

## Supply Chain Performance Analysis on Small Medium Enterprises Using *Supply Chain Performance Assessment Tool (SCPAT)*

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### Abstract

Global competition that driven by the agreement such Asean China Free Trade Area (ACFTA), impact the small medium enterprise in each group member of ACFTA should compete each other. Indonesia as one of ACFTA member should increase their industry competitive advantage including their small medium enterprise competitive advantage to compete other ACFTA member. Supply chain strategy can be applied to enhance competitive advantage and in order to reassure that the supply chain has been performed well, it is necessary to engage a performance appraisal. This research is a quantitative research, with the confirmatory type of study to evaluate the supply chain performance of Sentra Industri Rajut Binong Jati Bandung using Supply Chain Performance Assessment Tool (SCPAT). There are 60 business units as the research sample. The samples are then grouped into three groups, namely Top Unit Usaha Rajut, Average Unit Usaha Rajut and Small Unit Usaha Rajut. The results showed that the cost dimension performance is above the average level, the time dimension is at the level of the average, while the performance of reliability dimension is low.

*Keywords : Performance; Supply Chain; Supply Chain Performance; SCPAT*

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### Introduction

Since the first time ACFTA has been officially applied, Indonesia's trade balance continues to experience a surplus from oil and gas exports but has a deficit from non-oil and gas sector. As stated in the statistical data released by the Ministry of Trade that the percentage of Indonesian exports mostly came from the non-oil sector of 84.95%, superior to the oil and gas sector <sup>[1]</sup>.

Indonesia's trade balance in the non-oil and gas sector since 2006 continues to show deficits. The condition occurred during 2006-2013, with its deficit peak occurring in 2013 at -8.288.869.8 (in thousand US dollars) compared to China. In the non-oil and gas sector, the majority of the commodities produced are from the Industrial sub-sector where the sub-sector is able to contribute 77.90% of the total non-oil and gas sector exports equal to 66.18% of the total exports Indonesia can afford <sup>[1]</sup>.

Due to the inability of small business units to compete with China which has an integrated textile industry from raw materials, textile machinery to finished products. So the domestic market is flooded with Chinese products with very competitive quality and price. Though domestic market is a potential market for small and medium garment industry which mostly focus only on domestic market <sup>[2]</sup>. As a result of TPT sub-sector include finished garment (non-knitted And knitted), fibers and yarns as well as various types of fabrics. Where apparel is in the form of knitted goods exported 2% of the total export of industrial sector <sup>[1]</sup>.

The decline in textile exports was directly proportional to the continuity of the knitting commodity business. For the amount of export of knitted goods separately, since the year 2011 the number continues to decline. Starting from the range of 3 million US \$ to enter the figure of 2 million US \$ course. This decline occurred sharply at the turn of 2015 to 2016 <sup>[1]</sup>. The impact of this decline in knitted exports was also felt by the craftsmen at Sentra Industri Rajut Binong Jati, Bandung.

Sentra Industri Rajut Binong Jati is one of ten potential industrial areas in Bandung, located in Binong Village,



Batununggal Subdistrict, Bandung City. This industrial center produces handmade knitwear such as sweaters, gloves, scarves, jackets, and others.

The implementation of ACFTA affects the business continuity in this industrial center. By the end of 2011 the number of business units constantly around 400 business units with a total workforce of 8000 people. However, this number decreased rapidly in 2012 where there was a decrease of 60 units of business forced to quit the business, so th therefor industrial center is only able to absorb 5100 workers. The number of business units continued to decline until the beginning mid-2016, it was recorded only around 120 business units operating in this center. The decline is indicated as a result of imported products from China <sup>[3]</sup>.

