

*Full Length Research Paper*

# Development of a soft network model to improve supply chain management performance of SMEs

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Nowadays, supply chain management (SCM) plays a crucial role in gaining competitive advantage in business for all productions and service industries. The recognition of the parties into SCM and their positions are considered highly strategic from management viewpoint. The present paper introduces a soft network model for SCM of small and medium sized enterprises (SMEs) to enhance the performance of the whole chain. The comparison of the conceptual model shows that it will cover all elements of the supply chain by employing procurement, production and marketing centers. Collaboration of all parties based on the unison commission into the SCM model will enhance the performance of the supply chain and continually improve it according to 'plan, do, check and act' (PDCA) philosophy through integration of the whole chain parties. The implementation of the proposed model leads to the improvement key performance indicators of the supply process by reducing the finished product price, delivery time and shortage, thereby making a green competitive environment for business to business purposes by employing knowledge base orientation and maintaining the collaborated union of SMEs as technology-driven firm.

**Key words:** SCM, SMEs, inter-firm collaboration, soft network, SMEs union.

## INTRODUCTION

In fast-changing and increasingly competitive global market, small and medium-sized enterprises (SMEs), which exert a strong influence on the economy of many countries through their ability to innovate new products and processes, have been the engine of economic growth and technological progress (Bruque and Moyano, 2007). In the past, large firms were regarded as the main driving forces for innovation, but more recently, the interest has shifted to SMEs as well as networks of firms (Todtling and Kaufmann, 2004). Desirably or undesirably, any business organization is a piece of at least one supply chain. This number is variable on the size and nature of that business and SMEs are not an exemption. The importance of effective SCM can also be seen in an organization's ability to gain a competition advantage (Meehan and Muir, 2008).

In this context, regarding the size, function and

relationship of SMEs, the nature of SCM implementation is very different when compared to large firms. In other words, small firms do not implement SCM in the correct way that large firms do (Arend and Winser, 2005). This inadequacy could be due to the way small firms find their position in the supply chain and the way they cooperate with the parties within the chain. Accordingly, in many cases, theoretical models are effective tools to illustrate the real trends in a virtual environment.

## REVIEW

In 1980s, the term supply chain management (SCM) was developed to express an integrated key business approach from the original suppliers to the end users. Supply chain management is a monolithic collaboration of design, maintenance and operation of supply chain processes to target the satisfaction of end users. From operational management point of view, supply chain management is the strategic coordination of the supply

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chain for the purpose of integrating supply and demand management (Stevenson, 2007). There is no doubt that SCM applications are more suitable to large firms. Fair enough, these groups were the inventors of SCM elements which are known as functions of SCM these days. In this part, the paper focuses on investigation of previous efforts on developing models to deploy SCM in SMEs. Basically, lack of any solid effort on the context of integration of both internal and external parts of supply chain for SMEs is highly tangible. The arguments and discussion are mostly focused on both supply and demand sides of chains.

One of the most rapidly emerging theories about the competitiveness of SMEs is that both can be accelerated through inter-firm collaborations (Rosenfeld, 1996). In Denmark, the term “network” was formally introduced for the first time. A network is loosely defined as three or more firms that cooperate in order to gain strength of numbers, solve common problems, enter new markets, or develop and produce goods (Gelsing, 1992).

However, there are many classifications of network, but most of them obey two main fashions in the nature of operation. The first group is hard network defined as three or more firms joining as an allied consortium to co-produce, co-market, co-operate or co-purchase in a product or market which needs an integrated and intensive management to be coordinated. On the other hand, soft network which is the combination of three or more firms joined together with less shared resources and intensive alliance with a contrast focus on solving mutual and common problems, share information or acquire new skills (Gelsing, 1992).

The profitability of the SMEs may have been critically determined by an ability to obtain supplies of the right quality on time and at the most favored price (Thakkar et al., 2005). Vertical chain management (VCM) is a proposed model for SMEs to increase mutual benefit in dealing with business activities under supply chain management. The VCM is the coordination of SMEs in the same business (Figure 1). The objective is to have the bargaining power over the supplier and to be the world-class supply chain supplier under the limited cost (Udomleartprasert et al., 2003).

This strategic model has a four-stage process for combination, which follows a continuous cycle. The first stage of implementation is the establishment of SME community which follows a network structure. In the next level, the focus is on specifying strategic suppliers and materials. The third stage is responsible for monitoring the supplier performance, and finally, a continuous improvement in supplier performance stands in the last stage. VCM has a centralized point of view on the demand side of SMEs.

