,367 branch offices and 33,000 sales points.

PT Pos Logistik Indonesia (PLI) provides distribution solution services with land, sea and air transportation models as well as using flexible, reliable and efficient train services to all corners of Indonesia with several transportation operation methods. The transportation operation system includes from one pickup point to another delivery point, then from one pickup point to several delivery points (multi drop), from several pickup points to one delivery point (multi pickup) and local transportation operations from one point to one point and vice versa within the metropolitan area (shuttle). In carrying out its objectives as a logistics service provider, PT Pos Indonesia (Persero) has a predetermined work area. These work areas are divided according to each operational area, with the aim of ensuring that the boundaries between areas are clear and that errors do not occur when carrying out their duties. In carrying out postal services in Indonesia, PT Pos Indonesia divides the territory of Indonesia into eleven regions or regional divisions within its operations. The divisions include all provinces that are part of the division. The provinces of Aceh and North Sumatra are included in Division I of the Medan branch.

According to Ali et al. (2021) it has become a critical practice to measure organizational performance with an evaluation scheme covering the financial and management perspectives and the organization’s sustainability performance. In the dynamic logistics industry both in Indonesia and internationally, PLI provides services tailored to consumer needs. PT Pos Logistik Indonesia (PLI) Langsa branch has a warehouse which functions for inventory management, inbound and outbound management as well as product distribution to all shops in Langsa city. This warehouse serves customers who have problems with storage space, labor problems and daily business operations so that customers can focus more on handling product

development, brand marketing and customer satisfaction. PT Pos Logistik Indonesia (PLI) in Langsa City meets customer needs, including, "same day delivery" services for fast and timely delivery of goods, "e-commerce logistics" services to support MSMEs in online marketing, and "cold chain logistics" services for delivery of goods that require special temperatures. Therefore, it becomes essential for PLI as logistics service providers (LSPs) to implement sustainable business practices, especially in Langsa City.

Such cooperation with other LSPs enables LSPs to provide more effective logistics solutions compared to what could be achieved individually (Pomponi, Fratocchi, & Rossi Tafuri, 2015). Such cooperation also occurs even though companies may compete with each other (Martin et al., 2018). Argued that horizontal cooperation between LSPs in the transportation industry and logistics industry is a fairly recent phenomenon. Partners in horizontal cooperation aim to offer complementary services to avoid unnecessary logistics costs (Verdonck, 2017). As acknowledged by Martin et al. (2018), cooperation among LSPs has become an important research area, since severe competition in global markets, rising costs, and heightened customer expectations have caused the profit margins of companies to decrease. Therefore, Abidi et al. (2019) establish criteria for evaluating strategic partners in a network of LSP. Based on the vision and mission of PT Pos Logistik Indonesia (PLI) itself, namely "To be the most trusted, widest and leading provider of integrated logistics solutions in Indonesia", and its mission, namely "To be the answer to logistics challenges in Indonesia, by combining the company's capabilities in providing solutions through a national approach that is synergized with global solutions using appropriate technology, so that our presence not only provides solutions for customers but also provides benefits for investors in improving the Indonesian economy and improving logistics in Indonesia," it is necessary if PLI also has the same criteria. Right to become a logistics service provider.

Since LSP partners evaluation deals with many conflicting objectives, different criteria need to be considered for evaluating LSP partners (Büyüközkan & Görener, 2015). According to Alkhatib et al. (2015) the LSPs' evaluation and selection process is multi-dimensional. The decision maker's subjective evaluations and feelings toward evaluation dimensions/criteria directly affect the process. A large number of criteria, the very diverse use of terminology, and different classifications of criteria used to select a logistics service provider (LSP) reflect the lack of consensus in defining criteria (Bajec & Tuljak-Suban, 2017). Logistics partners' selection is another important criterion to ensure reliable on-time delivery in a collaborative relationship. This enhances the long-term partnership (Ramanathan et al., 2021). While LSPs are generally required to deliver more sustainability with a high quality of logistics services (Gruchmann et al., 2018), logistics service quality (LSQ) and sustainable service quality (SSQ) presented by logistics providers are the main criteria for selecting the best logistics providers (Centobelli et al., 2017), (Gupta et al., 2018). Does PT Pos Logistik Indonesia as a logistics service provider have these two important elements? To answer this question, it is necessary to conduct research on PT Pos Logistik Indonesia (PLI) in Langsa City.

