Supply Chain Performance Measurement System Development for Shoes SME using Subcontract Production Strategy Based on Integrated SCOR-BSC Model

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Abstract. Textile and apparel companies are a company that is widely available in Indonesia. SME discussed in this research is one of many textile companies in Indonesia that produce shoes. A production strategy that is used by the company is a subcontract strategy. When the economic crisis hit the world in 1997 to 1998 Indonesia's economy was affected, only the SME sector could survive and remain strong, and from the number of SME as many as 56,534,592 units or 99.99%, with the remaining 0.01% or 4,968 units is a large scale business [1]. This explains that SME is productive businesses to be developed and have their own strength to survive following ups and downs in the economy. This company have started its business since 1998 and has a dream to become a big company that leads the market by having characteristics of the product which is trendy design, provide excellent quality and internationally known.

Problems experienced by SME in Madura Indonesia are found in their business processes such as packaging, marketing, and capital issues [2]. SME is often neglected due to the small scale of production and not yet able to compete with other business units. Weaknesses faced by SME entrepreneurs in enhancing business capacity are very complex and include various indicators which one of the others is interrelated, among others, lack of capital both in number and source, lack of managerial skills and skills to operate in organizing and limited marketing [1]. Problems that are also often happening in SME are

1. Introduction

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miss management and lack of standardization process business [3]. Based on these problems it can be seen most of the problems that occur come from the absence of standardization in business processes, lack of knowledge in managing supply chain and the absence of a system that can show the performance of the company which can be used by companies in decision making.

Problems experienced were not different from the problems mentioned above. This company has not implemented the standardization of each activity in the overall business process, nor has a measurement of Key Performance Index for each activity in the business process. This company trust their production for shoes and having a contract to other company which makes it harder to control and measure their performance of business activities. This company needs standardization of Key Performance Index for each of their business activity so that they can measure the performance of their supply chain business activity.

Good supply chain management can increase the competitive level of the company in terms of effectiveness in the use of resources to achieve end customer service objectives, greater levels of precision both in planning and controlling material flow and information from suppliers to end users, improve relations between supply chain members, reduce inventory levels, delivery time, and others [4]. To expand market share and increase the competitiveness of SME, in decision making process Top Level Management requires a performance measurement system that can be used to measure company’s performance so that future decision making is better and more accurate. In order to be able to manage supply chain management well, a model that can perform performance measurement systems or company performance is needed.

One model that can be used to measure company performance is Supply Chain Operation Reference (SCOR) and the Balanced Score Card (BSC). SCOR provides a framework to isolate supply chain management practices and processes that produce the best performance with five planning needs which is plan-source-make-deliver-return [5]. Balanced Score Card (BSC) can also be used to help balance the financial and non-financial of the company to adjust the strategies that have been set [5]. The two models are then integrated into the framework of the SCOR-BSC model that can be used and make it as a performance measurement system to improve effectiveness and maintain the stability of supply chain functions in SME.

2. Research Methodology

![Figure 1. Framework SCOR-BSC (adapted from [5])](image-url)
In this research knowledge and sources that are related to the topic of the research is studied from literature and the actual condition of the object of the research. Then, the problem and objective of the research are identified and determined. All subject that is related to the research is collected through interview and observation to the company’s executive. The data consist of the business process of the company, stakeholder, and the objective of the company.

Process business of the company is important to know the process that happens in the company as it is going to be mapped in the performance attribute of the SCOR model. Company’s objective and stakeholder are used to determine which performance attribute in the SCOR model for the mapping process and also to determine the metrics that are going to use. The first step to do is to conduct the BSC model that are going to be implemented to the company, in this research BSC KPIs used are obtained from previous research that focused on the SME. Then the next step is the mapping process of the business process in the company to the SCOR model related to the perspective of the SCOR model which is the plan, source, make, deliver, and return.