A theoretical model in SCM for Turkish SMEs is another approach in the implementation of SCM in SMEs (Calinipar, 2007) (Figure 2). The cooperation in this model is getting command from the SME union which is

similar to a network structure. Based on this approach, a two-stage model is available. The first stage model occurs in the supply and production centers of model and on the other side, the second stage takes place in the product and customer center. Each side has correspondent centers to control and manage activities. The supply and production side of the model is considered for the whole of the SME union which is responsible to coordinate the members of the union. In the right side, the focus is on the customer center, which consists of three different customer centers.

## **METHODOLOGY**

The dominant efforts of this paper appear in the following section. The study is concentrating on describing how the methodology used in the research meets the paper objective, which is the development of the final model. This methodology consists of two parts. The first part describes the design and development of the SCM model for SMEs using soft network, and the second part states the three-stage implementation process of the proposed model within the members of collaborated firms.

## **MODEL DEVELOPMENT**

### **Architecture of the model**

This section stamps the main scheme of the model and the inter relationships within the components of the firm. The most significant aspect of collaborative chain management (CCM) model is the style in which SMEs join the group and shape a unique scheme. In fact, SME unions will be coordinated by a superintendent. SME union frame in the model stands for the community of SMEs which joined the unions and are receptive for a collaborated partnership as a consortium (Figure 3).

### ***SME union***

The SME union is directly established under the supervision of SME union commission. All the joined members must follow the rules and procedures defined by the management of the consortium. In addition, the management commission must be selected by a neutral approach. This commission consists of three subdivisions which are production center, procurement center and marketing center. Although, each center has different functions, they receive the orders from the main management of the union.

### ***Procurement center***

Since supply capacities of SMEs are limited, they do not have a wide selection of advantages and environment (Calinipar, 2007). Moreover, they avoid making cooperation with suppliers who are larger and more capable (Donk and Vaart, 2005). This is a logic basis for SMEs to join a bigger community and enjoy the bargaining power of a bigger firm. Saving time, reducing costs, stable process and regular supply opportunities can only be achieved through such institutionalization (Vaar and Donk, 2006). The proposed center provides an adequate ambiance in high level of assurance, at a relatively low cost for joined members of SME union. This trend will be finalized to a sustainable and flexible supplier relation and will be able to overcome the fluctuations and shortages of the market. The

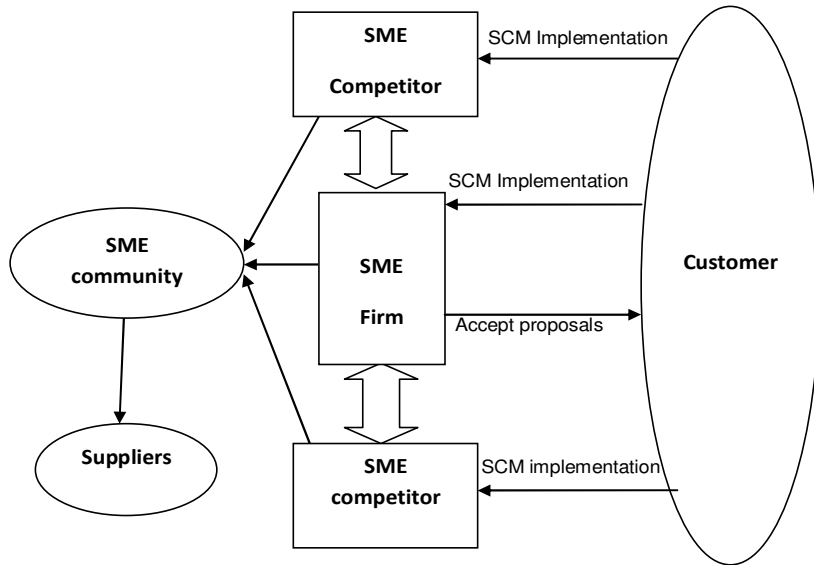


Figure 1. Vertical chain management model (Udomleartprasert et al., 2003).