The average problem faced by knitting craftsmen in Binong Jati related to the availability of raw materials according to market demand, cash flow of raw material suppliers - raw material factories, high raw material prices because raw materials come from other countries, the accumulation raw materials in suppliers affecting raw material prices, the possibility of defects in production and capital. The series of problems leads to the inability of domestic knits products to compete from China that have relatively lower selling prices. The advantages of China's imported products occur because the industrial supply chain in the country has been integrated, starting from the procurement of raw materials to the final consumer.

To maximize the competitive advantage of the domestic knitting industry, one strategy that can be apply is the supply chain strategy, to improve the overall competitiveness of partners in the chain<sup>[4]</sup>. This strategy aims to reduce costs, reduce capital and improve service<sup>[5]</sup>.

While supply chain strategies can assist business development and maximize competition, a business unit must prove that its supply chain activities have been performed effectively and efficiently. To finding out this criteria, an audit can be done in form of measurement and evaluation of supply chain performance [5]. This study aims to assess the supply chain performance of Sentra Industri Rajut Binong Jati Bandung using Supply Chain Performance Assessment Tool (SCPAT).

### **Supply Chain Performance Measurement**

A study by United State Agency International Development that describes the measurement of supply chain performance is not applied in this study because of its characteristics made for pharmaceutical and pharmaceutical industries [6]. Research performance (Ahmad & Yuliawati, 2013) using SCOR is considered complex if applied to objects in the form of business units (SMEs) [7]. The previous research which used as the reference base because of the suitability of the tool used is the research of Banomyong & Supatn year 2011a. Banomyong and Supatn (2011a) in a pilot test study aimed at building a supply chain appraisal tool from a variety of pre-existing theories. This research is a theoretical study that the end result is a new method offered to measure performance not implementation of performance measurement. In the study, 43 SMEs in Thailand were drawn from industrial random to wash the methods offered. The result was built Supply Chain Performance Assessment Tools (SCPAT) as a tool offered for performance appraisal [8]. Further research with different purposes was also carried out by Banomyong and Supatn in the same year, both of which examined the 25 SMEs then benchmarked with a Thai company as a SCPAT implementation from the SME's point of view. To see how this tool can be applied. The results of this study indicate that Top Thai Company companies have dimensions of world class equivalent cost different than 25 SMEs are also studied. The time dimension is also surpassed by the Top Thai Company, even the group's reliability towards the SME group has a wide variety. The performance measurement of 25 SMEs is from a variety of industries, whose benchmark is a Top Thai Company, not another group in the same industry so it has not been able to describe the implementation of SCPAT if applied to organizations within the same industry [9].

Research on the performance of SME Binong Jati using SCPAT applied to 60 units of knitting business in Sentra Rajut Binong Jati. Because it is a central unit, the object under study has the same characteristics, in contrast to the research of Banomyong and Supatn that uses industry randomly. This research is an implementation of performance appraisal using SCPAT instead of theoretical development such as research that has been done first. This study uses primary data from the results of the collection using questionnaires and interviews.



SCPAT aims to assess key activities of small and medium enterprise supply chains (SMEs) at the operational level with different approaches for performance assessment. This assessment framework refers to nine supply chain activities such as; Customer service, demand planning and forecasting, purchase and procurement of raw materials, inventory arrangements, order processing and logistics communications, material handling and packing, transportation, site selection for facilities, warehousing and storage, handling of product returns and reverse logistics<sup>[8]</sup>.

Table 1. SCPAT Matrix

Supply Chain Activities	Cost Dimension	Time Dimension	Reliability Dimension
Customer Service & Support	Customer service cost per sale	Average order cycle time	DIFOT (CS and support)
Deman Forecasting & Planning	Forecasting and planning cost per sale	Average forecast period	Forecast period
Purchasing & Procurement	Procurement cost per sale	Average procurement cycle time	Supplier in full and on time
Inventory Management	Inventory cost per sale	Average inventory days	Out of stocks rate
Order Processing & Logistic Communications	Order processing cost per sale	Average order processing cycle time	Order accuracy rate
Material Handling & Packaging	Value of damaged good per sale	Average materisl hsndling and packaging time	Damage rate
Transportation	Transport cost per sale	Average delivery cycle time	DIFOT (transportation)
Facilities Site Selections, Warehousing & Storage	Facility cost per sale	Average inventory cycle time	Inventory accuracy
Return Goods Handling & Riverse Logistics	Return goods value per sale	Average cycle time for customer return	Rate of returned goods

