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Strategy of Product Availability Improvement: Case on Imported Galvalume in Indonesia

Lim Sanny, Rillond Setiawan and M. Idham Sofyan
Bina Nusantara University, Jl. Kebon Jeruk Raya No. 27,
Kebon Jeruk, 11530 Jakarta Barat, Indonesia

Abstract: Product availability is one of the problems that can be solved with inventory control planning and logistic distribution channel optimization. The purpose of this thesis is to decide and execute the best alternative strategy for the company that is adjusted with its present direction and condition. Analysis is based on strategic management that using IFE, EFE, IE and QSPM matrix in order to select the best strategy. The analysis result showed that an alternative with the most attractiveness score is inventory control planning and therefore that is a chosen strategy to execute. Inventory control planning could retain optimal product availability with some method like Q Model, P Model, Min-Max inventory. That also could combine with the time series forecasting method to estimate the budget for inventory in the future. The company should keep using the best inventory method specification and evaluate the forecasting periodically in order to get the optimal product availability level.

Key words: Strategic management, inventory control, forecasting, optimal product, logistic

INTRODUCTION

The competition has been rising not only for manufacture level but also in every element of supply chain, its section reach after and evolves their business. The companies driven are taking role in global supply chain on Asian perspective particularly occur due to the differences of wages in various country, divergence of information communication technology and other factor that allow companies in order to get efficiency and effective from their business process (Baldwin, 2012). Recently, the galvalume industry is growing rapidly and showing trend positively in every decade. In Indonesia, the steel industry is seen as good enough by included in 50th of the biggest steel industry in the world. Furthermore, the growth rate of the steel industry in, Indonesia since 2007 to quarter one of 2012 is around 2.73%. It is unequal with the growth rate of domestic demand toward steel products in last few years. According to Directorate General of Manufacturing Industry Basis, national industry of steel is growing rapidly, this things revealed through the estimation of consumption needs in domestic area which is about 12 million ton year^{-1}, yet still insufficient, It refers to domestic production which is about 6 million ton year^{-1} and unable to fulfill the demand. In addition, there are around 70% of raw materials for production yet must be imported at present. Thereby, the quantity of the remaining demand is unfulfilled by steel companies, thus making a good opportunity for trading company whose members are steel suppliers overseas.

For companies, it is difficult to realize and preserve the customer needs continuously besides much expectation from themselves. The essential thing is how to retain the products as good as possible that is the background of this research problem. The retain process not only for improving competitive advantage but also influence the decision-making process, customer satisfaction and loyalty. By increasing the availability of product, the companies must have preferences which are procurement and inventory control and the optimization of distribution channels subsequently.

Literature review: Strategic management is defined as the process by which managers of the firm analyze the internal and external environments for the purpose of formulating strategies and allocating resources to develop a competitive advantage in an industry that allows for successful achievement of organizational goals (Cox *et al*., 2012). Strategic management is about the major decisions and investments needed to achieve the goals of the enterprise: taking actions and making investments to reflect opportunities and changing circumstances (Shrestha and Gynawali, 2013). Strategy is understood as a pattern of decisions, commitments and actions undertaken by an organization to improve its competitiveness and achieve superior performance

Corresponding Author: Lim Sanny, Bina Nusantara University, Jl. Kebon Jeruk Raya No. 27, Kebon Jeruk, 11530 Jakarta Barat, Indonesia

(Hambrick and Fredrickson, 2001; Kim and Mauborgne, 2002). Strategy of an organization is devising plans to direct operational activities including products and services that will be presented to customers (Rumelt *et al*., 1991; Venkatraman, 2008). The strategy also consists of defining goals and missions that must be fulfilled, as well as the logistics and distinguishing sources to reach the original goals (Saghaei and Fazayeli, 2012). Strategy is a comprehensive plan which is defined within the boundaries of company's goals, benefits and environmental factors which helps the company to reach its goals when constructed and executed in a proper manner (Varbanova, 2013). Selecting a strategy includes three main steps: creating the strategy, evaluating the strategy and selecting the strategy. The major dimensions include: analyzing internal and external environments, formulating strategies, developing a competitive advantage and achieving organizational goals (Bowman *et al*., 2002; Bracker, 1980; Jemison, 1981; Porter, 1996; Rumelt *et al*., 1994; Schendel and Hofer, 1979; Teece, 1990; Wright *et al*., 1996). Therefore, with using suitable methods, the best selections will be identified and selected. By choosing the most suitable strategy, we can obtain how to reach goals and make a balance between the organization and its environment.

