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SUPPLIER SELECTION CRITERIA OF TURKISH AUTOMOTIVE INDUSTRY

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ABSTRACT

Supplier selection in supply chain management becomes more important due to the competition between supply chains rather than companies. Managing the supply chain is an important but complex issue for automotive manufacturers. This increases the importance of effective supplier selection in automotive industry. In this study, in order to investigate the supplier selection in supply chain management a questionnaire is applied to companies of Turkish Automotive Industry which is being affected from the increasing competition. A factor analysis is applied to the findings of questionnaire to explore the supplier selection criteria of Turkish Automotive Industry Companies.

Keywords: Supplier Selection, Supply Chain Management, Supplier Selection Criteria, Factor Analysis, Turkish Automotive Industry

INTRODUCTION

Across industries, firms increasingly assign greater responsibility to suppliers in order to produce innovative, high–quality products at a competitive cost. Increasingly demanding customers, globalization, accelerated competition, technological advances in the communication of information, decreased governmental regulation worldwide manufacturing firms toward adoption of the supply chain management (SCM) philosophy.

The supply chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage through to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain.

Supply chain management is the integration of these activities through improved

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supply chain relationships to achieve a sustainable competitive advantage (Robert and Ernest, 1999:2). The great benefit of supply chain management is that when all of the channel members – including suppliers, manufacturers, distributors, and customers – behave as if they are part of the same company, they can enhance performance significantly across the board (William, 1997:17)

Greater dependence on suppliers increases the need to effectively manage suppliers. Three dimensions underlie supplier management: (1) effective supplier selection; (2) innovative supplier development strategies; and (3) meaningful supplier performance assessment mechanisms (Vijay and Keah, 2002:11).

Supply chain management can be define as the task of integrating organizational units along a supply chain and coordinating materials, information and financial flows in order to fulfill (ultimate) customer demands with the aim of improving competitiveness of supply chain as a whole (Hartmut and Christoph, 2001:9).

This definition is described with the figure of "The House of Supply Chain Management". The House of Supply Chain Management (see figure 1) illustrates the many facets of SCM. Forming a supply chain requires the choice of suitable partners for a mid-term partnership; one of the pillars of the House of Supply Chain Management shows this choice.

The choice of partners starts with analyzing the activities associated with generating a product or service for a certain market segment. Successful supply chain approaches are built on strategic alliances with the best suppliers. Selection criteria should not be based solely on costs, but on the future potential of a partner to support the competitiveness of the supply chain. A suitable organizational culture and a commitment to contribute to the aims of the supply chain will be of great importance. A possible partner may bring in specialized know – how regarding a production process or know – how of products and its development (Hartmut, et al., 2001).

In adopting a supply chain management philosophy, firms must establish management practices that permit them to act or behave consistently with the philosophy. Previous research has suggested various activities necessary to implement an SCM philosophy successfully at table 1.1 (John, 2001:10).

Table 1.Supply Chain Management Activities

1. Integrated behavior
2. Mutually sharing information
3. Mutually sharing channel risks and rewards
4. Cooperation
5. The same goal and the same focus of serving customers
6. Integration of processes
7. Partners to build and maintain long – term relationships