B. METHODS

1. Collect Data

Data collection was carried out through a questionnaire that included respondents' perceptions of the importance of the factors that determine why PLI was chosen as a logistics service provider. Questionnaire strategies were used to identify criteria selection-based sustainable logistics service quality (SLSQ) theoretical framework, that is *sustainable transport elements, training, collaboration, sustainable packaging, and sustainable information*. In this part, close-ended questions using 5-point Likert scales were utilized to explore the respondents' satisfaction degree (1 = not important; 2 = moderately important; 3 = important; 4 = very important; 5 = extremely important). 20 items were used to measure the factors' importance. Of these, three items were used for measuring the sustainable transport elements; seven items for measuring the trained PLI Employees elements, four items for measuring the collaboration elements, three items for measuring the sustainable packaging elements, and three items for measuring the sustainable information elements (Table 1). These items were adapted from previous studies (Ali et al., 2021). We selected and modified these items after discussions with local academics and practitioners in logistics who are familiar with the context of Langsa City. The questionnaire was developed and then distributed through an electronic survey system (Google Form). The study sample included 120 shops/Small and Medium Enterprises (SMEs) that used PLI as services of logistics providers. The data were analyzed with the statistical software SPSS. To answer the research questions, descriptive statistics were performed.

The exploratory factor analysis (EFA) was conducted to test the validity and reliability of the scales. The exploratory factor analysis (EFA) is used for checking dimensionality and often used in the early stages of research to gather information about the interrelationships among a set of variables (Pituch & Stevens, 2016). EFA determines the number and relationship between components including the statistics analysis and statistical preliminary agreement, and the EFA employs advanced statistical analysis to extract by following three steps (Shrestha, 2021):

a. Firstly, we examined preliminary agreement, using KMO, Bartlett's test of Sphericity Approx, Chi-square to determine the suitability and relevance of the data. To determine the suitability of the data set for factor analysis, sample size and strength of the relationship among the items have to be considered. To determine the strength of the relationship among the items, there must be evidence of the coefficient of correlation > 0.3 in the correlation matrix. The suitability of the data is used to see whether the data in the questionnaire is suitable for processing using factor analysis. There are two statistical measures to assess the factorability of the data: Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. KMO test is a measure that has been intended to measure the suitability of data for factor analysis. In other words, it tests the adequacy of the sample size. The test measures sampling adequacy for each variable in the model and for the complete model. KMO values range from 0.00 to 1.00 and can be computed for the total correlation matrix as well as for each measured variable. Overall KMO values $\geqslant 0.7$ are desired (Lloret et al., 2017), but values less than 0.50 are generally considered unacceptable, indicating that the correlation matrix is not factorable. If the sample size is < 300 the average communality of the retained items has to be tested. An average value > 0.6 is acceptable for sample size < 100, an average value

between 0.5 and 0.6 is acceptable for sample sizes between 100 and 200 (Tabachnick & Fidell, 2013). Bartlett's Test of Sphericity tests the null hypothesis, H_0: The variables are orthogonal i.e. The original correlation matrix is an identity matrix indicating that the variables are unrelated and therefore unsuitable for structure detection. The alternative hypothesis, H_1: The variables are not orthogonal i.e. They are correlated enough to where the correlation matrix diverges significantly from the identity matrix. The significant value < 0.05 indicates that a factor analysis may be worthwhile for the data set.

