ANALYSIS OF CRITICAL FACTORS AFFECTING CUSTOMER SATISFACTION IN MODULAR KITCHEN SECTOR

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ANALYSIS OF CRITICAL FACTORS AFFECTING CUSTOMER SATISFACTION IN MODULAR KITCHEN SECTOR

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ABSTRACT

ANALYSIS OF THE CRITICAL FACTORS AFFECTING CUSTOMER SATISFACTION IN MODULAR KITCHEN SECTOR

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This study starts with the review of the literature in customer satisfaction, customer satisfaction methods and models. After selecting a proper customer satisfaction method and model, the study conducts a survey and a questionnaire among the customers and professionals in the modular kitchen sector. The aim of the study is to analyze the factors affecting customer satisfaction and finding out the ones related with the modular kitchen sector. After applying the survey, the relations between the inputs and outputs of the satisfaction are analyzed with the overall satisfaction itself. The strong and weak factors are determined and a proper CRM tool is build-up to realize a decision-support and forecast tool in the study, which can be seen as a beginning for the companies in the real sector in this business to build a much more detailed and ERP integrated software and to use them. The results of the survey are compared with the similar studies from the literature.

Keywords: customer satisfaction, partial least square regression, critical factors affecting customer satisfaction, modular kitchen, customer satisfaction index

ÖZ

MODÜLER MUTFAK SEKTÖRÜNDE MÜŞTERİ MEMNUNİYETİNİ ETKİLEYEN KRİTİK FAKTORLERİN ANALİZİ

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Bu çalışma müşteri memnuniyeti, müşteri memnuniyeti metotları ve modellerini kapsayan bir literatür araştırması ile başlamaktadır. Çalışma, uygun bir müşteri memnuniyeti metodu ve modeli seçtikten sonra, modüler mufak sektöründeki müşteriler ve profesyoneller üzerinde bir araştırma ve anket uygulamıştır. Bu çalışmanın amacı müşteri memnuniyetini etkileyen faktörleri analiz etmek ve modüler mutfak sektörü ile ilgili olanları ortaya çıkartmaktır. Anket uygulandıktan sonra müşteri memnuniyetinin girdi ve çıktıları kendisi ile birlikte analiz edilmiştir. Güçlü ve zayıf etkili faktörler belirlenmiş ve bir karar-destek ve tahmin sistemi kurabilmek için uygun müşteri ilişkileri yönetimi aracı oluşturulmuştur. Bu araç aynı zamanda bu alanda faaliyet gösteren reel sektör firmalarına daha detaylı ve ERP ile entegre olan bir yazılım kurmak ve uygulamak adına da bir başlangıç olarak görülebilir. Çalışmanın sonuçları literatürdeki benzer çalışmalarla karşılaştırılır.

Anahtar Kelimeler: müşteri memnuniyeti, kısmi en küçük kareler regresyonu, hazır mutfak sektöründe müşteri memnuniyetini etkileyen kritik faktörler, hazır mutfak, müşteri memnuniyeti indeksi

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INTRODUCTION

1.1 Significance of the Subject

Kösali (2006) stated that furniture industry in the world and in Turkey has become to transform to a more information and capital centered fashion sector. The main reason behind of this transformation is the globalization period that the furniture industry is having at the moment.

Kitchen was defined by Ulular (2006) as a place, where the foods are stored, prepared and gets cooked. The activities in a kitchen can be listed as follows:

- washing
- preparing
- transferring
- storing
- eating (Ulular, 2006)

Additionally, Altıparmak (2006) admitted that the below activities can also exist in a kitchen as daily activities:

- having a rest, watching TV, reading book

There are currently 45 members of the Muder (Kitchen Society) in Turkey, but the exact number of the kitchen-bathroom manufacturers is still unknown because of the no-name companies in the sector. The biggest manufacturers in European Region are Germany and Italy (Kösali, 2006).

Although the consumer's renewal time of kitchens in Turkey is 3-4 times during the human's lifetime, this proportion is even not the half of the world average (Yapı

Endüstri Magazine, 2005). The rapidly growing construction sector plays a reader role in the development of the modular kitchen sector.

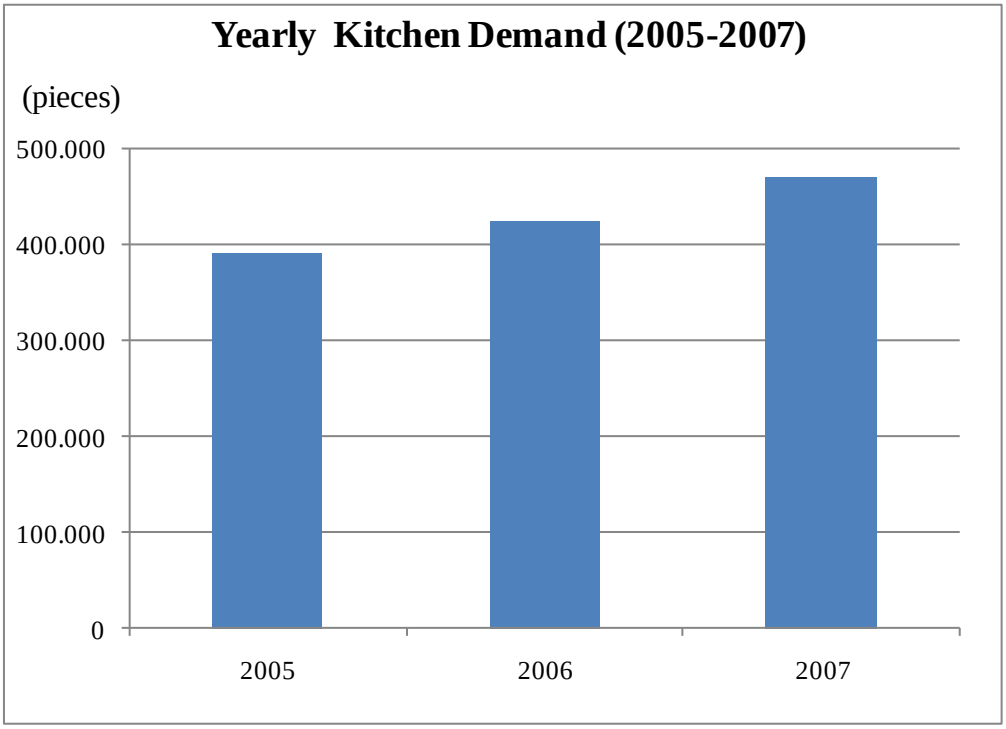

Figure 1.1 Yearly Kitchen Demand in Turkey between the Years 2005-2007

As it can be seen from the above figure, yearly kitchen demand in Turkey between the years of 2005-2007 was expected to increase with a yearly speed of %7-11. Turkey realized the export of 5 Billion 397 Thousand USD in 2004, but the import was 17 Billion 240 Thousand USD at the same year (Yapı Endüstri Magazine, 2005).

Some social and technological factors affecting the increasing importance of the kitchens have been defined in SLKM Pilot Paper, which is prepared by the Institute of Certified Public Accountants of Ireland, as follows:

Social Factors

- Open plan design in homes has been popular in recent years. People are bringing rooms together, creating more space and bringing in more light, they prefer a more sophisticated look and get rid of clutter;

- While the kitchen will continue to be central gathering place, it has also become the room of choice to entertain guests;
- Many home-improvement TV shows and home decor magazines encourage people to update furniture with a more fashionable design and the people want to be involved in the whole design process having been influenced by such shows and magazines;
- In general, consumer awareness of products and fashion trends within the industry are becoming greater;
- Because of the fact that kitchens have started to be seen as a major contributor to increase the desirability of a residence, the construction companies give more importance to the design and quality of the kitchens.

Technological Factors

- Latest improvements in materials and design provide a wider choice of kitchen cabinets, mechanisms and accessories;
- The increasing usage of the internet as a specification and purchasing tool;
- Development of computer softwares to design 3D kitchens.

1.2 Aim of the Study

Wellington (1995) stated that the changes in customer needs and expectations will cause customers to keep setting ever higher standards and therefore to achieve perfection is impossible.

Hill and Alexander (2006) admitted that in recent time's organizations of all types and sizes have increasingly come to understand the importance of customer satisfaction. It has been clear that it is far less costly to keep existing customers than to win new ones and it is becoming accepted that there is a strong link between customer satisfaction, customer retention and profitability.

Kotler (1984) defined the general factors affecting purchasing behavior as follows:

1. Physical and technical aspects of the goods
2. Economy (the price of the good(s))
3. Image of the seller
4. Number and variety of the resources
5. Communication skills
6. Psychological and social factors

This study includes a statistical application on customer satisfaction in modular kitchen sector and will try to bring out the factors affecting customer satisfaction in modular kitchen business and then to find out the correlations among them. Thus, the study will help the investors in this business to decrease the risk of losing customer, money and time.

1.3 Scope of the Study

The study can be expressed in 5 main sections.

1. Firstly, a literature survey to gain necessary information about customer satisfaction, customer satisfaction methods and models will be carried out.
2. Secondly, selection of the proper customer satisfaction measurement method and tool and the application of them among the customers and professionals in the modular kitchen sector.
3. Then, a statistical analysis of the study to investigate the factors affecting customer satisfaction and also to find the correlations among them.
4. Building up a neural network algorithm on the results of the survey and testing the results for various demographic groups.
5. Lastly, a conclusion and discussion chapter to evaluate the findings of the statistical research.

1.4 Research Questions

In order to focus to the main topic and to get the desired results from the study, it can be practical to state some questions and then try to answer them. The answers of the below questions will be sought in the study:

- Why is customer satisfaction so important and how does it affect the success of the companies?
- What are the general critical factors affecting the customer satisfaction?
- How is it possible to build a comprehensive customer satisfaction survey in modular kitchen sector?
- Which topics should be included in the survey?
- Which factors have significant effects on customer satisfaction in modular kitchen sector?
- What are the outputs of the customer satisfaction and how do they change as the customer satisfaction increases and decreases?
- What are the results of this study for the companies in the real sector to focus on?

And some other questions will be asked after stating the critical factors affecting customer satisfactions.

- What is CRM and why is it so important in business world?
- What kind of CRM applications exists and which one of them can be applied in this study?
- Is it possible for the companies in this sector to predict the behavior and expectation of the customers according to their demographic features?
- What kind of an application can the real companies apply to build a forecast and decision support system in this sector?

1.5 Structure of the Thesis

The study will be conducted in seven chapters. The significance and aim of the study were given in the first chapter *Introduction*. The scope of the study is also defined here and the research questions are stated to clear the borders of the study.

The second chapter begins with a literature survey about the customer satisfaction and continues with customer satisfaction methods and models.

Measuring customer satisfaction and related statistical methods will be focused in Chapter 3 and proper customer satisfaction model is constructed in Chapter 4. The descriptive and conventional statistical results are given in Chapter 5. Chapter 6 is about constructing a CRM tool and applying artificial intelligence on the survey. Chapter 7 is the *discussion* chapter and reviews the results of the Chapters 5 and 6.

CHAPTER 2

LITERATURE REVIEW

2.1 Customer Satisfaction

The field of customer satisfaction is wide and includes many academic disciplines. Customer satisfaction is one of the most popular subjects common in marketing surveys and is part of the most popular research studies in marketing that include market segmentation and concept testing (Smith, 2007).

Peterson and Wilson (1992) stated that 15.000 trade and academic articles had been written on this topic over two decades. In this chapter, a review of the published literature upon which this study rests will be presented.

2.1.1 Definition of Customer Satisfaction

Firstly, the concept of satisfaction itself needs to be defined. The Longman Web Dictionary defined *satisfaction* as "[1] *a feeling of happiness or pleasure because you have achieved something or got what you wanted."* It describes *satisfied* as "[1] *pleased because something has happened in the way that you want, or because you have got what you want, [2] feeling sure that something is right or true." Customer* is defined as "*someone who buys goods or services from a shop, company etc*."

Kotler (1997) defined customer satisfaction as follows:

"Satisfaction is a person's feelings of pleasure or disappointment resulting from comparing a product's perceived performance (or outcome) in relation to his or her expectations."

Whereas Brown (1992) defined customer satisfaction as:

"The state in which customer needs, wants and expectations throughout the product or service's life are met or exceeded resulting in repeat purchase, loyalty and favorable worth-of mouth"

After having given some basic definitions from the literature, the focus will be given to some approaches to the explanation of customer satisfaction. Jones and Sasser (1995) stated that there are four basic elements affecting customer satisfaction: the basic elements of the product or service, basic support services, a recovery process for counteracting bad experiences and extraordinary service. Another widely used approach is proposed by Richard Oliver, the expectancy disconfirmation theory (Oliver, 1980). According to this theory, which has been tested and confirmed in several studies, customers purchase goods and services with pre-purchase expectations about anticipated performance.

Customer satisfaction can also be defined as satisfaction based on an outcome or a process. Vavra (1997) suggested that customer satisfaction characterizes satisfaction as the end-state, which can be seen as a cognitive state of reward, an emotional response to an experience or a comparison of rewards, resulting from the experience of consumption.

Jones and Suh (2000) showed the difference between transaction-specific satisfaction and overall satisfaction. Transaction-specific satisfaction is based on a single service encounter and generally transaction-specific satisfaction may not be perfectly connected to overall satisfaction.

2.1.2 Importance of Customer Satisfaction

A satisfied customer is a way for the companies to increase their profit, whereas a customer, who is not satisfied, is a loss for the companies, which also affects the profitability.