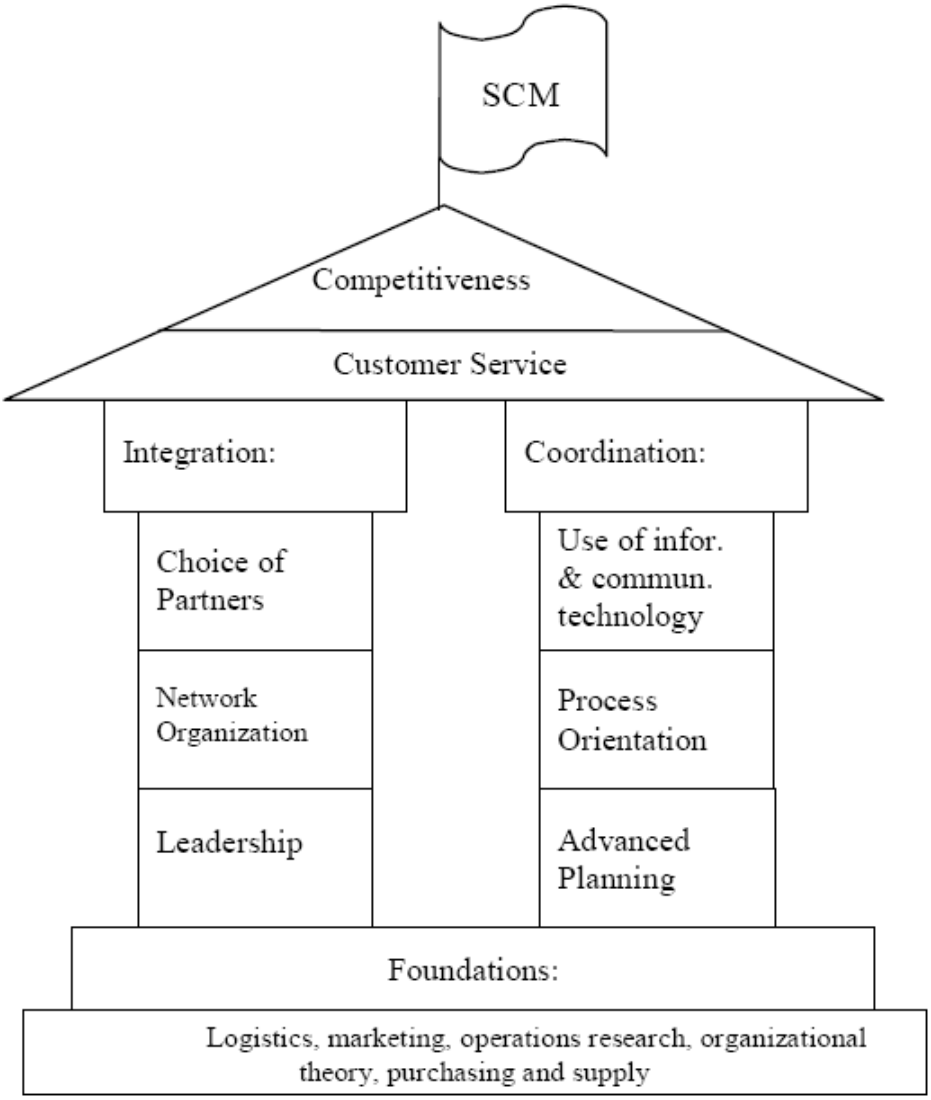

Figure 1.House of SCM (Hartmut and Christoph, 2000:10)

The concept of supplier management has grown to meet the changing needs of

today's marketplace. As is illustrated in Table 2, traditional approaches to supplier sourcing, the procurement management process, an buyer/seller relationship values have undergone significant modification and accented the need for close-working business alliances.

Table 2. Traditional Purchasing Versus Supplier Partnering (David, 2000:239)

Traditional Approach	Supplier Partnerships
Primary emphasis on price	Multiple selection criteria
Short – term contracts	Long – term contracts
Evaluation by bid	Evaluation by commitment to partnership
Many suppliers	Fewer selected suppliers
Improvement benefits shared based on relative power	Improvement benefits shared equally
Minimal involvement in design issues	Close involvement in design issues
Improvement at discrete time intervals	Continuous improvement
Problems are supplier's responsibility to correct	Problems jointly solved
Information proprietary	Information shared
Clear definition of business responsibilities	"Virtual" organizations

The relationship between buyer and seller must be open and honest; there must be commitment to using available resources to achieve common objectives; there must be an equal share in the risks and the rewards; and it must be a long-term proposition meant to weather the bad as well as the good times. Finally, partnership means redefining the usual ways purchasers and vendors think about product quality and reliability, delivery, price, responsiveness, lead time, location, technical capabilities, research and development investment plans, and financial and business stability. Choosing the right partners is critical to the success of the SCM implementation. If the wrong partner is selected, an incredible amount of energy and resources can be expended in a very short time with no real payback. (David, 2000:344).

