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A Theoretical Model Proposal in Supply Chain Management for Turkish SMEs

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Abstract

Although number of Small and Medium Enterprises (SME) in Turkish economy is high, their share in national income is low due to low efficiency. Implementation of Supply Chain (SC) and Supply Chain Management (SCM), which largely take place in the literature recently, by SMEs will lower costs and increase efficiency and thus lead to significant gains for both SMEs and Turkey. SMEs' operation capacity is small and structural features are very sensitive. Therefore, a possible deviation or error in Supply Chains Management causes big losses. Thus, it is inevitable to discuss scientifically and implement SCM for SMEs in this respect.

In this research, the aim is to introduce a special Supply Chain Management theoretical model in general SCM models which is appropriate for SMEs' structure due to their operation capacity, numerical condition and other features. In accordance with this aim, taking the conditions of this sector into consideration, a two-stage model which is appropriate for structure of SMEs in Turkey is proposed. The first stage of the model consists of "supply and production centers" and second stage consists of "product and customer center".

Key words: Supply Chain, Supply Chains Management, SME.

JEL Classification: M1, M11.

1. Introduction

Today, Supply Chains Management (SCM) applications increase rapidly. Advantages in costs, flexibility, customer satisfaction, speed and economy of time which are provided by this system are among the reasons of why it becomes widespread (Hilmola et al., 2005). Besides, integration of more than one enterprise and flow of information, money and goods also make the system complicated.

In Turkey, which is in harmonization process with the European Union, spreading SCM in SMEs has an important place. Besides, Turkey does not have sufficient studies on this issue in literature and practice (Keskin et al., 2004). The bottlenecks that SMEs in Turkey experience should be eliminated in order to enable them to develop. Although there are many institutions such as KOSGEB, TOBB, Chambers of Industry and banks which support SMEs, their problems do not end. SMEs can become self-sufficient and get stronger if they implement SCM. Because, as a result of establishment of this system in accordance with the structure of SMEs and its implementation, it will lead to a synergy effect besides some benefits. Because of these reasons, implementation of SCM is very important for Turkey.

Supply Chain Management can be described as integration of all components of production and supply processes in the process from obtaining raw materials to delivery of the product to the end user. Another definition is: integration of flow of materials, information and money which enable delivery of the right product to the customer on right time, in right place, for the right price and with the lowest cost possible for the entire supply chain. The flow is completed by integrating all components of the process from obtaining raw materials to delivery of the product to the end user (Seuring, 2004; Krajewski ve Ritzman, 2005).

The aim in supply chain is formation of an enterprise series by SMEs coming together in order to minimize costs and thus reduce the competitive effect of the market. In this system, the enterprises

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which form each ring of the chain are customers of the next enterprise. Also, supply chain is a difficult logistics system because of conditions and features of SMEs. Thanks to SCM, integration of all components in the system is assured and thus synergy is created in the system integrity and effectiveness is provided.

Increasing importance of SCM is related not only with the requirements within the enterprise but also with increasing globalization movements, reduction of restrictions in international trade, environmental conditions, computer assisted production programs and government practices (Gunasekaran, 2004).

There are different classifications and criterions in supply chain applications. Seuring (2004) takes five criterions into consideration in evaluating SCM. These criterions and their places in supply chains can be summarized as follows:

- ◆ Physical resource: Material flow (flow regarding material and information);
- ◆ Content resources: Life cycle evaluation (logistics and network);
- ◆ Actors: Enterprises and shareholders ;
- ◆ Cooperation: Multiple (vertical chain); and
- ◆ Targets: Reducing environmental effects (recovering chain performance).