Source: Banomyong dan Supatn (2011)

There are three levels of supply chain performance: superior, similar, and inferior. The superior level indicates a high performance for a supply chain activity against a predetermined standard. A similar level means supply chain performance is within the average value range of the performance benchmark. Inferior levels represent low performance under the benchmark performance. SCPAT developed in order to understand more deeply about the performance or supply chain performance at the company doing benchmarking to see the differences and compare the assessment results.

### Methodology

Based on the method and purpose of the research, this research is classified as descriptive quantitative research, with exploratory type of investigation. There isn't intervention to the existing data due to the research. Research is done only by collecting data from related sources without any modification. The unit of analysis study analysis is an organizational unit covers number of business units in Sentra Industri Rajut Binong Jati. While the time of research implementation, conducted by cross section. The calculation use several equation such as:

#### 1. Transportation cost per sale

Based on the mode of transportation used by the knitting business unit at Sentra Industri Binong Jati using Small package carriers with average quota of maximum delivery 300 kg using single van truck [10].

#### 2. Calculating the Cost of Warehousing Per Sale

Warehousing rental costs include area, price per meter and operating cost [11].

#### 3. Calculating Damage Per Sale Value



According to [12] Damage product can affect the cost of goods sold and / or income in accordance with the conditions of when the damage occurred, namely; Damage during production in the form of No finished product or irregular product and damage after production in the form of casualty lost. Damage cost is obtained from the amount of damage multiplied by market price;

$TDC = \text{Damage product} * \text{Price}$

#### 4. Calculate the Cost of Return Per Sale

Total consumer goods returned by consumers divided by total sales [8]

#### 5. Calculating Order Cycle Time

Order cycle time (OCT) encompasses all time related events that generate the toll time required for customers to receive their orders [5]. So the calculation of total order cycle time as follows:

$TOCT = \text{Order transmittal} + \text{Order processing \& assembly} + \text{Additional stock acquisition} + \text{Delivery time}$

#### 6. Calculating Order Processing Cycle Time

Order processing cycle time represents several activities including customer order cycles, especially on order preparation, transmittal order, order entry, order filling and order status reporting [5]. So for kiting the total order processing cycle time knitting business unit in Sentra Binong Jati can be done with the following formulation:

$TOPCT = \text{Order entry} + \text{order filling} + \text{Order status reporting}$

7. Delivery cycle time according to Boldtoff (2003), Gunasekaran et al (2001), and Beamon (1999) in [8] is the time between starting to deliver the product until the product arrives at the consumer's location.

#### 8. Calculating Material Handling & Packing Cycle Time.

Material handling includes a short distance movement that usually occurs in a warehouse or building [13]. MH is not applied by artisans in Binong Jati because the production place also applies as storage place of raw material and finished product in process of packaging [3]. While packing cycle time in Banomyong and Supt in 2011 includes the time to start packaging the product.

#### 9. Calculate DIFOT Transportation

Transportation DIFOT rate is the percentage of items that have been delivered (delivered) in full and on time to customers [14].

$\text{DIFOT transportation} = (\text{Number of orders delivered to main customers}) * (\text{Number of orders delivered to customer})$ .