Because of the pressure of globalization in the last two decades outsourcing activities has become an important strategic decision so that supplier selection is a prime concern. In fact, the selection problem is more crucial for the automotive manufacturers. The issue of the selection of supplies is essentially a problem of selecting the most suitable suppliers for

different parts or component. The objective is selecting the ideal combination of suppliers, given the criteria that are important for the purchasing decision under a number of secondary conditions (Zeger and Filip, 1999). One of the automotive manufacturer company is a successful as its ability to co-ordinate the efforts of its key suppliers as steel, glass, plastic, and sophisticated electronic systems are transformed into an automobile that is intended to compete in world markets against the US, the Japanese, the European and the others manufacturers (Spekman, et al., 1998: 53).

Supplier selection process is a multi-criteria problem, which includes both qualitative and quantitative factors. In order to select the best supplier in the automotive industry it is necessary to make a trade off between tangible and intangible factors some of which may conflict.

Traditionally, the selections of suppliers are often based on the price criterion. The cheapest supplier is usually selected without taking into consideration additional costs this supplier may introduce in the value chain of the purchasing organization. Thus, the costs related to unreliable delivery, limited quality of goods supplied, and poor communication are not involved in the selection process (Zeger, et al., 1999)

Supplier decisions are one of the most important aspects that firms must incorporate into their strategic processes. With the increasing importance of the purchasing function, supplier management decisions have become more strategic. As organizations become more dependent on suppliers, the direct and indirect consequences of poor decision making become critical (Marvin, Gioconda, & Carlo, 2003: 492).

Selecting the most appropriate suppliers is considered an important strategic management decision that impact all areas of an organization. Because this reason, this study describes the extent to which factors are using as supplier selection criteria in the Turkish automotive industry by using a survey. It presents a factor analysis that describes which factors are using by the Turkish automotive manufacturer companies as supplier selection criteria.

Literature Review

During recent years, supply chain management and the supplier (vendor) selection process have received considerable attention in the business management literature. There are several factors that complicate the supplier decision (Soukup, 1987). These include: (1) a rapid increase in value of purchased items as a percentage of total revenue for manufacturing firms; (2) an increased rate of technological change accompanied by short product life cycles; and (3) an expansion of outsourcing.

Dickson (1966), in one of the early works on supplier selection, identified over 20 supplier attributes which managers trade off when choosing a supplier. Since then, a considerable number of conceptual and empirical articles on supplier selection have appeared. An exhaustive review was done by Weber et al (1991). In these articles quality, cost and delivery performance history highlighted as the three most important criteria in supplier selection. According to this review of 74 articles discussing supplier selection criteria, quality was perceived to be most important, followed by delivery performance and cost.

Discussions with academics and practitioners alike indicate that some still consider unit price the criterion that carries the most weight in the selection and evaluation of suppliers (Micheal and Chong, 2001). According to another view; suppliers must be selected n the basis of how well they met a variety of specific requirements, and not solely on price. Different organizations have different requirements (Vaidyanathan, Rajesh, and Benton, 1999: 53).

Suppliers directly impact, either positively or negatively, the cost, quality, technology, delivery, flexibility, and profits of the firms that incorporate the supplies' outputs into their final product (Daniel and Thomas, 2002). If capable suppliers exist and are selected, a company may reap competitive advantage from its supply chain. Supply chain can provide a sustainable competitive advantage by enabling the manufacturer to please customers by improving product offerings and service while simultaneously reducing cost.

Supplier selection strategy is the strategy adopted by the manufacturer, to evaluate and select suppliers, which fulfills the requirements of the manufacturer. To build more effective relationship with suppliers, organizations are using supplier selection criteria to strengthen the selection process (Nelson, et al., 2005:333).

