Using the Supply Chain Operation Reference (SCOR) Model to Assess the Potential Impact on Business Management in Malaysia SME Industry: A Conceptual Framework

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Abstract

The SCOR Model is one of the most applied reference models to support the description of supply chains and understanding the relationship between supply-chain management practices and supply chain performance becomes increasingly important. The Supply Chain Operations Reference (SCOR) model owes its wide dissemination particularly the activities of the Supply chain council provides a framework for characterizing supply chain management practices and processes that result in best in class performance. This paper investigates potentials for future extensions of the model. An explorative survey of 15 companies in SMESs for extension potentials population. By an exhaustive analysis of 80 samples to be evaluate for this study. This exploratory study investigates the relationship between supply chain business management planning and supply chain performance based on the four decision areas provided in SCOR Model Version 4.0 (PLAN, SOURCE, MAKE, DELIVER) and nine key supply chain management planning practices derived from supply chain business management experts. The questionnaire tool by Supply chain council is used to analyze requirements on modeling tools to support the application of a respective extended SCOR Model. A concept of a tool support which accomplishes most of the requirements is described and realized as a prototype which is introduced in this paper. The results show that planning processes are important in all SCOR supply chain planning decision areas. Collaboration was found to be most important in the Plan, Source and Make planning decision areas, while teaming was most important in supporting the Plan and Source planning decision areas. Process measures, process credibility and process integration were found to be most critical in supporting the Deliver planning decision area. Using these results, the study discusses the implications of the findings and suggests several a venues for future research.

Keywords: Supply Chain Operation Reference (SCOR) Model, Supply Chain Business Management, Performance Measurement

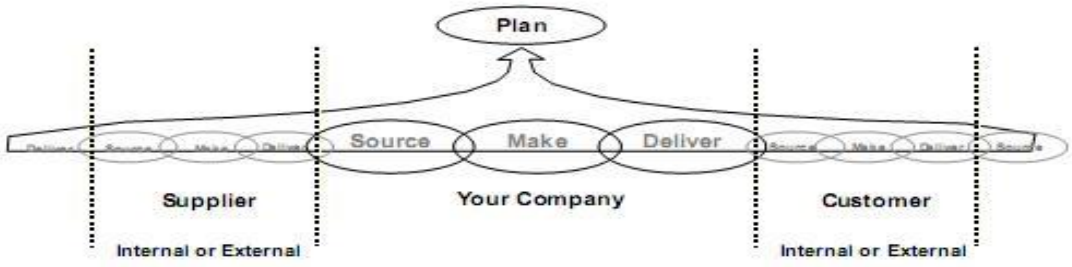
Introduction

Today business entities competes base on plat form of customized products, services and cost efficient productions. In addition, globalization and intensive world-wide Competition along with the technological advancements create an entirely new business environment for competition as well as providing the opportunities to succeed. As a result, many companies becoming more customers oriented in terms of reducing response time to customer requests and improving quality. Companies focused on core competencies and attempted to achieve competitive advantage by more effectively managing purchasing activities and relationships with suppliers. This has shifted many companies focus on supply chain processes to an ability to add customer value.

SCM and related strategies are crucially important to the success of a company. This is because the cost and quality of goods and services old are directly related to the cost and quality of goods and services purchased. Therefore, supply chain policies such as procurement and supplier selection have an important role in the SCM. With the wide spread use of internet, web-based systems enable organizations to form strong customer and supplier integration for inventory management, demand forecasting, customer and supplier relationship management.

Supply chain processes and activities must be linked with business management impact of achieving performance and order to develop such links, correlations between Supply Chain Operational Reference (SCOR) Model measures and business measures must be identified. The identification of these correlations would allow the senior decision makers to translate business management targets into Supply Chain Operational Reference (SCOR) Model measures and middle management to tie these measures to operational processes to be implemented at lower levels of the organization. On the other hand, the knowledge of the impact of processes on Supply Chain Operational Reference (SCOR) Model and business management measures can help supply chain executives assess the viability and the business management impact of proposed changes.

