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Measurement of Organic Catfish Supply Chain with Supply chain Operation Reference (SCOR) Approach In The Home Industry (Organic Catfish In Dungus Sidoarjo)

Nita Kusuma Wati[a], Waluyo Prasetyo[b], dan Rina Sri Wulandari[c]

Department of Industrial Engineering, Universitas Nahdlatul Ulama Sidoarjo, Indonesia

[a]Corresponding Author: waluyo.tin@unusida.ac.id, waluyo.prasetyo@gmail.com

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A B S T R A C T

Ready to serve food is food that has been cooked and stored, either using preservatives or by various storage methods. The object of this research is a producer of catfish frozen food in Sidoarjo. The limited yield of catfish from this business is due to the inadequate capacity of the pond and it only produces 2,000 catfish per harvest period. This organic catfish business still has not implemented a structured supply chain system; performance measurement has been focused on each business owner. The aim of this research was to measure the supply chain of organic catfish using the SCOR approach. It can be concluded that by selecting Supplier A will resolve the problem. Based on the 19 performance indicators, there were three marked red indicators in the Traffic Light System that were needed to be improved.

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1. Introduction

Known as a potential maritime country as well as an agricultural country, Indonesia has quite a large amount of fish. About 16 percent of fish species are in Indonesian waters. According to data, the total number of fish species in Indonesian waters is around 7,000 species and nearly 2,000 of them are freshwater fish (Khairuman and Amri, 2008). Currently, Indonesians prefer ready to serve food products because they are more practical and economical in serving. Ready to serve food is food that has been cooked and stored, either using preservatives or by various storage methods. The object of this research is a producer of frozen food catfish in Sidoarjo, this company is full of orders for various kinds of organic frozen catfish. The limited yield of catfish from this business is due to the inadequate capacity of the pond and it is only able to produce 2,000 catfish per harvest period. Therefore, business owners often experience shortages of stock and cannot fully fulfill incoming orders, which results in reduced business income and often makes customers disappointed (Junaedi and Mas'ud, 2018).

Fauzi and Mas'ud, (2019) The development of rumors in the market stating that catfish contains a lot of substances that are dangerous for consumption by the body and the wider/growing green market makes business owners think hard to change people's mindsets towards organic food. With a harvest cycle of about 3-4 months, business owners often run out of stock from their privately-

owned catfish ponds. To ful fill customer stock, business owners collaborate with independent extension workers from the Sidoarjo Fisheries Government. From this extension, it is then distributed to organic catfish fostered farmers because the quality of the catfish must really be maintained, so that this business does not take any harvest apart from the business assistance of the two extension workers. To ful fill orders from the service, this business always strives for products at the same price, both from their own crops and from assisted organic catfish farmers. In addition, this business is also applying for a halal certification process from Lembaga Pengkajian Pangan, Obat-obatan, dan Kosmetika Majelis Ulama Indonesia (LPPOM MUI). To become the most sterile frozen food producer in Sidoarjo, business owners must prioritize quality and strive to maintain product selling price benchmarks. Djohar, et al (2004) stated that the realization of an organization that can have a competitive advantage is through value advantages and productivity advantages. Value advantages are obtained from products that are high value and in accordance with consumer desires, while productivity advantages are obtained based on the results of high production volumes and low costs.

This organic catfish business still has not implemented a structured supply chain system. So far, the performance measurement has been focused on each business owner. The aim of this research is to measure the supply chain or supply chain of organic catfish with the SCOR approach in the home industry (Organic Catfish in Dungus Sidoarjo).

2. Literature Review

Some of the study results in the initial references related to the SCOR topic used in this study include: An application of AHP in the development process of a supply chain reference model focusing on demand variability was written by Ponis, S. T. et al (2014). This journal was published by Springer. In this paper, author described a real-life case of the demand variability problem in order to contributing fixation on a reference model focusing on supply chain processes by using elaboration. Discussions took place on critical demand regarding currently ill-treated, underestimated or even worse, overlooked. This discussion focused on the foundation model selection level of the research and devoted details of AHP's application to promote the selected appropriate reference model to serve as the base of improvement of a SCOR model with a concern of the demand variability management. There were a group division of two academic professors and three supply-chain proficient under the supervision of the AHP study facilitator. Final result of this process was in a unanimous decision to shortlist SCOR and GSCF models. At last, the GSCF model was elected as an initial basis for the development of the SCOR model in the managing demand variability concern.