2. Relationship Between SMEs and Supply Chain Management

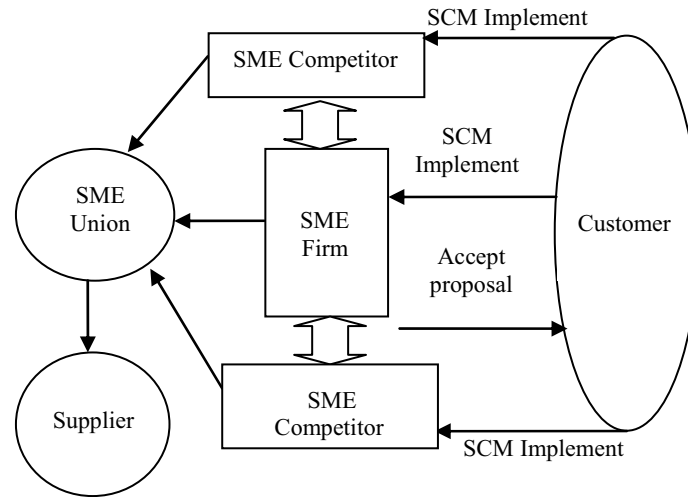
SCM requires a serious integration from planning process to order and sales. In order to be successful in supply chains management, enterprises should share their stock, production and promotion estimations and plans with customers and suppliers which form the other rings of the chain. However, most of the enterprises still avoid sharing since they fear that their rivals will obtain this information. Reservation of information and avoiding use of technology by some enterprises reduce pace and effectiveness of supply chains. Also, lack of technical knowledge in SMEs limits use of technology in supply chains. Besides, big enterprises which take place in the same chain with SMEs still experience some problems in supply chains applications although they support the system with technologies. The reasons of these problems are that SMEs in the chain have limited resources of, they want to protect themselves from the competitive advantages of big enterprises and they do not want their control over their assets to be restricted (Chen et al., 2004). Other problems experienced in implementation of SCM in SMEs are: lack of supplier management skills, high level of competition in supply chain, lack of cooperation in supply chain, lack of customer management knowledge, distance with the customers, distance with the suppliers, requirement of investments on information technologies by partners. On the other hand, while supply chains management reduces advantages SMEs which they gain due to their structural features, it gives them more opportunities for management and controlling risks (Arend vd., 2005; Essing vd., 2001; Lee vd., 2001; Udomleartpresert vd., 2003).

According to Chen and others (2003), SCM's benefits for suppliers include shorter transformation process, low stocking costs, less labor costs, increasing effectiveness and fast distribution. Besides the problems experienced due to structure of SMEs, their integration through Supply Chains lead to the following benefits (Chen et al., 2004):

- ◆ Standardization of production: Advanced quality control, shorter production period, increasing effectiveness.
- ◆ Simplification of supply chain process: Control over suppliers, recovery in process transformation stage, closer relationship with suppliers, increase in supply chain effectiveness, obtaining raw material from suppliers on time.
- ◆ Automation of processes: Reducing errors, obtaining information on time.
- ◆ Recovery in purchase process: Shorter loading-unloading period, faster ordering process, less labor costs.
- ◆ Reducing costs: Reduced risks, reduced stock capital costs, reduced unused far material stocks.

- ◆ Recovery in payment process: Faster payment transactions.
- ◆ Recovery in distribution process: Delivery by logistic service suppliers on time, shorter delivery period, recovery in distribution management.
- ◆ Development in global competition: Having the opportunity to give orders globally.

SCM is perceived by SMEs differently. In other words, in several researches, it was seen that SMEs do not perceive their suppliers to be their partners, as big firms do; rather, they perceive them to be a process which protects them against lack of production (Udomleartpresert et al., 2003). It is a known fact that SMEs do not have bargaining power against big enterprises. In order to increase SMEs' bargaining power and relationships with customers, vertical supply chain is proposed to SMEs by Udomleartpresert to be able to implement gain-gain strategy (Figure 1).



Source: Udomleartprasert, P., Jungthirapanich, C. ve Sommechai, C.; "Supply Chain Management–SMEs Approach", IEEE, 3, 2003.

Fig. 1. Vertical Chain Management Model

In vertical chain model, the aim is maximizing bilateral benefits with suppliers in the chain and gaining bargaining power over suppliers through establishment of a union by SMEs operating in the same sector (Udomleartpresert et al., 2003). SCM provides benefits of vertical integration without reflecting them to costs.