Figure 1.1 – Single Supply Chain Path or "Thread" in SCOR



Sources: Model Terminology (SCC 2000)

The Business Process Reference Model in the SCOR model describes high-level business processes associated with all phases of satisfying customer demand (SCC 2000). At the highest level the SCOR Model is organized around four business process types: Plan, Source, Make, and Deliver. One additional process, Return, is scheduled to be added in the soon to be released version 5.0. These processes represent the vertical-neutral abstractions from all demand/supply planning, purchasing/procurement, manufacturing, order entry and outbound logistics, and returns processing activities. The SCOR Model, therefore, provides a business process framework with standard descriptions and interdependencies among processes.

The Aim is to meaningfully map supply chains and supply chain activities with varying complexities across multiple industry especially in SMEs. As indicated by the survey results, reducing cost of operations, improving inventory turnover, reducing lead times, fulfilling customer satisfaction, increasing flexibility and cross-functional communication appear to be the most important objectives to implement SCM strategies.

Literature review

Supply Chain (SC)

Supply chain includes all the processes that put the product in the hand of end-user. This includes numerous transactions involving physical movement, exchange of information, and the flow of money. Supply chain normally designed for strategic advantage. Continuous improvement for both product and supply chain deter competitors (Vorst, 2017).Responding proactively to the market and business environment changes can be facilitated by simultaneous development of supply chain and the output/product of the chain (Ismail et al., 2016).

Supply Chain Performance

Supply chain is consisted of flow of materials and products to customers and also in the supply side of spare parts and return of defective products. In other words supply chain consisted of upstream or supply side; downstream or customer side while the company is in the middle (Jonsson, 2016). The aim of logistics is to give competitive advantage to company and increase the performance and this performance has different attributes of (Jonsson, 2016), thus are towards customer assistance, time, expenses, adaptability, capitals and circumstances.

Supply Chain Management (SCM)

Supply chain management (SCM) includes a set of approaches and practices to effectively integrate suppliers, manufacturers, distributors and customers for improving the long-term performance of the individual firms and the supply chain as a whole in a cohesive and high-performing business model (Chopra and Meindl,2016). Integration of internal processes of the organization with the suppliers and customers forms the essence of the whole idea behind SCM. With the wide spread use of internet, web-based systems enable organizations to form strong customer and supplier integration for inventory management, demand forecasting, customer and supplier relationship management (Frohlich and Westbrook, 2008).

McCormack (2008) studies maintenance and change control of this documentation is also a critical component. For collaboration and teaming to occur, individuals from the various functions involved in effective SCM must work as a tightly integrated group with shared authority to make decisions and take actions. A collaborative, team based SCM structure presents the span of involvement, influence and authority in an SCM organization, and enables multi-dimensional, cross-functional authority. Early research suggests that there are different types of collaboration based upon the intensity of the information exchanges, and the nature of the relationship. These types are transactional, cooperative (coordinative) and collaborative.

Background of Supply Chain Operation Reference (SCOR) Model

The researcher Thomas Lambert D.M. and Cooper M.C said (2017), the global competitive business environment, complex and rapidly changing by customer demands, and advances in information technology forced enterprises to look for efficiencies in their internal operations as well as in coordinated operations with their suppliers, partners and customers. The article introduces the Supply Chain Operations Reference (SCOR) Model as the vertical and technology-neutral enabler for process management. In order to achieve the full benefits from SCOR as a catalyst for Supply Chain Management (SCM) initiatives, effective business process management and enterprise software applications must be implemented to generate real-time supply chain intelligence. SCOR model includes five key supply chain operations Plan, Source, Make, Deliver and Return and is organized into four levels of observation. It is not only appropriate to look at complex supply chains, but it also offers the opportunity to improve basic requirements, which contributes significantly to the acceptance of the model. There are five processes are considered:

