Süleyman Demirel Üniversitesi
İktisadi ve İdari Bilimler
Fakültesi Dergisi
Y.2011, C.16, S.3, s.467-478.

Suleyman Demirel University
The Journal of Faculty of Economics
and Administrative Sciences
Y.2011, Vol.16, No.3, pp.467-478.

# THE LEVEL OF MEETING SUPPLIER SELECTION CRITERIA BY THE SUB-INDUSTRY: THE CASE OF TURKISH AUTOMOTIVE INDUSTRY

# YANSANAYİCİLERİN TEDARİKÇİ SEÇİM KRİTERLERİNİ KARŞILAMA DÜZEYİ: TÜRK OTOMOTİV SANAYİ ÖRNEĞİ

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**ABSTRACT**

*In this study, the level of suppliers operating in the Turkish automotive sector to be able to meet the criteria for supplier selection that been applied by basic industries to themselves is investigated. It is seen that the supplier enterprises' level of meeting the selection criteria applied themselves has been increasing in the last five years time period. Also, it is determined that the performances of the supplier enterprises being able to meet these criteria in the high level are high too.*

**ÖZET**

*Bu çalışmada Türk otomotiv sanayisinde faaliyet gösteren tedarikçilerin, ana sanayilerin kendilerine uyguladıkları tedarikçi seçim kriterlerini karşılayabilme düzeyleri incelenmiştir. İşletmelerin son beş yılda bu kriterleri karşılayabilme düzeylerinin arttığı görülmüştür. Ayrıca bu kriterleri yüksek düzeyde karşılayabilen işletmelerin performanslarının da daha yüksek olduğu tespit edilmiştir.*

*Turkish Automotive Industry, Supplier Selection.*
*Türk Otomotiv Endüstrisi, Tedarikçi Seçimi*

## 1. INTRODUCTION

The effective and intense competition between the enterprises increases the importance of the suppliers. It is fairly important to work together with the right suppliers in terms of developing competitive capabilities by meeting basic performance criteria. The enterprises trust in the suppliers meeting the basic performance criteria such as price, quality and delivery. In other words, the enterprises want to work together with the suppliers providing goods and services having the quality they need and offering cost advantage, and being flexible against the demand fluctuations.

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So, the selection of the supplier that will be worked together is always an important subject for the enterprises. Different approaches are developed in this topic (Analytical Hierarchy and Expert Systems) and the suppliers holding determined criteria are tried to be confirmed.

It is possible to come across many studies in the literature about supplier selection. In these studies, generally it is assessed whether the suppliers fit the criteria the enterprises determine or not and the selection process is performed. However, it is rarely to come across the studies in which the supplier selection criteria are being evaluated from the supplier's point of view. In this context, the aim of this study is to determine the level of suppliers operating in the Turkish automotive sector to be able to meet the criteria for supplier selection that been applied by basic industries to themselves.

## 2. REVIEW OF LITERATURE

Today, that the competition is between the suppliers rather than the enterprises is a reality. Because of this, the power of the enterprise does not only depend on its performance; but also the power of all of the members of the supply chain. In other words, the chain is powerful as the weakest circle. In this context, selection of the supplier is one of the most important topics in the supply chain (Görener, 2009: 1000). In the supplier selection, it is not the only thing that the supplier meets the criteria determined by the enterprise, but also the supplier should have a structure enabling to develop long-time, cooperative and unattached product price relations (Güleş, 1996). As such beginning with the supplier selection, the process is transformed into a cooperative form and over the long term contributes to the competitive structure of the enterprises.

In the supplier selection and evaluation process, three criteria as price, quality and delivery are emphasized. But, it can be said that besides these conventional criteria, new criteria such as innovativeness, speed, technology, and product diversity are taken into account recently. In this context, the most common supplier selection criteria in the literature can be summarized as follows:

Table 1: The Criteria Utilized for Selecting Supplier

| Criteria | | |
|---|---|---|
| Cost Accounting Criteria | Rate | Relationships with Labor |
| Information Technology Resources | Price | Financial Compatibility |
| Order Process Compatibility | Capacity | Positions of Installation |
| Dependence Formability | Flexibility | Incompatibility Number |
| Invoicing Errors | Compensation | Educational Resources |
| Frequency to Remain out of Stock | Guaranties | Product Availability |
| Product Output Accuracy | Eligibility | Delivery in Time |
| Order Cycle Time | Credibility | Cycle Duration |
| Packaging Facilities | Company Reputation | Information Share |
| Delivery Performance | Quality Control | Delaying Time |
| Transportation Abilities | Quality System | Business History |

Resource: Öz and Baykoç, 2004; Chen and Paulraj, 2004; Chuang, 2004

In the study, as well as the supplier selection criteria applied by basic industries, the reasons for changing the relationships of suppliers with basic industries, and the difficulties met in basic industries were also investigated.