The supplier selection strategy in terms of technology, quality, cost and delivery performance are important strategies in overcoming the "upstream" uncertainties, such as supplier defaults on delivery and performance, high cost production, and quality rejects; as well as "downstream" uncertainties due to demand volatility and changes in product mix, price, and competition action, which requires flexibility in the manufacturing processes (Nelson, et al., 2005:334).

Methodology

The population for this study consists of manufacturing firms in the automotive industry in Turkey listed in the member lists of "Association of Automotive Parts & Components Manufacturers" and "Automotive Manufacturers Association". A questionnaire instrument was developed to collect data for this study. A copy this questionnaire was sent each of the 170 companies listed in the sampling frame, out of which 58 copies were collected back. However, only 49 copies were usable.

The design of the questionnaire is derived from the issues and questions raised in the literature. The questions were taken from the past questionnaires with few modifications made to the model requirements (Daniel et al., 2002; Michael et al., 2001; Nelson et al., 2005; Vijay et al., 2002; Robert et al., 1998, Chan et al., 2004). Based on these sources 28 criteria used to select suppliers were identified (see table 3).

Respondents were asked to indicate the importance their firms assigned to these supplier selection criterions in the supplier selection process. A five-point Likert scale, which ranged from 1 (Low Importance) to 5 (High Importance), was used to assess importance. The questionnaire was pre-tested for content validity by 10 purchasing and materials management. Where necessary questions were reworded to improve validity and clarity. Pretest questionnaires were not used in the subsequent analyses. The revised instrument was sent to general managers of the companies. It was assumed that respondents were familiar with their organizations' supplier management activities and could make reasonable judgments regarding suppliers' performances.

Table 3. Findings about Supplier Selection Variables

Variables	1	2	3	4	5	N	M.	S.D.
1. Company size	2 (4.1)	5 (10.2)	27 (55.1)	11 (22.4)	4 (8.2)	49	3.20	0.889
2. Ability to meet with contract conditions	-	2 (4.1)	4 (8.2)	24 (49.0)	19 (38.8)	49	4.22	0.771
3. Scope of resources	-	-	9 (18.4)	27 (55.1)	13 (26.5)	49	4.08	0.672
4. Technical expertise level	-	-	3 (6.1)	21 (42.9)	25 (51.0)	49	4.45	0.614
5. Industry knowledge	-	1 (2.0)	6 (12.2)	24 (49.0)	18 (36.7)	49	4.20	0.735
6. Commitment to quality	-	-	-	11 (22.4)	38 (77.6)	49	4.78	0.422
7. Open site evaluation	-	3 (6.1)	4 (8.2)	23 (46.9)	19 (38.8)	49	4.18	0.834
8. Having enough information about your business	-	1 (2.0)	13 (26.5)	19 (38.8)	16 (32.7)	49	4.02	0.829
9. References / reputation of supplier	-	1 (2.0)	12 (24.5)	18 (36.7)	18 (36.7)	49	4.08	0.838
10. Ability to meet delivery due dates	-	-	1 (2.0)	10 (20.4)	38 (77.6)	49	4.76	0.480
11. Price of materials, parts, and services	-	-	5 (10.2)	13 (26.5)	31 (63.3)	49	4.53	0.680
12. Financial stability and staying power	-	1 (2.0)	11 (22.4)	24 (49.0)	13 (26.5)	49	4.00	0.764
13. Supplier's effort in eliminating waste	1 (2.0)	1 (2.0)	15 (30.6)	26 (53.1)	6 (12.2)	49	3.71	0.791
14. Ability to have honest and frequent communications with suppliers	-	-	4 (8.2)	20 (40.8)	25 (51.0)	49	4.43	0.645
15. Flexible contract terms and conditions	-	2 (4.1)	12 (24.5)	23 (46.9)	12 (24.5)	49	3.92	0.812
16. Geographical compatibility / proximity	-	2 (4.1)	12 (24.5)	26 (53.1)	9 (18.4)	49	3.86	0.764
17. Cultural match between companies	2 (4.1)	6 (12.2)	23 (46.9)	15 (30.6)	3 (6.1)	49	3.22	0.896
18. Past and current relationship with supplier	-	3 (6.1)	18 (36.7)	18 (36.7)	10 (20.4)	49	3.71	0.866