Since size of the enterprise is not taken into consideration in most of the studies on supply chain management, there is no sufficient research on to what extent SCM fits to SMEs and whether it is right to implement exactly the same SCM, which is implemented on big enterprises, on SMEs. In the study by Arend and Wisner (2005) on this issue, it was investigated to what extent small enterprises fit to supply chains application. As a result of the research, it was found out that SMEs do not implement SCM rightly, they do not use SCM strategies fully and they do not select SCM freely. In fact, there is a weak harmony between SMEs and SCM. In the study by Arend and others (2005), it was concluded that SMEs are more willing to use supply chains after they begin using their suppliers' electronic data interchange (EDI) system.

In the research conducted by Keskin and others (2004) on SMEs in order to determine the role of bearer enterprises in supply chain, it was concluded that SMEs do not include bearers in strategic planning, small enterprises do not make long-term contracts, medium enterprises rarely make contracts, they do not have computer link with bearers, bearer enterprises do not develop themselves and thus they are not willing to operate in the SCM in long term. This study indicates

that bearer enterprises which are the most important factors influencing costs and on time delivery are far from being a ring of the chain.

As a result of the study conducted by Ulusoy (2003) on four different sectors in order to evaluate innovation management and supply chains of enterprises operating in production sector in Turkey (while 70% of only automobile sector consists of big enterprises, 80% or more of other sectors consists of SMEs); it is indicated that there is a little information sharing between suppliers and producers in Turkey. In the study, producers' demand estimations, production planning and graphics, sales data, stock data of producer enterprises, suppliers' stock data, production planning and graphics and production cost structures are used as information types.

As a result of literature search, some of the studies on SMEs were examined. In this stage of the study, the theoretical model proposal which includes applicable practical techniques regarding supply chain management in Turkish SMEs takes place.

3. A Theoretical Model Approach in SCM Approach for Turkish SMEs

One of the biggest problems of SMEs in developing countries is the rational and economical use of logistics support services. Both high share of these services in total costs and their effect on efficiency cannot be underestimated. Turkish SMEs constantly stand in the forefront with their credit and financial problems. SMEs do not prioritize institutionalization and scientific models by focusing sufficiently on supply chains concept and content and this leads to losses of efficiency and time values. Discussing institutions and channels which take place in supply chains and thus displaying them conceptually and systematically will accelerate the sector's development.

As was mentioned in the first section of the study, studies regarding research on supply chains in SMEs have been and are being conducted in Turkey to a certain extent. Besides, bringing the applicable and practical aspects of the system in the sector is an important approach.

Supply chains generally have a broad field from supply resources to the customer. Therefore, supply chains' management and principles have different features in all functional stage or stages of enterprises. Based on this approach, a two-stage model is proposed in the research. The first stage of the model takes place in supply and production centers and the second stage takes place in product and customer center in consideration of their features and qualifications (Figure 2).

