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SCOR-BSC Integrated Model for A Small Medium Enterprise Clothing Industry Using MTS-based Production Strategy in Indonesia

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Abstract. Small and Medium Enterprises (SME) in Indonesia continues to grow. SMEs have proven to be able to survive, and Indonesia was hit by a crisis in 1997. However, UKM has several disadvantages, one of which is the difficulty in developing its business. Hence performance measurement is needed so that SMEs can see the performance of their SMEs and can make improvements. This research will focus on one of the SMEs engaged in the clothing industry in the city of Bandung. This research also focuses on the production section that uses the make-to-stock strategy as its production strategy. The integrated SCOR-BSC model is used as the basis for determining the KPI needed by SME clothing. The results of this study can be the basis for the development of a monitoring system.

1. Introduction

The development of Small and Medium Enterprises (SMEs) in Indonesia continues to grow. This can be seen from the increase in the number of SMEs in Indonesia. Although Indonesia was hit by a crisis in 1997, SMEs can survive and can drive the economy with its strength [1]. This made the government continue to support SMEs in Indonesia.

However, there were still many issues that had to be faced by SMEs such as lack of a strategic approach to the procurement department, lack of knowledge of supply chains, high inventory levels, lack of standardization, and uncertain changes in quantity and schedules [2]. Besides, weaknesses that are still experienced by SME entrepreneurs in improving business capacities, such as lack of capital and sources of investors, lack of managerial skills and operating skills in organizing, and limited marketing [3]. Besides this, the weakness of SMEs to develop is that the supply chain has not been identified [4]. To be able to increase the competitiveness of SMEs, one way that can be done is to improve supply chain performance [5].

A good supply chain management can increase a company's competitive level in terms of effectiveness in the use of resources to achieve end customer service goals, higher levels of precision both in planning and controlling material flow and information from suppliers to end user, improve relationships between supply chain members, reduce inventory levels, delivery time, and others [6]. In order to achieve these objectives, it is essential to measure the performance of various supply chain functions and to maintain these performances in both the related companies and the supply chain [7]. To be able to manage good supply chain management, a model that can measure the performance of the company's supply chain is needed.

One model that can measure company performance is the Supply Chain Operation Reference (SCOR). SCOR provides a framework to isolate supply chain management practices and processes that



produce the best performance with five planning needs (source-make-plan-deliver). In addition to SCOR, a Balanced Score Card (BSC) can also be used to help balance financial and non-financial use to adjust the strategies that have been set with [2]. With BSC, companies can establish the company's strategy and mission into four perspectives consisting of financial, customer, internal processes, and learning and growth [8]. Both of these models can be integrated into the framework of SCOR-BSC, which can improve the effectiveness of supply chain functions in MSMEs and integrate processes with supply chain needs [2].

The object studied in this research is an SME engaged in the industry of clothes. This SME is located in the city of Bandung, West Java. In its production process, it uses the make-to-stock strategy for its production strategy. In carrying out its business processes, the SME cannot be separated from supply chain activities which consist of planning, procuring raw materials, making products, and sending products to customers consisting of other businesses (Business to Business) or end users (Business to Customer). However, the object studied currently does not have a key performance index (KPI) to measure the performance of supply chain activities. This results in no fixed standards in its business activities. The absence of these standards has resulted in the owner being unable to monitor and evaluate the performance of supply chain activity [9]. The results of this research can be the basis for the development of a monitoring system. With a monitoring system, it can help SMEs in inputting data, assessing and monitoring performance, and making decisions [10] [11] [12] [13].

2. Methodology

This research started with the collection of company objective and vision, the role of stakeholders in the company, and business process that relevant to the research. Those data are obtained by interviewing with the owner. Knowing the role of stakeholder and business process is essential to map the process business into SCOR process. Company objective is vital to determine which SCOR performance attribute that describe the activity in the company.

The SCOR process then decomposed from level 1 to level 3. This is important because by decomposing the process, the vital activity that has to be done can be detected. From the decomposing process, the next step is determining KPI/performance metrics of the process. The determining KPI/performance metrics is done based on the SCOR performance attribute that already set before. The KPI/performance metrics that already determined are used as the KPI of BSC as seen in figure 1.