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19. Suppliers' effort in promoting JIT principles	-	-	2 (4.1)	19 (38.8)	28 (57.1)	49	4.53	0.581
20. Supplier has strategic importance to your firm	-	1 (2.0)	9 (18.4)	29 (59.2)	10 (20.4)	49	3.98	0.692
21. Suppliers' willingness to share confidential information	2 (4.1)	5 (10.2)	19 (38.8)	15 (30.6)	8 (16.3)	49	3.45	1.022
22. Percentage of suppliers' work commonly subcontracted	3 (6.1)	1 (2.0)	27 (55.1)	16 (32.7)	2 (4.1)	49	3.27	0.836
23. Supplier's order entry and invoicing systems, including EDI	3 (6.1)	8 (16.3)	16 (32.7)	17 (34.7)	5 (10.2)	49	3.27	1.056
24. Your annual orders as a percentage of their overall business	2 (4.1)	5 (10.2)	21 (42.9)	15 (30.6)	6 (12.2)	49	3.37	0.972
25. Provide your company extra advantage at competition	-	3 (6.1)	8 (16.3)	27 (55.1)	11 (22.4)	49	3.94	0.801
26. Willingness to integrate supply chain management relationship	1 (2.0)	5 (10.2)	16 (32.7)	20 (40.8)	7 (14.3)	49	3.55	0.937
27. Commitment to continuous improvement in product and process	-	1 (2.0)	7 (14.3)	21 (42.9)	20 (40.8)	49	4.22	0.771
28. Reserve capacity or the ability to respond to unexpected demand	-	1 (2.0)	4 (8.2)	23 (46.9)	21 (42.9)	49	4.31	0.713

The values in parenthesis at table 3 are percent values and the others are frequency values. "N" is response value, "M" is median, "S.D" is standard deviation.

RESULTS

Demographic and Descriptive Statistics

Responses came from approximately 17 percent from automotive manufacturer companies and the rest 83 percent came from automotive parts and components manufacturer companies. 80 percent of these companies are manufacturing automotive or automotive parts with in 20 years or more. Companies varied from ten to 3000 employees with a median of 250, and 88 percent are operating at international markets with a big amount of exportation. Questionnaires are responded by general manager with 17 percent, purchasing manager with 15 percent, logistics manager with 11 percent and associative general manager with 11

percent.

The sixth numbered variable "Commitment to quality" is the most important criteria within the 4.78 median according to responses. Another important supplier selection criteria is "Ability to meet delivery due dates" (10 th variable) within the median 4.76. The other important supplier selection variables are 4 th, 11 th, 14 th, 19 th and 28 th. The less important variables are first variable "Company Size" and 17 th variable "Cultural match between companies".

ANALYSIS

Prior to assessing the impact of supplier selection reliability and factor analyses were conducted by the help of SPSS 11.0. In order to ensure to reliability of the measures, the multiple statements dealing with supplier selection variables were assessed for reliability using Cronbach's α. The reliability α of supplier selection factors is found 0.8334 which shows that the sample have a higher reliability. The minimum generally acceptable value for Cronbach's α is 0.70. The cronbach's α values of supplier selection factors are shown at table 4. 16 th and 28 th variables were omitted from analyses because of their negative effect on the reliability of survey.

