Application Scorecard Logistics Method for Comparative Analysis of Performance Measurement: A Case Study

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Abstract

With current conditions, many activities make it impossible to travel far and meet many people. Therefore, shipping services have developed quite recently. The development of freight forwarding services has led to increasingly fierce competition for logistics companies in Indonesia. With this condition, designing a model to measure logistics performance is quite important as an evaluation tool for logistics companies in Indonesia. This study makes a design of a logistics performance measurement model based on the Logistics Scorecard perspective and is divided into two stages: identifying the logistics supply chain business strategy to obtain KPIs, and compiling a model to measure logistics performance. There are 23 KPIs according to the five Logistics Scorecard perspectives. From the application of the logistic scorecard, the percentage of total results for each company can be obtained, and indicators that need to be improved can be identified. The design of this model can provide positive input for companies to improve performance in certain areas, this is done so that the logistic services that have been analyzed can continue to develop and become one of the companies that have good performance to serve consumers

Keywords
Network Design, Electric Vehicle, Charging Station, Feasibility Investment

1. Introduction
At present, the increasing needs of people and technology make the field of logistics become one of the important aspects of efforts to meet human needs. According to Burg in Lysons (2000), the notion of logistics is the integration of procurement, transportation, inventory management, and warehousing activities in providing tools or methods that are cost-effective, to meet customer needs, both internal and external. Meanwhile, according to Bowersox (2000), logistics is defined as the strategic processing of moving and storing goods, spare parts, and finished goods from suppliers, between company facilities, and to customers. Brewer and Speh (2000) use the Balanced Scorecard

approach in measuring supply chain performance, which helps in utilizing supply chains to be a source of competitive advantage and provide ideas in managing plans.

With the growing need for aspects of logistics as a service that delivers a variety of human needs to various regions, that's encouraging the emergence of various logistics companies. Logistics companies emerged with a variety of transportation offers and the speed of delivery. Various kinds of goods ranging from food, various kinds of letters, vehicles, to pets can be sent through logistics services that are around us. Various choices of transportation equipment ranging from land transportation such as trains, buses, trucks, boxcars, motorbikes, etc., sea transportation modes, to air transportation modes such as airplanes are also used by logistics services to deliver goods to consumers on time. SMEs also have some limitations related to procurement, internal operations, and product development and stewardship (Tambunan, 2006; Sutopo, 2006, 2007; Yuniaristanto et al, 2009).

One of the keys to success in an organization and in this case the logistics company is the ability to measure its performance. Performance measurement system needed to monitor and control, communicate organizational goals in the form of a - chain in the supply chain, look everywhere, about the organization associated with the objectives and achieve the goals to be achieved, and determine the direction of improvement to achieve competitive goals. Performance measurement systems can be modeled in a logistics scorecard. The SCM-Logistics Scorecard (LSC) has been developed since 2001 by the Tokyo Institute of Technology (Tokyo Tech) in collaboration with the Japan Institute of Logistics System (JILS). LSC has become an efficient tool for analyzing the relationship between a company's supply chain performance and managerial performance (Arashida et.al., 2004). The key index of competitiveness is classified with perspective/logistics performance measurement aspects such as the orientation of business strategy, planning and implementation capacity, efficiency and productivity of logistics, information technology implementation, and supply chain collaboration. Measurement of five perspectives with 23 KPIs is designed to illustrate facts, figures, and qualitative responses about supply chain practices in organizations. Quantitative responses are measured by rating scale or level 1 - 5. Level 1 shows a very bad business process on the performance and logistics capabilities of the company, and level 5 shows that the business does the best in logistics activities (MJ Yose, 2017). Sutopo et al (2005) assess from the perspective of finance, customers, internal business processes, growth, and learning. The assessment method was conducted by using Adjusted Profit (AP) with Total Price Recovery (TPR) indicators and Total Factor Productivity (TFP) by utilizing the Data Envelopment Analysis (DEA) Method (Saputri et al, 2019). Hisjam and Sutopo (2012) explains about performance measurement framework for investigating problems sustainability of furniture production in SMEs