A high level of satisfaction can deliver many benefits, including (Renee Hancock, 2007):

- Loyalty: a highly satisfied customer is a loyal customer;
- Repeat purchase: a highly satisfied customer buys more products;
- Referrals: a highly satisfied customer tells their family and friends about the product or service;
- Retention: a highly satisfied customer is less likely to switch brands;
- Reduced costs: a highly satisfied customer costs less to serve than a new customer;
- Premium prices: a highly satisfied customer is willing to pay more for the product or service.

Stewart (2001) stated that the converse of this is that dissatisfied customers, who will tell more people of their dissatisfaction, possibly complain to the company, change to another company, or totally withdraw from the market.

2.1.3 Economic Effects of Customer Satisfaction

In a study published in 1994 by Deutsche Bundespost Postdienst, the economic effects of customer satisfaction were summarized as follows:

- a shift of the demand curve upwards: lower price elasticity, higher margins;
- a reduction in marketing costs: customer acquisition requires more effort;
- a decrease in transaction costs: contract negotiations, order processing, bargaining, etc.;
- a decrease in customer turnover: fewer customers to replace;

- an increase in cross-selling: more products, larger accounts;
- a reduction of employee turnover: satisfied customers affect the satisfaction of front-line personnel;
- an enhanced reputation: positive customer word-of-mouth;
- a reduction of failure costs: reduction in downtime, warranty claims, etc.;
- an increase in reservation prices: satisfied customers are less susceptible to seek new suppliers as the price of a current supplier increases.

Moreover, Westlund et al. (2005) stated that the last two decades of empirical economic research has provided comprehensive empirical support for the hypothesis that customer satisfaction is effective on financial performance, profitability as well as shareholder value. The theoretical explanation can be explained as the customer satisfaction will result in more repurchase, more cross selling, less of price sensitivity, and more of positive word-of-mouth, which is shown with a positive relationship in Figure 2.1 between customer satisfaction and profitability.

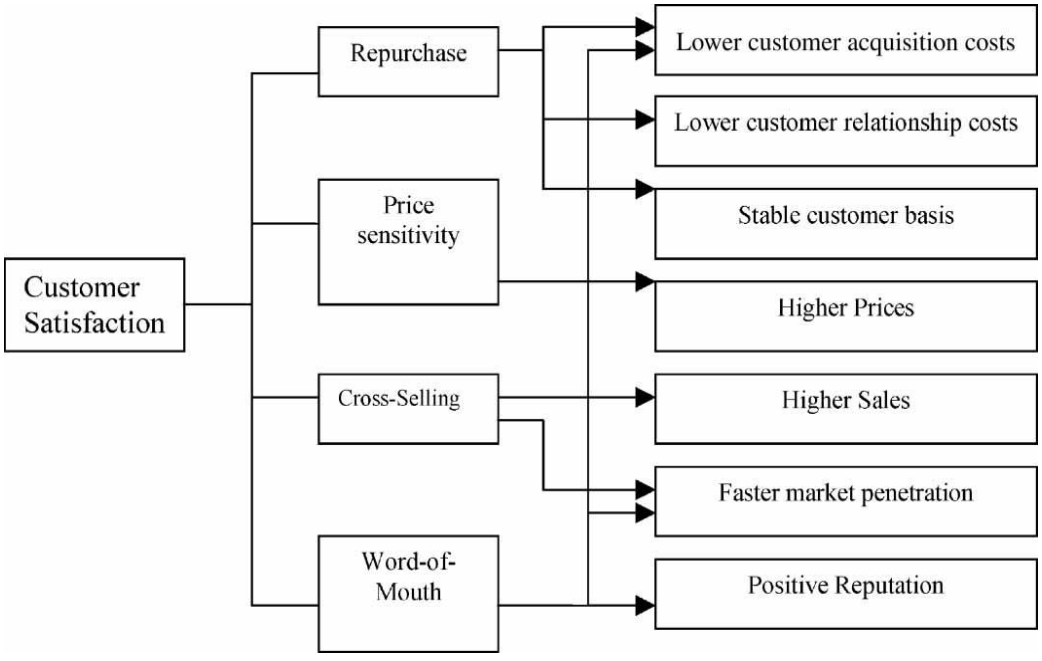

Figure 2.1 A conceptual model of the relationship between customer satisfaction and financial performance (Westlund et al., 2005)

2.2 Frameworks and tools for evaluating customer satisfaction

In this part, frameworks and tools for evaluating customer satisfaction will be listed. The frameworks in the literature were defined according to the nature of the business, which are as follows:

- Products
- Services
- Product-Service Systems (PSS)

2.2.1 Frameworks for evaluating customer satisfaction with products

2.2.1.1 Kano Model of Customer Satisfaction

The developer of Kano Model is Dr. Noriaki Kano, who is a Japanese professor and international consultant and has received the individual Deming Prize in 1997. The *attractive quality creation* studies that he had performed in late 1970s and 1980s were commonly referred in the U.S. to the *Kano Model* (Zultner and Mazur, 2006).

In his model, Kano (1984) distinguished between three types of product requirements which influence customer satisfaction in different ways when met:

- Must-be requirements: These are the requirements that the customer will be extremely dissatisfied, when they are not fulfilled. However, the fulfillment of these requirements does not increase the customer satisfaction. The must-be requirements are taken as basic criteria of a product and fulfilling the must-be requirements will only lead to a state of "not dissatisfied". The must-be requirements were taken by customers as prerequisites. They were taken as granted and therefore the customers do not explicitly demand them;

- One-dimensional requirements: Customer satisfaction is proportional to the level of fulfillment of these requirements, which means that higher level

of fulfillment lead to higher level of the customer satisfaction and vice versa. These requirements are often explicitly demanded by the customer;

- Attractive requirements: These requirements are such requirements that when they are not met, there is no feeling of dissatisfaction. But when they are observed by the customer with a given product, they have the greatest influence on the customer satisfaction. The customer does not explicitly express these requirements (Kano, 1984).

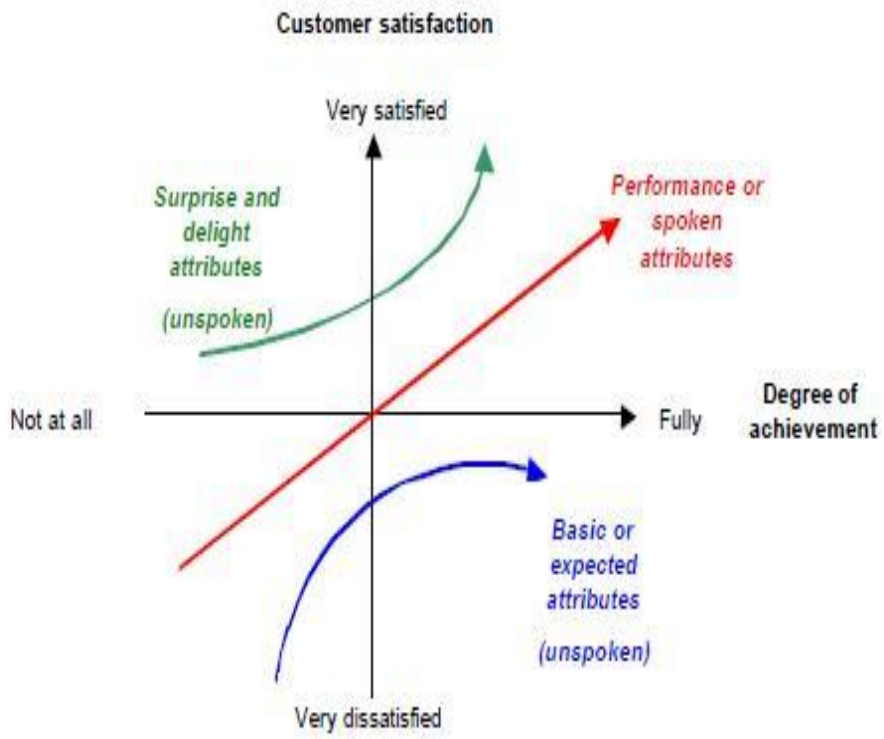

Figure 2.2 The Kano model (Kano et al., 1996)

2.2.1.2 Diffusion of Innovations

Diffusion of Innovations is a theory introduced by Everett Rogers firstly in his book, *Diffusion of Innovations*, in 1962. Rogers defined six main traditions having impact on his research: anthropology, early sociology, rural sociology, education, industrial, and medical sociology.

Moreover, diffusion of an innovation is a five–step process and the five steps were defined by Roger as follows: awareness, interest, evaluation, trial, and adoption.

These steps were revised by Rogers in later editions to: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2005). Additionally, he explained these latest steps as follows:

- Knowledge: person becomes aware of an innovation and has some idea of how it functions;
- Persuasion: person forms a favorable or unfavorable attitude toward the innovation;
- Decision: person engages in activities that lead to a choice to adopt or reject the innovation;
- Implementation: person puts an innovation into use;
- Confirmation: person evaluates the results of an innovation-decision already made.

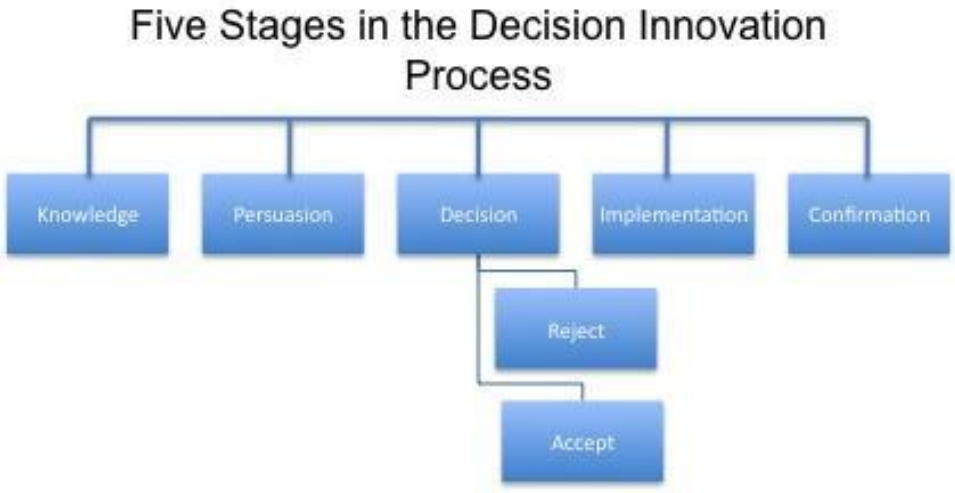

Figure 2.3 Five Stages in the Decision innovation process

Clarke (1999) defined important characteristics of innovation in his website:

- relative advantage: the degree to which it is perceived to be better than what it supersedes;

- compatibility: consistency with existing values, past experiences and needs;
- complexity: difficulty of understanding and use;
- trial ability: the degree to which it can be experimented with on a limited basis;
- observability: the visibility of its results.

And different adopter categories are identified as: innovators (venturesome), early adopters (respectable), early majority (deliberate), late majority (skeptical), laggards (traditional)

Lastly, Clarke (1999) concluded that *Diffusion of Innovations* is seen basically as a descriptive tool, which is less strong in its explanatory power and less useful still in predicting outcomes. It provides guidance as to how to accelerate the rate of adoption (www. rogerclarke.com/SOS/InnDiff.html).

2.2.2 Frameworks for evaluating customer satisfaction with services

2.2.2.2 Service Quality Model

Mont and Plepys (2003) stated the quality of a service perceived by customers will differ depending on the strategy the company applies to deliver and promote that service according Grönroos. The service quality model by Grönroos (1982) can be divided into technical quality and functional quality dimensions. The first square in Figure 2.4 denotes what the customer receives as the output of a service production process and the second square in Figure 2.4 explaines how the technical quality is produced and transferred to the customer during buyer-seller interactions (Mont and Plepys, 2003).

Gummesson and Grönroos (1987) took technical quality as a basic condition for a positively perceived total quality; however they defined the functional quality as the one that adds competitive edge. Mont and Plepys (2003) stated further that the distinction is also made in the model between perceived and expected service quality and it is suggested that the quality is perceived subjectively.

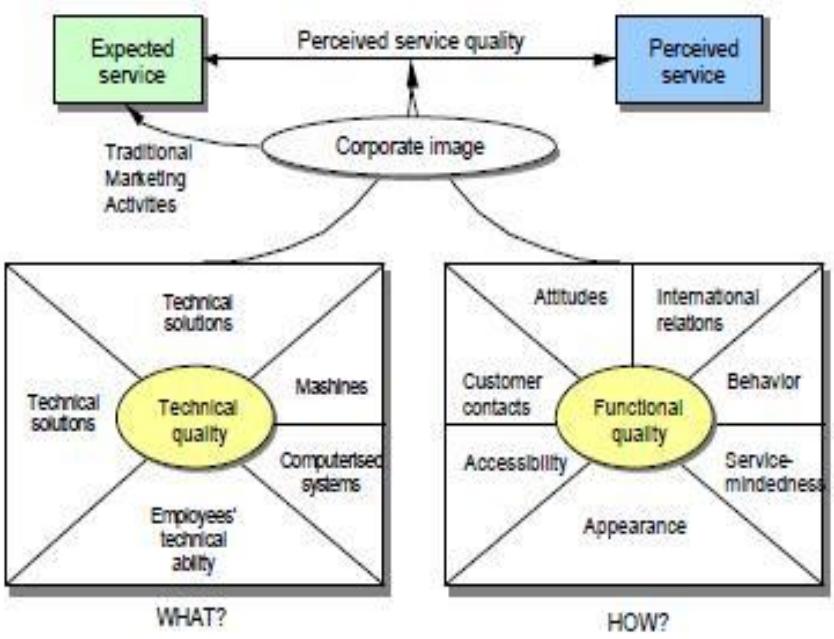

Figure 2.4 Service Quality Model (Grönroos, 1982)

Mont and Plepys (2003) admitted that the expected quality is heavily influenced by market communication (advertising, sales campaigns, PR and direct mail), word-of-mouth, company image, and customers needs. A company can not reach company image, while it is controlling market communication and the word-of-mouth. Grönroos (1982) concluded that the total perceived quality is defined both by the level of technical and functional dimensions and by the gap between the expected and experienced quality.