Table 4. Factor Analysis of Supplier Selection

	Variable. Nu.	α	Mean	Stan. Dev.	Factor Loadings
Factor Groups of Supplier Selection		0.8334			
Factor I: Adequacy of Corporate	4 9 12 10 14	0.7170	4.4490	0.6145	0.714 0.696 0.528
Technical expertise level			4.0816	0.8376	0.528 0.505
References / reputation of supplier			4.0000	0.7638	
Financial stability and staying power			4.7551	0.4800	
Ability to meet delivery due dates			4.4286	0.6455	
Ability to have honest and frequent communications with suppliers					
	Total Variance				20.993
Factor II: Information Sharing and Service Adequacy	21	0.6099	3.4490	1.0219	0.775
	11 15		4.5306	0.6801	0.686 0.596
Suppliers' willingness to share confidential information			3.7143	0.7906	
Price of materials, parts, and services					
Flexible contract terms and conditions					

Scope of resources					
	Total Variance				8.977
Factor III: The capacity and systems that suppliers have	1 23	0.6898	3.2041	0.8893	0.859 0.708
Company size	22		3.2653	1.0562	0.598
Supplier's order entry and invoicing systems, including EDI			3.2653	0.8360	
Percentage of suppliers' work commonly					
	Total Variance				8.236
Factor IV: Supplier Integration	19 20 27	0.5985	4.5306	0.5810	0.855 0.536 0.480
Suppliers' effort in promoting JIT principles	25		3.9796	0.6919	0.449
Supplier has strategic importance to your firm			4.2245	0.7710	
Commitment to continuous improvement in product and process			3.9388	0.8013	
Provide your company extra advantage at					
	Total Variance				6.479
Factor V: Relationship Between Companies	17 18	0.5215	3.2245	0.8959	0.809 0.678
Cultural match between companies			3.7143	0.8660	
Past and current relationship with supplier					
	Total Variance				6.301
Factor VI: To Obey The Agreements	2 13	0.6820	3.7143	0.6250	0.771 0.583
Ability to meet with contract conditions			4.2245	0.5944	
Supplier's effort in eliminating waste					
	Total Variance				5.550
Factor VII: Supply Chain Relationship	26 24	0.5127	3.5510	0.9368	0.882 0.477
Willingness to integrate supply chain management relationship			3.3673	0.9724	
Your annual orders as a percentage of their overall business					
	Total Variance				5.205
Factor VIII: Audit	7 5	0.4721	4.1837	0.8335	0.766 0.579
Open site evaluation Industry knowledge			4.2041	0.7354	
	Total Variance				4.696
Factor IX: Quality Level	6 8	0.4022	4.7755	0.4216	0.696 0.577
Commitment to quality			4.0204	0.8289	
Having enough information about your business					
	Total Variance				4.463

Factor analysis was carried out to reduce each scale to smaller number of underlying factors.

Principal components analysis was used to extract factors (eigen-values > 1) and Varimax rotation used to obtain a more interpretable factor matrix. With few exceptions, variables had factor loadings of at least 0.50. The 26 remaining supplier selection criteria were reduced to nine underlying factors (table 4). The nine factors accounted for 71 percent of total variance in the data.

CONCLUSIONS

A number of conclusions can be drawn from this study. This study demonstrates the importance supplier selection factors in automotive industry. It is apparent from these findings that in Turkish automotive industry the most important supplier selection factor is adequacy of corporate. These factor consist of Technical expertise level, References / reputation of supplier, Financial stability and staying power, Ability to meet delivery due dates, Ability to have honest and frequent communications with suppliers. With the increasing competition in markets companies willingness to have strategic partner than a supplier in their supply chains. This factor shows us that Turkish automotive companies want to make a long term relationship with their suppliers by developing closer ties, share confidential information. Also supplier must serve the buyer's long term needs by obeying the delivery agreements with higher technical production level.

Selecting the most appropriate suppliers is considered an important strategic management decision that impact all areas of an organization because of this automotive companies gives more important technical expertise level, financial stability and honest communication. Companies give less importance to quality and price level because they want to build strategic alliances with the best suppliers. If the selected partner has a future potential than the quality and price level can be easily improved by the supplier development program.

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