Decision Support System of Performance Assessment for Sustainable Supply Chain Management

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ABSTRACT

Sustainable supply chain management (s-SCM) requires a practice tool to assess performance that able to measure, evaluate and improve the existing operations of supply chain. The research question is how to build a decision support system (DSS) for performance assessment of s-SCM. The author has designed a DSS for performance assessment of s-SCM. There are some elements in designed DSS namely existing achievement, standards, indicators achievement and priority, computation algorithm, and recommendation for improvement. Theoretical contribution of this study is the development of relationship between total and partial performance in mathematical formulation. The model that has been presented is still using generic indicators. If the particular company would like to apply model that additional indicators should change the encoding computer program. However, the modification is very easy to perform. DSS structure of this study is still able to accommodate any kind of particular requirement.

Keywords: Decision Support System (DSS), Partial Performance, Supply Chain, Sustainable Supply Chain Management (s-SCM), Total Performance

INTRODUCTION

Many companies have been faced with conflict of interest between profit oriented and environment concerns. According to Blengini and Shields (2010), sustainable concept has been trusted to improve economy, social and environment in context of business strategy simultaneously. In macro perspective, it is a concept that can save current generation without ignoring the destiny of future generations to meet their needs. Sikdar (2003) has been argued that sustainable concept is a paradigm about harmonization between economic development, environmental security, and social equity. This concept is very suitable to be applied to solve various problems in the supply chain management (SCM). Sustainable supply chain management (s-SCM) is a paradigm of supply chain management that aimed to man-

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age operations with environmentally inputs and transforming these inputs to achieve economic and social benefits simultaneously.

SCM is an approach concerning overall operation to be performed efficient and effective. Strategy is formulated to denote achievement of targets. This is means that organizations need to establish suitable model of performance assessment for s-SCM. Performance assessment is needed to ensure sustainability process in supply chain operation. Assessment of s-SCM performance is complicated problem because of involving several actors in transversal process (Estampe et al., 2010). s-SCM is performed to achieve given operational, tactical and strategic objectives. Performance assessment can help decision makers to improve their operation in operational level, tactical as well as strategic level (Gunasekaran et al., 2011). s-SCM performance assessment is consisting of four phases that is design, measurement, evaluation and improvement. It can be applied to assess overall operations in terms of customers’ satisfaction and costs incurred.

There are two categories relating to previous studies about SCM performance assessment. First, studies that have been conducted in developing framework and metrics formulation. For examples, Hadiguna et al. (2011) proposed indicators and metrics for sustainable supply chain of automotive industry. Baghwat and Sharma (2007) developed framework using balanced scorecard that measures and evaluates supply chain operations. Gunasekaran et al. (2011) developed a framework for measuring performance the strategic, tactical and operational level performance in a supply chain. The emphasis of study is identifying performance measures dealing with suppliers, delivery performance, customer-service, and inventory and logistics costs. Kleijnen and Smits (2003) conducted a critical analysis of various metrics for SCM performance in particular manufacturing companies. Hervani et al. (2005) provided a green supply chain management performance measurement system that internally and business focused. Framework that developed was considering inter-organizational and environmental issues within a business context. Wu et al. (2011) investigated performance metrics of high-tech companies in term of improvement their weaknesses through partner relationship management to maximize their supply chain performance.

Second, design of performance assessment tools that have been developed by applying mathematically and/or computer based modelling. For examples, Ganga and Carpinetti (2011) designed a supply chain performance model based on fuzzy logic to predict performance. They integrated causal relationships and Supply Council Operations Reference model (SCOR). Vanteddu et al. (2006) designed a new performance comparison tool with the novel application of MS Excel. Tool can facilitate decision making in aligning the respective business or functional strategy with the corresponding supply chain strategy. Olugu and Wong (2012) designed an expert fuzzy rule-based system for closed loop supply chain performance measurement in automotive industry. El-Baz (2011) proposed performance measurement tool based on combining fuzzy set theory and Analytical Hierarchy Process (AHP). Tool that designed is aimed to ensure the consistency of the designer’s judgment when they are comparing importance of one factor over another to find the weight of each of supply chain activities.

At this point, s-SCM requires a practice tool to assess performance that able to measure, evaluate and improve the existing operations of supply chain. The research question is how to build decision support system (DSS) for performance assessment of s-SCM. This idea is in line with Ganapathy and Narayanan (2003) that decision making orientation in supply chain models can be classified into prescriptive and descriptive. Prescriptive models are focused on the system, and descriptive models evaluate the performance of a system. This paper presents a decision support model that can be applied to facilitate assessment process by decision maker.
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