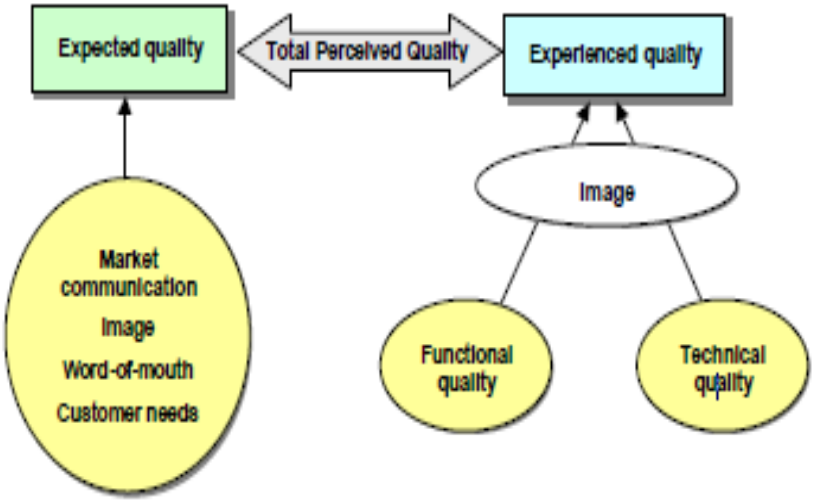

Figure 2.5 Total Perceived Quality (Grönroos, 1988)

2.2.2.3. The SERVQUAL model

One service quality measurement model that has been extensively applied is the SERVQUAL model developed by Parasuraman et al. (1985, 1986, 1988, 1991, 1993 and 1994). SERVQUAL has been used most often as an approach for measuring service quality to compare customer's expectations before a service encounter and their perceptions of the actual service delivered (Parasuraman et al., 1985).

Van Iwaarden et al. (2003) defined five generic dimensions or factors as follows:

- Tangibles: Physical facilities, equipment and appearance of personnel;
- Reliability: Ability to perform the promised service dependably and accurately;
- Responsiveness: Willingness to help customers and provide prompt service;
- Assurance (including competence, courtesy, credibility and security): Knowledge and courtesy of employees and their ability to inspire trust and confidence;
- Empathy (including access, communication, understanding the customer): Caring and individualized attention that the firm provides to its customers.

Mont and Plepys (2003) admitted that the model measures the difference between customer's expectations about general quality of a certain group of service providers and their perceptions about the actual performance of a service provider from that group. The customer satisfaction is defined by the model as perceived quality, which explains the gap between expected service and perception of service actually received (Figure 2.6).

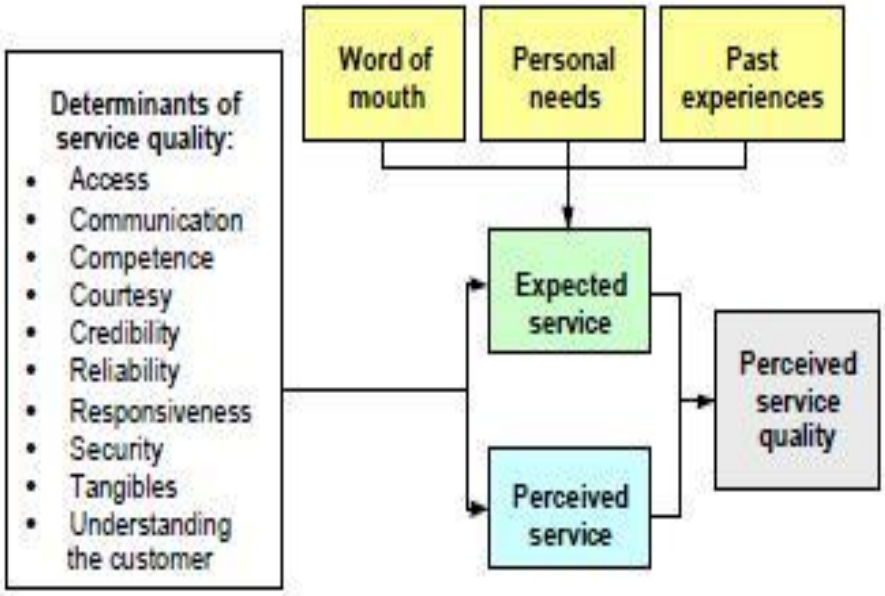

Figure 2.6 Servqual Model (Parasuraman, Berry et al., 1985)

SERVQUAL has been extensively criticized on both theoretical and operational grounds. Francis Buttle (1996) critiqued SERVQUAL in the article *"SERVQUAL: review, critique, research agenda"* on a number of theoretical and operational bases. He particularly noted that SERVQUAL's 5 dimensions are not universals, and that the model fails to draw on established economic, statistical and psychological theory. Mont and Plepys (2003) stated that another criticism is the lack of a clear link between satisfaction and perceived service quality in the model. Mont and Plepys (2003) stated that an alternative model, SERVPERF, which was developed by Cronin and Taylor in 1992, was later developed for these reasons and is based on the findings that service quality does not depend on expectations and can be directly measured by simple performance based measures of service quality.

2.2.3 Frameworks for evaluating customer satisfaction with Product-Service Systems (PSS)

Mont and Plepys (2003) defined the major components of any PSS or eco-services as products, services, infrastructures and networks and listed as follows:

- Product evaluation is performed by assessment of products or technologies;
- Person-based or other types of services like technical, information and knowledge services, which are included into PSS, may be evaluated;
- Infrastructure can also be evaluated when the customer comes into contact with enabling supporting technology, or by the evaluation of ambient conditions, spatial layout and functionality or by evaluating signs and artifacts of the PSS;
- Networks are not usually exposed to the eyes of the customer, but in some cases they may be evaluated, when they come into contact with the customers.

In addition to the major components of PSS services, Mont and Plepys (2003) defined PSS as follows:

"In the case of PSS or eco-services, customers are exposed to both dimensions: product and service. In addition, due to closer relations with the service provider customers can even become exposed to infrastructure and networks that support PSS delivery. Therefore, in the PSS context an evaluation of all four PSS components becomes relevant" (Figure 2.7).

The evaluation of the customer satisfaction with a product depends on the tangible features of the product, whereas the evaluation of the customer satisfactions depends on the intangible dimensions for the services.

The literature survey and interviews with the professionals in the modular kitchen sector showed that the modular kitchen business can be seen as one of PSS because of its nature. The steps of the purchase procedure in the modular kitchen sector can be summarized as follows:

- Showroom
- Design
- Purchasing
- Production

- Delivery
- Assembly

The next step is the selection of the proper statistical method for collecting and analyzing necessary data.

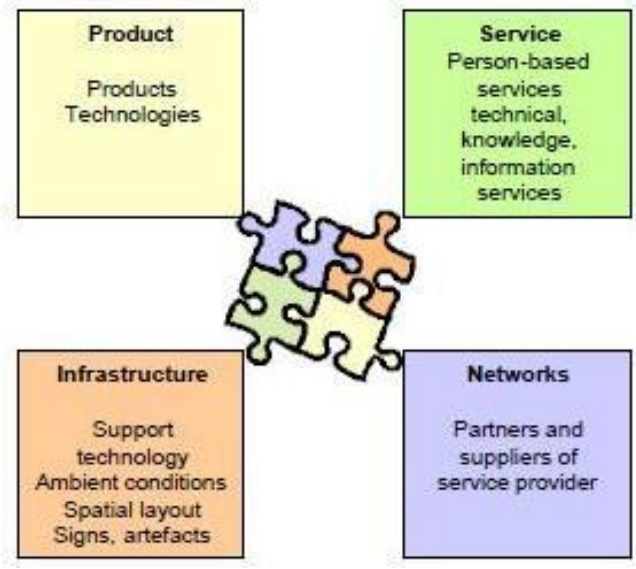

Figure 2.7 PSS dimensions that can be exposed to customer judgement (Mont and Plepys, 2003)

2.2.3.1 Customer Satisfaction Index Model

Gustaffson et al. (2000) stated that many national and international customer satisfaction barometers or indices have been introduced in the last decade. These satisfaction indices are generally included within a system of cause and effect relationships or satisfaction mode. Of critical importance to the validity and reliability of such indices is that the models and methods used to measure customer satisfaction and related constructs continue to learn, adapt and improve over time (Gustaffson, 2000).

According to Stewart (2001), basic model for estimating the customer satisfaction indices is composed of a system of equation, which shows the relations among six constructs, perceived quality, customer expectations, perceived value, customer satisfaction, customer retention and customer complaints. These constructs are

measured by multiple questionnaire items to improve the precision of measurement and each question is measured on a ten-point scale to enhance reliability and reduce error in the indices.

In the same study, Stewart (2001) admitted that the data in customer satisfaction indices are analyzed using a proprietary version of partial least squares modeling (PLS) to produce a customer satisfaction index, which can be found in the study of Fornell et al. (1996). Similarly, it is claimed that the index has a high correlation with customer repurchase intention and price tolerance and hence economic performance because of the weighting of individual items such as overall satisfaction, confirmation to expectation and comparison to ideal (Fornell et al., 1996).

Customer satisfaction index model was defined by Stewart (2001) as being used at both the macro and micro level. Examples of the macro level applications are the Swedish Customer Satisfaction Barometer and the American Customer Satisfaction Index. It measures economic performance in regard to quality from a customer perspective. This may be compared with a productivity index, which also measures economic performance but refers to quantity.

Fornell et al. (1996) mentioned that the micro level application of the customer satisfaction index method focuses on a single business, which assists in the managing of the overall business strategy by concentrating on the retention of customers rather than the more common emphasis on recruiting new clientele. The methodology considers the customer base to be an asset. It aims to measure what variables affect customer satisfaction and retention and the model also includes the impact of changes to the variables upon reuse, recommendation, repurchase and price tolerance.

- **Swedish customer satisfaction barometer (SCSB)**

Grigoroudis et al. (2008) mentioned that the Swedish Customer Satisfaction Barometer, established in 1989, was the first truly national satisfaction index. It is conducted under the supervision of the University of Michigan National Quality

Research Center and the Swedish Post Office. The data are collected through a telephone survey, where approximately 23.000 customers joined to the study, while currently more than 130 companies participate in this survey. The survey is designed to obtain a nationally representative sample of customers of major companies in 32 of Sweden's largest industries. The companies surveyed in each industry sector are the largest share firms, such that cumulative market share is more than 70% (Fornell, 1992).

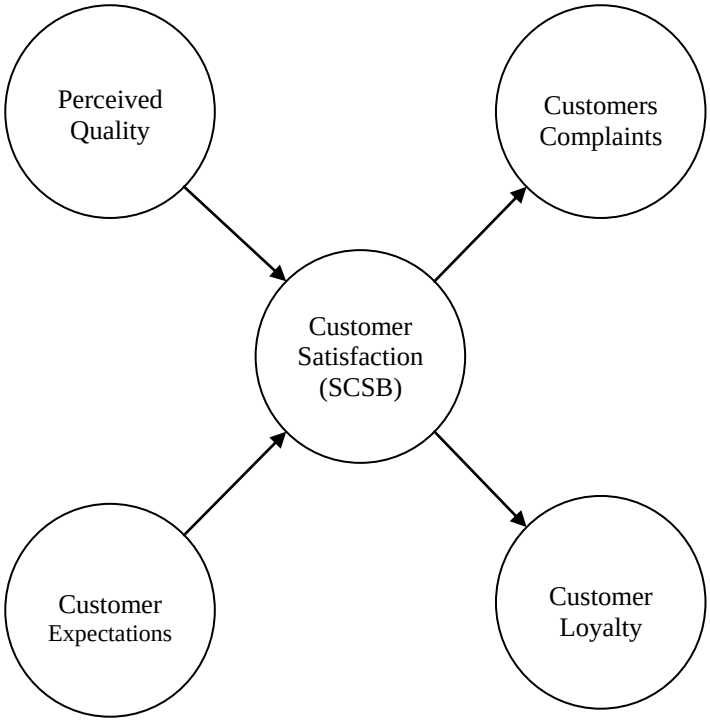

Figure 2.8 SCSB model

The analysis is based on the Fornell's approach, as it can be seen in above Figure 2.8, while the model is self-weighting and estimates the indices and the strength of relationships between the variables in order to maximize the explanation of customer satisfaction, as expressed by the sample of customers (Grigoroudis et al., 2008).

- **American customer satisfaction index (ACSI)**

Grigoroudis et al. (2008) explained that the American Customer Satisfaction Index (ACSI) was established in 1994 following several years of development and pre-testing. It is produced through a partnership of the University of Michigan Business

School, American Society for Quality and Arthur Andersen. National Quality for Research Center (NQRC) at the University of Michigan Business School is responsible for researching and producing the ACSI (Fornell et al., 1996; National Quality Research Center, 1998; 2000).

The website of ACSI (www.theacsi.org) explains that the American Customer Satisfaction Index uses customer interviews as input to a multi-equation econometric model developed at the University of Michigan's Ross School of Business. The ACSI model is a cause-and-effect model with indices for drivers of satisfaction on the left side, which are customer expectations, perceived quality, and perceived value, satisfaction (ACSI) in the center, and outcomes of satisfaction on the right side , which are customer complaints and customer loyalty, including customer retention and price tolerance.