Contributions of Industry 4.0 to lean management within the supply chain operations reference model was written by Müller and Birkel (2020) and was published by Inderscience Enterprises Ltd. The description of prerequisite for Industry 4.0 with its conflict was discussed as a part of lean management principles. This paper provided a systematic literature review with the potentials of Industry 4.0 devoted to lean management within the six dimensions of the SCOR model. Further, the possessed contrast aspects of Industry 4.0 and lean management were showed, in particular regarding the implementation of Industry 4.0 across the supply chain, and ecological and social aspects that were in conflict with economic targets of lean management. Furthermore, this paper presented the potential for further managerial research and practice.

Improvement of supply chain performance of printing services company based on supply chain operation references (SCOR) model. This journal was contributed by Ikatrinasaria et al (2020) and was published under licensee Growing Science with ID doi: 10.5267/j.uscm.2020.6.001. This journal focussed on supply chain cases in the manufacturing process, delivering orders, PO In and PO Out at PT EJI. This company run a business of printing and merchandising Services. The company was supplied by several suppliers and all processes were an integral part of the supply chain system. It

engaged SCOR Method to revise the supply chain. This contribution results of the performance measurement were a suggestion of improving supply chain with the SCOR method. This method composed of 4 performance criteria, namely: 1) Reliability Criterion: Perfect Order Fulfillment (POF); 2) Responsiveness Criterion: Order Fulfilment Cycle Time (OFCT); 3) Cost Criterion: Cost of Goods Sold (COGS); 4) Assets Criterion: Cash to Cash Cycle Time (CTCCT). The performance measurement outcome indicated 80.0 for the delivery process. It was the lowest point ranked to other metrics, namely Make 99.0 and Source 95.0. The point for recommendation were shipping improvements (delivery) through the allocation of shipping routes for shipping Online and Offline, checking the quality of invoice documents to avoid incomplete documents, making SOPs for shipping, and providing dietary at the time of delivery to avoid mismatching goods.

Insight from Industry Transforming supply chain operations in response to economic reform: the case of a motorcycle manufacturer in India was written by Kapoor and Ellinger. This journal was published on Supply chain Management: An International Journal, Volume 9 Number 1 2004 pp 16-22, DOI 10.1108/13598540410517548 by Emerald Group Publishing Limited. It figured economic reforms that sparking commercial activity in semi-industrialized nations and were often imputed with meaningful rises in customers demand. This research concerned on a depiction changing of a motorcycle manufacturer's supply chain in response to the lately liberalization of the Indian economy, and on insight obtained from previous events. The authors trusted on this organization, the application of supply chain management practices was broadly utilized in industrialized nations, and it gave the managers a role model as an insight at the company which were facing alike deviances of supply chain operations consolidation to comply surges in demand.

3. Methodology

This research applied SCOR approach to measure the supply chain of organic catfish. The reference process of the supply chain model is a management tool used to obtain a framework for measuring, improvising and communicating SCM decisions in a company with suppliers and customers (Supply Chain Resource Cooperative, 2004). The SCOR model was developed by the Supply Chain Council in 1996 (Stephens (2001), Wang et al. (2010), Liu et al. (2013)). Lambert et al. (2005) stated that SCOR is a useful tool for identifying areas of improvement to obtain quick repayment opportunities and satisfy top management's desire for cost reduction and asset efficiency.

Data collection was carried out through field studies, interviews, literature studies, and questionnaires. Data processing was carried out after the data was collected, so that the existing problems could be solved. The data processing steps included:

- Mapping on the Supply Chain. Mapping was done through interviews and collecting secondary data at the place of business. In addition, brainstorming was conducted to map the flow of the material supply chain. According to Simchi-Levi and Kaminsky (2002), SCM is an approach in integrating various organizations that carry out the procurement or distribution of goods, namely suppliers, manufacturers, warehouses, and stores so that these goods can be produced and distributed in the right amount, at the right time. and the minimum possible cost. According to Schroeder (2007), SCM is the design, design and control of the flow of materials and information along the supply chain with the aim of current and future customer satisfaction. According to Mentzer et al. (2001), SCM is a strategic system coordination of traditional business functions and tactics across business functions within a particular company and across companies in the supply chain with the aim of improving the long-term performance of individual firms and the supply chain as a whole. According to Indrajit and Djokopranoto (2003), SCM is an organizational system that distributes production goods and services to its customers. This chain is also a network of various organizations that are interconnected and have the same goal, namely the best possible procurement or distributor of the

goods. Therefore, in a supply chain, a strategy and methodology are needed that can regulate, direct and move other people in order to achieve their goals and is commonly known as supply chain management.