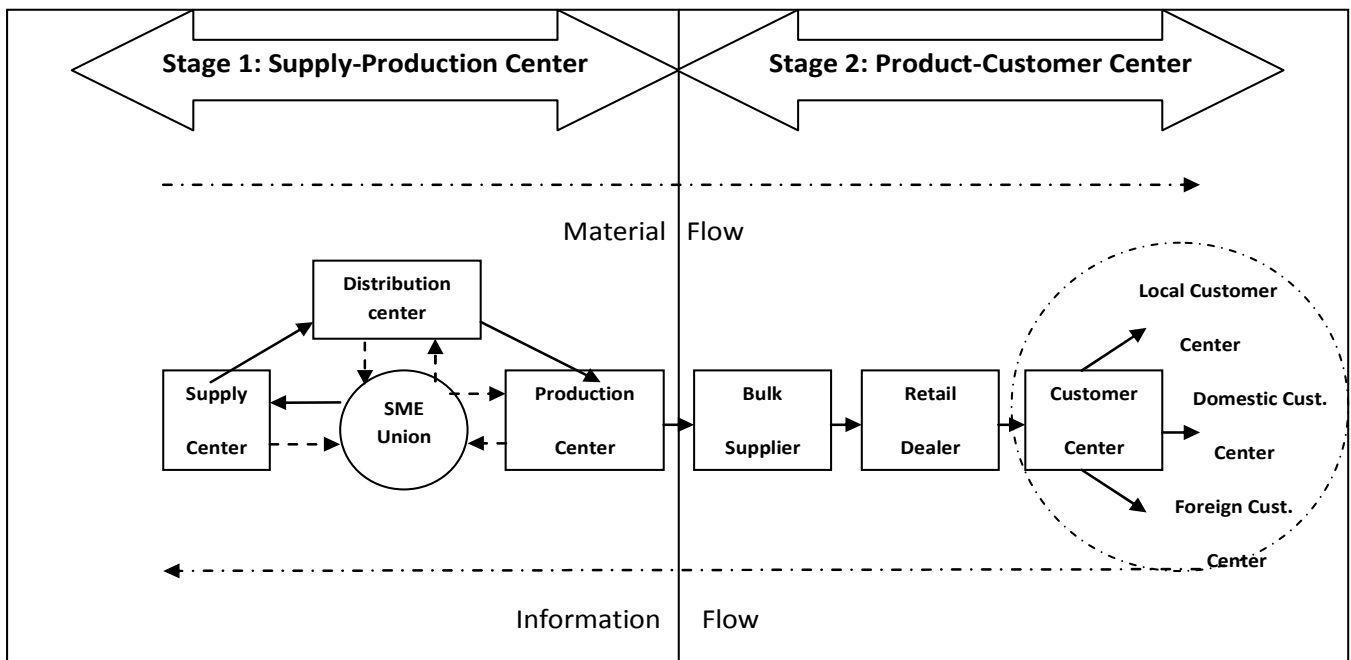


Figure 2. Turkish model of SCM in SMEs (Calinipar, 2007).

members of this center must have a comprehensive orientation on supplier relationship management (SRM), purchasing, logistics management and physical distribution planning activities.

**Production center**

SMEs are often struggling with routine involvements. Lack of access to qualified staff to assist SMEs with business planning and

appraisal and on the other hand, the weakness on accessing technology is distinct. Deployment of operation management as a comprehensive tool in achieving competitive advantage in the contemporary performance of quality, speed and price is the scope of this division. However, the other main goal of this center is to maintain the union as an up-to-date firm. Material requirement planning (MRP), inventory management, total quality management (TQM), capacity management and technical support are all responsibilities of the production center. It is essential for this center