This internal and external analysis, when performed, allows the executive decision maker to formulate the strategy for the organization (Porter, 1980). SWOT is a process for asking the questions which allow for information to be identified but lacks a methodology for formulating the strategy aspect (Venkatraman, 2008). The process allows a company to potentially identify its strength but it does not create the strategy to use these traits to capitalize on a coming opportunity (Porter, 1981). Thus, formulating a strategy is "in a sense, biblical: the appearance of grand strategy all at once, fully formed (Mintzberg, 1994). This "choosing" of strategy means there is little traceability on how the planning was accomplished and only lists of internal and external issues to provide information in later stages as to why the organization is moving in certain direction (Hajikhani and Jafari, 2013). Observations have revealed that SWOT analysis shows weakness in evaluation and measurement and this weakness could be covered by using QSPM Model assuring in a more suitable strategy design (Meredith and Forest, 2009). This step benefits from all previous studies and goal-setting activities and after creating strategies, each must be given a priority based on its importance after which they must be selected considering the stake-holders and relevant benefits.

Inventory control is linked to order Quantity (Q) and Re-order point (R). To determine the optimal order Quantity (Q*) and re-order point, according to the following Q-Model formula (Jacobs *et al*., 2011):

$$Q_{opt} = \sqrt{\frac{2DS}{H}}$$

$$SS = zs\sqrt{L},\ R = \bar{d}L + SS$$

Where:

z = Standard deviation for service probability
D = Demand/year
S = Ordering cost
H = Handling cost
SS = Safety Stock
R = Re-order point
Q* = Economic order Quantity

Furthermore, P Model refers to rules order regularly following the fixed term but the quantity order of goods are different. The difficulties on technique implementation laid in discontinuity of pure demand, thus predetermine of the interval order was invalid. The equations for economic order of quantity are as follow (Jacobs *et al*., 2011):

$$Q^* = \bar{d}(T^* + L) + SS - I$$

$$T^* = \sqrt{\frac{2S}{HD}}$$

$$SS = zs\sqrt{T^* + L}$$

$$I = SS + \frac{1}{2}(dT^*)$$

Where:

I = Inventory
T* = Time (for reorder point)
L = Delivery time
$\bar{d}$ = Average demand

The minimal-maximal inventory concept need to sight continuously while it had to be ordered, the order process should be done in advance. At the same time, the minimum and maximum number of inventories must be determined previously considering the fluctuation level of demand (Heizer and Render, 2013). The way this system works is when the inventory attained to its limitation and approached the edge of safety stock, hence the re-order process has to be executed. Thus, the minimum limitation represents the re-order time while the maximum limitation as the perimeter of company readiness to invest their capital in the form of raw material stock. So, the most important things are the minimum and maximum limitation which must be determined for order quantity (John and Langley, 2013). The following formulas mathematically would be (Jacobs *et al*., 2011):

$$SS = \frac{D}{n}$$

$$Min = (DL) + SS$$

$$Max = 2(DL) + SS$$

$$Q^* = Max - Min$$

Refer to previous research by Nejad *et al.* (2011) in its empirical study which were utilized and applied EFE matrix, IFE matrix, SWOT analysis, QSPM and TOPSIS, the appropriate strategy for market development efficiently was evolved guidelines that foster the investment.

The strategy had selected with average score essentially dominance compared with others equal to 2.1 on QSPM calculation and reinforced by TOPSIS Method with Ci in the amount of 0.5796. Bhagoria *et al.* (2010) in their case study, they did the comparison of total cost from calculation with the EOQ, POQ and Lot for Lot Method, the company could reduce inventory cost by producing Light Motor Vehicle (LMV). For the result, the total cost which required by Lot for Lot Method was 2.400, it was not as much of EOQ 4.342 and POQ Method 2.760. However, it has not been done for Galvalume sector particularly in Indonesia, thus the importance of this research is applied for.

MATERIALS AND METHODS

This research was conducted at trader company in Indonesia which focused in supplying steel product (galvalume) for domestic market. The observations completed especially on sales and logistic division. The inquiry process focused on obtaining the information directly, linked to the availability of galvalume products.

The research method is qualitative approach while the strategic analysis in the form of quantification used for measuring qualitative data with the mathematics models usage, its developed based on theories of literature. The quantitative result was analyzed obviously, thus it shows the clear relationship between existing data with the calculation results which had been obtained to solve the company problems. Data collection techniques are interview and observation, also find the secondary data from the company. Flowchart of the study can be seen in Fig. 1.