- Identification of Performance Aspects. In order to obtain the right Supply Chain, the indicators used must be in accordance with the strategic objectives of the place of business.
- Design of a Supply Chain Performance Measurement System. After successfully identifying the supply chain in the organic catfish home industry, the performance design was shown in tabular form. There are various ways to measure the performance of world companies. Performance determination is carried out on measurements including quality, speed, flexibility, reliability and so on. This supply chain strategy applies the following relationships:

$$P_i = \sum_{J=1}^{n} S_{ij} W_j \quad (1)$$

Dimana:

P_i = Total *of supply chain* performance for varian i
n = Total performance of objective
S_{ij} = Supply chain score i in performance of objective j
W_j = Weight of performance objective

In the AHP process, hierarchical arrangement, priority setting, and logical consistency checks are carried out. AHP was developed by Thomas L. Saaty in 1977 and is used as the main tool to solve multi-criteria decision-making problems (Najmi and Mauki, 2010). Bhagwat and Sharma (2007) describe AHP as a systematic process to describe the elements of a problem hierarchically. Ponis et al. (2015) stated that the AHP application is appropriate to use because it can help decision makers structure complex decisions, develop utility measures, and synthesize both tangible and intangible measurements to meet competence in almost all decisions. According to Wibisono (2006), AHP is prepared based on three basic steps, namely:

1. Hierarchical design is solving complex and multifactorial problems into a hierarchy.
2. Prioritizing procedures after the hierarchical structure has been resolved and selecting procedures for each element at each level to obtain relative significance values.
3. Calculating the results for carrying out the mathematical process and normalizing and finding the priority weights for each matrix that is carried out after forming the preference matrix. An example of a pairwise comparison matrix using the example A1, A2, A3, …… An.

The analytical hierarchical process is a model of decision making with logically personal values and is a flexible model. (Saaty, 1993). There are three principles in compiling a hierarchy (Saaty, 1993), namely:

1. Describe and describe hierarchically by breaking the problem into separate elements.
2. Priority differentiation and synthesis.
3. Logical consistency, logical grouping of elements and consistently ranked.

4. Results and Discussion

Product Demand

During the period January-August 2019 the demand for organic catfish products was presented in Table 1.

Table 1. Organic Catfish Demand for Januari-Agustus 2019

Date	Demand per Month (Pcs)							
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**
1	10	8	-	5	12	12	-	18
2	10	5	10	10	12	19	15	13
3	13	7	8	13	15	7	20	15
4	16	10	5	18	16	10	30	18
5	12	9	5	6	12	9	28	14
6	9	9	6	9	12	19	25	14
7	14	12	8	17	14	12	35	13
8	7	15	8	12	14	15	22	12
9	7	10	7	21	9	10	18	13
10	12	10	7	15	10	10	20	12
11	11	10	10	20	8	17	22	23
12	10	9	9	20	6	12	14	17
13	9	12	9	15	12	12	12	16
14	14	11	6	13	15	-	35	11
15	13	11	8	11	17	-	40	15
16	12	9	4	7	10	20	25	19
17	13	19	4	12	9	16	9	12
18	9	15	7	18	18	9	-	16
19	11	18	4	21	-	8	10	12
20	11	12	6	17	20	12	9	12
21	14	10	10	11	12	15	20	11
22	14	10	5	13	18	12	30	16
23	9	-	-	9	22	9	21	16
24	6	-	-	9	31	12	18	21
25	12	-	-	9	10	14	19	24
26	9	-	-	6	21	25	25	20
27	11	-		12	16	-	10	28
28	14	-	6	17	20	-	18	31
29	11		-	22	38	18	9	31
30	10		-	10	20	10	19	15
31	10		-	13	20		-	10
Total	**343**	**241**	**152**	**411**	**469**	**344**	**578**	**518**

Source: Organic Catfish Producer

Each variant pack contained five catfish with different prices starting from 36,000-40,000 rupiahs per package. Products were marketed to millennials and middle and upper economies because the price can be up to two and a half times more expensive than non-organic catfish in the market. The capacity of the catfish ponds for business owners was still on a small scale, which could only accommodate 2,000 catfish per harvest in every three and a half months.