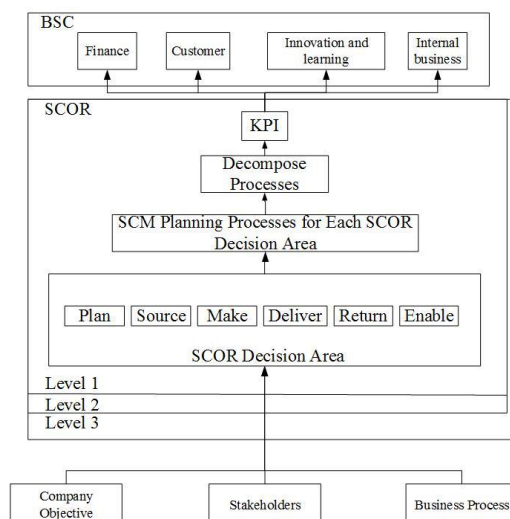


Figure 1. The framework of performance measurement using SCOR-BSC integrated model

3. Result and Discussion

3.1. SCOR mapping

The first thing to do in this research is conducting interview and observation to obtain the company objective, business process, and stakeholder. From the interview with the company's owner, the company objective can be identified. The company objective is to provide the product with the best quality with optimized cost and able to face changes in customer demand. At the same time, the SCOR process and SCOR performance attribute are also prepared by studying from the SCOR model as seen in Table 1.

The company objective can be divided into three objectives, and then those objectives be mapped into three SCOR performance attributes. The first objective is to provide the best quality product to the customer. This objective could be mapped into the performance attribute. The second objective is to provide the product with an efficient process. For this objective, it represented by cost attribute. The last objective can face changes in customer demand, and this objective is represented by agility performance attribute

Table 1. Company objective

Company Objective	Performance Attribute
Provide the product with the best quality	Reliability
Able to optimize cost	Cost
Able to face changes in customer demand	Agility

This research focused on the make process. Therefore, the SCOR model (Figures 2 and 3) studied are plan make and make-to-stock. The reason for choosing make-to-stock is because the object that being studied uses make-to-stock strategy in their production strategy. Based on SCOR model version 12.0, the plan make has four activities consist of (1) Identify, Prioritize, and Aggregate Production Requirements, (2) Identify, Prioritize, and Aggregate Production Resources, (3) Balance Production Resource with Production Requirements, and (4) Establish Production Plan. The SCOR model for make-to-stock consists of (1) Schedule Production Activities, (2) Issue Material, (3) Produce and Test, (4) Package Product, (5) Stage Product, (6) Release Product to Deliver, and (7) Waste Management.

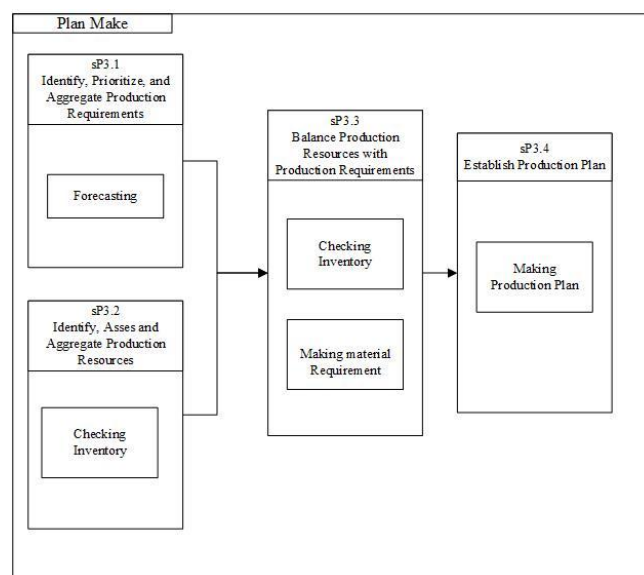


Figure 2. Mapped plan make process into the SCOR model

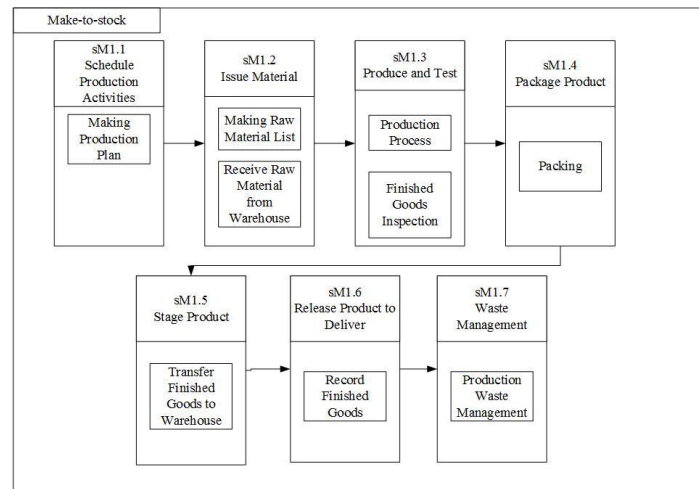


Figure 3. Mapped Make-To-Stock process into the SCOR model

After the company business process is mapped into the SCOR model, the SCOR performance metrics related are predetermined. The company then verifies the predetermined metrics. The verification process is essential to understand which metric the company needs that. This process is done by interviewing with the owner. Table 2 shows the verified metrics and performance attribute.