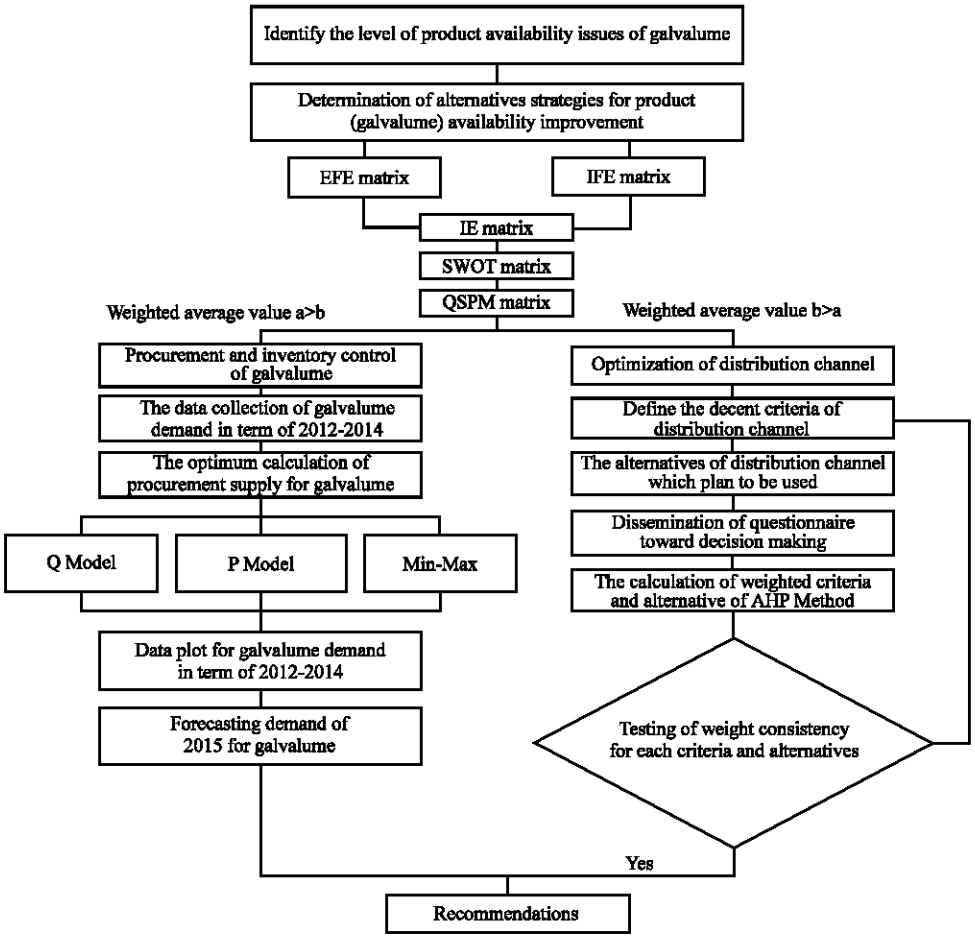

Fig. 1: Flowcharts of research

RESULTS AND DISCUSSION

The first step in choosing the appropriate strategy to improve product availability that will be executed is by doing an approach in strategic management. Strategic management can help corporate to analyze objectively and proportionally each alternative strategy that will be implemented. Strategic management initial is by using EFE matrix to analyze environment factors, EFE matrix consists of opportunity and threat. After that in strategic management, we need IFE matrix in order to analyze internal condition of the company that consists of strong and weakness. The results from EFE and IFE matrix are combined to get the view of corporate positions on IE matrix. To develop and match each strategy with internal and external condition, it could help by SWOT matrix. The last step is using QSPM matrix to analyze and decide the most appropriate strategy that indicated by the highest total weight score in that matrix.