The supplier selection criteria used in the study are the product quality, being able to meet the demands coming in various amounts, fast delivery, being conscious of quality control techniques and applying them, delivery in the promised time, ability to meet quickly a number of various demands, to be able to meet the demands of product diversity, the power to realize the commitments given about distribution, programs for reducing cost, technological support, lower cost, and R & D revenues (Öz and Baykoç, 2004; Akman and Alkan, 2006; Chen and Paulraj, 2004; Chuang, 2004).

The items reviewed in the scope of the reasons for changing relationships of the supplier enterprises with basic industries are economic factors, increase in competition, the presses from customers, changes arising in the international area, providing the contribution to the activities for product renewal, governmental policies, and information technologies (IT), and the new possibilities provided by Internet. (Stump and Sriram, 1997; Lassar et al., 2009; Quinten et al., 2006; Bhatnagar and Sohal, 2005; Fuchsloche, 2007).

In the scope of the reasons for changing relationships of the suppliers with basic industries, the items of the price/cost of the products delivered, delivery in time, ability to be able to meet the demands of customers, the quality of products delivered, the level of technical ability we have, the level to realize the commitment about distribution, the level of R & D activities owned, and, geographical closeness were assessed. (Baskak and Mihçioglu, 2004; Li et al., 2005; Shin et al., 2000; Li et al., 2006; Kanan and Tan, 2005; Chung et al. 2006; Wasti, 2001)

## 3. METHODOLOGY

### 3.1. Method of the Study and Sample

The data set of this study was obtained from the survey realized on 255 enterprises (data of the year 2009), the members of Association of Automotive Parts Components Manufacturer (TAYSAD). Therefore, all enterprises constituting the sample mass of this study are the enterprises being in active in the same sector.

As a result of survey carried out on 255 enterprises, 114 forms, suitable for assessing were obtained. The 114 survey forms obtained refer to the return rate of 44%. When the empiric works carried out in this area are examined, it is seen that the return rates from main mass range between 20% and 50%. For example, in the study carried out by Bülbül (2003) on the renewal activities of enterprises, the return rate was 25%. In a study carried out by Ulusoy (2003) about renewal management and applications of supply chain on the various industries (electronic automotive, and cement sectors ) in Turkey, the return rates ranged 60%, 56%, and 64%, respectively, while, in a study carried out by Kincade et al. (2001) on the performance of supply chain of clothing producers, return rate was 37%. In this context, when the return rates in the surveys are compared to the similar studies, and regarding to the return rate of the surveys realized via mail, 44% of return rate is in an acceptable level.

In order to identify the ability of the enterprises participating in the study to represent the sample mass, the known attributes of the not replying enterprises were compared with the same attributes of the replying enterprises Since any secondary data were not reached except for the number of employees for the replying and not replying enterprises, comparisons were conducted based on this information. The comparison results of the attributes of the replying and not replying enterprises made via the interrater group t-test are shown in Table 2. Between the replying and not replying enterprises, it was not found any statically significant difference ( $p < .05$) in terms of the number of employees. In this context, the sample mass has a representative ability.

Table 2: Representative Power of Sample Mass

| | **Numbers of employees according to TAYSAD data** | | | | **Independent Samples *t* Test** | |
|---|---|---|---|---|---|---|
| | **Those participating to survey (n=114)** | | **Those not participating to survey (n=141)** | | | |
| | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** | **t** | **p** |
| Numbers of employees | 272.99 | 347.97 | 283.33 | 532.83 | -.177 | .859 |

In this study, Wilcoxon Test was utilized in order to measure the variation in the levels to be able to meet the supplier selection criteria of enterprises and One Sample t-Test was used in order to test the situation

associated with the performances of enterprises meeting the selection criteria in the high level. In addition, in order to analyze the relationships between the variables of interest, frequencies, means, and standard deviations were calculated.

### 3.2. Hypothesis of the Study

Regarding to several studies[2] on previously SCM and supplier selection, the hypothesis of study were constituted. These hypothesis are:

***Hypothesis 1*:** In the last five years, the level of the supplier enterprises to meet the selection criteria has increased.

***Hypothesis 2*:**. The performance of enterprises meeting the supplier selection criteria in the high level is higher.

## 4. FINDING OF THE STUDY

### 4.1. The Characteristics of the Sample

The study was realized on the enterprises, the members of Association of Automotive Parts Components Manufacturer (TAYSAD).

