EFFECTING FACTORS OF CUSTOMER SATISFACTION AT SUPPLY CHAIN CONTEXT: AN EMPIRICAL INVESTIGATION AT TURKISH MANUFACTURING INDUSTRY

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To be successful in global competitive markets, many firms have responded to rapid technological change, heightened competition and shortened product life cycles by focusing customer satisfaction. It is very difficult to ensure customer satisfaction. In spite of the increasing offer, customers are more conscious, and they make purchasing decisions by evaluating multiple choices and selecting among these choices. In this paper, supplier performance was evaluated by their customers and then, effects of performance criteria factors on customer satisfaction were analyzed. To examine the role of supplier performance in customer satisfaction, a survey was conducted of 182 manufacturing companies in Turkey. Factor analysis yielded seven factors: technical capability, innovation, conformance quality, pricing, delivery, flexibility and service. Correlation analysis indicated that innovation, delivery, flexibility and service factors significantly correlated with customer satisfaction. Hierarchical multiple regression analysis suggested that delivery, flexibility, service and innovation significantly contributed to the customer satisfaction.

1. INTRODUCTION

During the last decade, supply chain management is emphasized as a management approach. The importance of building and managing relationships among partner firms in a supply chain, has received considerable attention in research and practice. Supply chain management is an increasingly important organizational concern, and proper management of supplier relationships constitutes one essential element of supply chain success (Fawcett et al., 1995; Giunipero and Brand, 1996). Relationships between buyer and suppliers have also been underlined with themes such as partnership management (Johnson and Lawrance 1988; Ellram, 1995). Long term supplier relationships allow customers to receive better services and provide them access to know how and capabilities that they lack in house (Kalwani and Narayandas, 1995; Sheth and Sharma, 1997). In order to build and maintain healthy long-term relationships, some researchers have broadened the examination of relationship satisfaction drivers to include variables related to a supplier's performance on product range, product quality, product support, customer service efficiency, sales promotion effectiveness, pricing, sales force expertise and knowledge, etc. (Biong, 1993; Gosh et al., 1997; Schellhase et al., 2000; Abdul-Muhmin, 2005).

The importance of supplier performance in supply chain context provides manufacturer firms to establish and maintain competitive advantage in highly competitive markets (Humphreys et al, 2004). Success of supplier performance is related with new product and process, quality of product and service improvement and variation. Therefore reduction cost of product, communication and sharing knowledge, delivery on time are improved (Tang et al., 2001; Gentry et al., 1996).

In today's competitive environment, suppliers are an increasingly important resource for firms. According to this importance there are a lot of studies about supplier selection and evaluation within a wide range of methods such as TWP, ANP, AHP, and TOPSIS. Recently Mendoza et al., 2008 are used Analytical Hierarchy Process (AHP) and Goal Programming (GP), Arunkumar et al., 2008 take use of meta-heuristic algorithm.

Aim of this study was to determine the most effecting factors of customer satisfaction among dimensions of supplier performance. For this aim a questionnaire study was conducted in Turkish manufacturing industry. Firstly literature about investigation dimensions of supplier performance and customer satisfaction was carried out and a theoretical model and hypotheses were developed. Then the model was tested by using MINITAB 13.0 statistical software. After that provided results were discussed.

2. THEORETICAL BACKGROUND

In business to business (B2B) markets, when considering the satisfaction of an industrial customer, it is necessary to evaluate the satisfaction of the different constituents of the buying centre being in contact with the industrial supplier (Parasuraman, 1998). Anderson and Narus (1990), in their effort to model manufacturer-distributor relationships, defined satisfaction as a positive, affective state resulting from the appraisal of all aspects of a firm's working relationship with another firm. According to this definition, satisfaction can be contrasted with an objective summary assessment of outcomes. If expectations are exceeded by performance, satisfaction is generated (Chumpitaz and Paparoidamis, 2004).

Lam S.Y (2004) proposed and empirically analyzed a conceptual framework that considers customer perceived value, customer satisfaction, and switching costs as antecedents of customer loyalty in a B2B context. Also integration of a supplier with its customer provide lots of benefits such as operational capabilities valued by customers, such as product quality, delivery reliability, process flexibility or cost leadership (Rosenzweig et al., 2002).

In this study, factors influencing customer satisfaction was examined. The most important factor for customer satisfaction was supplier performance. For relationship satisfaction, the literature suggests additional variables relating to suppliers' performance on key marketing functions like product quality, pricing, and distribution effectiveness as key determinants (Abdul-Muhmin, 2005). In this study, seven dimensions were determined and explained below.

2.1 Dimensions of Supplier Performance
The selected dimensions for this study are technical capability, delivery, conformance quality, service, flexibility, competitive pricing and innovation.