The indices shown in the Figure 2.9 are multivariable components measured by several questions that are weighted within the model. Customer evaluations of the determinants of each index, which are reported on a 0 to 100 scale, are assessed by the questions. The arrows in the models represent the impacts. Another future of the ACSI model is that it is a self-weighting model to maximize the explanation of customer satisfaction (ACSI) on customer loyalty (www.theacsi.org).

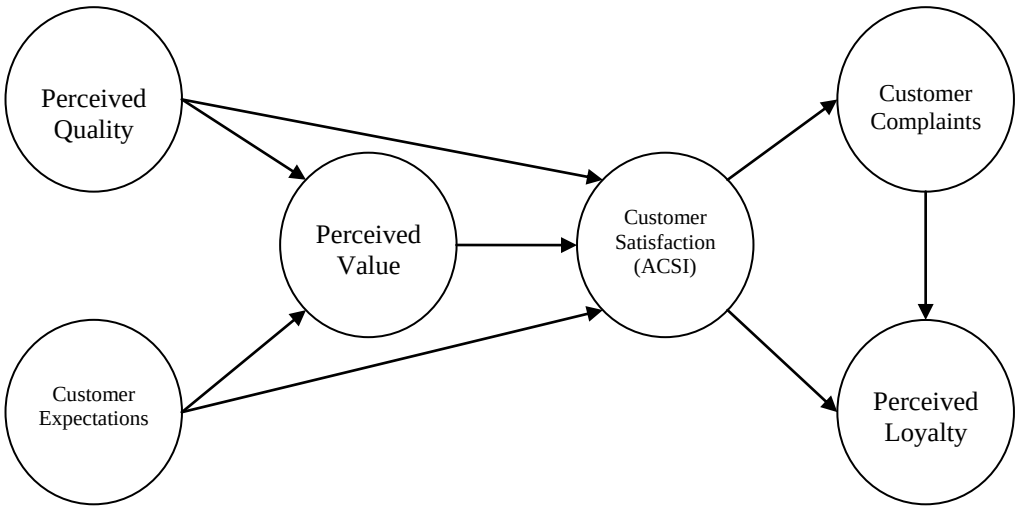

Figure 2.9 The ACSI model (National Quality Research Center, 1998)

ACSI measured all the companies, industries and related economic sectors starting from the baseline year 1994 and it is updated quarterly with new data for a couple of sectors replacing data from the previous year. Consequently, ACSI provides analytical results at different levels, i.e. for each economical sector, industry or a set of selective companies included in the survey (Grigoroudis et al., 2008).

- **German Customer Satisfaction Barometer**

Grigoroudis et al. (2008) explained that the German Customer Satisfaction Barometer (GCSB) has been established by the German Marketing Association e.V. and the Deutsche Post AG and has operated on a yearly basis since 1992. Its general philosophy focuses on the following points (Meyer & Dornach, 1996):

- Supplying single industries and suppliers with data to determine their position and deficiencies in the market according to the customer's perspective;
- Supplying information on customer's expectations as well as on the ways through which they are modified;
- Supplying continuous information and controlling customer satisfaction measures;
- Developing and strengthening the customer orientation philosophy of the German industries, companies, organizations and institutions.

- **Other customer satisfaction barometers**

Grigoroudis et al. (2008) explained that the development of the European Customer Satisfaction Index (ECSI) was inspired by the successful application of ACSI and SCSB. ECSI was founded by the European Organization for Quality (EOQ), the European Foundation for Quality Management (EFQM) and the European Academic Network for Customer-oriented Quality Analysis, and supported by the European Commission (DG III).

The ECSI model is a modified adaptation of the ACSI model (Figure 2.10) and it provides the ability to produce four levels of satisfaction indices, similarly to ACSI results (Grigiroudis et al., 2008):

- National customer satisfaction indices
- Economical sector indices
- Specific industry indices
- Scores for companies and organisations within the survey

Other important customer satisfaction index models, developed during the last decade, that are able to provide systematic results were explained by Grigoroudis et al. (2008). They are the Turkish Customer Satisfaction Index (TMME), Norwegian Customer Satisfaction Barometer (NCSB), the Korean Customer Satisfaction Index (KCSI), the Malaysian Customer Satisfaction Index (MCSI), and the Swiss Index of Customer Satisfaction (SWICS).

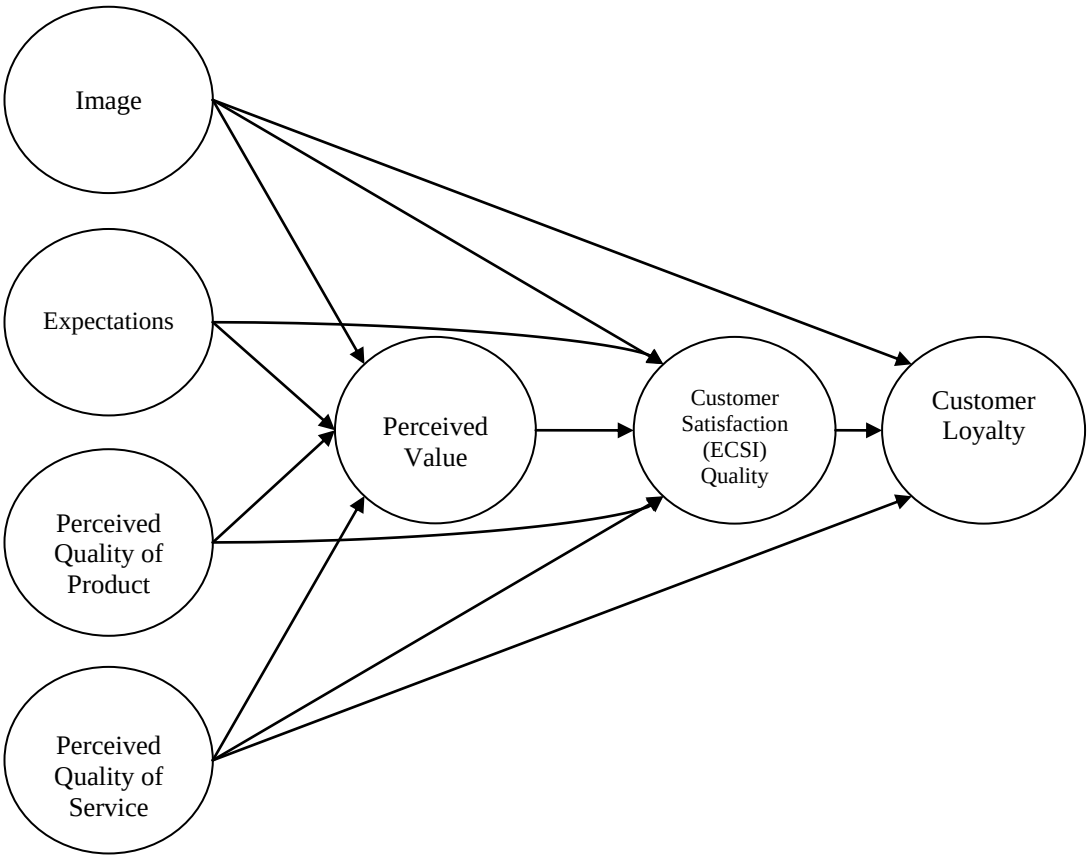

Figure 2.10 The ECSI model (Ciavolino & Dahlgaard, 2007).

2.3 Methods of Data Collection

According Mont and Plepys (2003), different disciplines employ similar sets of approaches and tools for studying consumer satisfaction. These approaches can be classified as being exploratory, descriptive, comparative or interpretative.

- Exploratory and descriptive approaches are generally used to evaluate attitudes, opinions, and public understanding of various issues, i.e. health and environment, consumer attitudes towards specific instruments or coercive measures;

- Comparative and explanatory approaches take part in studying particular consumer behaviors, i.e. recycling; and for development of predictions of specific factors that may affect values and attitudes, which in their turn may lead to changes in behavior;

- Interpretative methods and envisioning are employed to predict the consequences of particular consumption patterns, i.e. dematerialized lifestyles (Mont and Plepys, 2003).

Methods of data collection can be expressed by six different tools, which are shown in below Figure 2.11: surveys, in-depth interviews, focus-group interviews, observations, mystery shopping, psychographic portrait of customers

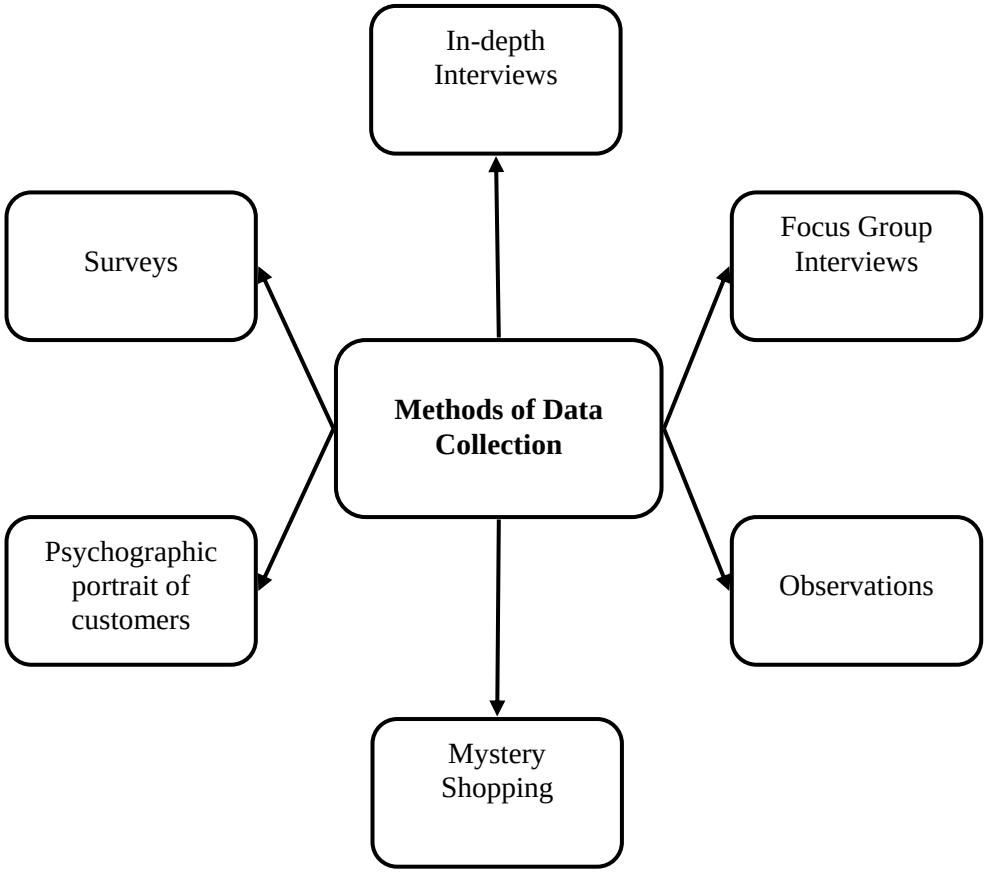

Figure 2.11 Methods of Data Collection

2.3.1 Surveys

According Houston (1999) Surveys can be used for many purposes, including:

- determining customer needs/assessing customer satisfaction;
- identifying organizational strengths and weaknesses;
- targeting areas needing improvement;
- assessing the effectiveness of new or existing policies or programs.

Singer and Gucwa (n.d.) explained that the effectiveness of a given type of customer satisfaction survey depends on its objectives and intended audience. The three major methods and their sub-categories are:

- Personal: one-on-one interviews

- Telephone
- Written: direct mail, fax, e-mail

Singer and Gucwa (n.d.) showed the differences between telephone surveys and written surveys. Telephone surveys cost less than personal visits, and their results can be obtained almost instantaneously, but the depth of information obtained varies widely, and some telephone interviews conducted by experienced callers can last more than an hour. Telephone surveys are useful for obtaining both qualitative and quantitative information.

Written surveys are the most economical way and are used usually when there are large numbers of potential respondents. They are used mostly for compiling quantitative information, because most respondents will not take the time to write out details of specific issues or observations (Singer and Gucwa, n.d.).

Survey techniques have benefits and drawbacks, even though the survey techniques are well developed and have a long history (Mont and Plepys, 2003):

Benefits:

- Access to many customers;
- Opportunity to see and describe variations and distributions of variables in population;
- Possibility to gain general information about consumer's attitudes, intentions, and perceptions;
- Amount of collected data allows use of statistical analysis for explaining and predicting certain behaviors.

Drawbacks:

- Problematic to make consumers understand and interpret questions in the same way;
- People tend to provide socially acceptable answers;
- Reliance on consumer self- reporting;
- Time consuming and difficult to develop good questionnaire;

- Difficult to get access to needed population/sample;
- . Questionnaires require testing, but once at use corrections are difficult to make (Mont and Plepys, 2003).

2.3.2 In-depth interviews

Mont and Plepys (2003) stated that one of the ways to complement surveys is in-depth personal interviews. These interviews can be used as a test bed for questionnaires and can be an effective when the number of respondent is small. The choice of participants for the interviews is based on three different ways: on their willingness to participate, on their value as a customer, and on their ability to articulate issues (Kessler, 1996).

According to Conteh and Hanson (2003), there are a number of threats to the reliability and validity of findings in all kinds of interviews and surveys due to various types of biases and errors. One of the threats is the risk that respondents will give the answers they think the interviewer wants to hear instead of revealing his/her true answer, which is called social desirability bias; and the risk that respondents will usually accept a statement than disagree with its opposite, which is called yes-saying. Lastly, there is also potential for interviewer bias, where the interviewer influences the responses by revealing particular opinions (Bowling, 1997).