Product Sale

Information regarding sales of original organic, yellow broth, and spicy seasonings catfish were presented in Table 2. This data was the sales for the three organic catfish variants during the January-August 2019 period.

Table 2. Product Data Sale

No	Organic Catfish	Month (Pcs)							
		Jan	Feb	Mar	Apr	Mei	Jun	Jul	Aug
1.	Original	191	134	89	217	226	194	292	281
2.	Yellow Broth	53	37	17	65	87	49	106	79
3.	Spicy Seasonings	99	71	46	128	156	101	195	158
Total		**343**	**242**	**152**	**410**	**469**	**344**	**593**	**518**

Source: Organic Catfish Producer

Total sales for original organic catfish in Table 2 were mostly obtained in July 2019 as many as 292 pieces and the least was in March 2019 as many as 89 pieces. The highest total sales for yellow broth catfish were obtained in July 2019 as many as 106 pieces and the least was in March 2019 as many as 17 pieces. Total sales of spicy seasonings catfish were mostly obtained in July 2019 as many as 195 pieces and the least was in March 2019 as many as 469 pieces. The three products showed the highest sales in July 2019 and the lowest sales in March 2019. Based on Table 2, it could be seen that the highest sales of the product are original organic catfish, the middle level was organic spicy seasonings catfish, and the lowest level was organic yellow broth catfish. The demands for organic catfish products were presented in Figure 1.

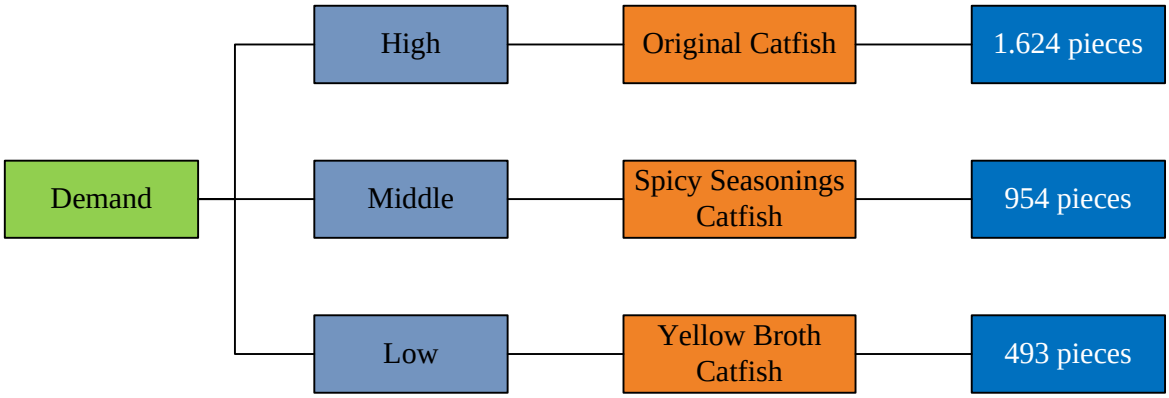

Figure 1. Product Demand
Source: Data Processing Results

In February 2019 there was a shortage of 1 (one) package, April had an excess of 1 (one) package, and July there was a shortage of 15 packages. This deficiency in fulfilling consumer demand had to wait some periods to be accomplished, while the excess of product can be saved to anticipate a sudden demand or used as a sample at promotional events such as exhibitions.

Delay in Stock of Organic Catfish from Suppliers

The delay in providing organic catfish stocks were caused by:

a. Delivery service. Shipping services sometimes refused to ship one type of item. Business owners did not only sell catfish, there were other fish species that also be sent every period, because the shipping costs incurred were too much if they only send one type of item.
b. The Product did not Meet the Standard. The standard of catfish from business owners was 80-100 gr/fish according to demand. If the supplied catfish was under standard size, then it could be accepted on condition that there was not too much difference from 80gr/head. This receiving process caused catfish to be sorted in different ponds to match with the demand. It resulted in late delivery.

c. Checking Catfish on Each Supplier. The owner of the organic catfish business always checked directly to the location of the supplier who sent the organic catfish to the business process even though the suppliers were a community of organic catfish farmers. This was regularly done to keep the catfish shipped according to standards. So, the business owner must inspect every content of jurigen before being transported.