Process	**Content**
Planning (Plan)	The interplay of supply and demand
Sourcing (Source)	Procurement of products, components and services for service provision
Manufacturing (Make)	The manufacture of products, intermediate products and services to different manufacturing
Delivery (Deliver)	The supply of products and services to the customer with the appropriate accompanying
Return (Return)	To receive a faulty product or return of primary products or raw materials to the supplier

Table 1: Processes and their content of the SCOR model

The model's business process framework provides a common language to facilitate horizontal process integration across different business units and players in the value chain. This framework is a strategic tool for describing, communicating, measuring, implementing and controlling, and fine-tuning complex SCM processes. Given that the Council membership has increased to 700 companies across five continents, the model offers the benefits of standardization if all value chain participants implementing the SCOR model adhere to the framework (Van der Aalst,W. Desel, J. and Oberweis, 2009).

Sources: Adapted from *Supply Chain Operation Reference Model* (SCC, 2009).

The next authors J.Emblemsvag (2005) are examined using BPO for the process orientation. The topic is important since enhancing the effectiveness and efficiency of SC analytics is a critical component of a chain's ability to achieve its competitive advantage. Business analysis have been identify as important "tool" for SCM and optimization techniques have become an integral part of organizational business processes .A correct relevant business decision based on bundles of very large volumes of both internal and external data is only possible with business analysis .It is therefore not surprising that research interesting business analysis use has been increasing . However, despite certain anecdotic evidence (see for instance the examples given in) or optimistic reports of return-on-investment exceeding 100 % a systematic and structured analysis of the impact of business analysis use on Supply Chain performance has not yet been conducted. Accordingly, the main contribution of our paper is its analysis of the impact of the use of business analysis in different area soothes Supply Chain based on the Supply Chain Operations Reference (SCOR) Model on the performance of the chain. Further, the mediating effects of two important constructs, namely information systems support and business processes orientation (BPO).

Business Process Orientation means having a new view to the organization business processes. It is a powerful tool helps companies to compete. BPO helps companies that act better in their network of activities and improve their business performance (Lockamy III and McCormack, 2008). It has a root in the organizational models and the works did by theoreticians (Deming, Porter, Davenport, Short,Hammer, Byrne, Imai, Drucker, Rummler-Brache, and Melan, cited by McCormack et al., 2008). BPO concept describes a goal oriented organization which effectively work on processes instead of bureaucracies and hierarchies meanwhile they pay attention to customer satisfaction (McCormack et al., 2008.)

SCOR Model and performance

SCOR model and its process performance measurement has found implication for many areas of interest in firms like sales and advertisement, marketing and customer relationship management; new product and service development (Van et al., 2012). They said this performance is the one which holds efficiency and effectiveness; short term and strategic programs; operative and vital decisions and other important managerial issues of the company. Their representative (organized top-down structure) performance measurement model has five stages. Beginning with business level for considering overall after sales financial performance; followed with process level in which roles and responsibilities regarding to supply chain activities for after sales services are discussing; carry forward with activity level where front office and back office after sales performance is being considered in terms of reliability, responsiveness to customers, lead time,waste and cost management and utilization of total assets; finally the fifth level that respective researchers came to innovativeness and development in terms of Research and development, Human resources utilization and Information technology by introduced change management as one of other usage of SCOR model in supply chain performance (Vam et al., 2012).

Linking SCOR Model on business management

This area of research corresponds to P1 in Level2 of the Supply Chain Operations Reference (SCOR) Model. Another SCM research area revealed in the literature review is then necessity for supply chain information technology (IT) to foster information sharing (Humphreys and Rutner, 2006). Supply chain competitiveness (M. Jegers 2013). It support advanced planning systems and internet technologies (Cross, 2006; Brewton and Kingseed, 2006; and Deeter-Schmelz , 2006). Miller (2018) from her article suggest using of ERP systems for the effective use of supply chain IT can have a dramatic impact on each of the four decision areas provided in SCOR Model Version4.0 (Plan, Source, Make, Deliver). A direct correspondence to P1 in Level2 of the Supply Chain Operations Reference (SCOR) Model is observed in this area of the literature. There have been only a small number of studies attempting to empirically link specific SCM practices to supply chain performance. One significant study utilized the twenty-first century logistics framework, a list of six critical areas of competence in achieving supply chain logistics integration, to investigate the relationship between logistics integration competence and performance (Cox.Cooper et al., 2015).