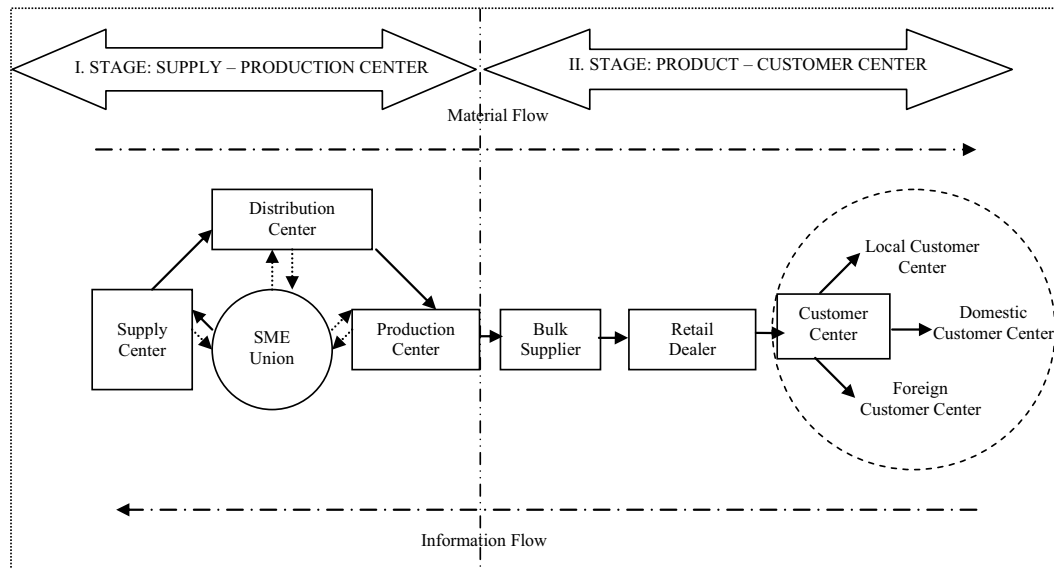


Fig. 2. SME Supply Chain Management Model

In supply-production stage of the model there are supply center, customer center and production center. SME union, which is among these institutions, provides integration among institutions at the first stage. The second stage, which is product-customer center, consists of bulk supplier, retail dealer and customer centers. In the model, while there is continuous material flow from supply center to customer center, there is information flow in the opposite direction.

3.1. Supply and production centers stage

Institutions which take place at the first stage of the model which is supply-production stage are examined in this section.

Supply Centers: Supply centers and supply policies, which constitute the first ring of SMEs' supply chains, include different practices. Since supply capacity of SMEs is small they do not have a wide selection advantage and environment. Moreover, they avoid making cooperation with suppliers who are bigger and more powerful than they are (Donk et al., 2005). Because of these reasons, there is need for a common supply center which will meet supply needs for different sectors. Saving time, reducing costs, stable prices and regular supply opportunities can only be achieved through such institutionalization (Vaart et al., 2006). Besides, selection of supply methods also becomes important. The classical method used in the system, in other words pulling method rather than pushing method (JIT – just-in-time production) contributes to providing continuity and integration (Bommer, 2001). Since SMEs will orient towards mutual solidarity and support policies through supply centers in SCM, supply risk also decreases to minimum. Thanks to this system, advantages such as continuous supply, stable price and acceptable quality are gained.

While decision is taken for selection of supply resources' places, it should be investigated in the framework of SCM system. Factors such as distance of supply resource to production centers, quality of the input and whether suppliers are in the country or abroad are influential in selection of place (Narasimhan vd., 2004).

Conducting necessary quality and quantity researches in selection of supply resources also becomes important. Numerical analysis of supply resources is one of the important issues in planning supply resources. Moreover, qualifications of supply resources should also be evaluated. These resources' compatibility with standards, product mix elasticity, supplier's reputation, delivery safety, capacity elasticity, delivery speed and competitive power it will provide have to be planned in the context of the issue (Olhager, 2004).

Access Systems to Supply Chains: One of the important channels which take place in supply chain system is access and transportation. Access system's structure, operating system, infrastructure and superstructure features become important in an economic and rational logistics programming. Besides, access reduces both waste of time and losses due to transportation costs in supply chains system (Ritchie et al., 2000; Keskin, 2004).

Turkish SMEs can achieve economical and rational results not by selection of transportation and access model by individual enterprises but by planning by common central units of enterprises operating in the same field (Udomleartpresert, 2003). In fact, mass transportation, selection of access system in accordance with the good's features, having it on the rightist time, advantages provided by mass transportation (Keskin, 2004) such as economic wages can be provided by expertise, knowledge and decision of this unit.

Development of bearer firms' infrastructure by these firms, meeting with the enterprise which is in the chain on a common point, giving necessary information rapidly and effectively using technological tools are also important issues.

Distribution Channels: Another institution which takes place at supply centers-production centers stage is distribution centers. Raw materials, semi-products and materials constitute distribution centers' operation fields and stages especially in accordance with their capacities. Besides single-stage distribution centers, multiple-stage distribution centers can also be preferred due to factors such as intensity, variety, distance to production and operation centers.

In order to achieve efficient and economic results from SMEs' logistics support programs, it is suggested that common distribution units of distribution centers should be established in Turkish SMEs, as that of supply resources and access channels, and goods should be sent to these units and related production centers from distribution centers.