In this case, the calculation for total weight score for EFE matrix is 3.05 which the result is from multiplication of weight and rating each opportunity and threat. Total weight score for EFE matrix is 2.63 which the result is from multiplication of weight and rating of each opportunity and threat. So, when total weight score from IFE and EFE matrix be positioned in IE matrix, it is in quadrant II that indicate growth and build. In that position, company could develop the intention strategy and integrative strategy in SWOT matrix. The results from developing SWOT matrix are: SO strategy (Business development in manufacture area), WO strategy (Integrating distribution channel with company), ST strategy (Inventory control planning, integrating supplier with company) and WT strategy (Logistic distribution channel optimization). In order to get the most appropriate strategy, QSPM matrix could compare each strategy that could execute by corporate depend on their condition. The strategy will be compare is inventory control planning and logistic distribution channel optimization. Total attractiveness score for inventory control planning strategy is 6.06 that bigger than logistic distribution channel optimization strategy in 4.10 as seen in Table 1. So, from all strategic management process, it concluded the strategy will be executed in the next step is inventory control planning.

In order to execute inventory control planning, the first step is deciding the most appropriate method with historical demand from galvalume G550/AS70 and galvalume G550/AS100. Table 2 shows the comparison of cost in stock for the next period.

The P Model was inventory method with the smallest procurement cost equal to USD 16.949.520 for galvalume G550/AS70 and USD 9.572.800 for G550/AS100. Furthermore, the company would apply the method of inventory P Model for galvalume G550/AS70 and G550/AS100 with the following specifications as seen in Table 3.

Table 1: QSPM matrix

		Strategies			
		Inventory control planning		Logistic distribution channel optimization	
Parameters	Weight	AS	TAS	AS	TAS
Opportunity					
Limited steel manufacture in Indonesia	0.30	4	1.20	2	0.60
Construction area growth in Indonesia	0.15	3	0.45	1	0.15
Unfilled regional demand	0.15	4	0.60	2	0.30
Cooperation with international supplier	0.05	3	0.15	3	0.15
Cooperation with international distribution logistic channel	0.05	2	0.10	4	0.20
Threat					
Experience and reputable competitor in trading area	0.05	2	0.10	1	0.10
Regulation issue from government in import limitation	0.06	1	0.06	2	0.12
Unpredictable inflation	0.10	4	0.40	2	0.20
Unpredictable supplier loyalty	0.10	2	0.20	2	0.20
Inconsistency distribution logistic channel	0.02	3	0.06	4	0.08
Strong					
Cooperation with Steel force from Belgium	0.25	2	0.50	1	0.25
Good internal management	0.10	3	0.30	3	0.3
Customer trust in transaction	0.07	4	0.28	3	0.21
Good and experienced human recourses	0.10	3	0.30	2	0.20
Wide business relation	0.07	2	0.14	2	0.14
Weakness					
Low reputation	0.03	1	0.03	1	0.03
Low bargaining power to supplier	0.10	3	0.30	2	0.20
Low bargaining power to distribution logistic channel	0.07	2	0.14	4	0.28
Not implement inventory system	0.12	4	0.48	1	0.12
High lead-time	0.09	3	0.27	3	0.27
Total			6.06		4.10

Table 2: Cost comparison in stock with different inventory model

Cost comparator	G550/AS70 ($)	G550/AS100 ($)
Q Model	17.087.580	9.912.064
P Model	16.949.520	9.572.800
Min-Max inventory	26.178.300	15.788.672

Table 3: Stock specification for galvalume

	P Model	
Methods	G550/AS70	G550/AS100
Safety Stock (SS)	861 ton	465 ton
Reorder Point (R)	1.678 ton	1.098 ton
Procurement Quantity (Q)	1.330 ton	965 ton
Procurement frequent (f)/2th	12 times	10 times

Table 4: Forecast error comparison for galvalume G550/AS70

Forecasting	BIAS	MAD	MSE
Naive Method	28.2609	119.5652	17.900
Moving average	61.9048	116.51	20.00635
Weighted moving average	51.75	104.45	16.76875
Exponential smoothing	46.3579	111.7744	17.77882
Exponential smoothing with trend	21.6678	116.654	20.04732
Trend analysis	0.0	93.9562	13.27811
Linear regression	0.0	93.9562	13.27811
Multiplicative decomposition (centered moving average)	-7.087	70.7442	10.47548
Multiplicative decomposition (Average of all data)	-9.0122	80.4599	11.72366
Additive decomposition (centered moving average)	0.0	69.9268	10.04521
Additive decomposition (Average of all data)	0.0	73.05	9.6744

Next step is getting to know about estimation stock cost for next year by stocks simulation. The stock simulation gives business growth representation in next year, it also helps the corporate to decide about stock cost and order period in the future. But to implement that stock simulation, it needs some demand in next period which can get by doing time series forecasting. Demand in the next period that will be used is demand from result of least error forecasting. Error rate could be looked in BIAS, MAD and MSE as seen in Table 4. So, the least error forecasting for galvalume G550/AS70 is additive decomposition (average of all data) which will be used in the next step. The least error forecasting for galvalume G550/AS70 is multiplicative decomposition (average of all data).