Of the enterprises in the scope of study, while the enterprises with minimum employees are employing 55 people, 2200 of people have been working in the enterprise with maximum employees. The average value of the employees working in the enterprises was determined as approximately 273. When regarding to the numbers of employees, 86.8% of the (99 enterprises) enterprises are medium –sized, 13.2 % (15 enterprises) are large-sized.

Of the enterprises in the scope of study, the youngest one has been operating for five years and the oldest enterprise, in other words, the most experienced member has been operating for 71 years. The average activity durations of enterprises were determined as approximately 27 years.

47.4% of the enterprises were founded with the domestic capital. The rate of enterprise with a foreign partner is 13.2%.

### 4.2. The Relationships of the Enterprises with the Basic Industry

In order to determine the factors being effective in changing relationships of enterprises with the basic industries, the factors in Table 3 are asked as 7-point Likert scale. In the scale, "1" refers to "not important at all", 7 "extremely important". The results are presented in Table 3.

[2] See: Güleş, 1996; Öz and Baykoç, 2004; Akman and Alkan, 2006; Chen and Paulraj, 2004; Chuang, 2004.

Table 3: The Factors Being Effective in Changing Relationships of Enterprises with the Basic Industries

| Factors | Mean | Std. Dev. |
|---|---|---|
| Economic factors | 6.40 | 0.95 |
| Increase in competition | 6.36 | 0.94 |
| The presses from customers | 6.15 | 1.11 |
| Changes in international area | 6.12 | 1.15 |
| Providing the contribution to the product renewal activities | 6.11 | 1.24 |
| Governmental policies | 5.77 | 1.44 |
| The new possibilities by IT and Internet | 5.68 | 1.46 |
| Total *(Cronbach alpha= 0.86)* | 42.51 | 6.10 |

Notes: (i) n=114; (ii) in the scale "1" refers to " not important at all", "7" extremely important (iii) frequency way according to two ways Anova Test ($\chi^2$=446.447: p<.001) results are statically significant.

The most important factor being effective in changing relationships of enterprises with the basic industries is the economic factor with the average of 6.40. When considering that the study was carried out in the period of Global Crisis 2008 -2009, it is quite meaningful that economic factors are seen as important effects. However, that the factor of the press for competition (6.36) is followed by the factors of the presses from customers (6.15), and the changes arising in the international area (6.12) is important in terms of showing that the enterprises operate under a competitive and global pressure. However, providing the participation to the product renewal factor, one of the most important instruments of coping with these global competitive presses for automotive manufacturer takes places after these factors. Information technologies and internet contributing to the development of competitive abilities of the enterprises take place in the last order with the average of 568. When the participation to the activities of product renewal are evaluated together with the information technologies and internet use, it can be said that these three factors have an important places in reducing the competition increasing in the global meaning and decreasing the press from the customer.

When regarding the forming situation in the scale taking place in Table 3, it is considered that, in the change of the relationships of enterprises with basic industry, the elements being effective can be grouped and more clearly descriptions can be made. On this purpose, an application of "*factor analysis*" was realized. Before making factor analysis, the correlation between the elements being effective in changing the relationships of enterprises with the basic industry was examined and identified that there was a high degree of correlation between some variables. This situation indicates that it was possible to make a factor analysis, consequently, that the meaningful groups could be created. In this context, varimaks *rotational prime components factor analysis* was applied to the elements being effective in changing the relationships of enterprises with the basic industry. As seen in Table 4, it was possible to take together the elements being effective in

changing the relationships of enterprises with the basic industry into two groups.

As seen in Table 4, as a result of prime components factor analysis, two groups forming associated with the elements being effective in changing the relationships of enterprises with the basic industries accounts for 69.25 % of total variance. The eigenvalues are higher than "1" and factor charges than 0.45. The groups forming as a result of factor analysis are referred to "Uncontrolled Factors" and "Technology and Competition". When examining the table, "Uncontrolled Factors " expressing the first factor structure account for 40.08% of total variance and it covers the items of governmental policies, economic factors, and changes arising in the international area.