Metric input is the condition of logistical activities carried out by the company according to the respondents for each KPI. The conditions of this qualitative logistical activity are quantified in the form of 1-5 scale values according to the provisions in the metric. The calculation process is to multiply the scale value by the weight for each filled KPI. The result is a score for each KPI and the overall total logistical performance score of the company. This score is classified based on performance score categories, whether at level 1, 2, 3, 4, or 5. These performance scores can then be compared with other companies in the same industry (Gong et.al., 2011).

This study will discuss the performance measurement of PT. KALOG is a logistics company owned by PT. Kereta Api Indonesia (KAI) where this company uses trains owned by PT. KAI is a mode of transportation in sending goods (motorbikes) to consumers. Performance measurement of PT. KALOG will be compared with PT. Rosalia Express is one of the logistics companies from Solo Raya which also relies on its vehicles in the form of buses, trucks, truck boxes, etc. in the delivery of goods (motorbikes) to consumers. This performance measurement is carried out because of the increasingly widespread logistics service companies in Indonesia and this effort is expected to be able to improve the performance of PT. KALOG Surakarta to face intense competition in the field of logistics services.

2. Methodology

2.1 Logistics Scorecard Questionnaire

Data collection is done by filling multiple questionnaires about company SWOT. This is useful as a tool for systematically analyzing an organization's internal and external environment effectively, as well as a tool for identifying problems and planning for future actions (Hashemi et.al, 2012). Making an effective strategy map will lead to improved performance measurement systems, better implementation of company business processes, and proven to have improved performance for many companies (Armitage and Scholey, 2006). Ikasari et al (2019) conduct supply chain performance assessment using the Supply Chain Operations Reference (SCOR) based on 5 indicators; reliability, responsiveness, cost, asset management, and agility.

Figure 1 describes the five perspectives and 23 KPIs measured in the study using the Logistics Scorecard method. The key competitiveness indexes are classified together with five perspectives on logistics performance measurement, namely: business strategy orientation, capacity planning, and implementation, logistics efficiency, and productivity, information technology implementation, and supply chain collaboration. Figure 1 explains that each perspective has its own index. orientation of business strategy has 4 assessment indexes, planning and implementation capacity has 5 assessment indexes, efficiency and productivity of logistics has 5 assessment indexes, information technology implementatinon has 5 assessment indexes, and supply chain collaboration has 2 assessment indexes, for a description of each index perspective is shown in Figure 1. Measurement of five perspectives with 23 KPIs is designed to illustrate facts, figures, and qualitative responses about supply chain practices in organizations.