b. Factor extraction. This step determines the least number of factors that can best represent the interrelationships among the set of variables. For obtaining factor solutions, principal component analysis and common factor analysis can be used. Factor extraction by using Principal Component Analysis (PCA) specific, according to (Kassambara, 2017), PCA, which is one of the most popular multivariate analysis method. PCA components may enhance parsimony in other statistical analyses and may contribute information for decisions regarding the number of factors to retain for subsequent common factor analysis, but most methodologists recommend that common factor analysis be employed when the purpose is to identify latent constructs responsible for the variation of measured variables (Price, 2017). This study has used principal component analysis (PCA) because the purpose of the study is to analyze the data in order to obtain the minimum number of factors required to represent the available data set. In this study, the technique is used to assist in the decision concerning the number of factors to retain: Kaiser's Criterion. The Kaiser's criterion (Eigenvalue Criterion) can be used to determine the number of initial unrotated factors to be extracted. The eigenvalue is a ratio between the common variance and the specific variance explained by a specific factor extracted. The eigenvalue of a factor represents the amount of the total variance explained by that factor. An eigenvalue greater than one is considered to be significant, and it indicates that more common variance than unique variance is explained by that factor.

c. Factor rotation. Factors obtained in the initial extraction phase are often difficult to interpret because of significant cross-loadings in which many factors are correlated with many variables. In this study, orthogonal factor rotation is used because it results in solutions that are easier to interpret and to report. The varimax rotation is the method related to orthogonal rotation. Varimax method is used to minimize the number of variables that have high loadings on each factor (Loewen & Gonulal, 2015). Indicate that PCA with varimax rotation would yield similar results to common factor analysis when the communalities are high and if the latent variables are practically uncorrelated; otherwise, PCA with varimax rotation is likely to yield distorted results. Varimax tends to focus on maximizing the differences between the squared pattern structure coefficients on a factor (i.e. focuses on a column perspective). The spread in loadings is maximized loadings that are high after extraction become higher after rotation and loadings that are low become lower. If the rotated component matrix shows many significant cross-loading values then it is suggested to rerun the factor analysis to get an

item loaded in only one component by deleting all cross loaded variables we employed factor rotation by using Varimax method.

d. Factor interpretation. To define the name of each component and determine the weight indicators, eigenvalues, percentage of variance, and cumulative percentage of variance, we adopted the naming and the weight of the component. The following are the Criteria for Selection of Logistics Service Provider Companies, as shown in Table 1.

Table 1. Logistics Service Providers Company Selection Criteria

No.	Criteria
1	The product becomes better available after using sustainable means of transport by PLI
2	It is rare to receive a damaged product due to PLI using sustainable means of transport
3	Using a re-route system enhances the orders' delivery at the right time
4	Trained PLI employees provide your SME with better problem handling.
5	Trained PLI employees provide your SME with a better problem response.
6	Trained PLI employees help solve your problems in a reasonable time
7	Trained PLI employees help you to reduce accident rates
8	PLI personnel contact employee has enough knowledge and experience
9	PLI enhances environmental knowledge sharing with your SME
10	You achieve better performance when PLI considers your complaints.
11	Collaboration with PLI improves your sustainable performance practices
12	PLI cooperates with your SME to achieve environmental goals
13	PLI cooperates with your SME to exchange environmental knowledge
14	Your SME cooperates with PLI in the process of sustainable packaging
15	Sustainable packaging decreases your SME's disposal practices costs
16	Sustainable packaging enhances goods stowage
17	It is uncommon to find a damaged product using sustainable packaging materials
18	The sustainable information received from PLI improves your compliance with environmental standards
19	The sustainable information received from PLI improves your SME's performance
20	The sustainable information received from PLI is constantly updated

C. RESULT AND DISCUSSION

1. Result

In this study, the validity test is conducted to measure whether the data that has been obtained after the study is valid data with the measuring instrument used (questionnaire). The validity test of each question is > 0.30, so the question items are considered valid. A reliable instrument is an instrument that when used repeatedly to measure the same object, will produce the same data. The reliability test will be able to show the consistency of the respondent's answers in the questionnaire. Reliability test is done by testing the statement items that have been declared valid in the validity test, and the reliability will be determined. The reliability of a variable construct is said to be good if it has a Cronbach's alpha value > 0.60. The validity of the items and the reliability of the questionnaire were tested with the statistical software SPSS application. The results are shown in Table 2.