Table 4: Factor Analysis Associated with the Elements Being Effective in Changing the Relationships of Enterprises with the Basic industries

| Factor/Item | Factor Charges | |
|---|---|---|
| | 1 | 2 |
| ***Uncontrolled factors*** | | |
| Governmental policies | | 0,937 |
| Economic factors | | 0,526 |
| Changes arising in international area | | 0,722 |
| ***Technology and Competition*** | | |
| The new possibilities provided by information technologies and internet | 0,740 | |
| Presses from customers | 0,913 | |
| Increase in competition | 0,837 | |
| Providing the participation in the product renewal activities | 0,573 | |
| *Eigenvalue* | *2,82* | *2,03* |
| *Explained Variance (%)* | *40,08* | *28,97* |
| *Total Variance (%)* | | *69,25* |

*Notes: (i) Variance rotational prime components analysis. (ii) KMO: .690, Barlett Test=444.662; p<.001.*

"Technology and Competition" describing the second factor covers the new possibilities provided by information technologies and internet, the presses from the customers, the increase in the competition, and providing the participation in the product renewal activities accounts for 28.97% of total variance.

### 4.3. The Difficulties of Enterprises with the Basic Industry

In order to determine the difficulties encountered during carrying out the relationship of the enterprises with the basic industry, the items in Table 5 was asked in the way of "7 point Likert scale." In the scale, "1" refers to "not important at all", "7", extremely important. The results are presented as follows:

Table 5: The Difficulties of Enterprises with the Basic Industry

| Difficulties | Mean | Std. Dev. |
|---|---|---|
| The price/cost of the products delivered | 6.32 | 1.10 |
| Delivery in time | 6.07 | 1.64 |
| The power to be able to meet the demands of customers | 6.03 | 1.51 |
| Quality of products delivered | 6.00 | 1.77 |
| The level of technical ability we have | 5.94 | 1.56 |
| The level of realization the commitment about the distribution | 5.93 | 1.60 |
| The level of R & D activities we have | 5.84 | 1.65 |
| Geographical closeness | 5.66 | 1.74 |
| Total *(Cronbach alpha= 0.95)* | 47.73 | 10.74 |

*Notes: (i) n=114; (ii) In the scale, " 1" refers to " not important at all" and "7", extremely important. (iii) According to Friedman two-ways Anova test ($\chi^2$=24.148: p<.001) the results are statistically significant.*

The most important difficulty of enterprises with the basic industry is the factor of the price/cost of products delivered with the average of 6.32. Even though the major part of enterprises in the scope of this study (84 enterprises together with those being transition stage) have an cooperative structure, the problems experienced with the basic industry about the price of the delivered product may be interpreted that the developed relationships do not fully reflect a cooperation model. However it can be put forward that the study was carried out in the period of a global crisis (2008 -2009) makes dominant this factor. This result can be evaluated as a compatible result with the preference of "economic factor", seen as the most important factor in the relationships with the basic industry (See, Table 4.16). Delivery in time (6.07), and the power to be able to meet the demands of customers (6.03) are the factors taking place in the second and third order. Generally, since the cooperation model exhibits a structure considering the delivery important, the ability of enterprises to be able to meet the demands from the customers, basic industries, are highly important. The level to be able to realize the commitment about the distribution (5.93) also has an attribute supporting delivery in time and the level to be able to meet the demands from the customers. Another important issue is also related to the quality of the products delivered (6.000). Quality is an essential issue in developing the cooperation relationship and can be evaluated as an irrevocable element of the trust and cooperation between purchaser and supplier.

### 4.4. The Level of Enterprises to Be Able to Meet the Supplier Selection Criteria

In order to determine the level of enterprises to be able to meet the supplier selection criteria applied on them by the basic industry, the factors in Table 6 are asked in "7- point Liker Scale". In the scale, "1" refers to "not meeting it at all", "7", meeting it in extremely higher level. The results are presented in Table 6 below.

When examining the Table 6, it is seen that there was a variation in the meeting level of all items compared to five years ago and these variables

were statistically significant according to the dependent two group t-test. The enterprises consider the product quality (6.18) as the most important item. When considering that the enterprises in the scope of study are the automotive sub industrialists, this result is significant. That the enterprises supply the raw material in high quality is important in terms of the basic industry's being able to produce the products in high quality. Because of that this result is also the demand of basic industry, it should be evaluated that automotive manufactures feature the supply of the raw material in high quality. Hence, the quality, a fundamental competition instrument, was considered as important by the enterprises in the scope of study. In this context, the results in Table 6 support the hypothesis in Number 1 that "the level of the supplier enterprises to meet the selection criteria has increased in the last five years."