Additionally, Conteh and Hanson (2003) stated that the most important limitation of most qualitative methods is perhaps that while they are extremely useful for identifying the range of types of views and behaviors, they cannot assess their frequency and/or their distribution across providers unless the sample is large and randomly selected. Unstructured data collection may allow the researcher to collect a plethora of opinions but this in turn makes validation and cross comparisons of the data difficult.

2.3.3 Focus group interviews

Krueger (1988) explained that focus group interviews were born in the late 1930's by social scientists that had doubts about the accuracy of traditional information gathering methods.

Focus group interviews enable the producers, manufacturers and sellers to understand the thinking of consumers (Krueger, 1988).

Focus groups can be used at any point in a research program. Stewart and Shamdasani (1990) have summarized the more common uses of focus groups to include:

- obtaining general background information about a topic of interest;
- generating research hypotheses that can be submitted to further research and testing using more quantitative approaches;
- stimulating new ideas and creative concepts;
- diagnosing the potential for problems with a new program, service or product;
- generating impressions of products, programs, services, institutions, or other objects of interest;
- learning how respondents talk about the phenomenon of interest which may facilitate quantitative research tools;
- interpreting previously obtained qualitative results

Mont and Plepys (2003) admitted that the strengths of the focus groups interviews are the possibilities to assess how people perceive themselves or conceptualize issues and the possibility to test new issues or new dimensions of customer satisfaction. The weakness is that it is difficult to distinguish between personal and group perceptions. Group dynamics can also prevent certain issues or perceptions from being tackled. Lastly, the size of a sample is usually not representative in focus group interviews.

2.3.4 Observations

Patton (1990) showed some examples about folk wisdom about human observation in his book, *Qualitative Research and Evaluation Methods*.

> *"In the fields of observations, chance favors the prepared mind"*
>
> *- Louis Pasteur (1822-1895)*

> *"People only see what they are prepared to see*
>
> *- Ralph Waldo Emerson (1803-1882)*

Taylor and Bogdan (1984) defined participant observation as a research that involves social interaction between the researcher and informants in the milieu of the latter, during which data are systematically and unobtrusively collected.

Moreover, Mont and Plepys (2003) stated further that a source of data in the observation is everything that goes around the setting. This includes the physical environment and activities as well as social environment, such as patterns of interaction, frequency of interactions, direction of communication patterns, decision-making patterns, and verbal and non-verbal communication patterns.

According to Conteh and Hanson (2003), one advantage of direct observation is that it may give a more reliable indication of the provider's real behavior than their reported behavior, but a major concern is bias arising from the presence of the researcher, which may alter the provider's behavior. However, observing for a sufficiently long period of time can reduce the extent of this bias.

One of the main criticisms of observation research is that it lacks reliability. Since data are collected in a non-standardized way, it is not generally useful for statistical treatment. Without a statistical analysis to confirm the significance of observation patterns or trends, researchers often find it hard to ensure that their findings are real and not merely the effects of chance (Mont and Plepys, 2003).

2.3.5 Mystery shopping

The Market Research Society (MRS) defines *mystery shopping* or *mystery customer* search as:

"The uses of individuals trained to experience and measure any customer service process, by acting as potential customers and in some way reporting back on their experiences in a detailed and objective way."

Mont and Plepys (2003) explained that this type of research is based on the information collected at points-of sale. Mystery shopping consists of natural observation conducted by specially trained persons sent by a company, who pretend to be customers or business partners. These persons visit selected retail points to gather information and observations about staff responsiveness, attitudes towards customers or products, staff quality and competence, their appearance (and other related behavioral attributes), the aesthetics and functionality of inspected site, *i.e.* overall perception of the shopping experience.

Michelson (2001) showed different types of data collection methods for mystery shopping:

- In person/on-site shops
- Telephone shops
- E-Commerce website shops
- Hidden video/audio recording
- Full narrative shops (qualitative)
- Checklist shops (quantitative)
- Purchase & return shops
- Discrimination (matched-pair) testing.

The advantages and disadvantages of the method were stated by Mont and Plepys (2003) as follows:

- Mystery shopping helps to raise customer service standards and identify weak points from the customer perspective;
- It allows evaluation of services from the customer side and unbiased representation of the weak point of the service;
- The direct involvement in the process allows a better understanding of customer and service provider behavior and the important moments of their interaction that in the end might affect customers' perception of the service;
- Mystery shopping is, however, a time consuming procedure and requires significant effort to find and train mystery shoppers. Hiring professional mystery shoppers can be also costly.

2.3.6 Psychographic portrait of customers

Mont and Plepys (2003) defined psychographic portrait of customers as a part of psychographic research, which analyses the consumer's activities, interests, and opinions about products, services, and shopping experiences. They stated that the method is a descriptive research method identifying the detailed characteristics of potential or existing clients. It combines sociological methods of gathering consumer information (social and demographic characteristic, information on consumption patterns, etc.) with the methods originating from personality psychology.

Additionally, psychographic portraits of many customers allow customer segmentation in terms of purchase frequency, respondent's experience of various shopping centers or service organizations, as well as benchmarking against competitors (Mont and Plepys, 2003).

Finally, Mont and Plepys (2003) stated the strength and weaknesses of psychographic portrait of customers as follows:

- The strength of a psychographic portrait is that by collecting information about consumption patterns and perceptions it combines both qualitative and quantitative data and thus provides extensive background information for market segmentation and potential customization of products or services;

- The weaknesses are that the method is time consuming and relies on very extensive information. The reliability is likely to be medium as it relies on self-reporting of customers. An extensive experience is required to create a reliable psychographic portrait of customers.

2.3.7 Selection of the proper method

After exploring six different toolboxes for measuring customer satisfaction, the proper method to use in this study has to be selected. Since in-depth interviews and focus group interviews are mainly based on qualitative research, rather than quantitative research, it is very difficult to do a statistical analysis using these methods.

The same problem is true for observations. Since data are collected in a non-standardized way, it is not generally useful for statistical treatment.

Mystery shopping procedure is used generally for raising customer service standards and identifying weak points from the customer perspective as stated above, thus, it is not a proper method to get a statistical data and analyze them.

Because of the fact that psychographic portrait of customers is a method, which is a descriptive research method identifying the detailed characteristics of potential or existing clients, it is not useful to do a quantitative research by using this method.

The advantages of surveys like opportunity to see and describe variations and distributions of variables in population, possibility to gain general information about consumer's attitudes, intentions, and perceptions and amount of collected data allows use of statistical analysis for explaining and predicting certain behaviors are important to use it in this study. Despite of some disadvantages like being time consuming and relying on very extensive information, surveys are selected as the most proper method.

CHAPTER 3

MEASURING CUSTOMER SATISFACTION

3.1 Introduction

Having decided to use customer satisfaction index as the framework of this study to measure the customer satisfaction, the next step is to select the proper statistical analysis method.

Gefen et al. (2000) stated that Structural Equation Modeling (SEM) techniques such as Linear Structural Relations (LISREL) and Partial Lest Squares (PLS) are second generation data analysis techniques that can be used to test the extent to which IS research meets recognized standards for high quality statistical analysis, otherwise know as statistical conclusion validity.

Fornell (1991) suggested using partial least square to estimate latent variables in customer satisfaction index (CSI) models. Additionally, O'Loughlin and Coenders (2002) admitted that this recommendation was grounded on the argument that the other widely employed framework used to estimate relationships among latent variables makes more strict assumptions on the data, mainly regarding normality.

PLS method will be discussed in this chapter and it will be argued that PLS in particular is suited to measuring satisfaction, since it has a tolerance to the type of the data generated by a customer survey.

3.2 Partial least squares regression (PLSR)

Encyclopedia of Measurement and Statistics defined PLS regression as a recent technique that generalizes and combines features from principal component analysis and multiple regression. Abdi (2007) admitted that it is particularly useful when it is

needed to predict a set of dependent variables from a large set of independent variables (i.e., predictors). Additionally, Chin (1997) explained PLS as follows: "*PLS can be a powerful method of analysis because of the minimal demands on measurement scales, sample size, and residual distributions. Although PLS can be used for theory confirmation, it can also be used to suggest where relationships might or might not exist and to suggest propositions for later testing."*

Chin (1997) admitted that PLS avoids two serious problem, because it is component-based model instead of better known factor-based covariance fitting approach for latent structural modeling (e.g LISREL, EQS, COSAN, and EZPATH)

- Inadmissible solutions
- factor indeterminacy

Assuming that the measured variance is useful variance and need to be explained, PLS approach is generally more suitable for application and prediction. PLS avoids indeterminacy problem and defines the component score very clear because of the fact that PLS uses the estimation of the latent variable as exact linear combinations of the observed measures (Chin, 1997).

In the same study, Chin (1997) stated that sample size in PLS studies can be smaller, with a strong rule of thumb suggesting that it should be equal to the larger of the following:

- ten times the scale with the largest number of formative (i.e., causal) indicators; or
- ten times the largest number of structural paths directed at a particular construct in the structural model.

Finally, PLS is considered better suited for explaining complex relationships (Chin, 1997).

3.2.1 Basic Model

Electronic Statistics Textbook (www.statsoft.com/textbook/) explains the basic model for PLS regression as follows:

"The main purpose of partial least squares regression is to build a linear model $\boldsymbol{Y=XB+E}$, where $\boldsymbol{Y}$ is an n cases by m variables response matrix, $\boldsymbol{X}$ is an n cases by p variables predictor (design) matrix, $\boldsymbol{B}$ is a p by m regression coefficient matrix, and $\boldsymbol{E}$ is a noise term for the model which has the same dimensions as $\boldsymbol{Y}$."

It should be noted that there is no correlation between the factors score variables used in the predictive regression model, since both principal components regression and partial least squares regression produce factor scores as linear combinations of the original predictor variables. It is supposed that there is a data set with response variables $\boldsymbol{Y}$ (in matrix form) and a large number of predictor variables $\boldsymbol{X}$ (in matrix form), some of which are highly correlated (www.statsoft.com/textbook/).

Electronic Statistics Textbook includes that "a regression using factor extraction for this type of data computes the factor score matrix $\boldsymbol{T=XW}$ for an appropriate weight matrix $\boldsymbol{W}$, and then considers the linear regression model $\boldsymbol{Y=TQ+E}$, where $\boldsymbol{Q}$ is a matrix of regression coefficients (loadings) for $\boldsymbol{T}$, and $\boldsymbol{E}$ is an error (noise) term. When the loadings $\boldsymbol{Q}$ are computed, the above regression model becomes $\boldsymbol{Y=XB+E}$, where $\boldsymbol{B=WQ}$, which can be used as a predictive regression model".

And the last step of the prediction model is*:* "Partial least squares regression produces a p by c weight matrix $\boldsymbol{W}$ for $\boldsymbol{X}$ such that $\boldsymbol{T=XW}$, i.e., the columns of $\boldsymbol{W}$ are weight vectors for the $\boldsymbol{X}$ columns producing the corresponding n by c factor score matrix $\boldsymbol{T}$. These weights are computed so that each of them maximizes the covariance between responses and the corresponding factor scores. Ordinary least squares procedures for the regression of $\boldsymbol{Y}$ on $\boldsymbol{T}$ are then performed to produce $\boldsymbol{Q}$, the loadings for $\boldsymbol{Y}$ (or weights for $\boldsymbol{Y}$) such that $\boldsymbol{Y=TQ+E}$. Once $\boldsymbol{Q}$ is computed, we have $\boldsymbol{Y=XB+E}$, where $\boldsymbol{B=WQ}$, and the prediction model is complete." (www.statsoft.com/textbook/).

Finally, additional matrix to complete description of partial least squares regression procedures is given that the *p* by *c* factor loading matrix ***P*** which gives a factor model $\boldsymbol{X}=\boldsymbol{TP}+\boldsymbol{F}$, where ***F*** is the unexplained part of the ***X*** scores (www.statsoft.com/textbook/).

After having explained the basic model for partial least square regression, the next step is describing the Nonlinear Iterative vartial Least Squares algorithm to compute partial least squares regression.

3.2.2 Nonlinear Iterative vartial Least Squares (NIPALS) Algorithm

The website of *Fundamentals of Statistics* stated that NIPALS algorithm has been developed by H.Wold at first for Principal Component Analysis (PCA) and then for PLS. It was seen as the most commonly used method for calculating the principal components of a data set and the results of NIPALS are more accurate then the results of Singular Value Decomposition (SVD) (www.statistics4u.info).

The algorithm for NIPALS is listed in Table 3.1. The first column shows the steps of the algorithm, second column shows the mathematical equation for the related step and lastly the explanation of the step was given in the 3rd column.

Table 3.1 NIPALS Algorithm (www.statistics4u.info)

Step	Math.	Explanation
1.	$\boldsymbol{u := x^i}$	Select a column vector x_i of the matrix X and copy it to the vector u
2.	$\boldsymbol{v := (X'u)/(u'u)}$	Project the matrix X onto u in order to find the corresponding loading v
3.	$\boldsymbol{v := v/\lvert v\rvert}$	Normalize the loading vector v to length 1
4.	$\boldsymbol{u_{old} := u}$ $\boldsymbol{u := (Xp)/(v'v)}$	Store the score vector u into u_{old} and project the matrix X onto v in order to find corresponding score vector u
5.	$\boldsymbol{d := u_{old}-u}$	In order to check for the convergence of the process calculate the difference vector d as the difference between the previous scores and the current scores. If the difference |d| is larger than a pre-defined threshold (e.g. 10-8) then return to step 2.
6.	$\boldsymbol{E := X - tp'}$	Remove the estimated PCA component (the product of the scores and the loadings) from X
7.	$\boldsymbol{X := E}$	In order to estimate the other PCA components repeat this procedure from step 1 using the matrix E as the new X

3.3 Model's Components

There are manifest and latent variables in PLS model. Wittingslow and Markham (1999) stated a manifest variable is a variable, which can be measured directly and a latent variable is inferred from a set of manifest variables and can not be measured directly (Scott, 2001).