Technical Capability
Today firms have to improve services and process to make competitions in global environment. Therefore firms have to trade with suppliers which have ability for these attributes. In addition, the technical capability of suppliers is one of the important decision criteria for supplier selection and evaluation. In the strategic purchasing literature beside selection of classical supplier criteria, technologic capability is very important factor when making purchasing decision (Katsikeas et al., 2004). This main criterion is included improvement capability of supplier and firm, technical know-how level. Ellram (1990) suggested that either using the traditional supplier selection criteria, such as price and quality, or using criteria related to the future of the buyer–seller relationship such as technical capability. According to Monczka et al. (1995) modern purchasing processes contains evaluation of suppliers' strategic capabilities such as their technological capability, their ability to contribute to future product development. Buyers need for a long-term interactive relationship with a supplier and the possession of technical capability of by the supplier is essential for the buyer to gain competitive advantage (Gustin et al., 1997) .If a supplier has such this capability this influences and increases customer performance and also effects customer satisfaction.

Delivery
The adaptation ability of determined delivery schedule is always important criteria for selection supplier and keeping on relationship between supplier-manufacturers. According to demand supplier has an ability of following the exact delivery schedule (Chan and Kumar, 2007). The criteria of delivery is included delivering the product, purchasing from supplier, on time and reliable.

Conformance Quality
In supply chain management, not only manufacturer but also semi product and material supplier are responsible for quality. The most important factor leading to international sourcing is the high quality of the products, which makes a good impression to the customer (Chan and Kumar, 2007). Good quality is essential to corporations in maintaining competitiveness and customer loyalty. In supply chain management, improving product quality is no longer merely the responsibility of the manufacturer, but is also the responsibility of the suppliers who provide the parts and components. Finished product quality is determined by production capability of supplier and it determines finished product quality and customer satisfaction (Chen et al., 2005). If quality of supplier is high level, product quality level will be high. This also increases customer satisfaction level.

Service
Service criteria contains after sales customer relationships, handling of customer complaints. In some studies such as Gustin et al., (1997), Karande et al. (1999) service attributes of a supplier have been used as principal determinants of purchasing process. In recent studies, importance of service quality has been given heightened attention in marketing practice. Therefore the deployment of service-related attributes in influencing supply source selection decisions is both understandable and warranted. Providing service of the supplier is an important criterion in selection of a supplier and in

evaluation of supplier performance (Katsikeas et al., 2004) and it is important to evaluation of supplier performance by customer. The good service given by the supplier may be helping the increase the customer satisfaction (Chan and Kumar, 2007).

Flexibility
Supplier flexibility is defined as adaptation of supplier to customer wants and expectation. Today firms try to perform the manufacturing according to customer needs. Customer wants and market conditions change very rapidly. In this environment supplier needs to increase flexibility of their manufacturing system. As a result of this needs quantity of product and production should be set to be able to adapt customer wants and demands. Flexibility means quick response capability to changing customer requirements. If suppliers achieve flexibility; they can have opportunity for customer satisfaction and expectation (Emerson and Grim, 1999).

Competitive Pricing
Every firm wants to obtain minimum price of product to increase the market share and therefore must find a low-cost supply base in order to minimize manufacturing cost (Chan and Kumar, 2007). Generally firms based on low level unit costs which provide them make profit, increase their competitiveness, and develop performance (Tracey and Tan, 2001). Therefore price that is important determiner to make a purchasing decision pricing criteria contains giving of supplier convenient price respect to others and high level price cutting according to purchasing product quantity. Unit price is used with a priority in relation to the other elements as selection criteria in traditional approaches to purchasing. Price was described as a top priority and important determinant of the purchasing decision (Gustin et al., 1997; Evans, 1994). But Piercy et al., (1997) investigated different prices attributes in relation to costs associated with the specific product. If supplier provides acceptable price and price discounts for manufacturers, price increases customer satisfaction level of manufacturers in B2B context.

Innovation
The process of solving problems in a satisfactory level in an unstable market condition is defined as a journey to unknown. But it is crucial to pursue this quest (Zhuang, 1995). It is assumed that an innovative firm would have a pro-active stand concerning new approaches and opportunities while analyzing and researching its current activities (Cerami, 2001). In innovation literature, the main aim of strategy related with innovation is to adapt to the current environment. From the supplier's view point, this include activities such as development of specific products and services for customers, development of new R&D projects and involving in customer's product development process. In this manner, innovation can also be seen as a means to adapt environment and customers wants. Innovation is a must for firms to survive, go on and thrive (Manu, 1992). Innovation also helps firms in shaping the future of a given sector. Successful, innovative supplier firms can provide new and low-cost, high quality semi-products in a much faster way. Moreover, these supplier firms use system and processing novelties to serve their customers and improve their customer products (Lawson and Samson, 2001). Also this characteristic of supplier increases customer satisfaction because thanks to innovativeness of supplier, customers provide low-cost, high-quality semi-products from supplier. Then use them in their products performance of customer products increase also this arise satisfaction level of customer.

3. REAL-LIFE EXAMPLE

The purpose of this study was to determine effecting factors of supplier performance on customer satisfaction. Dimensions of supplier performance effecting customer satisfaction mostly in the literature were determined. According to above explanations the necessary empirical model was formed and the hypotheses of this study were formulated. A questionnaire survey was constructed and was applied to 182 manufacturing firms performing in Kocaeli, Turkey. The survey results were evaluated and the model of the study was tested by using MINITAB 13.0 statistical software. After that provided results were discussed.