Table 2. Validity and Reliability

Index	Variable	Item Total Correlation	Cronbach's Alpha if < 0.60, Item deleted
X_1	The product becomes better available after using sustainable means of transport by PLI	0.749	0.945
X_2	It is rare to receive a damaged product due to PLI using sustainable means of transport	0.805	0.944
X_3	Using a re-route system enhances the orders' delivery at the right time	0.823	0.944
X_4	Trained PLI employees provide your SME with better problem handling.	0.707	0.946
X_5	Trained PLI employees provide your SME with a better problem response.	*0.142*	*0.951*
X_6	Trained PLI employees help solve your problems in a reasonable time	0.728	0.945
X_7	Trained PLI employees help you to reduce accident rates	0.394	0.95
X_8	PLI personnel contact employee has enough knowledge and experience	0.696	0.946
X_9	PLI enhances environmental knowledge sharing with your SME	0.494	0.949
X_{10}	You achieve better performance when PLI considers your complaints.	0.808	0.944
X_{11}	Collaboration with PLI improves your sustainable performance practices	0.790	0.944
X_{12}	PLI cooperates with your SME to achieve environmental goals	0.627	0.947
X_{13}	PLI cooperates with your SME to exchange environmental knowledge	0.861	0.943
X_{14}	Your SME cooperates with PLI in the process of sustainable packaging	0.645	0.947
X_{15}	Sustainable packaging decreases your SME's disposal practices costs	0.854	0.943
X_{16}	Sustainable packaging enhances goods stowage	0.409	0.95
X_{17}	It is uncommon to find a damaged product using sustainable packaging materials	0.622	0.947
X_{18}	The sustainable information received from PLI improves your compliance with environmental standards	0.740	0.945
X_{19}	The sustainable information received from PLI improves your SME's performance	0.472	0.949
X_{20}	The sustainable information received from PLI is constantly updated	0.849	0.943

In Table 2, it can be seen that of all the variables, there is one variable that is invalid, namely X_5 variable. If variable X_5 is removed, it will change the Cronbach's Alpha value from *0.949* to *0.951* so that variable X_5 can be removed. Taking into account the 19 remaining questionnaire statement items after the X_5 indicator was issued, the reduction of the 19 items into the factors they represent is carried out by EFA through the stages as explained below (Loewen & Gonulal, 2015), (Watkins, 2018):

a. The Suitability of the Data

The suitability of data is determined by looking at the Bartlett test of sphericity, Kaiser-Meyer-Olkin (KMO), and Measures of Sampling Adequacy (MSA) values that are sought for each indicator. Kaiser-Meyer-Olkin is used to measure the suitability of data for factor analysis. Similarly, Bartlett's test of Sphericity, correlation matrix, and determinant score are computed to detect the appropriateness of the data set for functioning factor analysis. In this study, the quantity values that must be met the Bartlett test of sphericity value with significance < *0.05*, the KMO value must be ≥ *0.50* and the MSA value must be ≥ *0.60*. s Bartlett's Test of Sphericity which is *significant* since it's <0.05. Kaiser-Meyer-Olkin measure of sampling adequacy ≥ *0.50* which is for the construct *0.913*, and this means that the sample size is adequate (Hoque et al., 2018). Accordingly, the current data are acceptable. In general, factor analysis can be used on all variables formed. The significance value in the Bartlett test is *0.000 < 0.05*, so it is concluded that the correlation between the variables that form factors can be explained by other variables. The next step is to carry out the MSA test, in this study the MSA criteria used was > *0.60*. The MSA test for all variables can be seen in Table 3.