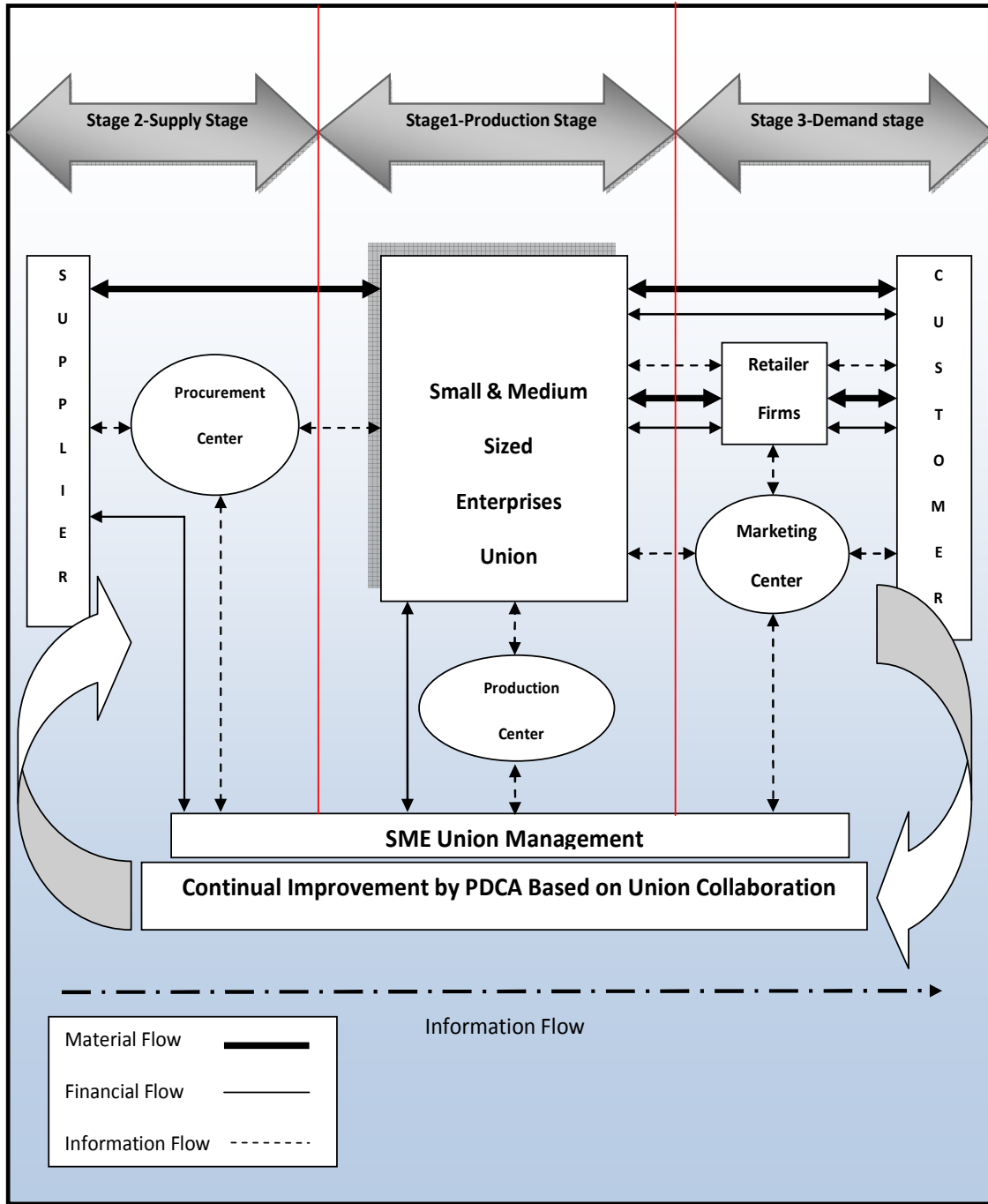


Figure 3. Collaborative chain management.

to recruit human resources with expertise in industrial engineering, manufacturing and information technology (IT in that specific field of operations and affairs). Production center has a direct and continuous connection with members of the union to establish a sustainable frame for a continuous improvement cycle in a functional approach. Plan, do, check and act (PDCA) program certainly will be helpful in this respect. It is also stated by ISO that organizations continually improve the effectiveness of quality management system through the use of data analysis and corrective and preventive action (ISO, 2002).

**Marketing center**

Marketing study within small and medium firms seems to be considerably limited and qualitative in nature. Marketing division is responsible for analyzing the current trend of market and corresponding demand. Marketing center can determine, forecast and announce shortage and surplus of demand to the members and establish an efficient customer relationship frame. Market research is another task of this center to identify an accurate mean of marketing mix to attract and satisfy the target market.

Considering the nature of established union, this division is accountable to construct a positive environment of competition between members by identifying the correspondent strengths and opportunities, and avoiding a fake competition in which the result are nothing except a decreased profit and complication of common difficulties. The selection of administrative staff must be done professionally with a focus on market experience, customer relationship management, sales techniques and E-marketing fields. These three subdivisions have different goals and strategies, but aligned with the main objectives of SME union commission which aims to build a suitable environment for SMEs to reach their desired goals. The relationships between collaborated firm and external portions are shown in the proposed model (Figure 3).

### Model interrelationships

In the CCM, the relationships and connections among different portions of the model play a very crucial role in the overall logic and success of the system. The thick line in the model stands for the flow of material, while the thin line stands for money and the discrete line is for the flow of information (Figure 3). As observed, the SME union members do not have any direct connection with the suppliers. However, the procurement center is responsible in managing the SRM affairs. Consequently, this will lead to less conflict between the firms and the supplier side and it will gain bargaining power over them. The larger amounts of orders issued by procurement center to the suppliers are considered as an initiative to get extra grants. Moreover, procurement center plays as an expert interface between supplier and SME firms to solve the inadequacies. In other words, SME firms delegate the financial issues to the procurement center and will focus more on the core activities.