3.1 The Model and Hypotheses
Empirical model of the study was developed and constructed as shown in Figure 1.
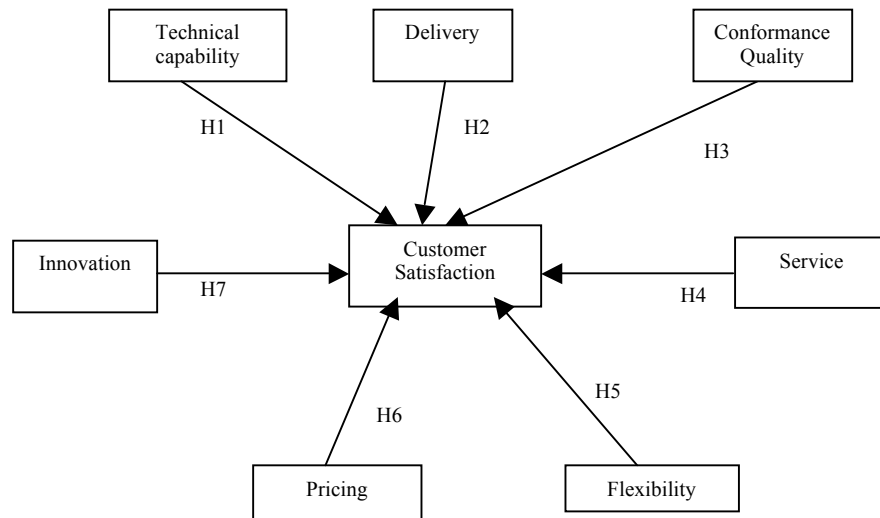
Figure 1. Empirical model of the study

For this study the following seven hypotheses are built:

Hypothesis 1: Technical capability influence customer satisfaction positively.
Hypothesis 2: Delivery influence customer satisfaction positively.
Hypothesis 3: Conformance quality influence customer satisfaction positively.
Hypothesis 4: Service influence customer satisfaction positively.
Hypothesis 5: Flexibility influence customer satisfaction positively.
Hypothesis 6: Competitive pricing influence customer satisfaction positively.
Hypothesis 7: Innovation influence customer satisfaction positively.

3.2 Survey Instrument
A questionnaire was designed for defining customer satisfaction in B2B firms at supply chain context. The constructed survey instrument included 20 supplier's performance criteria on a seven point scale ranging from (1) very poor to (7) excellent.
   The technical capability dimension of supplier performance was measured using items adapted from Katsikeas et al. (2004). These items are R&D ability, technical know–how and adaptability to future customer needs.
   The delivery dimension of supplier performance included two items modified from Shin et al. (2000). The items refer giving advices about probable problems during delivery and deliver products fast and reliably.
   The service dimension included three items adapted from Katsikeas et al. (2004). The items are after sale service, existence of pay back policy for returning products.
   The flexibility dimension was measured using three items modified from Stank et al. (1999). Products delivery in ordered quantity, quick response capability of urgent product demands; capability to inventory adjusting in order to adapt our changing product demands.
   Pricing dimension was measured using two items adapted from Shin et al. (2000) including fair price in respect of other suppliers, and adequate price discount according order quantity.
   Innovation dimension of Supplier performance included four items adapted from Laamanen (2005). It included speed of new product development, product development ability for special customer requirement, ability for identifying of new product and new process, apposes to innovations.
   Customer satisfaction represents satisfaction level of manufacturer from its suppliers. Customer satisfaction operationalized in terms of general satisfaction from supplier, satisfaction from suppliers' activities which are crucial for us, satisfaction from business relations with supplier.

3.3 Sample

The survey was conducted in manufacturing industry in Kocaeli region in Turkey. Following a systematic random selection procedure, a sample of 500 manufacturing firm performing business to business was selected. The survey instrument was mailed to purchasing managers, managing directory quality assurance managers 195 survey instruments came back. 182 within 195 were worth to take in statistical analysis. 13 firms weren't satisfied the requirements of the survey and eliminated. Thus the survey included 182 firms. Some characteristics of study sample are investigated. Distribution of the firms included the survey according to industry, total employee numbers and age of the company are exhibited in Table 1.

Table 1. Some characteristics of the suppliers involved in the study

Industry	Frequency	%	Total Employee number	Frequency	%	Age of the company	Frequency	%
Chemistry	38	20.9	1-25	41	22.5	0-5 years	12	6.6
Iron-steel	41	22.5	26-50	40	22.0	6-10	26	14.3
Metal	24	13.2	51-100	33	18.1	11-15	36	19.8
Plastic	26	14.3	101-250	30	16.5	16-20	23	12.6
Machine	15	8.2	251-500	19	10.4	21-25	27	14.8
Paint	13	7.1	501- upper	19	10.4	26-30	18	9.9
Packaging	14	7.7				31- upper	40	22.0
Electronics	6	3.3						
Petrochemical	2	1.1						
Paper	3	1.6						
Total	182	100.0		182	100.0		182	100.0

3.4 Validity and Reliability

In order to measure validity of measures, principal factor analysis was performed. During initial investigation of factor analysis model, the sample size was estimated. As suggested by Gorsuch (1984), the sample size required for reliable factors should not be less than 100 individuals or an absolute minimum ratio of five individuals per variable. In this study, a total of 182 firms' responses of the 20 item questionnaire were obtained. Thus the basic requirement was almost achieved.