Table 6: The Level of Enterprises to Be Able to Meet the Supplier Selection Criteria

| Supplier Selection Criteria | Five years ago | | Present | | Paired Samples t Test | |
|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | t | p |
| Quality of product | 5.37 | 1.38 | 6.18 | 1.17 | -3.523 | <.001 |
| To be able to meet the demands coming in different amounts | 5.29 | 1.43 | 6.15 | 1.11 | -3.869 | <.001 |
| Fast delivery | 5.54 | 1.38 | 6.07 | 1.13 | -2.378 | <.05 |
| Becoming in the conscious of quality control techniques | 5.15 | 1.60 | 6.01 | 1.25 | -3.396 | <.001 |
| Delivering in the promised time | 5.53 | 1.37 | 6.00 | 1.17 | -2.322 | <.05 |
| Ability to able to meet in a number of demands quickly | 5.19 | 1.53 | 5.94 | 1.21 | -3.196 | <.001 |
| To be able to meet the demands about product diversity | 5.32 | 1.44 | 5.89 | 1.17 | -2.536 | <.05 |
| Power to be able to meet the commitment given about the distribution | 5.34 | 1.50 | 5.88 | 1.28 | -2.732 | <.05 |
| Cost reducing programs | 5.02 | 1.60 | 5.85 | 1.18 | -3.512 | <.001 |
| Technological support | 5.04 | 1.62 | 5.85 | 1.26 | -3.598 | <.001 |
| Lower cost | 5.32 | 1.48 | 5.81 | 1.27 | -2.166 | <.05 |
| R & D activities | 4.92 | 1.67 | 5.77 | 1.30 | -3.595 | <.001 |
| Total *(Cronbach alpha= 0.94)* | 63.04 | 15.01 | 71.39 | 11.47 | -4.096 | <.001 |

Notes : (i) n=114; (ii) In the scale" 1"1 refers to "not meeting at all " and "7" not meeting in extremely high level.

### 4.5. The Relationship between the Supplier Selection Criteria and Performance

That whether or not the performance of enterprises is varied depending on the level of enterprises to be able to meet the supplier selection criteria was investigated. In this context, in the similar way to the method

applied by Dean and Snell (1996) and Güleş (1999), the total performance of enterprises were found by adding the performance criteria of enterprises* and in order to measure whether total performance varies depending on the supplier selection criteria, the total performance of two groups were compared dividing the enterprises participating in the study into two groups according to the median rule as those meeting the supplier selection criteria in low level and those meeting in high level (Table 7).

Table 7: The Performance of Enterprise According to the Level to Be Able to Meet the Supplier Selection Criteria

| | **The level to be able to meet the supplier selection criteria** | | | | **Independent Samples t Test** | |
|---|---|---|---|---|---|---|
| | **Low (n=46)** | | **High (n=68)** | | | |
| | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** | **t** | **p** |
| Growth in market share | 5,20 | 1,53 | 5,85 | 1,57 | -2,218 | <.05 |
| Growth in sales | 5,39 | 1,41 | 5,56 | 1,58 | -0,581 | .563 |
| Investment profitability | 5,15 | 1,41 | 5,50 | 1,75 | -2,123 | <.05 |
| Growth rate | 5,17 | 1,48 | 5,63 | 1,57 | -2,563 | <.05 |
| *Total* | 20,91 | 5,48 | 22,54 | 6,08 | -2,462 | <.05 |

As seen in Table 7, while 16 enterprises meet the supplier selection criteria in low level, 68 enterprises meet them in high level. For all the other items except for the growth criteria in sales, the results are statistically significant. As also seen from the results, the performance of enterprises, which were able to meet the supplier selection criteria in high level, are higher and this supports **the hypothesis in number 2** that "the performance of enterprises meeting the supplier selection criteria in high level are higher".

## 5. CONCLUSION

It can be said that the enterprises operating in automotive sub industry are in a competitive environment and the relationships of them with their basic industry are in a continuous change according to the competitive conditions. In this context, the factors being effective in changing relationships of sub industrialists with their basic industry were examined and as a result of the factor analysis carried out, it became possible to take together into two groups the elements being effective in changing relationships of enterprises with their basic industries.

It is seen that for the last five years the levels of enterprises, in the scope of study operating in the automotive sub industry, to meet the criteria applied on them by the basic industry for supplier selection have increased. Besides this, it was determined that the performances of enterprises, having high levels to meet these criteria were also high.

This situation may be evaluated in such a way that the suppliers carried out important efforts in order to be able to keep in step with the

* Before summing up the points related to the competitive factors, Cronbach alpha value was calculated. The value is 0,95 and it points out that it is possible to find the total point by summing up individual points related to the variables.

competitive structure and to continue their relationship with the basic industry and that the efforts carried out influenced the performances of enterprises positively. As a conclusion, that the supplier enterprise meets the supplier selection criteria of the basic industry can be used as an important instrument both for continuing the togetherness with the basic industry and constituting a competitive structure.

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