#### 10. Calculate Damage Rate

Damage rate can be calculated from the number of defective products against the number of orders in a dozen [6]

#### 11. Calculating Rate of Returned Goods

Rate of return goods is the proportion of poor-quality good incurred by damage, misplaced, broken, expired items, etc [11] which can be calculated by:



12. Rate of return goods = Number of return goods / Number of delivery goods.

#### 4. Findings and Analysis

The previous research to measure supply chain of SMEs applied to variety industries in Thailand. The result found that the current supply chain system that have been use are not able to support or even sustain competitiveness as the overall performance is on par with those in the database but still very far from the major Thai company[6]. Base on the dimensional cost dimension of 43 Thai SMEs shows that cost superiority and advantage ae not exist over their competitors as their costs are on average at a similar level. The time dimension of SMEs group is only has superiority in the delivery cycle time. In the reliability dimension, it was observed that the discrepancy between the group average and the major Thai company was wide.

Top Unit Usaha Rajut is a group used as a benchmark of this performance appraisal. Top Group consists of 27 units of knitting business with the largest number of manpower of the total sample under study. In KPI the overall cost dimension shows good performance levels above the average with reference to 2 KPIs including at the superior level. Transportation costs are far away 1% ie in the range of 0.28%, followed by the return rate of goods that are below 0.5% with the percentage of 0.05%. At the level of Similar there are also two KPI each is the warehousing cost of 0.53% of total sales and the level of product damage by 0.24%. 5 Other KPIs can't be determined in value due to the unavailability of the relevant data.

From the overall 6 KPIs that can be measured on the time dimension of 2 KPI groups Top procurement cycle time that takes less than 1 day and packaging cycle time with the average time spent each 0.02 days is still less than 1 day. 1 KPI entered into a similar level ie cycle time order that required 9.6 days in the process. And the remaining two KPIs are at the inferior level, ie order processing, delivery and return goods cycle time. OPCT takes 3.9 days, while DCT spends 3.4 days and the return process can be completed in 5.3 days.

Reliability is the lowest performing dimension based on the reference value using SCPAT, where from 4 KPIs that can be measured there are 2 KPIs that are under the reference that is at the inferior level. The superior level is a damage rate of 0.19% along with the return rate of 0.074%. While the two KPIs that are in low performance level are accuracy order with 88% value and DIFOT of transportation equal to 68% far below 80%.

Based on the above exposure, SCPAT diagram can be shown the results of the measurement of each dimension. The cost dimension shows the cost measurement of existing KPI elements. The results of the assessment for each group are shown as follows:

Table 2 The Result

KPI Cost Dimension	Group					
	Top Group	Level	Average Group	Level	Small Group	Level
Transportation cost per sale	0.28%	Superior	0.85%	Superior	0.78%	Superior
Warehousing cost per sale	0.53%	Similar	0.71%	Similar	1.17%	Similar
Value Damage per sale	0.24%	Similar	0.42%	Similar	0.50%	Similar
Return goods value per sale	0.5%	Superior	0.12%	Superior	0.30%	Superior

  

KPI Time Dimension	Group					
	Top Group	Level	Average Group	Level	Small Group	Level
Order cycle time	9.6 days	Inferior	8.14 days	Similar	12.3 days	Similar
Procurement cycle time	1 days	Superior	1 days	Superior	1 days	Superior
Order processing cycle time	3.9 days	Inferior	2.6 days	Inferior	5.2 days	Inferior
Delivery cycle time	3.3 days	Inferior	2.9 days	Similar	3.8 days	Inferior
MH & Packaging cycle time	0.02 days	Superior	0.01 days	Superior	0.006 days	Superior
Cycle time for customer return	5.3 days	Inferior	3.8 days	Inferior	3.06 days	Inferior



KPI Reliability Dimension	Group					
	Top Group	Level	Average Group	Level	Small Group	Level
Order accuracy rate	88%	Inferior	87%	Inferior	83%	Inferior
DIFOT transportation	68%	Inferior	76.2%	Inferior	46.9%	Inferior
Damage Rate	0.19%	Superior	0.39%	Superior	0.54%	Superior
Rate of returned	0.074%	Superior	0.133%	Similar	0.512%	Similar