Communalities are calculated to determine whether factor analysis results are good or not. According to Figure 2, all of 20 items are highly explained with seven factors.
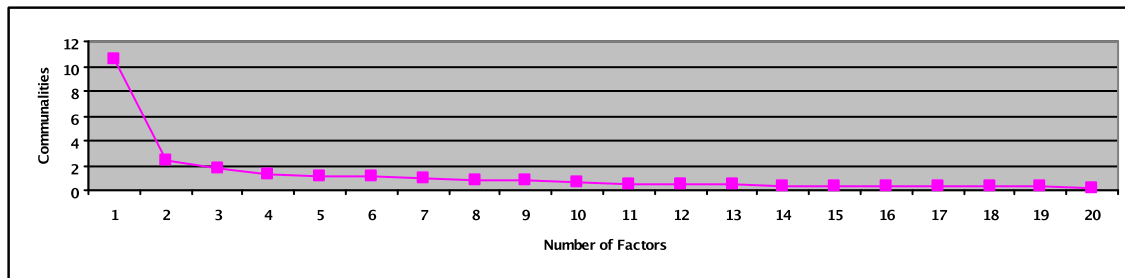

Figure 2. Relationships between Communalities and Number of Factors

The results of principal components analysis with varimax rotation resulted in the extraction of seven factors with factor loadings of 0.5 or greater as shown in Table 2. These factors together explain 72.619 % of the variance. First factor is included flex1, flex2, flex3; second factor is included innova1, innova2, innova3, innova4; third factor is included deliver1, deliver2; fourth factor is included service1, service2, service3; fifth factor is included quality1, quality2, quality3; sixth factor is included tech1, tech2, tech3, the seventh factor is included price1, price2. Explanations of all sub-items are shown in Table 2.

Table 2. Factor Loadings with Varimax Rotation

ITEMS	Flexibility	Innovation	Delivery	Service	Quality	Technical Capability	Pricing
	1	2	3	4	5	6	7
tech1						.604	
tech2						.738	
tech3						.438	
deliver1			.443				
deliver2			.780				
quality1					.581		
quality2					.834		
quality3					.754		
service1				.723			
service2				.751			
service3				.547			
flex1	.757						
flex2	.848						
flex3	.804						
price1							.605
price2							.789
innova1		.843					
innova2		.783					
innova3		.780					
innova4		.582					
Eigen value	3.976	3.606	3.053	2.690	2.542	2.336	2.131
Cumulative Variance %	14.199	27.076	37.981	47.587	56.667	65.010	72.619
Scale Statistics							
Mean	5.06685	5.72917	5.78952	5.64226	5.50552	4.97799	5.11128
SD	1.49469	1.19236	1.17679	1.45909	1.49985	1.49084	1.45042
Cronbach Alpha	0.880	0.872	0.682	0.806	0.828	0.842	0.777
KMO	.887						
Chi-square	2775.594						
Degree of Freedom	325						
Significance	.000						

The result of Barlett's test of sphericity showed that the associated significance level was very small (significance is 0.000). Moreover, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was shown to be 0.887 (see Table 3). Thus factor analysis was fully justified.

Reliability analysis was performed and the Cronbach alpha values of each scale were investigated. All Cronbach alpha values are in excess of minimum value of the 0.60 recommended by Cronbach (1951) and Nunnally (1978). Cronbach alpha values changed from 0,682 to 0,880. All Cronbach alpha values are in excess of 0.60 (see Table 3). As a result all independent values are reliable and valid.

3.5 Correlation and Regression Analysis

In the next step, correlation analysis was performed in order to determine relationship between factors. Results are given in Table 3. Satisfaction was positively and very significantly correlated with price, flexibility, innovation, technical capability, delivery, quality and service.

Table 3. Correlations between seven factors

	Satisfaction	Pricing	Flexibility	Innovation	Technical Capability	Delivery	Quality	Service
Satisfaction	1							
Price	.484(**)	1						
Flexibility	.577(**)	.465(**)	1					
Innovation	.537(**)	.531(**)	.449(**)	1				
Technical Capability	.411(**)	.389(**)	.298(**)	.645(**)	1			
Delivery	.546(**)	.371(**)	.720(**)	.449(**)	.348(**)	1		
Quality	.342(**)	.234(**)	.432(**)	.434(**)	.420(**)	.546(**)	1	
Service	.541(**)	.546(**)	.580(**)	.546(**)	.418(**)	.569(**)	.451(**)	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

After correlation analysis, multiple regression analysis was performed by using MINITAB 13.0 statistical software in order to test the model and hypotheses. As seen in Table 4, the best value was obtained when all factors were included to analysis. The highest value of R^2 is 0.522 and adjusted R^2 value is 0.499.