Scott (2001) explained that in a questionnaire each item measures a manifest variable and when processing the data they are grouped into latent variables. Customer satisfaction is also one of the latent variables that have to be measured by inference from a number of manifest variables (Wittingslow and Markham, 1999).

There are endogenous variables, which are affected by changes in other latent variables, and exogenous variables, which are not affected by changes in other latent

variables, in PLS model. The definition of exogenous and endogenous latent variable can change according to perspective that they are examined. Customer satisfaction in the model is firstly an endogenous latent variable regarding to the inputs of the customer satisfaction, and at the same time it is also an exogenous latent variable regarding to the outputs of the customer satisfaction (Wittingslow and Markham, 1999).

Scott (2001) explained that Figure 3.1 identifies the components of the PLS model and is a graphic representation of the structure of customer satisfaction using PLS. It has to be noted that this is only a simplified version and actual models usually include multiple exogenous and endogenous latent variables. The PLS model is constructed in such a way that so that it also focuses on the outcomes of the customer satisfaction, while it measures the customer satisfaction (Wittingslow and Markham, 1999).

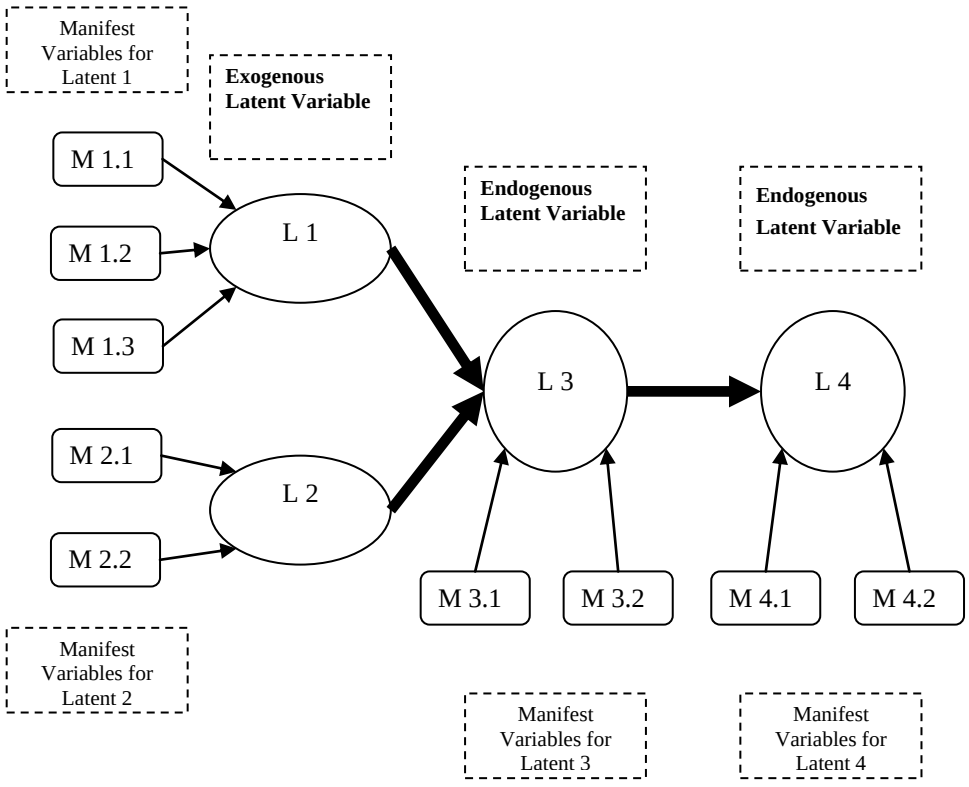

Figure 3.1 General structure of PLS model (Wittingslow and Markham, 1999)

The model displayed in Figure 3.4 has three separate components (Scott, 2001):

1. ***L1* and *L2*** are the exogenous latent variables, which are composed of the manifest variables *M1.1, M1.2* and *M1.3* and *M2.1, M2.2.* To calculate ***L1*** from *M1.1, M1.2* and *M1.3,* the weighted average of these manifest variables are taken instead of the straightforward summation of the manifest variables. Each manifest variable represents the mean value for the customer response to a particular question that influences overall satisfaction.

2. ***L3*** represents the overall customer satisfaction. The satisfaction score can be used to benchmark the results of the study with other organizations or companies.

3. ***L4*** is the endogenous latent variable, which represents the outputs of the customer satisfaction. These outcomes are typically factors such as repurchase, reuse and recommendation. In addition to the satisfaction score for each variable, the model also contains impact values of each exogenous latent variable on the endogenous latent variables (Scott, 2001).

3.4 Assumptions of PLS Regression

Garson (2009) listed the assumptions made in PLS regression as follows:

- Multicollinearity: Because of the fact that PLS factors are orthogonal, PLS models satisfy multicollinearity assumption.
- Independence of observations is not required.
- Distribution-free
- Appropriate sample size: The suggestions of Chin (1997) in part 3.2 are followed.
- Proper use of dummy variables: The dummy variable representing desired reference category must be omitted in the model.

- Standardized variables: The fact that all variables in the model have been centered and standardized, including dummy variables for categorical variables, has to be remembered before interpreting the results.
- Assumptions of linear regression: PLS includes most of the other assumptions of multiple regression, except that lack of multicollinearity among the independents is not required in PLS.

CHAPTER 4

METHODOLOGY

4.1 Introduction

After having explained CSI frameworks and related statistical method, PLS regression, the next step is to define the limits of the study and build the questionnaire of the survey. The sample frame, the study groupings, the parts of the questionnaire will be discussed in the following pages. To find the most related questions to assess the customer satisfaction of the participants, similar studies from the literature will be investigated.

4.2 Parameters used in the study

4.2.1 Sample frame

The interviews were held between December 2008 and January 2009 and the data collection period took around 2 months. The geographic area of the study was the big capitals in Turkey like Izmir, Istanbul, Ankara, Gaziantep, Bursa, Konya, Manisa, Kayseri, Muğla, Aydın, Denizli, Isparta, Edirne where the use of the modular kitchens was thought to be more widespread because of the population and overall income of these cities. The sample frame was those individuals who reside in the coverage area for the modular kitchen sector.

4.2.2 Study groupings

The study includes four different sub groups: Buyers for existing houses, Non-buyers for existing houses, Buyers for new houses and lastly Non-Buyers for new houses. The reason for that is the changing satisfaction level between the people who live in the same house during the decoration period and who don’t live. This difference in

the satisfaction level is caused by changing importance and priorities for two different groups. Normally, it is a more complicated and tiring period, if someone lives in the same house, while his/her home is getting decorated. And this automatically affects the expectations, importance and priorities. For example, the delivery lead time and assembly phases of buying new kitchen is expected to be more important for this group, since the people want to have their decoration finished as soon as possible to return their daily life.

Buyers for existing houses – These people are the ones, who have bought a modular kitchen and lived during the decoration period at the house, where their kitchen has been assembled. Because of the difficulties having a decoration, while living at the same house, many people are trying to avoid this situation, if they have other options. For example, some people have a second summer or winter house and they move there, while their homes are getting decorated.

Non-buyers for existing houses – The individuals in this group are thinking of buying a modular kitchen for their homes and they have to live in the same house during the decoration period, since they do not have any other alternative. They will show their expectancies in the survey by filling out the questionnaire form.

Buyers for new houses – In the first 2 subgroups, the decoration procedure was held in the same house, where the people are also living. The last 2 subgroups are consisting of people, who have decorated (will decorate) a new house or a second house, where they do not live. This subgroup belongs to the ones, who have already bought a modular kitchen.

Non-buyers for new houses – Like the previous subgroup, the people in this subgroup will either move a new house or have a second house to decorate; the difference with previous sub group is that these people have not bought any modular kitchen yet.

The two definitions of *Buyers* & *Non-buyers and Existing House* & *New House* were chosen to make any effects on the satisfaction of customers. The CSI demands a

minimum of 200 individuals that share the same model of customer satisfaction to achieve acceptable confidence levels. Sub groups with a population of 50 can be analyzed with validity of the model (Fornell et al., 1996). The above categories combine to form the following research study groupings.

Table 4.1 Research Study Groupings

	Buyer	**Non-Buyer**
Existing houses	People, who have bought modular kitchen for their existing houses.	People, who will buy a modular kitchen for their existing houses.
New houses	People, who have bought modular kitchen for their new houses.	People, who will buy a modular kitchen for their new houses.

4.3 Designing the Questionnaire

The next step is identifying the *exogenous latent variables* and *manifest variables* for *latent variables* (Inputs of the Model), then *endogenous latent variable*, which is customer satisfaction in our case, and finally the last *endogenous variables* (outputs of the Model). To do this, similar studies have been investigated and the literature was reviewed. Additionally, interviews with the professionals from the sector were carried out.

4.3.1 Parts of the Questionnaire

After having focused on similar studies in the literature and carried out interviews with the professionals from the sector, the survey was designed in 2 different main parts:

- Survey Questions

- Demographic Questions and General Information

4.3.1.1 Survey Questions

Survey Questions consists of from 11 different parts, which are as follows: Brand Image, Showroom, Sales Personnel, Customization, Purchase Procedure, Delivery, Assembly, Product Specifications, Price, Website, Catalogue and Printed Documents.

Brand Image

Kotler (1984) defined the factors affecting purchasing procedure as follows:

- Physical and technical features of the good
- Economy (the price of the good(s))
- Image of the Seller
- Variety of the Resources
- Communication
- Psychological and Sociological Factors

Brand can be classified in *Image of the seller* group of Kotler's factors. Akyüz (1998) stated the brand is one of the factors, which is effective in furniture purchasing procedure. Moreover, in the study of Kösali (2006), it was stated that brand is one of the most effective factors in purchasing procedure of the consumers in the modular kitchen sector. The survey designed to measure the effect of the brand in 3 aspects:

- Reputation
- Reliability
- Effect on Purchasing Decision

Showroom

Showrooms are the places, where the companies show offs their goods. The modular kitchen companies prefer to have as big as possible showrooms in the main streets of that area to be able to present as much as various models and modules. Akyüz (1998) concluded that one of the factors affecting peoples buying decision on furniture sector is the feature of the furniture showrooms. Moreover, Toksarı (2004) also showed the showrooms one of the distribution channels of the furniture companies.

The showroom questions in the survey are listed as follows to find out the possible features of them affecting customer satisfaction:

- Ease of Access
- Spaciousness
- Model and Modules Variety
- Physical Arrangement

Sales Personnel

During the interviews with the professionals from the sector, it was observed that the sales personnel in modular kitchen companies consist of mainly from architects, civil engineers and designers, because of the fact that the sales personnel have also to do the necessary design tasks during the purchasing procedure.

When the factors affecting purchasing in Kotler's (1984) study were investigated, it is possible to comment that the sales personnel is effective on *Image of the seller*, *Communication* and *Psychological and Sociological Factors.* The *Communication* meant in Kotler's (1984) study is the communication between the sellers and consumers, which show the importance of the sales personnel in purchasing decision. The questions in this part are trying to measure the below features of the sales personnel:

- Attitude
- Knowledge Level
- Communication Skills
- Sufficiency of the Information provided

Customization

The design phase in the modular kitchen sector is a complex procedure because of the fact that the spaces of the kitchens are usually very different from each other. This brings out the fact that modular kitchen product is a tailor-made product and should be designed according to the physical feature of the space.

This design and project phase in the purchasing decision was named as *customization* in this study. The professionals from the sector listed the necessary parts of this process as follows:

- Software Adequacy
- Response Time for Custom Projects
- Number of Alternative Offered
- Project Adequacy
- Adequacy of Additional Infrastructure Projects

Purchase Procedure

The professionals in the sector explained that the contract and printed project supply is one of the important tools of the purchasing in the modular kitchen. Another important factor is the payment alternatives offered. Akyüz (1998) stated that %74.2 of his study participants prefer to buy their furniture with hire-purchase. The Purchase Procedure has 3 questions to measure the effect of this part to the customer satisfaction:

- Purchase procedures and documentation

- Contract and project information details
- Payment alternatives offered

Delivery

The delivery phase in the modular kitchen sector was also shown as one of the major phases in purchasing a modular kitchen by the professionals from the sector. The standard delivery time is changing between 4-8 weeks. The details about the delivery are listed in the questionnaire in 4 different questions:

- Delivery Time
- Delivery Promptness
- Delivery Closure
- Delivery Pre-notification

Assembly

One of the facts differentiating the kitchen furniture from other furniture's like chairs, tables, sofas etc. is the need to the assembly the modules of a kitchen. The modules of the modular kitchen are arriving as disassembled packages. This makes the assembly part in this sector important. The parts of this procedure include:

- Product kitchen fit level
- Presence of all components
- Assembly team professional experience
- Assembly team housekeeping
- Assembly team technical knowledge

Product Specifications

This part is one of the Kotler's (1984) factors, which was listed as physical and technical features of the good. Akyüz (1998) stated functionality, ergonomy, social statue and technology as the features of the furniture. Moreover, in the same study,

Akyüz (1998) found that %68 of the participants has chosen the company to purchase a modular kitchen because of the quality reasons.

Toksarı (2004) explained the following factors should be included in the product in the design procedure: functionality, safety, durability, aesthetic factors, reliability.

Similarly, the factors of the kitchen defined as important by the professionals and consumers in the study of Kösali (2006) include the followings: design, quality, functionality, durability, safety, accessorize and technology.