The value of supply chain performance against cost dimension. However, after experiencing adjustments with business conditions at the Industrial Sentra Rajut Binong Jati then there are some activities that are not performed by the craftsmen so it is not possible to do related performance measurement. The following performance cost dimensions based on supply chain activities conducted in the industrial center:

Based on the calculation of transportation costs, the three groups of knitting business units are at the superior performance level ie the amount of transportation cost is below 1% of total sales. Top Group Rajut averaged 0.28% transportation cost. Average Group averages about transportation costs of 85%, in line with the previous two groups of Small Group on average spend 0.78% of the total sales. The third groups percentage are at a superior level that is below the maximum reference of 1% of total sales.

KPI warehousing cost per sale shows the average cost incurred by each group of business units ranging from 0.5-8% of sales achieved. Average cost of warehousing for Top Group is Rp. 223,776 of total sales amounted to 0.5%, Average Group cost of warehousing is 0.70%. While the Small Group average cost of warehousing is 1.17%. Performance of KPI value damage per sale Sentra Industri Rajut Binong Jati shows similar performance level, the percentage of each group from top, average, and small is 0.24%, 0.42% 0.49%, respectively. Top Group shows superiority performance from remaining groups.

Overall cost dimension performance of Sentra Industri Rajut Binong Jati can be assessed based on KPI transportation cost per sale, KPI warehousing cost per sale, KPI value damage per sale and KPI returned goods cost per sale. Those KPIs showing the result that all three groups are simultaneously on The same level of performance for each KPI of the total of 4 measurable KPIs. All business unit groups have been able to emphasize the costs of transportation, warehousing, damage products and return goods.

The time dimension shows the time measurement of existing KPI elements. There are nine KPI related time, but only 6 KPIs are performed in this Sentra. KPI Order cycle time shows the difference between Top and Average Group performance levels are at similar level with the required time of 9.6 and 8.14 days. While small groups are at the inferior level with a time of 12. 37 days. Procurement of raw materials can be completed in less than one day. KPI Order processing cycle time shows that level of performance. The three groups are inferior. Each Top, Average and Small Group spends 3.9, 2.6, and 5.2 days. The KPI Delivery cycle time shows the Top and Small Groups are at inferior levels for 33 and 3.8 days. While the Average group is superior for 2.9 days, there is a similar level. The next KPI is Material Handling & packaging cycle time Top Group takes time for 0.02 days for packaging. The Average and Small groups each took 0.01 and 0.006, so the three groups were at a superior level of performance. The last measured KPI is Cycle time for customer return time to receive the return item until the delivery time of replacement goods. Based on the assessment results, all three groups for KPI cycle time for customer return are at the inferior performance level, where each group takes 5.3, 3.82 and 3.6 days.

The time dimension indicates that there is superiority in which the KPI order cycle time Top Group of Rule and the Average Rule of the Knitting Act are at a similar level, superior to the Small Rule of the Knit Group located at the inferior performance level. KPI delivery cycle time also points to an advantage, where the Average Group can be processed with a shorter period of time than the Top and Small Groups.

Finally, measurable dimensions using SCPAT are reliability dimensions that measure reliability against existing KPI elements. There are four activities that are implemented in industrial centers Rajut Binong Jati. The first KPI was the KPI Order accuracy showing the three groups were at the level of inferior performance. No group is able



to achieve an order accuracy of 90%. KPI DIFOT Transportation also shows performance at the inferior level, where there are no groups with DIFOT transportation above 80%.

KPI Damage rate indicates that Sentra Industri Rajut Binong Jati able to minimize the level of production damage, so that the performance level of this industrial center is at the superior level. Each percentage of each group from Top to Small is 0.19%, 0.39% and 0.54%. KPI rate of returned goods shows that the Top Group's return rate is lower by 0.074% better than the other two groups. So that the Average and Small groups are at the same level, with the percentage of returns of 0.13% and 0.512%, respectively. Overall there is superiority in the reliability dimension, Based on the KPI rate of returned goods, the Top Rule of Rajut is superior when compared to the Average and Small Groups.