Table 4. Impacts of the Factors

Vars	R-Sq	R-Sq(adj)	C-p	S	Technical Capability (TC)	Delivery (D)	Quality (Q)	Service (S)	Flexibility (F)	Pricing (P)	Innovation (I)
1	36.9	36.5	43.4	1.0306					X		
1	34.0	33.6	52.4	1.0540		X					
2	46.2	45.5	16.5	0.95452					X		X
2	45.1	44.4	20.0	0.96453				X	X		
3	49.5	48.5	8.5	0.92843				X	X		X
3	49.0	48.0	9.8	0.93232		X			X		X
4	51.3	50.0	4.9	0.91462		X		X	X		X
4	50.2	48.8	8.3	0.92500	X	X		X	X		
5	51.8	50.2	5.3	0.91290	X	X		X	X		X
5	51.7	50.1	5.6	0.91381		X		X	X	X	X
6	52.1	50.2	6.3	0.91271	X	X		X	X	X	X
6	51.8	49.9	7.1	0.91529		X	X	X	X	X	X
7	52.2	49.9	8.0	0.91494	X	X	X	X	X	X	X

Vars lists the number of predictors in each model. Predictor columns (one for each predictor) are the last columns in the table. These columns indicate whether the corresponding predictor is included in the model. Predictors included in the model are marked with an X. R-Sq describes the proportion of variation in the response data explained by the predictors in the model. Adj. R-Sq is a modified version of R that has been adjusted for the number of predictors in the model. C-p is another statistic for assessing how well the model fits the data. S is the standard error.

Table 5 shows multiple regression analysis results. Adjusted R^2 is 0.499. This means that seven independent values explain 49.9 % of total variance belonging to customer satisfaction. So explaining power of this model is very high. F value of the model is 28.660 and it is significant at level of 0.000. Thus this model is statistically significant.

Table 5. Obtained Regression Equation

Dependent Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Customer Satisfaction (CS)	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.676	.464		1.457	.147		
TC	.068	.065	.078	1.051	.295	.582	1.717
D	.201	.096	.181**	2.097	.038	.433	2.307
Q	.043	.082	.036	.525	.600	.693	1.444
S	.150	.071	.166**	2.099	.038	.517	1.935
F	.227	.076	.256***	2.992	.003	.442	2.262
P	.068	.065	.079	1.062	.290	.583	1.716
I	.141	.075	.156*	1.872	.063	.466	2.144
F	28.660				.000		
Adj R-Sq	0.499						

*Significant at 0.1 level (one-tailed), **Significant at 0.05 level (one-tailed), ***Significant at 0.01 level (one-tailed)

Scores of variance inflation factor (VIF) and Tolerance were investigated to determine the existence of multicollinearity. The VIF scores were changing from 1.444 to 2.307. Tolerance values were changing from 0.433 to 0.693. Tolerance values of all independent variables are higher than minimum level of 0.1 and all VIF scores are smaller than the maximum level of 5.0 suggested by Mason and Perreault (1991). In this situation, there isn't multicollinearity for the model. Regression equation (1) including eight factors (seven independent and one dependent) is obtained as following;

Customer Satisfaction = 0.676 + 0.068 TC+ 0.201D +   ...   (1)
0.43Q + 0.150S+0.227F+0.068P+0.141 I

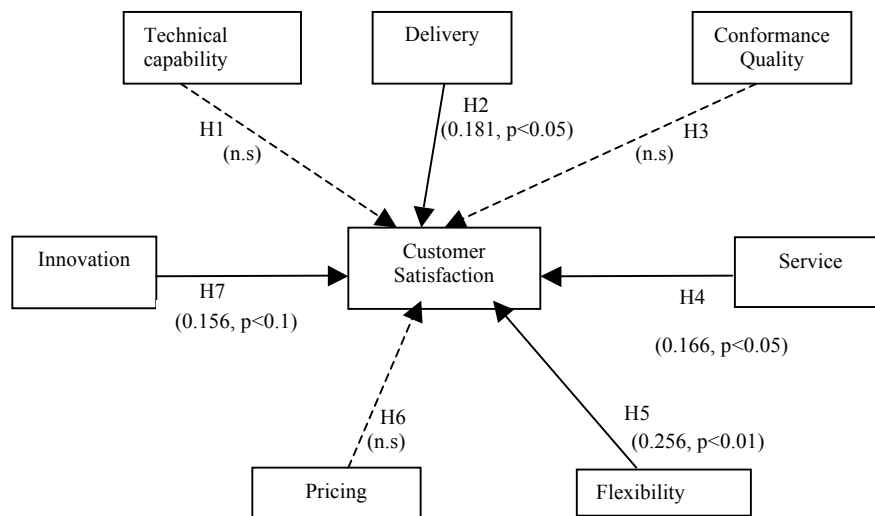Based on Table 5, analysis results are summarized in Figure 3.

Figure 3. Results of the study

According to figure above, technical capability has not a significant influence on customer satisfaction. H1 hypothesis is rejected. Delivery has positive and significant effect on customer satisfaction. It influences customer satisfaction with β value of 0.181 at significance level of 0.05. This means that delivery is one of the descriptors of customer satisfaction. So,

H2 hypothesis is accepted. Significant relationship between quality and customer satisfaction is not found. Thus, quality doesn't influence customer satisfaction and H3 hypothesis is rejected. Service influences customer satisfaction significantly and positively. It affects customer satisfaction with β value of 0.166 at significance level of 0.05. In this case, H4 hypothesis is accepted. Flexibility is the most important descriptor of customer satisfaction. Its effect on customer satisfaction is positive and very significant with β value of 0.256 at significance level of 0.01. In conclusion, H5 hypothesis is accepted. Effect of pricing on customer satisfaction is not significant, and then H6 hypothesis is rejected. Innovation affects customer satisfaction with β value of 0.156 at 0.1significance level of β. Thus, innovation has positive and significant effect on customer satisfaction. H7 hypothesis is accepted.