Table 3. MSA Value of All Indicators

Index	Criteria	MSA value
	The product becomes better available after using sustainable means of transport by PLI	0.887
X_2	It is rare to receive a damaged product due to PLI using sustainable means of transport	0.966
X_3	Using a re-route system enhances the orders' delivery at the right time	0.918
X_4	Trained PLI employees provide your SME with better problem handling.	0.883
X_6	Trained PLI employees help solve your problems in a reasonable time	0.838
X_7	Trained PLI employees help you to reduce accident rates	0.820
X_8	PLI personnel contact employee has enough knowledge and experience	0.938
X_9	PLI enhances environmental knowledge sharing with your SME	0.893
X_{10}	You achieve better performance when PLI considers your complaints.	0.955
X_{11}	Collaboration with PLI improves your sustainable performance practices	0.968
X_{12}	PLI cooperates with your SME to achieve environmental goals	0.953
X_{13}	PLI cooperates with your SME to exchange environmental knowledge	0.941
X_{14}	Your SME cooperates with PLI in the process of sustainable packaging	0.868
X_{15}	Sustainable packaging decreases your SME's disposal practices costs	0.955
X_{16}	Sustainable packaging enhances goods stowage	0.741
X_{17}	It is uncommon to find a damaged product using sustainable packaging materials	0.935
X_{18}	The sustainable information received from PLI improves your compliance with environmental standards	0.843
X_{19}	The sustainable information received from PLI improves your SME's performance	0.909
X_{20}	The sustainable information received from PLI is constantly updated	0.950

The results of the MSA test state that each indicator has an MSA value, which means that each indicator meets the MSA requirements, so that the factor analysis process can be continued.

b. Determination of Number of Factors

Factors with an eigenvalue of more than 1 are the factors that will be selected. The greater the eigenvalue of a factor, the better the factor is at representing a number of variables. By using the Principal Component Analysis (PCA) method, factors with an eigenvalue of more than 1 can be seen in Table 4.

Table 4. Number of Factors Formed

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	10.282	54.115	54.115
2	1.363	7.175	61.290
3	1.149	6.048	67.338

In Table 4, it can be seen that there are 3 factors with a cumulative percentage of *67.338%* which are able to explain the factors.

c. Factor Rotation

Factor analysis with Principal Component Analysis (PCA) extraction obtained 3 factors. These factors have a total of 19 variables. The three factors in the Principal Component Analysis (PCA) extraction method are each given a name according to the grouping of results on factor rotation. The results of the Varimax method can be seen in Table 5.

Table 5. Results of Factor Rotation with the Varimax Method

Factor 1		Factor 2		Factor 3	
Variable	Loading Value	Variable	Loading Value	Variable	Loading Value
X_6	0.840	X_{16}	0.858	X_7	0.778
X_{18}	0.827	X_{14}	0.735	X_9	0.728
X_1	0.812	X_{19}	0.588	X_{12}	0.488
X_{20}	0.799	-		-	
X_4	0.770	-		-	
X_2	0.724	-		-	
X_{13}	0.707	-		-	
X_{15}	0.689	-		-	
X_3	0.672	-		-	
X_{10}	0.653	-		-	
X_{11}	0.630	-		-	
X_{17}	0.609	-		-	
X_8	0.597	-		-	

In variable X_{12} (PLI cooperates with your SME to achieve environmental goals) it is shown that the loading value is *0.488*, based on the provisions of the loading value according to (Hair, Black, Babin, & Anderson, 2010) it is explained that for a sample of 120 Small and Medium Enterprises (SMEs) in Langsa City the recommended loading

value is *0.50*, so that the variable X_{12} cannot be included in the factor because the loading value is below *0.50*.

d. Factor Interpretation

Factor interpretation is carried out by grouping indicators that have a minimum weighting factor of 0.50. Variables that have a weighting factor of less than 0.50 will be removed from the model. Based on Table 4, it can be seen that there are eighteen variables spread across three factors with a total variance of 67.338%. Based on the results of the varimax rotation, it can be seen that the results of the factor analysis indicate the importance of three factors. However, it should be noted that the factor-naming process is not very scientific and is based on the subjective opinion of the analyst (Hair, Black, Babin, & Anderson, 2010):