Stocking and Production Stage: Last function of supply-production center stage is stocking and production activities. Stocking and stocking policies of supply chains at supply and production center stage are important in terms of both costs and capital need. In classical approach, stocking costs constitutes a high share of total costs in the system. Besides, continuous and stable transportation of raw materials, materials and semi-products from supply sources to distribution centers, from distribution centers to production centers and their production are not possible in terms of access, communication and supply capacity. Classical stocking systems are implemented under these circumstances. In classical stocking systems, significant costs such as storage, labor, stock losses and profit losses of capital in stock occur (Oktav, 1990).

There are significant bottlenecks for Turkish SMEs in terms of supply, production and marketing integration (Müftüoğlu, 1991). Therefore, effective stocking models are required in order to keep stocks, which constitute an important ring of supply chain in Turkish SMEs, at an economic level, minimize costs and reduce working capital need in connection with stocking. In conclusion, although implementation of this system is difficult for SMEs which do not take place in SCM system, SMEs can implement JIT thanks to SCM. Therefore, just-in-time (JIT) model is suggested to be implemented in SMEs. As a result of using JIT at production and distribution stage, benefits are shared between producers and suppliers, information sharing increases and mutual trust is constituted (Ulusoy, 2003).

Selection of goods in accordance with order of requirements, conformity with specifications, meeting needs on time, technical adequacy, which are general principles of keeping stocks at optimal level, take place among general principles in experiences on these issues. Besides, in case information is shared through cooperation with suppliers and customers via the internet, it becomes easier to control both production inputs stocks and final goods stocks and provide demand-supply equilibrium (Chen vd., 2004; Ayers, 2001).

Production: In order to provide fluidity targeted by the system in the production stage in supply chains, basic factors such as demandable production, technology, elasticity in production and innovation should be targeted (Narasimhan et al., 2004). Moreover, market demand of production and performance conditions of markets in which products will be distributed researched and determined.

In Turkish SMEs, it is seen that production processes, technology, domestic and foreign demandable product performance is not at the desired level and especially SME groups and groups established by SMEs operating in the same field are weak to a large extent in innovation performances, product elasticity and open competitions (Akgemci, 2001). In order to provide product fluidity in supply chains, enterprises should develop in terms of low costs, quality and modern technologies and common units should be established on these issues when necessary. Important problems which Turkish SMEs face in products emerge due to these said reasons.

3.2. Product and customer center

Product and customer centers take place at the second stage of the proposed model. Supply chain rings which take place at this stage are evaluated.

Product and Product Fluidity: Production capacity, product and product fluidity in supply chains form the enterprise's strategic policies for costs and capital need. Products which are elastic, demanded, innovative and aesthetic and cost less are very important in the system (Monkhouse, 1995). In Turkish SMEs, qualified product targets which include main elements such as costs, technological level and price should be selected. Implementation of this ring of supply chains in SMEs is considered to be a problem which is difficult to be realized in both observations and the

literature. One of the most important dilemmas of SMEs is about the implementation of supply chains. Because costs and inputs which are required in order to achieve these targets individually are very high in SMEs. However, they can be successful to a certain extent through establishment and operation of common units on these issues. SCM applications in SMEs can increase if financial enterprises and the government provide aid for establishment and operation of these units.

Demand management process tries to balance needs of customers and supply opportunities of firms. This process includes demand estimation and harmonizing this estimation with production, purchase and distribution. The process also includes developing alternative plans for unexpected cases when operations stop and managing these plans.

Retail Dealer-Bulk Supplier: Bulk supplier, semi-bulk supplier and retail dealer institutions also take place at product and customer stage which takes place in economical and rational fluidity of supply chains. As was mentioned in supply and production center stage, there should be certain solidarity and integrations also at this stage among SMEs and these institutions. Selection and evaluation should be made at this stage of the system taking main rules such as stock, security, time values and costs in terms of intermediary institutions' number, qualifications and distribution opportunities into consideration. At the stages when sales costs of Turkish SMEs are high, organizations and programs, such as having desired amount of goods with desired quality at the time and place where and when economy is desired to be set, are needed (Müftüoğlu, 1991). However, it is not possible for SMEs to provide these advantages individually. SMEs operating in the same field have to integrate on this issue and carry on these services with certain units. Otherwise, integration and fluidity order which is the main rule of supply chains faces bottlenecks.