4. CONCLUSIONS AND DISCUSSION

One objective of this study was to investigate the level of customer satisfaction in various supplier selection and evaluation criteria used by the customer in B2B context. A strong structure including seven factors were developed using the Turkish manufacturing industry as the empirical setting. Attempts to explain the relationship structure of customer satisfaction and dimensions of supplier performance may lead to generalizable factors and facilitate extent theory development. By examining outcome variables effecting customer satisfaction, this study offers a holistic approach to effective supplier behaviors in B2B context in a developing country.

There are several researches about customer satisfaction from supplier. For example, Stank et al. (1999) investigated effects of supplier performance on customer satisfaction and loyalty in food industry. They defined supplier performance as operational performance and rational performance. Abdul-Muhmin (2005) investigated product, pricing, distribution and communication (as instrumental factors) on relationship satisfaction in industrial markets. In this study, different from other studies, we defined supplier performance from supplier selection and evaluation criteria point of view.

Seven determinants are identified about customer satisfaction related with suppliers; technical capability, delivery, quality, service, flexibility, pricing and innovation. We found some differences in the impact of these determinants on customer satisfaction.

The evidence suggests that supplier performance in B2B context is likely to enhance customer satisfaction. Therefore it is important that firms identify, select and maintain enduring relationship with suppliers. The findings imply that close relationship with suppliers -which increases customer satisfaction level in terms of delivery, service, flexibility and innovation- should help to manufacturers for achieving a strong competitive position and long term success. Consistent with the conceptual model, the present results show that delivery, service, flexibility and innovation are positively related to customer satisfaction. The results of this study are relevant for suppliers and manufacturers in the B2B context. Four important conclusions emerge from this study:

> Supplier should give importance after sale services.
> Supplier should give importance flexibility.
> Supplier should develop efficiency of their delivery systems.
> Supplier should develop their innovativeness.

The dimension pertaining to supplier service performance was also held in high regard. Existing literature suggested that the supplier service support is one of the most important aspects which influence a customer's supplier selection, and also customer satisfaction (Gustin et al., 1997; Raydel and Lee, 1994). We find positive effect of supplier service on customer satisfaction. This finding is consistent with the literature.

Also delivery dimension influence customer satisfaction positively and significantly. Specifically, for working just in time conditions, delivery is very important because of that delivery of raw materials or semi-products on time, with demanded quantity and quality, on demanded place is an obligation for suppliers. High level of delivery performance is very important for customers. When suppliers provide these conditions, orders of manufacturing customer are not delayed and are obtained high quality. Then end users also satisfy from manufacturer. This provides high level of satisfaction of manufacturer from its supplier.

Flexibility dimensions have also positive and significant effect on customer satisfaction. This result is consistent with Hamburg et al. (2005) According to their results flexibility is one of the major determinants of adding on benefits of customers.

Innovativeness of supplier influences customer satisfaction positively. This result can explained by the growth in research about the role of supplier involvement in product development (e.g. LaBahn and Krapfel, 2000; Monczka et al., 2000). Johnsen (2004) reports that some suppliers (for example in telecommunications) may be more closely involved in technology programs also product development projects and thus technology application. Therefore innovativeness or innovation level of supplier is important for customer in order to produce competitive products. Also close relationships with supplier enable manufacturing customers to learn about rapid technological changes and enhance their ability to deal with novelty and innovation (Genünden et al., 1996; Walter, 2003). Therefore, this result is very important.

Contrary to the conceptual model, dimensions of technical capability, conformance quality and pricing are not related to customer satisfaction statistically and significantly.

Dimension pertaining to technical capability of supplier doesn't influence customer satisfaction. But technical capability is positively and significantly correlated with customer satisfaction. Technical capability is an important factor for supplier selection, but it doesn't have an important role on customer satisfaction in Turkish manufacturing industry. Having required technical capability of a supplier is an obligation in order to purchase for manufacturers. This criterion is very important factor for supplier selection and evaluation (Piercy et al., 1997; Ellram, 1990, Katsikeas et al., 2004), but it is not a determinant of customer satisfaction.

Price is an important and necessary factor in supplier selection and evaluation (Chen et al., 2005). So it is positively correlated with customer satisfaction. Price factor may play an important role in giving purchasing decision. But it doesn't any statistically significant effect on customer satisfaction. Suppliers give more value to other factors except price. This result exposes necessity of that supplier pay attention to other factors more than pricing and incline other factors. This finding supports results of Katsikeas et al. (2004).

Quality has always been one of the most important performance criteria even with a conventional purchasing strategy (Shin et al., 2000; Choi and Hartley, 1996). In the supplier selection literature, product quality has been identified as a critically important criterion in the raw materials and components purchase decisions of industrial firms (Wilson, 1994). However, contrary to expectations, quality has not any effect on customer satisfaction. But there is a significant correlation between quality and customer satisfaction. This result shows that although serving as a critical supplier selection criterion, it doesn't play a significant role in customer satisfaction. One possible explanation of this result could be found in the structure of Turkish industrial and socio-cultural environment.