1) Factor 1 consists of 13 elements: $X_6, X_{18}, X_1, X_{20}, X_4, X_2, X_{13}, X_{15}, X_3, X_{10}, X_{11}, X_{17}$, and X_8. This factor is dominated by the factor of trained PLI employees based on (Ali et al., 2021). This factor has an eigenvalue of 10.282 and can explain a variance value of 54.115%. This means that 54.115% of the criteria that PLI has as a logistics service provider chosen by Small and Medium Enterprises (SMEs) organizations in Langsa city are trained PLI employees.
2) Factor 2 consists of 3 elements: X_{16}, X_{14}, and X_{19}. This factor can be named "*sustainable packaging"*, because the variable X_{16} (*sustainable packaging enhances goods stowage*) having the largest loading factor value with a value of 0.858 which has an eigenvalue of 1.363 and can explain a variance value of 7.175%. This means that 7.175% of the criteria that PLI has as a logistics service provider chosen by Small and Medium Enterprises (SMEs) organizations in Langsa city are *sustainable packaging.*
3) Factor 3 consists of 2 elements: X_7 and X_9. This factor can be named "*the commitment to environmental goals"* which has an eigenvalue of 1.149 and can explain a variance value of 6.048%. This means that 6.048% of the criteria that PLI has as a logistics service provider chosen by Small and Medium Enterprises (SMEs) organizations in Langsa city are *the commitment to environmental goals*.

Evaluating and selecting the appropriate logistics service provider to meet needs is an important step that companies must take. One of the determining factors for success in this step depends on the company's knowledge regarding the selection of appropriate criteria (Jharkharia & Shankar, 2007). In this study, the explanatory factor analysis (EFA) method was used to explore the potential criteria constructs underlying logistics service provider selection measures. Based on the results, the top criteria selection for evaluating of logistics service providers in case study of PT Pos Logistik Indonesia (PLI) are *the trained PLI employees*. This is supported by research (Goffnett et al., 2016), which stated that teamwork, problem-solving, listening, and communicating topped the list of highly important skills for logistics managers. This factor can be named "*the trained PLI employees*". The findings in this study are in line with research (Alkhatib et al., 2015) which states that logistics resources and capabilities are valid factors for evaluating and selecting the best LSP. To obtain experts' evaluations of Jordanian LSP alternatives against the weighted resources and capabilities criteria, they used sixteen weighted resources and capabilities criteria in the evaluation process, and one of these criteria

is education and *training*. In other words, the trained employee's criteria must be taken into account to select PLI as a logistics service providers that perform well. The second top criteria selection are *the sustainable packaging*. The findings in this study are also in line with research (Alkhatib et al., 2015), where production & *packaging* facilities are one of sixteen weighted resources and capabilities criteria in the evaluation process of Jordanian LSP alternatives. The third top criteria selection are *the commitment to environmental goals*. The findings in this study are in line with research (Yuen et al., 2019) who studied 164 companies and revealed relationship management, information management, *organizational commitment*, strategic alignment, and performance management as important factors in logistics integration that influence supply chain performance. Specifically, the use of PCA in this research is not to exaggerate the amount of variance contained in each factor, but only to identify variables. If factor 1 has too many variables constructing it, this result may be due to variance related to sampling and measurement error not being eliminated as in other extraction methods. This weakness can be minimized in future research.

D. CONCLUSION AND SUGGESTIONS

The top three ranked criteria for evaluating of logistics service provider criteria selection in case study of PT Pos Logistik Indonesia (PLI) are *the trained PLI employees*, *the sustainable packaging*, and *the commitment to environmental goals*. *The trained PLI employees* factor is the dominant factor which can explain the variance value of 54,115%; *the sustainable packaging* factor can explain a variance value of 7.175%; and *the commitment to environmental goals* can explain the variance value 6.048%. Future research should include other types of SMEs in this or other cities. Although criterion selection measures have some advantages over objective measures, future research that uses logistics service provider criteria and variables from other perspectives should be considered. Future EFA studies should continue to observe recommended guidelines by reporting the type of extraction and rotation methods used, and the methods used to retain factors and by using multiple methods (e.g., extraction, rotation, factor retention). The reporting of complete details about all the choices made when conducting an EFA is strongly recommended. Most importantly, researchers need to be aware of the proper use of principal component analysis and common factor analysis and the potential negative consequences of relying on PCA with varimax rotation in the wrong research context.