Customer Centers: Orientation towards customer markets in SMEs' supply chains strategies can be discussed in three ways.

1) *Local Customer Center:* It is the process in which SMEs enter the market directly, in other words, face with the customer. In this process, the product is produced and then presented to the market and customer taking demand and order condition into consideration. Services such as introduction of the product to the customer and informing the customer are examined in this context. Certain service contracts and close dialogue between SMEs and the customers they face directly create a warm market environment. Presentation of products to customers is performed in this way in small enterprises which meet local demands. Face-to-face marketing provides advantages to the enterprise in terms of demands of customers, production and distribution planning. This system is being operative in undeveloped localities of Turkey. In local sales, SMEs can access customers not only directly but also via intermediary institutions.

2) *Domestic Customer Center:* Access of SME products to markets via intermediary institutions. Distribution can usually be made to the outside of the locality. SMEs in such markets should orient towards and adopt targets such as brand establishment and competitive product marketing strategies. Moreover, SMEs need to orient towards innovative products in these competitive markets to a certain extent. SMEs face the need to orient towards establishing certain organizations and assure power unity in order to survive in these competitive markets.

3) *Foreign Customer Center:* Another important function of supply chains is export-oriented marketing. Marketing goods to foreign markets should be examined in two aspects. First one is rational use of export channels and institutions. Second one is advertising in foreign markets and presenting necessary information to customers. While organizing all these operations, main elements such as demand frequency of the product by the customer, its compatibility with standards, acceptable quality and price should be taken into consideration (Akgemci, 2001). It is not possible for small and medium enterprises to overcome these multi-dimensional obstacles alone and be organized in Turkey. Another alternative for SMEs is to orient towards foreign markets. In order to achieve this, SMEs operating in the same field should establish their common export centers and their products' export and distribution can be performed by this organization.

Besides, since Turkish SMEs face several problems in competition strategy and superior product performance in terms of scientific models of supply chains strategies regarding exports, in time, they have to display a superior performance in costs and aesthetics which are conformable to customers in foreign markets in terms of quality.

Bullwhip Effect Risk of Supply Chain in SMEs: SCM application also leads to results which have negative effects on achieving the targets. At planning, estimation and production stages of the chain, an information erosion, which is called some sort of a bullwhip effect, occurs in planning sales estimation information in lower steps and reflecting them to higher steps (Lee et al., 1997). Especially in Turkish SMEs, since a complete integration cannot be achieved in all stages of supply chains, a high level of information erosion occurs.

When the data in the form of order amounts used by SMEs to estimate possible future demand amount deviate from the real, their estimations also deviate from the real (Hilmola et al., 2005). Such inaccurate estimations lead to very high costs for SMEs and other members of the chain. In order to prevent these costs, methods which reduce bullwhip effect such as reducing ambiguity, reducing variation, shortening supply period and establishing strategic partnerships should be used.

4. Conclusion

It is an indispensable obligation for Turkish SMEs to adopt and implement scientific and technical rules and principles of supply chains in order to maintain their operations economically, rationally and systematically. It is observed that some difficulties are experienced in implementation of supply chains even in developed countries.

Dispersed structure of SMEs and their inability to achieve a complete integration lead to problems and bottlenecks. In order to overcome these problems, it is required to reduce rules and principles of supply chains from theoretical dimensions to applicable and practical techniques concretely. It is also required to establish common planning and implementation centers at each stage of SMEs operating in the same field in the light of this system and the system should be supervised simultaneously.

In conclusion, Turkish SMEs should develop and implement supply chains system, which continuously integrates all institutions and channels from supply resources to customer centers, in accordance with their structural features in order to maintain their existence in regional, national and international competition markets.

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