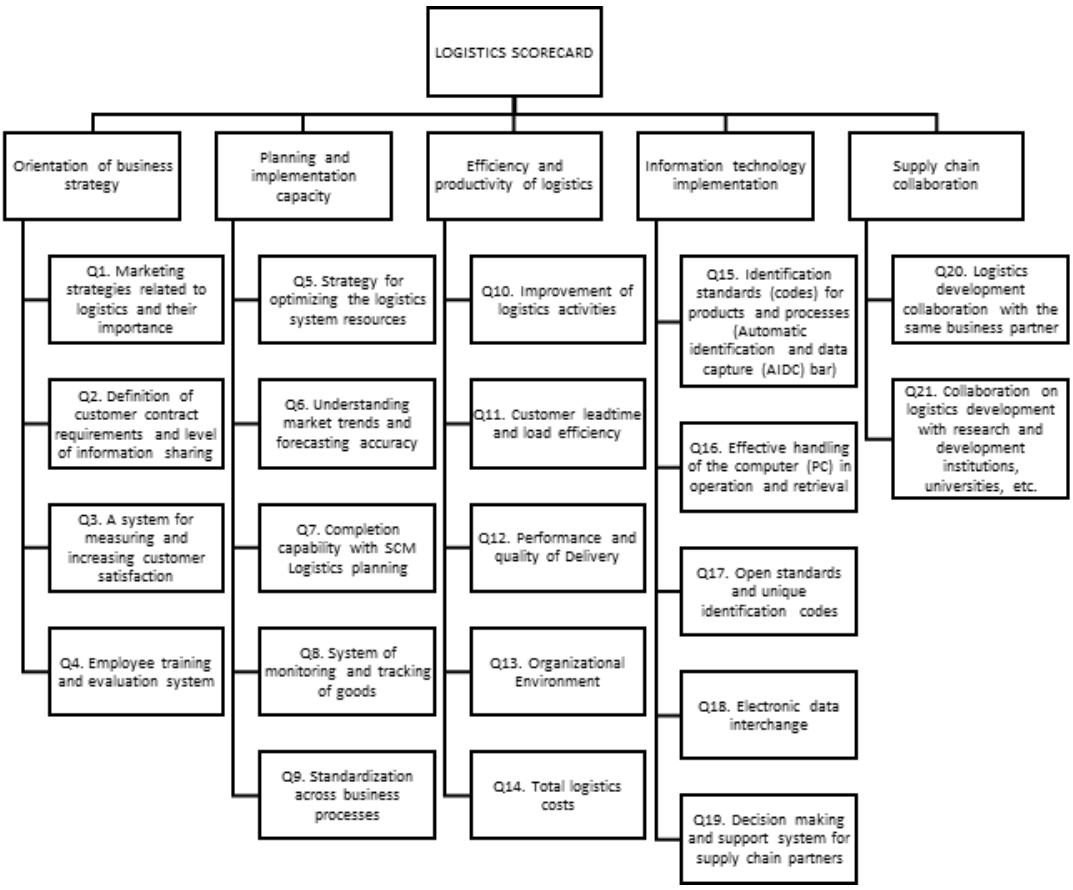

Figure 1. Logistics Scorecard
(Source**:** MJ Yose and Tokyo Institute of Technology)

Performance analysis is used to find out the factors that need to be improved and the factors that must be maintained in the company whose goal is to compete with companies in other logistics fields.

3. Result and Discussion

3.1 Company SWOT Analysis

SWOT analysis from PT. KALOG and PT. Rosalia Express is as follows. Table 1 and Table 2 describes the results of observations of the PT Kalog company regarding the strengths, weaknesses, opportunities that can be developed as well as a threat to the company

Table 1. Analysis of External and Internal Factors PT. KALOG

Strength (S)
1. Having professional human resources.
2. Goods train cars are capable of carrying large amounts of cargo.
3. The safety of the goods transported by PT KALOG is guaranteed.
Weakness (W)
1. The location of PT KALOG is not close to the station.
2. Shipping rates using freight trains are more expensive than logistical trucks.
3. Very slow and inefficient handling.
Opportunities (O)
1. PT KALOG has customers with special markets, such as fuel transportation, with extra services and flexible tariffs so that it is expected to provide new customers.
2. A promising opportunity with a special customer is a company that ships its goods through PT KALOG.
3. The need for cost efficiency and time causes the need for businesses to implement information technology such as ERP (Enterprise Resource Planning)
Threats (T)
1. PT KALOG does not obtain subsidized fuel while the fuel costs incurred are higher than logistic trucks.
2. The government imposes a VAT (Value added tax) of 10% for each goods shipment transaction.
3. There is not much competition in the field of shipping goods via the rail line but there are very many competitors sending goods via the highway and port.