5. LIMITATIONS AND FUTURE RESEARCH

Although the empirical findings generally support the conceptualized model, the limitations of the present study should be interpreted. Firstly, the study is limited to the manufacturing industry in a developing country, Turkey. Additional differences may exist on other characteristics of purchasing decision criteria not included in this study. This study was conducted within the national context of Turkey. Results may show differences between developing countries and developed countries. Therefore, the external validity tests would ideally require replication of this study within other countries and industries. But generalization of these findings may be applicable to firms' of countries with similar structural characteristics.

6. REFERENCES

1. Abdul-Muhmin, A.G. (2005). Instrumental and Interpersonal Determinants of Relationship Satisfaction and Commitment in Industrial Markets. Journal of Business Research, 58: 619-628.
2. Anderson, J.C. and Narus, J.A. (1990). A Model of Distributor Firm and Manufacturer Firm Working Partnerships. Journal of Marketing, 54: 42-58.
3. Arunkumar N., Karunamoorthy L. and Makeshwaraa N. U. (2008). Simulated Annealing for Solving Piecewise Linear Supplier Selection Problem Considering Quantity Discounts. International Journal of Industrial Engineering - Theory, Applications and Practice, Vol 15, No 2.
4. Biong H, (1993). Satisfaction and Loyalty to Suppliers within the Grocery Trade. European Journal of Marketing, 7: 21-38.
5. Cerami, J.R. (2001). Research in Organizational Design: The Capacity for Innovation in Large, Complex Organizations. The Innovation Journal, 6: 41-48.
6. Chan, F.T.S. and Kumar, N. (2007). Global Supplier Development Considering Risk Factors Using Fuzzy Extended AHP-Based Approach. Omega, 35: 417-431.
7. Chen, K.L., Chen, K.S. and Li, R.K. (2005). Suppliers Capability and Price Analysis Chart. International Journal of Production Economics, 98: 315-27.
8. Choi, TY and Hartley, S.L. (1996). An Exploration of Supplier Selection Practices across the Supply Chain. Journal of Operations Management, 14: 333-343.
9. Chumpitaz, R. and Paparoidamis, N.G. (2004). Service Quality and Marketing Performance in Business-To-Business Markets: Exploring the Mediating Role of Client Satisfaction. Managing Service Quality, 14: 235-248.
10. Cronbach, L.J. (1951). Coefficient Alpha and the Internal Structure of Tests. Psychometrika, 16: 297-334.
11. Ellram L.M. (1995). Partnering Pitfalls and Success Factors. International Journal of Purchasing and Materials Management, 3: 36-44.
12. Ellram, L.M., (1990). The Supplier Selection Decision in Strategic Part. Journal of Purchasing and Materials Management, 26: 8-16.