On the other side, marketing center is responsible for customer's issues. Customers are defined as final consumers of the goods or the middle hand retailers. As a tradition, middle hand retailers have a comprehensive basket of products which can be considered as a competitive advantage in the physical distribution area. Moreover, this advantage leads to having a partial bargaining power over the SME firms in decreasing the selling price. In this context, marketing center is responsible to penetrate in the middle ground between SME firms and final consumers to extract information and transfer it to the SME firms and union management. Furthermore, it does not seem logical to omit the financial, informational and logistics flows between SME firms and retailers in the first stage of collaboration.

Production center consists of experts in the specific field of industry in which SMEs are operating within. This center does not have any financial relationship with the members of the union, and is only responsible for the technical issues as it has been shown by the discrete line of information flow.

Regarding the SCM cornerstones, each business organization is in coactions with external and internal parties. Accordingly, the CCM divided the operational space to two external portions of supplier and customer, while the collaborated firm of SMEs is considered as a large internal part. In this context, the CCM tries to manage the overall function of the system by implementing correspondent centers and connect them as a one collaborative chain.

### Implementation of CCM model

The CCM model provides a suitable foundation for the union to identify its position in the current supply chains. The firm is also large enough now to deploy SCM applications in a professional perception. The implementation process consists of three stages which must be initiated in an assortment (Figure 4).

#### Initiate production center

The reason for establishing the production center as the first division is because it has less effect on the supplier, customer sides and the whole chain, and prepares SMEs to confront with an integral approach of functional operation.

#### Initiate procurement center

In this stage, the procurement center is established to connect the SMEs union and the commission. Production center has less effect on the cycle in comparison with marketing center.

#### Initiate marketing center

By initiating marketing center as the last division, the process of implementation will be completed and the SME commission is now ready to operate the SME completely.

## RESULTS AND DISCUSSION

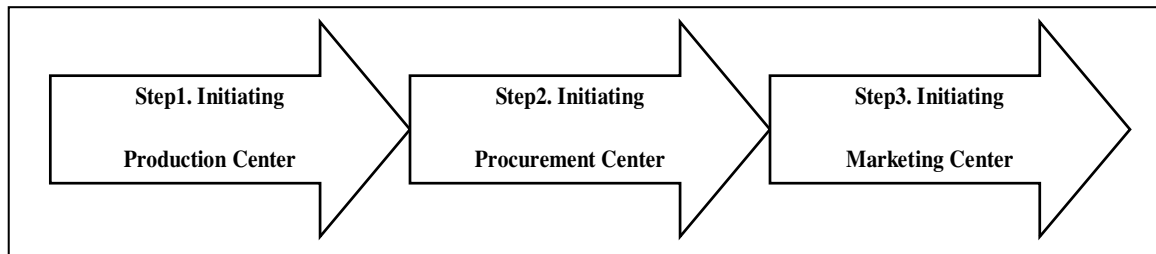
The development of CCM is inevitable and previous works are based on conceptual doctrines and the real result can be conducted in practice. However, in development of such theoretical models, the elements of SCM must be taken into account. Table 1 shows a holistic comparison among CCM, VCM and Turkish model in both internal and external portions (Table 1).

VCM with a focus on customer tries to implement SCM from the demand to the supply side of chain. A proper implementation of this method is required by a positive acceptance from customers and does not have any focus on internal supply chains of SMEs. The second model is similar to the proposed model in terms of implementation stages but with less effort on an integrated approach of production. However, CCM by collaborating with small firms provides a larger firm in practice in which the correct implementation of SCM is more feasible. In other words, members of SME union in CCM gain bargaining power over suppliers and customers in a large potential firm.

### Conclusion

To sum up, the collaborative chain management (CCM) seeks to locate both supplier and customer elements into a conceptual SCM model and integrate all the parties based on the material, cash and information flow to enhance the SCM performance of SMEs according to the continual improvement cycle. Implementation of soft network structure requires appropriate knowledge of industrial management and operation. Moreover, establishing procurement, production and marketing centers are part of the respected model which must be employed accordingly. The feedback from centers and union helps to a significant betterment of the whole chain.

The point is considerable, although such a holistic



**Figure 4.** Process of implementation.

**Table 1.** Comparison of models.

	<b>SME community</b>	<b>Union supervision</b>	<b>Supply focus</b>	<b>Production focus</b>	<b>Demand focus</b>	<b>Gradual implementation</b>	<b>Integral coordination</b>
VCM	✓	-	-	-	✓	-	-
Turkish model	✓	✓	✓	✓	✓	✓	-
CCM	✓	✓	✓	✓	✓	✓	✓

collaboration as CCM is scarce in practice, but in the latter supply chain management literature, there are plenty of successful cases in group purchasing, co-production and co-marketing. However, in further research, simulation of the proposed model could be discussed and developed.

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