Table 2. Analysis of External and Internal Factors PT. Rosalia Express

Strength (S)
1. Having competent human resources.
2. The infrastructure that supports services.
3. Goods shipping rates are cheaper than freight trains.
Weakness (W)
1. Work and rest periods are not appropriate.
2. Unpredictable traffic conditions can hamper the delivery of goods.
3. Very slow and inefficient handling.
Opportunities (O)
1. A promising opportunity with cooperation with special customers who ship their goods through PT Rosalia Express.
2. The addition of agents in several locations.
Growth of road infrastructure
Treats (T)
1. The route is prone to accidents.
The emergence of competition in freight services via the highway.

3.2 Recapitulation Logistics Scorecard

In this case, the number of respondents is 11 so that the multiples for the interval are 11, 22, 33, etc.
Interval:

0 — 11: Level 1
12 — 22: Level 2
23 — 33: Level 3
34 — 44: Level 4
45 — 55: Level 5

Calculation formula :

$$\sum \text{Weight x Number of Respondents} = \text{Total Level Results for each Company} \quad (1)$$

$$Percentage = \frac{Total\ Level\ of\ Results\ for\ each\ Company}{55} x100\% \quad (2)$$

Example :
Q1. Marketing strategies related to logistics and their importance PT.KALOG

$$\sum((5x1) + (4x8)) = 43$$

$$Prercentage = \frac{43}{55} x100\%$$

$$Percentage = 78\%$$

Table 3. Recapitulation Logistics Scorecard PT. KALOG

Questions	Level	Bobot	Number of KALOG	KALOG Result	Total	Percentage	Average Level Category
Q1. Marketing strategies related to logistics and their importance	5	5	1	5	43	78%	Level 4
	4	4	8	32			
	3	3	2	6			
	2	2	0	0			
	1	1	0	0			
Q2. Definition of customer contract requirements and level of information sharing	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q3. A system for measuring and increasing customer satisfaction	5	5	0	0	17	31%	Level 2
	4	4	0	0			
	3	3	0	0			
	2	2	6	12			
	1	1	5	5			
Q4. Employee training and evaluation system	5	5	3	15	46	84%	Level 5
	4	4	7	28			
	3	3	1	3			
	2	2	0	0			
	1	1	0	0			
Q5. Strategy for optimizing the logistics system resources	5	5	9	45	53	96%	Level 5
	4	4	2	8			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q6. Understanding market trends and forecasting accuracy	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q7. Completion capability with SCM Logistics planning	5	5	0	0	44	80%	Level 4
	4	4	11	44			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q8. System of monitoring and tracking of goods	5	5	11	55	55	100%	Level 5
	4	4	0	0			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q9. Standardization across business processes	5	5	10	50	54	98%	Level 5
	4	4	1	4			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q10. Improvement of logistics activities	5	5	0	0	41	75%	Level 4
	4	4	10	40			
	3	3	0	0			
	2	2	0	0			
	1	1	1	1			

Table 3. Recapitulation Logistics Scorecard PT. KALOG (Cont.)

Questions	Level	Bobot	Number of KALOG	KALOG Result	Total	Percentage	Average Level Category
Q11. Customer leadtime and load efficiency	5	5	0	0	44	80%	Level 4
	4	4	11	44			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q12. Performance and quality of Delivery	5	5	0	0	43	78%	Level 4
	4	4	10	40			
	3	3	1	3			
	2	2	0	0			
	1	1	0	0			
Q13. Organizational Environment	5	5	0	0	22	40%	Level 2
	4	4	0	0			
	3	3	0	0			
	2	2	11	22			
	1	1	0	0			
Q14. Total logistics costs	5	5	0	0	43	78%	Level 4
	4	4	10	40			
	3	3	1	3			
	2	2	0	0			
	1	1	0	0			
Q15. Identification standards (codes) for products and processes (Automatic identification and data capture (AIDC) bar)	5	5	0	0	43	78%	Level 4
	4	4	10	40			
	3	3	1	3			
	2	2	0	0			
	1	1	0	0			
Q16. Effective handling of the computer (PC) in operation and retrieval	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q17. Open standards and unique identification codes	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q18. Electronic data interchange	5	5	0	0	34	62%	Level 4
	4	4	1	4			
	3	3	10	30			
	2	2	0	0			
	1	1	0	0			
Q19. Decision making and support system for supply chain partners	5	5	0	0	24	44%	Level 3
	4	4	0	0			
	3	3	2	6			
	2	2	9	18			
	1	1	0	0			
Q20. Logistics development collaboration with the same business partner	5	5	11	55	55	100%	Level 5
	4	4	0	0			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q21. Collaboration on logistics development with research and development institutions, universities, etc.	5	5	11	55	55	100%	Level 5
	4	4	0	0			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			