## Discussion and Conclusion

The implementation of ACFTA by the government has an impact on the tight competition between domestic knitting products and knitting products originating from China. It is also felt directly by the craftsmen knitting in Industrial SENTRY Rajut Binong Jati. Competition occurs because knitting products from China have competing prices with quality that is not much different. The problems faced by domestic craftsmen are related to the price competition, which is due to the high cost incurred so that the set price is also higher than China. China's competitive advantage is due to supply chain integration, starting from the provision of raw materials to the spearhead to the final consumer. Supply chain strategy is considered to be able to increase the competition because it sees its purpose to push the cost, capital and service improvement. Thus an effective and efficient supply chain is indicated to be a solution to the problems facing knitting craftsmen. To be able to determine the effectiveness and efficiency of the supply chain must first be measured the performance of the supply chain. So with this assessment is expected to see the performance of the supply chain of craftsmen in the Industrial SENTRY Rajut Binong Jati.

Supply chain performance of Sentra Industri Rajut Binong Jati for Top, Average and Small UU Rajut Groups are together have performance above average based on KPI cost dimension. Including transportation cost per sale, warehousing cost per sale, value damage per sale and returned goods cost per sale. Time dimension of Top, Average and Small Groups has above average performance against the order cycle time KPI, procurement cycle time, and M.H & packaging cycle time. However, the performance level on the order processing cycle time and cycle time for customer return shows the performance that is below the reference value. This is due to the fact that productivity is determined by the number of knitting machines that have not yet matched the order and also the number of employees who operate the machine. Return of goods returns is still not considered, the tendency of the craftsmen not directly replace and focusing on the return of goods because it focuses on production itself.

In this time dimension there is superiority, where in the Average Group achieved superior performance based on delivery cycle time. This advantage occurs because the Average group can shorten the time for the delivery process. While other groups took longer to 9 to 20 hours. The Top, Average, and Small UU Rajut reliability group dimensions show performance above the average reference value against the KPI damage rate. However, based on order accuracy and DIFOT transportation KPI, the three groups are at the level of performance below the reference value. There is no very accurate group regarding order accuracy, the three groups have not reached the 90% accuracy of their order. The DIFOT transportation has not reached 80% because the craftsmen do not have a variety of alternative modes of transportation. So if things happen that can't be controlled such as congestion, natural disasters, facilities damage etc, then the process of transportation of goods will experience delays. In the reliability dimension there is also superiority to the KPI rate of return, where the Top Group of Rajut Act shows above average performance level, superior to the Average and Small UU Rajut group.

Based on the of the research results it is necessary to increase the performance of warehousing cost where the calculation shows the warehousing cost incurred is still big enough to reach more than 0.5% of total sales. Maximize storage space to avoid wasting the cost of warehouse rental. The cost of KPI which still needs an increase is the value of the broken product where the percentage of total product damage to sales is greater than 0.1% causing this KPI still in the level of average performance only. To reduce the amount of things that can be done by artisans is to improve the skills of workers so that the possibility of errors in production can be



reduced. Performance improvements to order cycle time, order processing cycle time, delivery cycle time and time for returns are required. Reducing time to order cycle time processing and order processing cycle time can be done by intensifying product outsourcing. Outsourcing decisions can shorten production time, will not increase the cost of employee and training costs, as well as support the minimization of work space utilization. Constraints on delivery cycle time are inversely proportional to cost, so the craftsman should determine the main focus on the emphasis of transportation costs or the effectiveness of delivery of goods.

For the next research can apply assessment of supply chain performance with SCPAT method to other industries. It is also desirable that further research considers the use of objects that already have systematic records related to their supply chain data. Further research is also expected to pay attention to exchange rate fluctuations and depreciation values.

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