13. Emerson, C.J. and Grimm, C.M., (1999). Buyer-Seller Customer Satisfaction: The Influence of the Environment and Customer Service. Journal of Business & Industrial Marketing, 14: 403-415.
14. Evans,R.H.,(1994). Product Involvement and Industrial Buying. Journal of Purchasing and Materials Management, 30: 35-41.
15. Fawcett, S.E., Calantone R. and Smith S.R. (1995). Delivery Capability and Firm Performance in International Operations. International Journal of Production Economics, 51: 191-204.
16. Gemünden H.G., Ritter T. and Heydebreck P. (1996). Network Configuration and Innovation Success: An Empirical Analysis in German High-Tech Industries. International Journal of Research in Marketing, 13: 449–462.
17. Gentry J.J and Vellenga, D.B. (1996). Using Logistics Alliances to Gain a Strategic Advantage in the Market Place. Journal of Marketing Theory and Practice, 4: 37-44.
18. Giunipero L.C. and Brand R.R. (1996). Purchasing Role in Supply Chain Management. International Journal of Logistics Management, 7: 29-37.
19. Gorsuch G, R.L. (1984). Factor Analysis. Lawrence Erlbaum Press, Hillsdale, USA.
20. Gosh A.K., Joseph W.B., Gardner J.T. and Thach S.V. (1997). Antecedents, Outcomes, and Moderating Influences On Industrial Distributors Satisfaction With Supplier Relationships. Journal of Marketing Theory And Practice, Fall: 58-67.
21. Gustin C.M., Daugherty, P.J., Ellinger A.E., (1997). Supplier Selection Decisions In Systems / Software Purchases. International Journal of Purchasing and Materials Management, 33: 41–46.
22. Hamburg C., Kuester S., Beutin N. and Menon A, (2005). Determinants of Customer Benefits in Business to Business Markets: A Cross Cultural Comparison. Journal of International Marketing, 13: 1-13.
23. Humphreys P.K., Li W.L. and Chan L.Y, (2004). The Impact of Supplier Development on Buyer- Supplier Performance. Omega, 32: 131-143.
24. Johnsen T. (2004). On the Management of Collaborative Innovation. Doctoral Thesis, University of Bath School of Management.
25. Johnson R. and Lawrence P.R. (1988). Beyond Vertical Integration- The Rise Of Value Adding Partnership. Harvard Business Review, 66: 94-101.
26. Kalwani M.U, Narayandas N. (1995). Long Term Manufacturer-Supplier Relationships: Do They Pay Off For Supplier Firms. Journal of Marketing, 59: 1-16.
27. Karande K., Shankarmahesh M.N and Rao C.P. (1999). Marketing to Public and Private Sector Companies in Emerging Countries: A Study of Indian Purchasing Managers. Journal of International Marketing, 7: 64-83.
28. Katsikeas, C.S., Paparoidamis N.G., ve Katsikea, E., (2004). Supply Source Selection Criteria: The Impact of Supplier Performance on Distributor Performance. Industrial Marketing Management, 33: 755-764.
29. Laamanen T. (2005). Dependency, Resource Depth, and Supplier Performance during Industry Downturn. Research Policy, 34: 125-140.
30. LaBahn D. and Early K.R. (2000). Supplier Involvement in Customer New Product Development: A Contingency Model of Component Supplier Intentions. Journal of Business Research, 47: 173-90.
31. Lam S.Y, Shankar V., Erramilli M.K and Murthy B. (2004). Customer Value, Satisfaction, Loyalty, and Switching Costs: An Illustration from a Business-to-Business Service Context. Journal of the Academy of Marketing Science, 32: 293-311.
32. Lawson, B. and Samson D. (2001). Developing Innovation Capability in Organizations: A Dynamic Capabilities Approach. International Journal of Innovation Management, 5: 1-23.
33. Manu F.A., (1992). Innovation Orientation, Environment and Performance: A Comparison of Us and European Markets. Journal of International Business Studies, 23: 333-359.
34. Mason, C.H. and Perreault, W. D. (1991). Collinearity, Power and Interpretation of Multiple Regression Analysis. Journal of Marketing Research, 28: 268-280.
35. Mendoza A., Santiago E. and Ravindran R. A. (2008). A Three-Phase Multicriteria Method to the Supplier Selection Problem. International Journal of Industrial Engineering-Theory, Applications and Practice, Vol 15, 2.
36. Monczka R., Handfield R. and Scannell T.V. (2000). New Product Development: Strategies for Supplier Integration. ASQ Quality Press, Milwaukee, USA.
37. Monczka, R.M., Callahan, T.J. and Nichols E.L. (1995). Predictors of Relationships among Buying and Supplying Firms. International Journal of Physical Distribution and Logistics Management, 25: 45-59.
38. Nunnally, J. C. (1978). Psychometric Theory, 2nd Edition, McGraw-Hill, New York, USA.
39. Parasuraman, (1998). Customer Service in Business-to-Business Markets: An Agenda for Research. Journal of Business and Industrial Marketing, 13: 309-321.
40. Piercy N.F., Katsikeas, C.S. and Cravens D.W. (1997). Examining the Role Of Buyer–Seller Relationships in Export Performance. Journal World Business, 32 (1): 73-86.

41. Raydel, T., and Lee, U. R. (1994). A Decision Support System for Integration of Vendor Selection Task. Journal of Applied Business Research, 10 (1): 132-143.
42. Rosenzweig E.D, Roth A.V, Dean J.M. (2002). The Influence of an Integration Strategy on Competitive Capabilities and Business Performance: An Exploratory Study of Consumer Products Manufacturers. Journal of Operations Management, 21: 437-456.
43. Schellhase R., Hardock P. and Ohlwein M. (2000). Customer Satisfaction in Business-to Business Marketing: The Case of Retail Organizations and Their Suppliers. Journal of Business and Industrial Marketing, 15: 106-21.
44. Sheth J.N. and Sharma A. (1997). Supplier Relationships: Emerging Issues and Challenges. Industrial Marketing Management, 26: 91-100.
45. Shin H., Collier D.A. and Wilson D.D. (2000). Supply Management Orientation and Supplier/ Buyer Performance. Journal of Operations Management, 18: 317-333.
46. Stank T.P., Goldsby T.J. and Vickery S.K. (1999). Effect of Service Supplier Performance on Satisfaction and Loyalty of Store Managers in the Fast Food Industry. Journal of Operations Management, 17: 429-447.
47. Tang, J.E., Shee D.Y., and Tang T. (2001). A Conceptual Model for Interactive Buyer-Supplier Relationship in Electronic Commerce. International Journal of Information Management, 21: 49-68.
48. Tracey M. and Tan C.L. (2001). Empirical Analysis of Supplier Selection and Involvement, Customer Satisfaction and Firm Performance. Supply Chain Management: An International Journal, 6: 74-188.
49. Walter A. (2003). Relationship-Specific Factors Influencing Supplier Involvement in Customer New Product Development. Journal of Business Research, 56: 721-733.
50. Wilson EJ. (1994). The Relative Importance of Supplier Selection Criteria: A Review and Update. Journal of Supply Chain Management, 30: 34-41.
51. Zhuang, L. (1995). Bridging the Gap between Technology and Business Strategy: A Pilot Study on the Innovation Process. Management Decision, 33: 13-21.

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