The six integration competencies in the framework are customer integration, internal integration, supplier integration, technology and planning integration, measurement integration and relationship integration. Their results showed that customer integration, internal integration and technology and planning performance are the dominant competencies related to performance. In this research, specific planning practices related to performance were difficult to identify, although some were implied within the measurement system used.

SMEs

The importance and emergence of small and medium enterprises (SMEs) as one of the small vibrant sectors of the economy in widely accepted. It has created tremendous employment opportunities and is the engine of economic growth locally and globally. Leveraging on the usage of information technology and communication has revolutionized operations and across businesses. SMEs need to strategies to differentiate and compete in the global market place, the integration of new horizons in sustaining and growing businesses to remain competitive. In the recent global financial crisis, SMEs remain the most resilient among all sectors. Many SMEs in fact, have not only maintained their momentum, but have in fact increased their capacity and capability. By creating the new SCOR Model in SMEs in a stronger presence, reaching out directly to business owners, and providing innovative solutions that suit the current economic climate for lifelong business relationship that will pay it over (Emerson A., 2011). SMEs as:

i. Small scale firm with sales turnover between RM250,000 to less that RM 10 million and the number of full time employees between 5 to 50
ii. Medium scale firm with sales turnover between RM 10 million to RM 25 million and the number of full time employees between 51 to 150 (SMIDEC, 2017)

Conceptual Framework

To accomplish the objectives of this project, the right approach must be applied in order to arrive to precise, accurate, reliable and factual conclusions. Without the application of such approach the result gained from the research might not be the right conclusion and the research can be deemed useless. Different approaches have been used to collect data and information. Each of the approaches has its own strengths and weaknesses depending on what type information that is to be collected. In this project, three approaches have been used in order to collect required data.

To develop the SCM system, a few methodologies were considered to be used. Comparisons were made where the pros and cons of each methodology were taken into careful consideration. The comparisons were made in order to identify the best methodology that needed to be employed during the course of this project. By employing right methodology it is hope that the system can be developed within the time frame set and ultimately fulfils the objectives of this project.

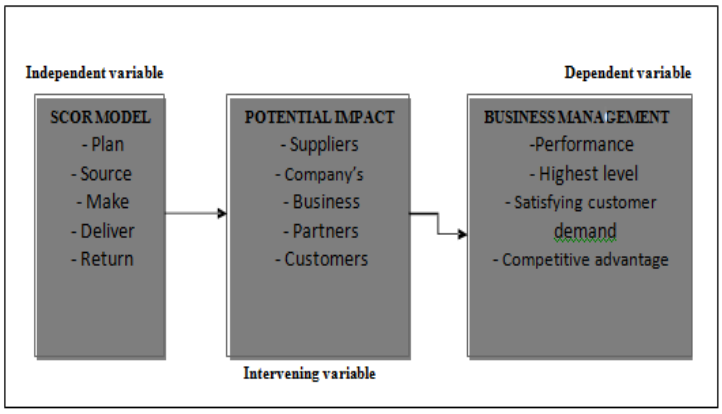


Figure 1 Proposed model of SCOR towards potential impact in business management performance

Based on the propose framework, we hypothesize that:

H_0: There is no relationship between SCOR Model with potential impact on business management.

H_1: If using SCOR Model is improved, then potential impact on business management will be also improved.