The object studied in this research only use plan, source, deliver and return because of the needs of subcontract production strategy. The company's production process is carried out by other companies so that the make process in the SCOR model is not used in this research. In the mapping process, the metrics are determined based on the company’s objective and stakeholder. After the metrics are determined, then metrics are verified by the company in assure to its conformity to the process and company need. The unverified metrics will not proceed to the next process. The metrics that are verified are then going to be mapped into BSC Strategic Objective Program. Figure 2 shows the framework of integrated SCOR-BSC model and used as the guideline in integrating SCOR and BSC.

2.1. BSC Model

![Figure 2. Company’s Objective and BSC Strategy Development](image_url)

Before the integration between SCOR and BSC is made, the Balanced Scorecard development is carried out first. The development of balanced scorecard starts with translating the company's vision into a strategy that is in accordance with the perspective contained in the BSC. The Balanced Scorecard
provides a framework to build coherent strategic goals. The coherence of strategic goals is built by creating a cause-effect relationship between one strategic goal and another strategic goal [6], the development of Balanced Scorecard conducted in this research can be seen in the Figure 3 Company’s Objective and BSC Strategy Development. As we can see in figure 3, there is a correlation between strategy to support the success of one strategy to another strategy, start from the bottom with learning and growth perspective, by growing employees professionalism it helps to improve employees skills by improving employees skills it helps to increase the service performance which support the process business and so on. All these strategies helps the company to support the last perspective which is financial with strategy increasing the company’s profit.

| BSC Perspective | Initiative Strategy | KPI | Program |
|-----------------|---------------------|-----|---------|
| Financial       | Increase Revenue    | Sales Growth [13] | Intensify promotion |
|                 |                     |      | Decrease Lost Sales |
| Customer        | Maintain customer satisfaction | % Customer Satisfied [14] | Provide Warranty |
|                 |                     |      | Product Warranty |

We can see in table 2 that is some example of BSC perspective, strategy and KPI in SMEs. The KPIs and initiatives strategy were obtained from previous research focused on SME. There we can see in financial perspective, strategy that can be used is increasing the revenue of the company with key performance index that can show the performance, which is sales growth with program that can be done by the SME is intensify the product promotion and decreasing lost sales. And as for the customer perspective, strategy that can be used is to maintain customer satisfaction with performance indicator which is % of satisfied customer with program that can be done by the SME is provide product warranty.

2.2. SCOR Model Mapping
As seen in methodology chapter, the first thing to do in this research is conducting interview and observation to the company, to see stakeholder and company’s objective and also company’s process business to proceed to the next step. There are three attributes related to the company’s objective and SCOR model which is reliability, cost, and agility. SCOR mapping in this research based on an actual business process which then the related activities are mapped into the SCOR model.

| Company’s Objective | Performance Attribute |
|---------------------|-----------------------|
| Meet the company’s target in meeting customer satisfaction in terms of quantity and quality | Reliability |
| Increasing the company’s ability to deal with external influences and following external changes | Agility |
| Companies are able to optimize and minimize expenses incurred | Cost |

This research is focusing on the production of the company. Production strategy used by the object of this research is subcontract strategy so it can be said that the company use other company as their partner to produce the shoes but in the end product, the product using the company’s brand. The activities involved in the shoe production process business on the SCOR model consist of a plan source, source stocked products, deliver stocked products, and source return defective and deliver return defective.
The plan source model based on SCOR model version 12.0 consists of 4 activities which are (1) Identify, Prioritize and Aggregate Product Requirements, (2) Identify, Assess and Aggregate Product Resources, (3) Balance Product Resources with Product Requirements, (4) Establish Sourcing Plans. This plan source contains a business process mapping of planning to procure shoe products to maintain stock shoes so that they can always meet customer needs when customers place orders. Figure 4 shows the SCOR model mapping for plan source.

The source stocked model consists of 5 activities which are (1) Schedule Product Deliveries, (2) Receive Product, (3) Verify Product, (4) Transfer Product, (5) Authorize Supplier Payment. The designation of the source stocked model shows the mapping of the company's business processes in the procurement of shoes using subcontract production strategy. Procurement of shoes is using source
stocked SCOR model because the company does not make its own shoe products. Figure 5 shows the source stocked SCOR mapping.