After get the most appropriate forecasting and inventory method for galvalume G550/AS70 and galvalume G550/AS100 as seen in Table 5, so the stock simulation in order to get stock cost estimation could be held. Stock simulation for galvalume G550/AS70 which using additive decomposition (average of all data) for forecasting method and P Model for inventory method as seen in Table 6. So, the total cost that needed for galvalume G550/AS70 stock for next year is:

$$TC = (11.970 \times 1.050) + (11.970 \times 12)$$
$$TC = 12.568.500 + 143.640$$
$$TC = USD12.712.140$$

Table 5: Forecast error comparator for galvalume G550/AS100

Forecasting	BIAS	MAD	MSE
Naïve method	-8.6957	108.6957	16.73913
Moving average	7.9365	101.5873	13.57143
Weighted moving average	8.5	96.5	12.9225
Exponential smoothing	-11.4959	99.1908	13.70771
Exponential smoothing with trend	-0.1824	104.7097	16.29571
Trend analysis	0.0	81.6473	9.466651
Linear regression	0.0	81.6473	9.466651
Multiplicative decomposition (Average of all data)	0.131	53.6047	3.907679
Multiplicative decomposition (centered moving average)	-3.4281	61.5876	6.884908
Additive decomposition (Average of all data)	0.0	53.6413	3.928896
Additive decomposition (centered moving average)	0.0	64.2539	6.9692

Table 6: Stock simulation for galvalume G550/AS70

		P Model	
Period	Demand	Order	Stock
25	812	1330	518
26	827	1330	1021
27	843	-	178
28	859	1330	649
29	874	1330	1105
30	890	-	215
31	905	1330	640
32	921	1330	1049
33	937	-	112
34	952	1330	490
35	968	1330	852
36	983	1330	1199
Total		11.970	

Table 7: Stock simulation galvalume G550/AS100

		P Model	
Period	Demand	Order	Stock
25	383	965	582
26	382	-	200
27	381	965	784
28	379	-	405
29	378	-	27
30	377	965	615
31	376	-	239
32	375	965	829
33	373	-	456
34	372	-	84
35	371	965	678
36	370	-	308
Total		4.825	

Stock simulation for galvalume G550/AS70 that using multiplicative decomposition (average of all data) for forecasting method and P Model for inventory method as seen in Table 7. So, the total cost that needed for galvalume G550/AS100 stock for next year is:

$$TC = (4.825 \times 980) + (4.825 \times 12)$$
$$TC = 4.728.500 + 57.900$$
$$TC = USD\ 4.786.440$$

CONCLUSION

Base on analysis about product availability improvement, we get some conclusion that strategic management analysis shows that company is in growth and build the position. The result is from the projection of total weight score from EFE and IFE matrix in IE matrix. Total weight score for EFE matrix is 3.05 and for IFE matrix is 2.63. In QSPM matrix, corporate shows some interest to execute a strategy to improve product availability with inventory control planning. The results indicated by total attractiveness score for that strategy in 6.06. The most appropriate inventory method for galvalume G550/AS70 is P Model, it is indicated by the least total stock cost in USD 16.949.520 for next year. The most appropriate inventory method for galvalume G550/AS100 is also P Model, it is indicated by the least total stock cost in USD 9.572.800 for next year. Optimal procurement quantity for galvalume G550/AS70 is 1.330 ton but for galvalume G550/AS100 is 965 ton. Optimal order frequency for galvalume G550/AS70 is 12 times per 2 years but for galvalume G550/AS100 is 10 times per 2 years. The cycle count for galvalume G550/AS70 is 80 days but for galvalume G550/AS100 is 95 days. The most appropriate forecasting method for galvalume G550/AS70 is additive decomposition (average of All data) and for galvalume G550/AS100 is multiplicative decomposition (average of all data). The demand result from that forecasting is used in calculation for stock cost estimation for next year and business growth representation. Demand forecasting result for G550/AS70 is 11.970 tons for next year and demand forecasting result for G550/AS100 is 4.825 tons for next year. Cost estimation to provide and control inventory for next year is USD 12.712.140 in galvalume G550/AS70 and USD 4.786.400 in galvalume G550/AS100.

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