Supplier/Catfish Producers

There were three suppliers that supply organic catfish for this home industry. Table 3 was data of organic catfish suppliers in Dungus Sidoarjo.

Table 3. Catfish Supplier

No	Month	Supplier		
		A	B	C
1	January			
2	February	1.000		
3	March	1.000	500	200
4	April	2.000		
5	May			
6	June		800	
7	July	1.000	1.000	800
8	August	1.500		
Total		**6.500**	**2.300**	**1.000**

Source: Organic Catfish Producer

Table 3 showed data from January to August 2019, Supplier A was the main stock supporter in this organic catfish business. The number supplied was 6,500 organic catfish, while the lowest supply value was given by Supplier C with a total supply of 1,000 fish.

Key Performance Indicator (KPI) Attributes

The next step was measuring supply chain performance. Table 4 was the KPI on the supply chain performance of the business to be measured and also showed the weights for each process assigned to the business process.

Table 4. KPI and Weights foe Each Level of Business Process

Process (Level 1)	Weights	Dimension (Level 2)	Weights	KPI (Level 3)	Weights
Plan	0,222	Reliability	0,037	Meet the Customer (BP)	0,006
				Staff Working Identification (IKK)	0,031
		Responsiveness	0,185	Production Scheduling (PJWP)	0,092
				Time Identification to New Product Specification (IJWSP)	0,092
Source	0,182	Realibility	0,028	Unsatisfied Raw Material (BBC)	0,015
				Raw Material Stock (PSBB)	0,004
				Reliable Delivery (PH)	0,009
		Cost	0,119	Order Cost from Supplier (BOPS)	0,119
		Asset	0,033	Daily Stock (PSH)	0.033
Make	0,262	Reliability	0,031	Error on Packaging (KSP)	0,015

Process (Level 1)	Weights	Dimension (Level 2)	Weights	KPI (Level 3)	Weights
				Total of Unsatisfied Product (TPC)	0,015
		Responsiveness	0,195	Product Processing Time (WPP)	0,146
				Fast Response on Varied Order (TMPV)	0,049
		Flexibility	0,035	Flexible Product Manufacturing (PPF)	0,035
Deliver	0,236	Reliability	0,196	Completion on Ready to Go Finished Good (PTPPJJ)	0,024
				Empty Product Level (TPH)	0,172
		Responsiveness	0,039	Product Lead Time (LTPSJ)	0,039
Return	0,098	Reliability	0,098	Customer Satisfaction Level (TKP)	0,016
				Product Replacement (WMPR)	0,082

Source: Data Processing Results

Calculation of KPI Score

To determine the priority on the performance of the organic catfish home industry, it was necessary to weight using the Traffic Light System (TLS). Table 5 was the calculation result based on TLS.

Table 5. The Calculation based on TLS

No	KPI	Weight	Target	Achieve-ment	Unit	Scoring System	Score		Colour
1	Plan	0,222						70,218	YELLOW
	- Reliability	0,037					2,292	61,35	YELLOW
	- BP	0,006	100	59,3	%	Higher is better	0,3558	59,5	RED
	- IKK	0,031	100	64,37	%	Higher is better	1,9954	64,37	YELLOW
	- Responsive -ness	0,185					14,52	78,5	YELLOW
	- PJWP	0,092	100	87	%	Higher is better	8.040	87	GREEN
	- IJWSP	0,092	100	70	%	Higher is better	6.4400	70	YELLOW
2	Source	0,182						15,716	GREEN
	- Reliability	0,028					1,315	15,67	GREEN
	- BBC	0,015	0	3,12	%	Lower is better	0.0468	3,12	GREEN
	- PSBB	0,004	100	51,87	%	Higher is better	0,2074	51,87	YELLOW
	- PH	0,009	100	86		Higher is better	0,774	86	GREEN
	- Cost	0,119						0,119	YELLOW
	- BOPS	0,119	100	63,5	%	Higher is better	7,5560	63,5	YELLOW
	- Asset	0,033						0,033	RED
	- PSH	0,033	100	56,25	%	Higher is better	1.856	56,25	RED
3	Make	0,262						2,059	GREEN
	- Reliability	0,031					0,646	2,465	GREEN
	- KSP	0,015	0	6,74	%	Lower is better	0,1011	6,74	YELLOW
	- TPC	0,015	0	3,12	%	Lower is better	0,0468	3,12	GREEN