ACKNOWLEDGEMENT

The researcher would like to thank the Head of the Institute for Research and Community Service (LP2M), Langsa State Islamic Institute (IAIN Langsa) for providing a research permit to speed up the researcher's research and community service process. Researchers also express their deepest gratitude to the Management of PT Pos Logistik Indonesia Langsa branch for the data provided, and for the quick response, as well as for the critical input that helped the research process and refinement of this paper, as well as increasing the visibility of this paper.

REFERENCES

Abidi, H., Dullaert, W., De Leeuw, S., Lysko, D., & Klumpp, M. (2019). Strategic partner evaluation criteria for logistics service provider networks. *The International Journal of Logistics Management, 30*(2), 438-466. doi:https://doi.org/10.1108/IJLM-07-2017-0178

Ali, A. H., Melkonyan, A., Noche, B., & Gruchmann, T. (2021). Developing a sustainable logistics service quality scale for logistics service providers in Egypt. *Logistics, 5*(2), 21. doi:https://doi.org/10.3390/logistics5020021

Alkhatib, S. F., Darlington, R., & Nguyen, T. T. (2015). Logistics Service Providers (LSPs) evaluation and selection: Literature review and framework development. *Strategic Outsourcing: an international journal, 8*(1), 102-134. doi:https://doi.org/10.1108/SO-12-2014-0028

Bajec, P., & Tuljak-Suban, D. (2017). Selecting a logistics service provider: a definition of criteria that consider the requirements of an external competitive environment. *Transport problems, 12*. doi:http://dx.doi.org/10.20858/tp.2017.12.se.14

Büyüközkan, G., & Görener, A. (2015). Evaluation of product development partners using an integrated AHP-VIKOR model. *Kybernetes, 44*(2), 220-237. doi:https://doi.org/10.1108/K-01-2014-0019

Casado-Vara, R., González-Briones, A., Prieto, J., & Corchado, J. M. (2019). Smart contract for monitoring and control of logistics activities: Pharmaceutical utilities case study. *International Joint Conference SOCO'18-CISIS'18-ICEUTE'18* (hal. 509-517). San Sebastián: Springer International Publishing. https://link.springer.com/chapter/10.1007/978-3-319-94120-2_49

Centobelli, P., Cerchione, R., & Esposito, E. (2017). Environmental sustainability in the service industry of transportation and logistics service providers: Systematic literature review and research directions. *Transportation Research Part D: Transport and Environment, 53*, 454-470. doi:https://doi.org/10.1016/j.trd.2017.04.032

Goffnett, S. P., Williams, Z., Gibson, B. J., & Garver, M. S. (2016). Identifying critical skills for logistics professionals: Assessing skill importance, capability, and availability. *Journal of Transportation Management, 27*(1), 6. doi:10.22237/jotm/1467331500

Gruchmann, T., Melkonyan, A., & Krumme, K. (2018). Logistics business transformation for sustainability: Assessing the role of the lead sustainability service provider (6PL). *Logistics, 2*(4), 25. doi:https://doi.org/10.3390/logistics2040025

Gupta, A., Singh, R. K., & Suri, P. K. (2018). Sustainable service quality management by logistics service providers: an Indian perspective. *Global business review, 19*(3), S130-S150. doi:https://doi.org/10.1177/0972150918758098

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7 ed.). New York: Pearson. https://digitalcommons.kennesaw.edu/facpubs/2925/

Hoque, A. S., Siddiqui, B. A., Awang, Z. B., & Baharu, S. M. (2018). Exploratory factor analysis of Entrepreneurial orientation in the context of Bangladeshi small and medium Enterprises (SMEs). *European Journal of Management and Marketing Studies, 3*, 81-94. doi:http://dx.doi.org/10.46827/ejmms.v0i0.384

Jharkharia, S., & Shankar, R. (2007). Selection of logistics service provider: An analytic network process (ANP) approach. *Omega, 35*(3), 274-289. https://doi.org/10.1016/j.omega.2005.06.005