![Figure 5. Deliver Stocked Product SCOR Mapping](image)

The deliver stocked model consists of 15 activities but only 5 used in this research due to the needs of the company process business. The activities are (1) Process Inquiry and Quote, (2) Pack Product, (3) Load Vehicle and Generate Shipping Documents, (4) Ship Products, (5) Received and Verify Product by Customer. Deliver stocked model are important to the process business of the company in terms of delivering some material needed in the production process in the subcontract. Material delivery is carried out by the company to maintain the quality of the product in accordance with the specifications desired by the company and also the material has been maintained in stock by the company. Figure 6 shows the SCOR model mapping for the delivery stocked product.

![Figure 6. Source Return Defective Product](image)

The source return defective product consists of 5 activities which is (1) Identify Defective Product Condition, (2) Disposition Defective Product, (3) Request Defective Product Return Authorization, (4) Schedule Defective Product Shipment, (5) Return Defective Product. This source return defective product provide business process mapping of product return to the supplier if there are any mistakes in product content or defect in the product. Figure 7 shows the SCOR model mapping for source return a defective product.
The deliver return defective product consist of 4 activities which is (1) Authorize Defective Product Return, (2) Schedule Defective Return Receipt, (3) Receive Defective Product (includes verify), (4) Transfer Defective Product. This delivers return defective product provide a material return by the supplier if mistakes in material content or there is a defect on the material. Figure 8 shows the SCOR model mapping to delivering return defective product.

After the company business process has been mapped into the SCOR model, then the selection of the metrics that can be used is done. The metrics obtained from the results of the mapping then verified by company executives. Verification needs to be done to select what metrics can be applied in the company, the unselected metrics will then not proceed to the next process.

2.3. Integrated SCOR-BSC

The metrics that have been previously obtained at SCOR are then integrated with the BSC to be used as KPIs of the predetermined BSC strategy. From these strategies, programs that can support the success of KPI are also determined. Mapping of SCOR KPIs to BSC KPI in this research, according to the SCOR-BSC framework [5] is SCOR KPIs that are obtained is adjusted to the related perspective on the BSC that also influences the program and strategy in the BSC. The integration of SCOR KPI in the BSC in this study is in a financial perspective in decrease cost strategy and business processes with 5 strategies, namely (1) Increase Service Development, (2) Maintain and Enhance Good Relationship with Stakeholders, (3) Product Quality Development, (4) maintain the accuracy of delivery and material availability for suppliers, and (5) Maintain Product Availability. The metrics that have been previously obtained at SCOR are then integrated with the BSC to be used as KPIs of the predetermined BSC strategy. From these strategies, programs that can support the success of KPI are also determined. We can see in table 3 some example of integrated KPI SCOR-BSC for SME with subcontract strategy.
The formulation of each KPI was also formulated to support the clarity of the success factors of the KPI.

Formulation of Integrated SCOR-BSC can be seen in table 4 below:

### Table 3. Integrated SCOR-BSC

| BSC Perspective | Strategic Initiatives | SCOR Processes | SCOR Activities | Formulation | Measurement Frequency |
|------------------|-----------------------|----------------|-----------------|-------------|----------------------|
| Financial        | Decrease fuel cost    | Decrease fuel cost | Decrease shipping costs | $\text{CDGS}_i - \text{CDGS}_{i-1}$ \times 100\%  |
| Customer         | Maintain and enhance customer loyalty | Provide competitive product quality and cost | % Customer Loyalty \[13\] | % Customer Loyalty \[13\] \times 100\%  |
| Internal process | Product Quality (Development) | Maintain the quality of material delivery for suppliers | Quality checking of product when product arrived | $\text{Quality checking}_{\text{product}} = \text{Defect Free}_{\text{product}} \times 100\%$  |
| Learning and Growth | Improve Employees Skill | Provide training minimum twice in a year | Employees Attendance \[14\] | Employees Attendance \[14\] \times 100\%  |