Thus, the factors under the headline of products specification in this study are:

- Quality Level
- Functionality
- Ergonomic Aspects
- Safety Level
- Finishing Characteristics
- Mechanism and Accessory Variety

Price

The economy was one of the factors listed in Kotler's factors, which is effective in purchasing decision. In addition to this, Akyüz (1998) stated that %31 of the participants in his study has given primary priority to the price in purchasing furniture. Toksarı (2004) used also price as a supporting factor to analyze purchasing procedure in the furniture sector. Lastly, in the study of Kösali (2006), the price was shown among the factors affecting purchasing decision.

The questionnaire has 2 price related questions:

- Price Level
- Perceived Value for Money

Website

Website is an important tool in today's world for almost all of the companies, which can be classified in Kotler's (1984) within the factors of *variety of the resources* and *communication*. The website part has 2 questions given below:

- Easy to surf website
- Sufficiency of information

Catalogue and Printed Documents

Akyüz (1998) listed catalogue and printed documents as one of the resources used by consumers in furniture purchasing decision. The following questions were listed in the study within this part:

- Visual support for decision making
- Catalogue model variety

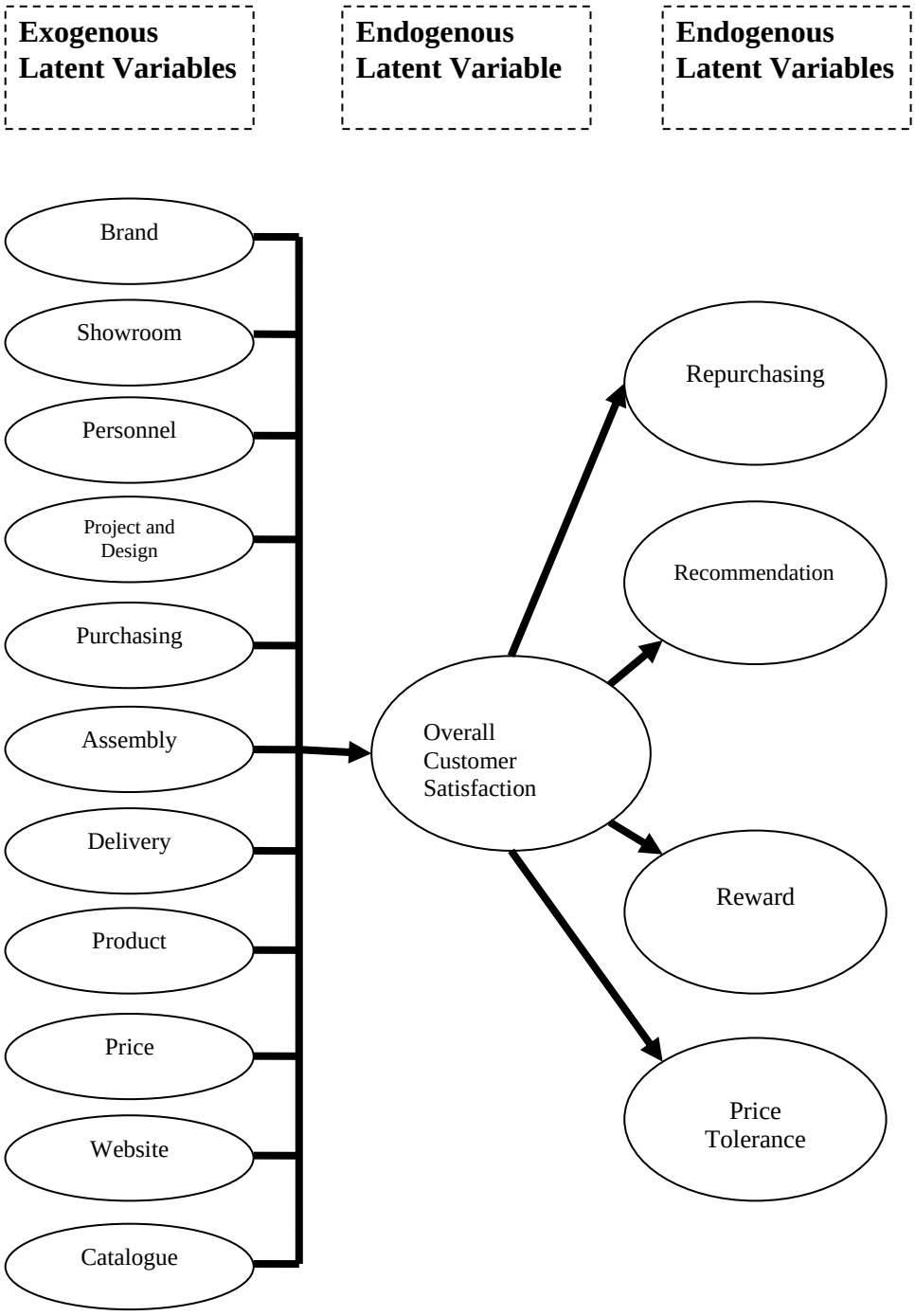

Figure 4.1 Theoretical model of customer satisfaction in modular kitchen sector

4.3.2 Interviews

There are 45 registered modular kitchen companies as a member of MUDER (Muder, 2006). The interviews with the professionals were focused on factors

affecting customer satisfaction in ready-made kitchen sector. The professions of the participants are as follows: five architects, three civil engineers and two designers.

After having performed the interviews and compared the comments of the professionals, 11 *exogenous latent variables* were found as the main input of the model with the help of the literature survey performed in the previous section. The findings from the similar studies were also examined during this step.

4.3.3 Model building

The preliminary customer satisfaction model in Figure 4.2 was built from the literature survey and the responses from the qualitative non-directive interview with the professionals in the sector.

The contents of each headline have been listed next to the each headline in the model. There are totally 11 *exogenous latent variables* and 40 *manifest variables* in the model. Accordingly, 40 questions have been derived in the survey to measure the impact of these variables on the customer satisfaction.

Overall customer satisfaction is one of the *endogenous latent variables* and consists of 3 questions in the model.

The outcomes of the customer satisfaction have been listed as 4 different *endogenous latent variables*, which are listed also as four questions in the survey.

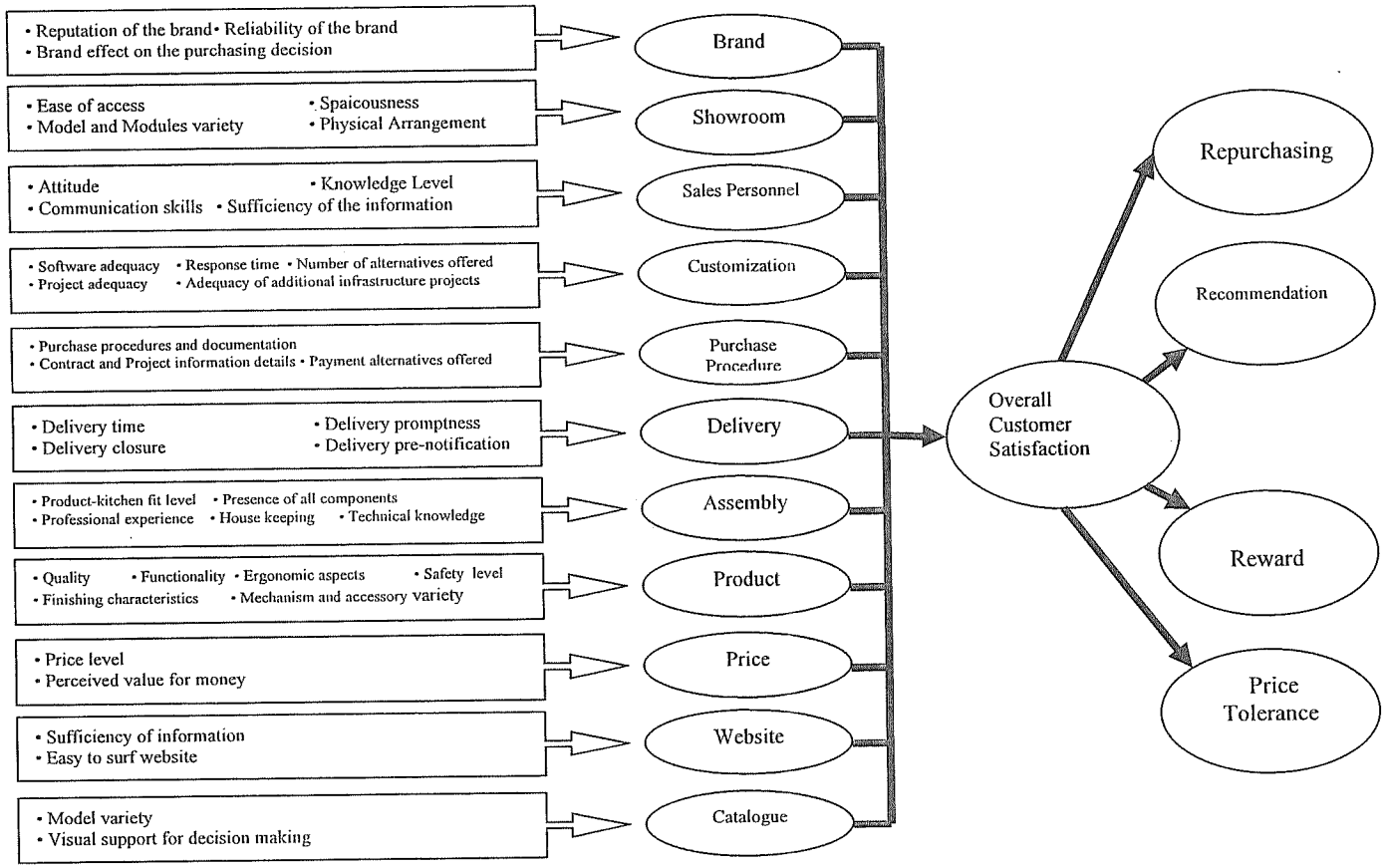

Figure 4.2 Preliminary model of customer satisfaction in modular kitchen sector

4.3.4 Instrument design

The instrument of the study, the questionnaire, was prepared after completing the literature survey and interviews with the professionals from the sector and finally comparing the similar studies. The common factors taken from these sources were transferred into the final questions in the survey. Extra questions were put to measure the customer satisfaction and the outcomes of the satisfaction or dissatisfaction, such as re-purchase activity, recommendation of the goods and service to others, reward and re-purchase intent even the price is increased. The survey is totally seven pages and consists of four main parts: The cover page, Technical questions, Demographic and General Questions, Comments.

The cover page explains briefly the intent of the study and gives information about how to fill out the survey.

Technical questions are about three main parts of the model, exogenous Latent variables, endogenous latent variables and final endogenous latent variables. The Exogenous latent variables are then divided into eleven main headings: Brand Image, Showroom, Sales Personnel, Customization, Purchase Procedure, Delivery, Assembly, Product Specifications, Price, Website, Catalogue and Printed Documents.

Demographic and General Questions are about the gender, age, city, marital status, income status, the place of decoration and the kitchen buying experience. Thus, there are totally 47 questions in the first part of the survey. This was followed by demographic features and general information, which consist of 8 questions. Finally the comments of the customers are asked, if they have any.

The respondent was asked for a reply on a one to ten scale with an explicit *Don't Know* option.

CHAPTER 5

RESULTS

5.1 Response Rates

Table 5.1 below shows total questionnaires sent out, total number of valid responses and the amount and percentage of these valid responses for each subgroup: Buyers for existing houses, Non-buyers for existing houses, Buyers for new houses, Non-buyers for new houses.

It is seen that the number of all existing house customers (162), are more than all new house customer (112). Also, total number of Buyers (163), are more than the number of all Non-buyers (111).

Table 5.1 Response rates in the various groupings

Subgroup	**Valid Responses**	**% Percentage**	**Questionnaires Sent Out**	**% Percentage**
Buyers for existing houses	111	40	320	34.69
Non-buyers for existing houses	51	19	320	15.94
All Existing House Customers	**162**	**59**	**320**	**50.63**
Buyers for new houses	52	19	320	16.25
Non-buyers for new houses	60	22	320	18.75
All New House Customers	**112**	**41**	**320**	**35.00**
All Customers	**274**	**100**	**320**	**86.25**

Totally, 16 surveys are taken out from the survey because of having too much empty answer and cursory evaluation including too much 1 or 10 answers.

5.2 Descriptive Statistics on Total Sample

Descriptive statistics for the total sample were shown in Table 5.2 below. There are totally eight columns in the table. *Q* shows the question number in the survey. Survey Questions are the final questions in the survey. *Min* and *Max* are the lowest and highest scores recorded for a given question by all respondents. *Mean* is the adjusted geometric average of all responses for that question and *MD* explains the Median value. *SD* is the Standard Deviation of all responses for that question. *N* is the number of valid responses to the question.