Table 4. Recapitulation Logistics Scorecard PT. Rosalia

Questions	Level	Bobot	Number of Rosalia	Rosalia Result	Total	Percentage	Average Level Category
Q1. Marketing strategies related to logistics and their importance	5	5	0	0	42	76%	Level 4
	4	4	9	36			
	3	3	2	6			
	2	2	0	0			
	1	1	0	0			
Q2. Definition of customer contract requirements and level of information sharing	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q3. A system for measuring and increasing customer satisfaction	5	5	0	0	14	25%	Level 2
	4	4	0	0			
	3	3	0	0			
	2	2	3	6			
	1	1	8	8			
Q4. Employee training and evaluation system	5	5	0	0	31	56%	Level 3
	4	4	0	0			
	3	3	9	27			
	2	2	2	4			
	1	1	0	0			
Q5. Strategy for optimizing the logistics system resources	5	5	0	0	35	64%	Level 4
	4	4	2	8			
	3	3	9	27			
	2	2	0	0			
	1	1	0	0			
Q6. Understanding market trends and forecasting accuracy	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q7. Completion capability with SCM Logistics planning	5	5	0	0	44	80%	Level 4
	4	4	11	44			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q8. System of monitoring and tracking of goods	5	5	2	10	46	84%	Level 4
	4	4	9	36			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q9. Standardization across business processes	5	5	7	35	51	93%	Level 5
	4	4	4	16			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q10. Improvement of logistics activities	5	5	0	0	44	80%	Level 4
	4	4	11	44			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			

Table 4. Recapitulation Logistics Scorecard PT. Rosalia (Cont.)

Questions	Level	Bobot	Number of Rosalia	Rosalia Result	Total	Percentage	Average Level Category
Q11. Customer leadtime and load efficiency	5	5	0	0	22	40%	Level 2
	4	4	0	0			
	3	3	0	0			
	2	2	11	22			
	1	1	0	0			
Q12. Performance and quality of Delivery	5	5	0	0	34	62%	Level 4
	4	4	1	4			
	3	3	10	30			
	2	2	0	0			
	1	1	0	0			
Q13. Organizational Environment	5	5	1	5	45	82%	Level 5
	4	4	10	40			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q14. Total logistics costs	5	5	0	0	44	80%	Level 4
	4	4	11	44			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q15. Identification standards (codes) for products and processes (Automatic identification and data capture (AIDC) bar)	5	5	0	0	44	80%	Level 4
	4	4	11	44			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q16. Effective handling of the computer (PC) in operation and retrieval	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q17. Open standards and unique identification codes	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q18. Electronic data interchange	5	5	0	0	33	60%	Level 3
	4	4	0	0			
	3	3	11	33			
	2	2	0	0			
	1	1	0	0			
Q19. Decision making and support system for supply chain partners	5	5	0	0	22	40%	Level 2
	4	4	0	0			
	3	3	0	0			
	2	2	11	22			
	1	1	0	0			
Q20. Logistics development collaboration with the same business partner	5	5	1	5	45	82%	Level 5
	4	4	10	40			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			
Q21. Collaboration on logistics development with research and development institutions, universities, etc.	5	5	4	20	48	87%	Level 5
	4	4	7	28			
	3	3	0	0			
	2	2	0	0			
	1	1	0	0			

From the calculations that have been done, the results are shown in Table 3 and Table 4. Table 3 describes the results of the scorecard calculation at PT KALOG from 5 perspectives and 21 indexes which have been described in Figure 1. Table 4 describes the results of the scorecard calculation at PT Rosalia . Table 3 and table 4 have explained the condition of the company which can represent the shortcomings that need to be fixed and the advantages that need to be maintained.