Data Collecting

In order to collect relevant information regarding this project, the data collection method is used. This method was chosen as one of the methodologies because of the large volume of information that can be gathered and reviewed. By using this methodology, secondary data can be gathered and analyzed. These data can then be used to provide more information and result in a better understanding of the subject matter. Data collected from quantitative data in 15 SMEs in Kuala Lumpur, Malaysia. Research in which he tried to assign the level of supply chain maturity and their relations with SCOR Model performance in theses above mentioned factories by doing several case studies, questionnaires and interviews with mainly the SMEs managers or CEOs.

All supply chain management performance and SCM maturity criteria were already calculated and applied in this thesis as required data. All of SMEs factories analyzed in this thesis were selected from the same cluster, steel industry, while they have different business specification as well. Then all relations between supply chain management performance and SCOR Model were evaluated by questionnaire. After finding the rating of SCOR Model, extracting data for the cluster of metal industry was done from database. Criterions like name, place, and number of employees gave confirmation to find the right companies from list of companies. Then 15 companies distinguished from the cluster of steel industry in Kuala Lumpur. For checking the effect of supply chain performance on SCOR Model of the company, researchers tried to find the respective value of each indicator for every firm during time to check the gradual effect of the maturity of supply chain over SCOR Model performance during years of establishment of that company.

Result and finding

The purpose of this chapter is to analyze the proposition made in the literature review about the effect of SCOR Model and supply chain performance in management of prior years in the questionnaire by result in performance area in SCOR Model of current year. Initially the constructs of analytics capabilities in the Plan, Source, Make and Delivery areas of SCOR were considered as latent variables of the formative construct related with performance.

Reliability Analysis

Reliability analysis is established by testing whether the items grouped under a factor are internally consistent and stable. Cronbach's alpha (α) was used to analyse the reliability of the instruments. Reliability over 0.80 is good reliability in the range of 0.70 is acceptable; and reliability less than 0.60 is considered poor (Sekaran, 2003). Results of this analysis are shown in Table 1. Usage of SCOR Model questionnaire, commitment to the potential impact on business management performance and relation supply chain performance are accepted based on Cronbach α above 0.70. Results of the descriptive analysis for all variables are presented in Table 7.

Case Processing Summary

	N	%
Cases Valid	78	97.5
Excluded*	2	2.5
Total	80	100

Table 2: Listwise deletion based on all variables in the procedure.

Reliability Statistic

Cronbach's Alpha	N of Items
0.92	43

The results are shown reliability over 0.80 is good that is 0.92 in this research with the 43 items are evaluated. As can be seen, all factors are not perfectly correlated, where their correlation coefficients range between 0 and 1. Hence, we can conclude that discriminates validity has been established. A value higher than the cutting point of 0.5 shows that the set of structural question is well offer good representation of the data and is prove valid with moderateness reliability. This show that SCOR Model has excellent scores of adjustment revealing strong evidence that companies in SMEs support the good potential impact on business management in analytical capabilities end to achieve a better supply chain performance. Here the parallel reliability is established well.

Hypothesis Analysis

H0. There is no relationship between SCOR Model with potential impact on business management.
H1. If using SCOR Model is improved, then potential impact on business management will be also improved.

This research hypothesis will be observed into frequencies by the number of actual observations noted for each category of a frequency distribution with chi-squared analysis. The expected frequencies are the number of observations that would be expected for each category of a frequency distribution assuming the null hypothesis is true with chi-squared analysis." Calculating the Chi-Square Statistic using this formula of frequency:

$$\chi^2 = \sum_{i=1}^{k} \frac{(O-E)^2}{E}$$

Chi-Square Test Analysis by SCOR Model and impact on business management result recognize that chi-square values are positive that is because the squared value in the numerator with x2= 0.087 overall. The greater the deviation between observed frequencies and expected frequencies, the greater the calculated chi-square value and it starting with 0.348, 0.006, 0.072, 0.004, 0.001, 0.013 and 0.433. The greater the calculated chi-square value, the more likely the sample does not to the expected frequencies, and therefore this research would be reject the null hypothesis. So here the alternative hypothesis would be accepted with value $p<0.10$.