Table 2. Verified methrics

Performance Attribute	Metric
Reliability	Forecast Accuracy
	Schedule Achievement
	Fill Rate
	Warranty and Returns
	Warranty Costs
	Yield
	Compliance Documentation Accuracy
Cost	Waste Processing Errors
	Cost to Plan Make
	Direct Material Cost
	Indirect Cost Related to Production
	Direct Labour Cost
Agility	Current Make Volume
	% of labour used in manufacturing, not used in direct activity

3.2. Development of Balanced Scorecard

The development of balanced scorecard is started by company vision and followed by its objective. After that, determine the strategy for the balanced scorecard. The strategy is divided into four perspectives: financial, customer, internal business process, and learning & growth. The balanced scorecard can be seen in Figure 4.

3.3. SCOR-BSC integrated model

The SCOR metric that already been verified by the owner of SME then integrated with the balanced scorecard. The verified metrics then become KPI from the strategies and programs of the balanced scorecard. Strategies that have a KPI from a verified SCOR metric are reduced operational cost, produce high quality with minimum waste, and maintain product availability. The strategy and other KPI that were not from SCOR were taken from previous research [14] [15].

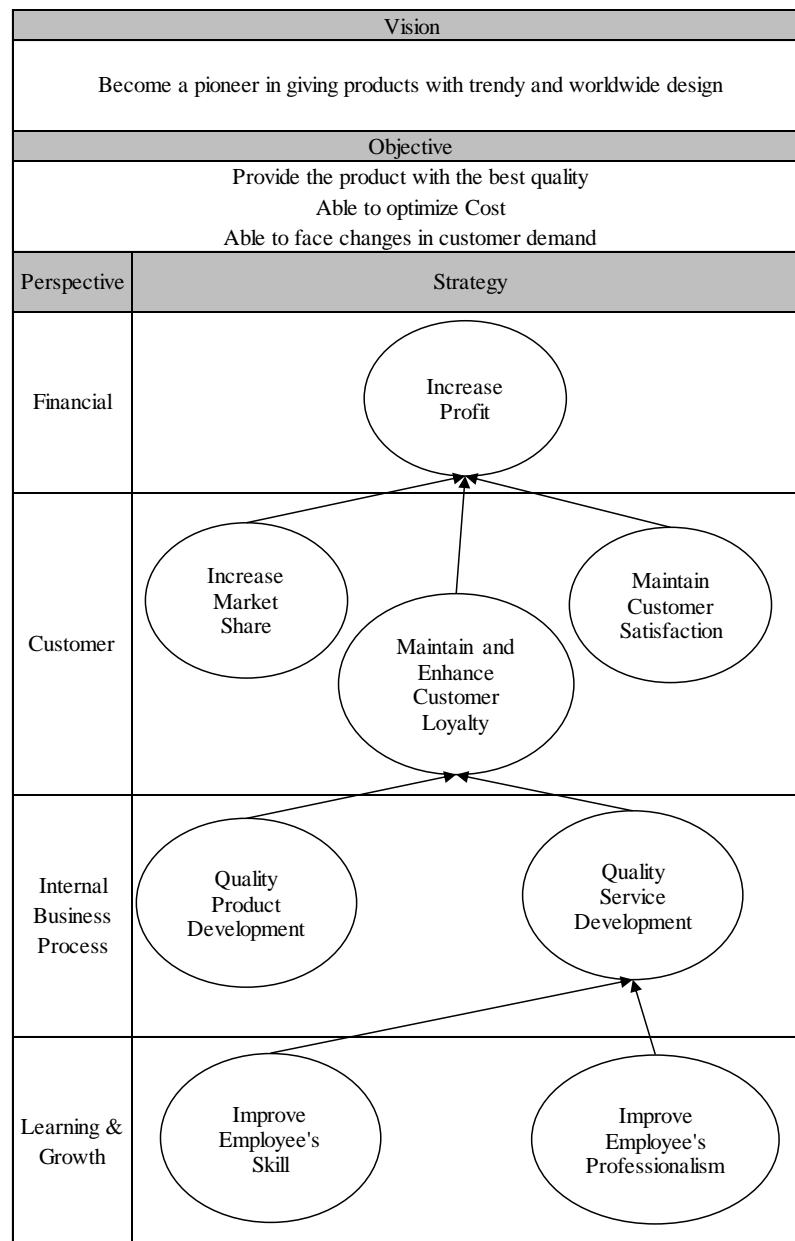


Figure 4. Developed balance scorecard

4. Conclusions

Based on company objective, stakeholder role, and business process obtained 14 performance metric that consists of 8 reliability performance metrics, four cost performance metrics, and two agility performance metrics. These 14 performance metrics then become KPIs of several BSC strategies that have been developed.