The highest percentage value obtained on the questionnaire submitted at PT. KALOG Surakarta is 100% namely in the ─ 8 questionnaire points regarding tracking and monitoring of goods, point ─ 20 regarding logistics development with business partners, and ─ 21 points on developing collaborative logistics development with research and development institutions, universities, etc. Meanwhile, the lowest percentage obtained in the third question point is 31% and discusses the system for measuring and increasing customer satisfaction. Meanwhile, at PT. Rosalia Express results of the highest percentage are in point 15 regarding the Standard identification (code) for products and processes (Bar Coding / Automatic Identification and Data Capture (AIDC)) that is equal to 95% and the lowest percentage is in the third question of 25% and discusses systems for measuring and increasing customer satisfaction.

Both companies have the lowest percentage at the third point, namely discusses systems for measuring and increasing customer satisfaction. The main factor in the low percentage at this point is the absence of a system used to measure customer satisfaction. The Benchmark of the success of the logistics company lies in the timeliness of delivery, if the shipment goes according to schedule it is deemed successful. Complaints from customers are made only when the goods sent arrive not at the promised time or the goods are damaged.

There are several methods a company can use to measure customer satisfaction in Tjiptono (2006), such as:

a. Complaints and suggestions system, every company needs to provide an opportunity for customers to submit suggestions, opinions, and complaints;
b. Customer satisfaction survey, measurement of customer satisfaction can be done by asking directly to customers, questions can involve two things, for example, customer expectations of certain attributes and the amount of performance they feel. Furthermore, the respondent/customer is asked to reveal two main points, namely about the problem related to the company's offer and suggestions for improvement;
c. Ghost shopping, this method can be done by hiring several people to act as customers / potential buyers of rival company products that are intended to find weaknesses and strengths of competitors' products;
d. Lost customer analysis, the company goes to customers who have stopped their purchases, the aim is to obtain information on the causes of dismissal and so on. This information will be useful for companies to take further policies to increase customer service satisfaction.

From getting these percentages it can be seen which aspects of key performance should be further improved. The need to improve the performance of an organization aims that the organization can increase the effectiveness and efficiency of an organization. Besides, with a performance evaluation like this, a company knows which aspects must be strengthened again to face competition with other organizations

4. Conclusion

Following are the conclusions that answer the purpose of this research:

1. The highest percentage value was obtained on the questionnaire submitted at PT. KALOG Surakarta is 100% namely in the ─ 8 questionnaire points regarding tracking and monitoring of goods, point ─ 20 regarding logistics development with business partners, and ─ 21 points on developing collaborative logistics development with research and development institutions, universities, etc. Meanwhile, the lowest percentage obtained in the third question point is 31% and discusses the system for measuring and increasing customer satisfaction.
2. At PT. Rosalia Express results of the highest percentage are in point 15 regarding the Standard identification (code) for products and processes (Bar Coding / Automatic Identification and Data Capture (AIDC)) that is equal to 95% and the lowest percentage is in the third question of 25% and discusses systems for measuring and increasing customer satisfaction.
3. PT. KALOG and PT. Rosalia Express has the lowest percentage at the third point, namely discusses systems for measuring and increasing customer satisfaction. Therefore it is recommended that both companies take measurements of customer satisfaction in the context of efforts to improve quality. Several methods can be used in measuring customer satisfaction, including complaints and suggestion systems, customer satisfaction surveys, ghost shopping, and lost customer analysis.

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