The results in this research clearly show that process measures and process oriented values and beliefs are critical ingredients in supply chain management performance by using the potential impact SCOR Model is measures used to link people's actions to supply chain performance goals is definitely related to performance in SMEs. A great number of the participants in this research indicated a well progress in this area. As supply chain management crosses company boundaries, this becomes even easier by using the SCOR Model process for potentially greater return of SMEs. Process oriented values and beliefs are also easy to implement. Trust and credibility are built over time and should will be treated as a "project". Trust is also between individuals with the SMES using SCOR Model process and is established as a result of hundreds of successful interactions between individuals. Creating an environment that enables this to occur is the task of the leaders of SMES companies in the SCOR Model as a critical success factor in implementing successful business management.

Overall, this research has shown that SCOR Model can be assessing for the critical factor in impact on business management of SMEs. When an organization's supply chain management becomes more business process oriented, the better it will perform. A significant number of SMEs companies from many different industries have participated in this research and benchmarking.

Discussion

The SCOR Model process can go into many levels of process detail to help a company analyze its supply chain. It gives SMEs companies an idea of how advanced its supply chain is by using SCOR Model in the process of planning to achieve goal. The process helps companies understand how the 5 steps repeat over and over again between suppliers, the company, and customers. Each step is a link in the supply chain that is critical in getting a product successfully along each level. The SCOR model has proven to benefit companies that use it to identify supply chain problems and giving a positive impact to improve the business management. The SCOR Model enables full leverage of capital investment, creation of a supply chain road map, alignment of business functions, and an average of two to six times return on investment. The use of SCOR Model at the corporation level for SMEs process alignment across sites with both unique and shared processes has proven to be exceptionally valuable as discussed in the result.

The SCOR model has also proven valuable at the implementation level. In an SCOR Model implementation for a manufacturing company, key functional Subject Matter Experts (SME) was asked to map their processes using their traditional vision approach. Each SME had described what they did with varying degrees of granularity, gaps, and overlaps. Roles, resources, and handoffs were obscured in ambiguities and assumptions. Process-to-process connections were simply not possible. SCOR was used as the model to rationalize the collection of processes. The theory was that SCOR, down to Level III, was a proven supply chain model that described a universal model. A functioning supply chain must fit the SCOR model at this level. Once this principle was accepted, the task was then assigning all the activities in the map‟ to an appropriate "home process" in SCOR Model. Duplicate activities were identified and removed, processes were connected, and gaps identified. The end result was a continuous end-to-end flow that was validated by the consensus in SMEs.

Conclusion

Regarding relationships between SCOR Model performance in business management and key of supply chain practices based on a review of the literature and discussions with supply chain experts and practitioners, and the SCOR Model areas included in the study (PLAN, SOURCE,MAKE, DELIVER).A review of The table reveals that the planning process variables in all four SCOR Model areas have The strongest relationship to supply chain performance. Collaboration variables were found to have a direct impact on Supply Chain performance in the PLAN, SOURCE, and MAKE areas of the SCOR Model.

Additionally, collaboration was found to have an indirect impact on supply chain performance in the DELIVER decision area. The collaboration results of the study are consistent with the finding of a study which found that collaboration improves supply chain service performance. It also reveals that teaming variables were found to have a direct impact on Supply chain performance in the PLAN and SOURCE areas. In addition, a process metrics variable was found to have a direct impact on supply chain performance in the DELIVER area of the SCOR Model. However, process metrics was found to only have an indirect impact on supply chain performance in the PLAN, SOURCE, and MAKE areas.

A process credibility, process integration, and information technology support variable was found to have a direct impact on supply chain performance in the DELIVER area. The process integration results of the study are consistent that reveals a relationship between supply chain integration and performance. Process documentation was found to have only an indirect impact on supply chain performance in the four SCOR Model areas included in the study. Finally, process ownership was found to have an indirect impact on supply chain performance in all four SCOR Model areas. SCOR Model plan processes, as well as other kinds of processes, demand assessment and management models geared towards actions resulting in improvement.

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