No	KPI	Weight	Target	Achieve-ment	Unit	Scoring System	Score		Colour
	- Responsive -ness	0,195					0,717	3,678	GREEN
	- WPP	0,146	100	54,6	%	Higher is better	7,9716	54,6	RED
	- TMPV	0,049	100	92,5	%	Higher is better	4,5325	92,5	GREEN
	- Flexibility	0,035						0,035	RED
	- PPF	0,035	100	70	%	Higher is better	2,4500	70	YELLOW
4	Deliver	0,236						3,144	GREEN
	- Reliability	0,196					1,225	6,25	GREEN
	- PTPPJJ	0,024	100	68,43	%	Higher is better	1,6423	68,43	YELLOW
	- TPH	0,172	100	56,87	%	Higher is better	9,7816	56.87	RED
	- Responsive -ness	0,039						0,039	
	- LTPSJ	0,039	100	87,5	%	Higher is better	3,4125	87,5	GREEN
5	Return	0,098						0,098	GREEN
	- Reliability	0,098					3,904	39,842	GREEN
	- TKP	0,016	100	90,62	%	Higher is better	1,4499	90,62	GREEN
	- WMPR	0,082	100	68,75	%	Higher is better	5,6375	68,75	YELLOW

Source: Data Processing Results

Example of *Score* Calculation on TLS

Right Side *Score*:

$$Plan\ Reliability = \frac{BP + IKK}{2} = \frac{59{,}9 + 64{,}37}{2} = \frac{123{,}87}{2} = 61{,}935$$

$$Plan\ Responsive = \frac{PIWP + IIWSP}{2} = \frac{87 + 70}{2} = \frac{157}{2} = 78{,}5$$

Left Side *Score*:

Score Reliability = 61,935 x 0,037 = 2,292

Score Responsiveness = 78,5 x 0,185 = 14,52

$$SCOR\ PLAN = \frac{Plan\ Reliability + Plan\ Responsive}{2} = \frac{61{,}935 + 78{,}5}{2} = \frac{140{,}435}{2} = 70{,}218$$

5. Conclusion

The research results that have been obtained in this study were concluded, among others:

1. The results of data mining through interviews, the problem of lateness in catfish stock could be resolved by selecting Supplier A. This supplier was active in shipping and was never late in delivery from the time period set by the business owner to meet consumer needs continuously.
2. The highest sales results were found in the original organic catfish variant and the lowest was the organic catfish variant with yellow sauce. From the 19 supply chain performance indicators, there were three indicators that showed red in the TLS. This needed to be improved by: (1) Meeting customers periodically and continuously, (2) Improving product manufacturing time, and (3) Maintaining daily stock inventory.

To help the organic catfish home industry in improving performance, suggestions as input for this industry were:

1. Business owners must establish good relationships with suppliers, provide clear and precise information so that there were no mistakes or misunderstandings in information order and delivery times.
2. Business owners needed to provide positive and clear reviews to their suppliers. In addition, business owners must be transparent for the problems they faced in their business activities, for example: the existence of products that were rejected or in terms of payment.
3. Improvements that needed to be made were not forcing suppliers to give discount prices because this would greatly affect disharmony between suppliers and business owners.
4. To improve the three indicators in the conclusion of point 2 (two), namely:
   a. Meeting Customers
      The improvements made were to create the best impression at the beginning of the meeting in order to bring in many customers and provoke a positive response from consumers.
   b. Fulfilment of Raw Material Stocks
      Improvements made were always controlling the production process and making decisions to maintain the condition/status of the inventory. In addition, business owners should add to the organic catfish variants offered so that consumers do not become fixated on the same/existing choices. It could be considered better if the yellow sauce organic catfish product was replaced because the demand was very low and the production process was more complicated. Finally, business owners could concentrate more on producing new variants which were expected to have more enthusiasts.
   c. Reliable Delivery
      It required supporting efforts to maintain the stock of products, effective and efficient transportations were very needed to deliver the goods in time with sharp quantity and great quality.

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