### Table 4. Integrated SCOR-BSC KPI, Program and Formula

| KPI | Program | Formula |
|-----|---------|---------|
| Order Delivery and/or Install Costs \[15\] | Increase fuel cost | $\text{CDGS}_i - \text{CDGS}_{i-1}$ \times 100\%  |
| % Customer Loyalty \[13\] | Provide product warranty | % Customer Loyalty \[13\] \times 100\%  |
| % Orders/Lines Received On-time to Demand Requirement / MOU with supplier \[15\] | Make legal and clear agreements / MOU with supplier | % Orders/Lines Received On-time to Demand Requirement / MOU with supplier \[15\] \times 100\%  |
| % Orders/Lines Received Defect Free \[15\] | Quality checking of product when product arrived | % Orders/Lines Received Defect Free \[15\] \times 100\%  |
| Delivery Item Accuracy \[15\] | Checking shipping document and goods before shipping | Delivery Item Accuracy \[15\] \times 100\%  |
| Forecast Accuracy \[15\] | Consider number of demand in past period | Forecast Accuracy \[15\] \times 100\%  |
| Provide Training \[15\] | Provide training minimum twice in a year | Provide Training \[15\] \times 100\%  |
| Employees Attendance \[14\] | Apply salary cut rules if absence without information or exceed the absence limit | Employees Attendance \[14\] \times 100\%  |

3. Conclusion

Based on the development of a performance measurement system using the integrated SCOR-Balanced Scorecard Model, the conclusions obtained are:
1. Based on company objectives, stakeholders, and company business processes, obtained 12 Integrated SCOR-BSC Strategies, 31 Integrated SCOR-BSC Programs, and 31 Integrated SCOR-BSC KPIs which consisted of 19 SCOR KPIs that were mapped into 2 BSC perspectives namely Financial and Business Process.

2. This research is limited to the process of procurement of products and using subcontract systems in the procuring the products and also the integrating SCOR to BSC in this research only focus in the procurement process, for further research researchers can measure the overall activity and process of the company's supply chain so that the relationship between SCOR and BSC can be seen more clearly and can be used as a basis for measuring overall company performance.

3. The strategies, programs, and KPIs obtained can be used as performance measurement systems or bases in making a company monitoring system that can assist companies in making decisions for the company's future development.

4. References

[1] Suci R Y 2017 Jurnal Ilmiah Cano Ekonomos 6 51-8
[2] Kurniasari D N 2015 Jurnal NeO-Bis 98-109
[3] Bolstorff P and Rosenbaum R 2012 Supply Chain Excellence a Handbook for Dramatic Improvement Using the SCOR Model New York: AMACOM
[4] D C Alina and Fernando M D 2014 Vision de Futuro 18 57-58
[5] Thakkar J, Kanda A and Deshmukh S 2009 Benchmarking: An International Journal 16 702-23
[6] Mulyadi 2005 UPP AMP YKPN
[7] Waaly N A, Ridwan Y A and Akbar D M 2018 International Mechanical and Industrial Engineering Conference (IMIEC), Malang.
[8] Novar M F, Ridwan Y A and Santosa B 2018 12th International Conference on Telecommunication Systems, Services, and Applications, Yogyakarta.
[9] Kuswanday R, Ridwan Y A, and El Hadi M R 2018 Proceedings of the 12th International Conference on Telecommunication Systems, Services, and Applications, Yogyakarta.
[10] Kaplan R S and Norton D P 1996 The Balanced Scorecard: Translating Strategies into Action Boston: Harvard Business School Press
[11] Jannah B, Ridwan Y A, and Haidi R 2018 Jurnal Rekayasa Sistem dan Industri
[12] Ismadhia A, Ridwan Y A, and Haidi R 2018 Jurnal Rekayasa Sistem dan Industri
[13] Widianingrung L D and Kabul I 2014 ComTech 1031-1040
[14] Mulyana J, Tjiang L, Sianto E M, and Gunawan I 2016 International Conference on Industrial Engineering and Operations Management, Kuala Lumpur.