Kassambara, A. (2017). *Practical guide to principal component methods in R: PCA, M (CA), FAMD, MFA, HCPC, factoextra* (1 ed., Vol. 2). Sthda. Diambil kembali dari http://www.sthda.com/

Lloret, S., Ferreres, A., Hernandez, A., & Tomas, I. (2017). The exploratory factor analysis of items: Guided analysis based on empirical data and software. *Anales de Psicologia, 33*, 417-432. https://revistas.um.es/analesps/article/download/analesps.33.2.270211/210801/0

Loewen, S., & Gonulal, T. (2015). *Exploratory factor analysis and principal components analysis. Advancing quantitative methods in second language research.* (L. Plonsky, Penyunt.) New York: Routledge. https://doi.org/10.4324/9781315870908-9

Martin, N., Verdonck, L., Caris, A., & Depaire, B. (2018). Horizontal collaboration in logistics: decision framework and typology. *Operations Management Research, 11*, 32-50. doi:https://doi.org/10.1007/s12063-018-0131-1

Pituch, K. A., & Stevens, J. (2016). *Applied multivariate statistics for the social sciences: Analyses with SAS and IBM's SPSS (6th ed.).* New York: Taylor & Francis. https://www.routledge.com/Applied-

Multivariate-Statistics-for-the-Social-Sciences-Analyses-with-SAS-and-IBMs-SPSS-Sixth-Edition/Pituch-Stevens/p/book/9780415836661

Pomponi, F., Fratocchi, L., & Rossi Tafuri, S. (2015). Trust development and horizontal collaboration in logistics: a theory based evolutionary framework. *Supply Chain Management: An International Journal, 20*(1), 83-97. doi:https://doi.org/10.1108/SCM-02-2014-0078

Price, L. R. (2017). *Psychometric methods: Theory into practice.* New York: Guilford Press. https://id.scribd.com/document/473479235/Psychometric-Methods-Theory-into-Practice-pdf

Ramanathan, U., Mazzola, E., Mohan, U., Bruccoleri, M., Awasthi, A., & Garza-Reyes, J. A. (2021). How selection of collaborating partners impact on the green performance of global businesses? An empirical study of green sustainability. *Production Planning & Control, 32*(14), 1207-1222. doi:https://doi.org/10.1080/09537287.2020.1796133

Sanchís-Pedregosa, C., González-Zamora, M. D., & Palacín-Sánchez, M. J. (2018). Outsource Services to Improve Financial Performance: Is There a Limit? *Global Business Review, 19*(1), 21-31. doi:https://doi.org/10.1177/0972150917713274

Shrestha, N. (2021). Factor Analysis as a Tool for Survey Analysis. *American Journal of Applied Mathematics and Statistics, 9*(1), 4-11. https://doi.org/10.12691/ajams-9-1-2

Tabachnick, B., & Fidell, L. (2013). *Using multivariate statistics (6th ed.).* Pearson. https://www.scirp.org/reference/ReferencesPapers?ReferenceID=1541229

Verdonck, L. (2017). Collaborative logistics from the perspective of freight transport companies. *4OR, 16*(1), 107-108. doi:https://doi.org/10.1007/s10288-017-0353-3

Watkins, M. W. (2018). Exploratory Factor Analysis: A Guide to Best Practice. *Journal of Black Psychology, 44*(3), 219–246. doi:https://doi.org/10.1177/0095798418771807

Wibowo, W., & Chairuddin, I. (2017). Sistem angkutan multimoda dalam mendukung efisiensi biaya logistik di Indonesia. *Jurnal Manajemen Transportasi & Logistik (JMTRANSLOG), 4*(1), 25-38. doi:http://dx.doi.org/10.54324/j.mtl.v4i1.48

Yuen, K. F., Wang, X., Ma, F., Lee, G., & Li, X. (2019). Critical success factors of supply chain integration in container shipping: an application of resource-based view theory. *Maritime Policy & Management, 46*(6), 653-668. doi:https://doi.org/10.1080/03088839.2019.1597289