Moreover, the result of this research can be the basis of performance measurement monitoring system. With the performance measurement monitoring system, SMEs can examine the performance of their business and improve so that their business can continue to grow.

Table 3. Balanced scorecard

Perspective	Strategy	Program	KPI
Financial	Increase in Profit	Increase number of product sold	%Profit Growth
		Reduce operational cost	Cost to Plan Make Direct Material Cost Indirect Cost Related to Production Direct Labor Cost
Customer	Increase Market Share	Increase promotion through social media	%Market Share
	Maintain and Enhance Customer Loyalty	Establish customer loyalty program	%Customer Retention
	Maintain Customer Satisfaction	Improve product and customer service quality	%Customer Satisfaction
Internal Business Process	Increase Quality Product Development	Produce high-quality product with minimum waste	Warranty and Returns Warranty Costs Yield Compliance Documentation Accuracy Waste Processing Errors Current Make Volume % of labour used in manufacturing, not used in direct activity
	Increase Quality Service Development	Maintain Product Availability	Forecast Accuracy Schedule Achievement Fill Rate
Learning & Growth	Improve Employee's Skill	Organize training to upgrade employee's skill	%Employee Training Participation Number of Training
	Improve Employee's Professionalism	Supervise employee's discipline	%Absence %On Time Employee's Attendance

Table 4. Key performance index

Program	KPI	Formula
Increase number of product sold	%Profit Growth	$\frac{Profit_n - Profit_{n-1}}{Profit_n} \times 100\%$
Reduce operational cost	Cost to Plan Make	\sum cost associated with the planning the making of the product [16]
	Direct Material Cost	Direct cost spent on material for production[16]
	Indirect Cost Related to Production	Indirect cost incurred in production indirect activity[16]
	Direct Labor Cost	Direct cost spent in on production labor
Increase promotion through social media	%Market Share	$\frac{\# Own product in the market}{\# Total product in the market} \times 100\%$
Establish customer loyalty program	%Customer Retention	$\frac{Customer_{end\ of\ period} - Customer_{new}}{Customer_{start\ of\ period}} \times 100\%$
Improve product and customer service quality	%Customer Satisfaction	$\frac{\# Satisfied Customer}{Total Customer} \times 100\%$

Program	KPI	Formula
Produce high-quality product with minimum waste	Warranty and Returns	Number of returns/period [16]
	Warranty Costs	$\frac{\sum \text{material, labor, and diagnosis for product defect cost [16]}}{\text{Usable output [16]}}$
	Yield	$\frac{\text{input}}{\text{Correct}} \times 100\% [16]$
	Compliance Documentation	$\frac{\text{Total documentation}}{\text{Correct}} \times 100\% [16]$
	Accuracy	
	Waste Processing Errors	$\frac{\text{Number of error}}{\text{Total waste transaction}} \times 100\% [16]$
Maintain Product Availability	Current Make Volume	Amount of each item manufactured [16]
	% of labour used in manufacturing, not used in direct activity	Percent of labor used in manufacturing, not used in direct activity [16]
	Forecast Accuracy	$\frac{\sum \text{Actuals} - \sum \text{Variance}}{\sum \text{Actuals to percentage error}} \times 100\% [16]$
	Schedule Achievement	$\frac{\text{Actual schedule}}{\text{Target schedule}} \times 100\% [16]$
Organize training to upgrade employee's skill	Fill Rate	$\frac{\# \text{product sold}}{\# \text{product produce}} [16]$
	%Employee Training Participation	$\frac{\# \text{Actual employee participation}}{\# \text{Target employee participation}} \times 100\%$
	Number of Training	$\frac{\# \text{Training}}{\# \text{Employee absence}} \times 100\%$
	%Absence	$\frac{\# \text{Employee absence}}{\# \text{Total attendance}} \times 100\%$
	%On Time Employee's Attendance	$\frac{\# \text{On time employee}}{\# \text{Total attendance}} \times 100\%$
Supervise employee's discipline		

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