Table 5.2 Descriptive Statistics on Total Sample

Q	SURVEY QUESTIONS	Min	Max	Mean	SD	MD	N
1	**BRAND**						
2	Reputation of the brand	1	10	7.45	1.76	8	274
3	Reliability of the brand	1	10	8.55	1.52	9	274
4	Brand Effect on purchasing decision	1	10	7.55	1.86	8	274
5	**SHOWROOM**						
6	Ease of Access	1	10	7.87	1.83	8	274
7	Spaciousness	2	10	7.97	1.69	8	274
8	Model and modules variety	1	10	8.31	1.78	9	274
9	Physical Arrangement	1	10	8.29	1.73	9	274
10	**SALES PERSONNEL**						
11	Attitude of the staff	1	10	8.63	1.61	9	274
12	Knowledge level of the staff	2	10	8.91	1.47	9	274
13	Communication skills	1	10	8.60	1.53	9	274
14	Sufficiency of the information provided	1	10	8.75	1.63	9	274
15	**CUSTOMIZATION**						
16	Software Adequacy	1	10	7.68	1.95	8	274
17	Response time for custom projects	1	10	8.33	1.66	9	274
18	Number of alternatives offered	1	10	8.27	1.92	9	274
19	Project Adequacy	1	10	8.60	1.64	9	274
20	Adequacy of additional infrastructure projects	1	10	8.53	1.91	9	274
21	**PURCHASE PROCEDURE**						
22	Purchase procedures and documentation	1	10	8.39	1.69	9	274
23	Contract and project information details	1	10	8.45	1.57	9	274
24	Payment alternatives offered	1	10	8.52	1.76	9	274
25	**DELIVERY**						
26	Delivery time	1	10	8.45	1.94	9	274
27	Delivery promptness	1	10	8.47	1.80	9	274
28	Delivery closure	1	10	8.33	1.83	9	274
29	Delivery pre-notification	1	10	8.40	1.79	9	274

30	**ASSEMBLY**						
31	Product kitchen fit level	1	10	8.99	1.37	9	274
32	Presence of all components	1	10	8.96	1.55	10	274
33	Assembly team professional experience	1	10	8.91	1.46	9	274
34	Assembly team housekeeping	1	10	8.37	1.97	9	274
35	Assembly team technical knowledge	1	10	8.85	1.65	9	274
36	**PRODUCT SPECIFICATIONS**						
37	Quality level	1	10	8.90	1.45	9	274
38	Functionality	1	10	8.80	1.52	9	274
39	Ergonomic aspects	1	10	8.58	1.63	9	274
40	Safety level	1	10	8.72	1.59	9	274
41	Finishing characteristics	1	10	8.50	1.64	9	274
42	Mechanism and accessory variety	1	10	8.28	1.83	9	274
43	Price level	1	10	8.38	1.61	9	274
44	Perceived value for money	1	10	8.79	1.82	10	274
45	**SUPPLEMENTARY INFORMATION**						
46	Sufficiency of information	1	10	7.71	2.22	8	274
47	Easy to surf website	1	10	7.67	2.22	8	274
48	Catalogue model variety	1	10	7.99	1.90	8	274
49	Visual support for decision making	1	10	7.92	1.91	8	274
50	**CUSTOMER SATISFACTION AND OUTPUTS OF THE MODEL**						
51	The kitchen meets the idea of an ideal kitchen	1	10	7.58	1.85	8	274
52	The kitchen has met the expectations	2	10	7.82	1.77	8	274
53	Overall satisfaction with the kitchen	2	10	7.70	1.71	8	274
54	Willingness to re-purchase another kitchen	1	10	7.20	2.42	8	274
55	Willingness to recommend others to buy	1	10	7.14	2.44	8	274
56	Willingness to reward	1	10	6.99	2.58	7	274
57	Willingness to re-purchase another kitchen if the price increased by % 10 percentage	1	10	5.95	2.75	7	274

5.3 Unidimensionality

Before proceeding in the PLS analysis of the study, unidimensionality test is performed on the study data. Unidimensionality tests are performed to measure the factors measured by manifest variables.

There are three different ways defined in the literature to measure unidimensionality of the blocks: Cronbach alfa, Dillon-Goldstein p and principal component analysis

Cronbach alfa testing is used in this study and the value of the result was found as 0.942 for the entire data set and shows that the model has unidimensionality (the criteria is 0.7) as shown in the below Table. It is also possible comment that the scale has a high-level of reliability.

Table 5.3 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.942	.950	47

5.4 Validity of the Model

Before starting the PLS regression of the data, the significance of the results of the PLS model was also checked.

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- H_0: Model is not valid
- H_1: Model is valid

Table 5.4 shows that Ho is rejected and the model used for the analysis of the study is valid and *p* value is under 0.05 significance level.

Table 5.4 Validity of the Model

Analysis of Variance for customer satisfaction					
Source	**DF**	**SS**	**MS**	**F**	**P**
Regression	10	2701.11	270.111	138.26	0,000
Residual Error	263	513.82	1.954		
Total	273	3214.93			

In this table, *DF* denotes Degree of Freedom, *SS* denotes Sum Square and *MS* denotes Mean Square.

5.5 PLS Regression

After having performed necessary unidimensionality and validity of the model tests, the next step is the analysis of the data with PLS regression. Table 5.5 shows the correlation results among the manifest variables of the model. The Spearman correlation method was used to build the following Table 5.5.

There are some guidelines offered in the literature to interpret a correlation coefficient and one of them was prepared by Cohen (1988). He defined following intervals:

Correlation	**Negative**	**Positive**
Small	−0.3 to −0.1	0.1 to 0.3
Medium	−0.5 to −0.3	0.3 to 0.5
Large	−1.0 to −0.5	0.5 to 1.0

More than half of the correlation data given in Table 5.5 is higher than 0.3, which shows medium and large relation among these variables according Cohen. However, it should be noted that the interpretation of a correlation coefficient depends mainly on the context and purposes and the same correlation number can be interpreted as large, whereas it can be interpreted as medium and small depending on the context and on the sample size.

Table 5.5 is the PLS regression results obtained by using MINITAB 14 software. As it was stated in Chapter 3, PLS regression is based on principal component analysis, where SEM is based on common (principal) factor analysis.

Table 5.5 Correlation Results

	b1	b2	b3	s1	s2	s3	s4	sp1	sp2	sp3	sp4	pp1	pp2	pp3	pp4	pp5	pp6	pp7	pp8	pp9	pp10	pp11	pp12	pp13	pp14	pp15	pp16	pp17	pa1	pa2	pa3	pa4	pa5	pa6	pa7	pa8	sl1	sl2	sl3	sl4
b1	1,00																																						
b2	0,33	1,00																																					
b3	0,53	0,37	1,00																																				
s1	0,20	0,21	0,24	1,00																																			
s2	0,12	0,29	0,25	0,51	1,00																																		
s3	0,15	0,34	0,18	0,38	0,51	1,00																																	
s4	0,04	0,25	0,11	0,38	0,52	0,51	1,00																																
sp1	0,16	0,34	0,15	0,30	0,33	0,29	0,24	1,00																															
sp2	0,18	0,47	0,28	0,29	0,40	0,36	0,38	0,64	1,00																														
sp3	0,09	0,27	0,17	0,32	0,35	0,18	0,35	0,55	0,62	1,00																													
sp4	0,22	0,45	0,26	0,29	0,30	0,30	0,33	0,46	0,66	0,60	1,00																												
pp1	0,17	0,30	0,20	0,31	0,33	0,24	0,29	0,25	0,37	0,29	0,45	1,00																											
pp2	0,13	0,32	0,18	0,26	0,25	0,24	0,24	0,30	0,35	0,32	0,45	0,56	1,00																										
pp3	0,16	0,41	0,24	0,29	0,31	0,33	0,28	0,33	0,42	0,34	0,49	0,55	0,66	1,00																									
pp4	0,11	0,37	0,21	0,23	0,31	0,25	0,19	0,35	0,49	0,42	0,58	0,44	0,41	0,57	1,00																								
pp5	0,15	0,30	0,23	0,21	0,27	0,27	0,29	0,34	0,46	0,36	0,48	0,33	0,44	0,48	0,52	1,00																							
pp6	0,17	0,31	0,21	0,31	0,27	0,25	0,25	0,32	0,37	0,35	0,39	0,41	0,41	0,49	0,52	0,46	1,00																						
pp7	0,15	0,29	0,23	0,28	0,29	0,23	0,29	0,27	0,42	0,37	0,45	0,40	0,44	0,43	0,50	0,42	0,68	1,00																					
pp8	0,03	0,23	0,08	0,22	0,24	0,17	0,25	0,28	0,28	0,35	0,37	0,25	0,25	0,34	0,32	0,29	0,32	0,48	1,00																				
pp9	0,12	0,28	0,18	0,22	0,22	0,21	0,20	0,16	0,30	0,26	0,37	0,32	0,45	0,43	0,39	0,41	0,33	0,34	0,32	1,00																			
pp10	0,13	0,31	0,27	0,29	0,24	0,29	0,22	0,26	0,40	0,34	0,48	0,42	0,43	0,49	0,52	0,48	0,45	0,45	0,32	0,68	1,00																		
pp11	0,15	0,31	0,30	0,30	0,33	0,28	0,26	0,29	0,45	0,42	0,49	0,41	0,44	0,48	0,49	0,46	0,42	0,52	0,39	0,61	0,73	1,00																	
pp12	0,20	0,28	0,27	0,26	0,33	0,18	0,29	0,28	0,40	0,43	0,44	0,26	0,35	0,45	0,46	0,42	0,41	0,48	0,36	0,52	0,60	0,67	1,00																
pp13	0,11	0,36	0,22	0,26	0,29	0,26	0,21	0,30	0,37	0,27	0,43	0,36	0,44	0,47	0,57	0,36	0,51	0,50	0,24	0,36	0,49	0,51	0,46	1,00															
pp14	0,12	0,29	0,21	0,18	0,31	0,25	0,19	0,29	0,42	0,30	0,48	0,32	0,35	0,47	0,56	0,39	0,41	0,38	0,30	0,41	0,50	0,54	0,44	0,66	1,00														
pp15	0,16	0,33	0,24	0,20	0,27	0,31	0,23	0,30	0,40	0,32	0,51	0,35	0,39	0,48	0,54	0,41	0,40	0,43	0,36	0,37	0,55	0,56	0,44	0,51	0,66	1,00													
pp16	0,20	0,30	0,15	0,20	0,21	0,20	0,24	0,23	0,32	0,30	0,43	0,31	0,26	0,38	0,39	0,38	0,25	0,33	0,32	0,40	0,47	0,45	0,43	0,41	0,51	0,61	1,00												
pp17	0,20	0,33	0,26	0,16	0,26	0,30	0,26	0,29	0,38	0,33	0,46	0,31	0,30	0,46	0,55	0,37	0,37	0,42	0,28	0,39	0,51	0,54	0,43	0,47	0,60	0,75	0,62	1,00											
pa1	0,23	0,45	0,30	0,27	0,30	0,25	0,31	0,36	0,43	0,36	0,49	0,35	0,39	0,47	0,55	0,40	0,39	0,37	0,29	0,41	0,45	0,44	0,35	0,49	0,60	0,55	0,43	0,55	1,00										
pa2	0,19	0,40	0,30	0,26	0,29	0,33	0,24	0,30	0,37	0,41	0,47	0,42	0,41	0,49	0,55	0,39	0,44	0,48	0,28	0,45	0,52	0,50	0,46	0,50	0,55	0,52	0,40	0,54	0,70	1,00									
pa3	0,22	0,37	0,30	0,23	0,27	0,30	0,21	0,28	0,38	0,38	0,43	0,47	0,47	0,48	0,59	0,41	0,50	0,50	0,23	0,44	0,51	0,53	0,47	0,55	0,56	0,49	0,37	0,51	0,60	0,76	1,00								
pa4	0,11	0,32	0,28	0,22	0,30	0,25	0,27	0,19	0,30	0,31	0,40	0,40	0,37	0,40	0,51	0,42	0,38	0,48	0,23	0,43	0,51	0,49	0,47	0,50	0,51	0,44	0,34	0,52	0,57	0,63	0,68	1,00							
pa5	0,21	0,31	0,32	0,27	0,36	0,36	0,36	0,35	0,46	0,37	0,45	0,38	0,34	0,45	0,48	0,43	0,37	0,41	0,32	0,32	0,43	0,42	0,41	0,40	0,46	0,45	0,36	0,46	0,50	0,49	0,49	0,45	1,00						
pa6	0,22	0,28	0,30	0,19	0,25	0,32	0,29	0,25	0,40	0,35	0,43	0,37	0,32	0,39	0,46	0,44	0,36	0,38	0,28	0,38	0,45	0,44	0,45	0,21	0,40	0,46	0,38	0,45	0,53	0,56	0,51	0,54	0,65	1,00					
pa7	0,03	0,24	0,17	0,22	0,20	0,29	0,13	0,20	0,33	0,21	0,29	0,22	0,25	0,34	0,42	0,34	0,22	0,27	0,21	0,28	0,35	0,40	0,27	0,34	0,40	0,42	0,30	0,40	0,42	0,43	0,31	0,34	0,30	0,32	1,00				
pa8	0,10	0,35	0,17	0,13	0,28	0,22	0,21	0,25	0,37	0,31	0,41	0,30	0,36	0,38	0,48	0,42	0,28	0,31	0,24	0,38	0,45	0,42	0,31	0,40	0,56	0,51	0,40	0,55	0,58	0,53	0,47	0,54	0,40	0,45	0,59	1,00			
sl1	0,23	0,31	0,27	0,15	0,22	0,23	0,21	0,06	0,29	0,19	0,33	0,33	0,24	0,36	0,40	0,22	0,28	0,35	0,31	0,34	0,39	0,39	0,21	0,32	0,32	0,44	0,36	0,43	0,36	0,37	0,34	0,37	0,39	0,41	0,18	0,36	1,00		
sl2	0,18	0,27	0,25	0,19	0,27	0,25	0,26	0,10	0,33	0,22	0,32	0,34	0,27	0,34	0,40	0,32	0,29	0,35	0,29	0,34	0,47	0,43	0,34	0,26	0,32	0,49	0,45	0,47	0,35	0,40	0,33	0,39	0,37	0,45	0,25	0,41	0,62	1,00	
sl3	0,20	0,36	0,28	0,21	0,26	0,34	0,28	0,25	0,39	0,36	0,37	0,33	0,29	0,38	0,43	0,34	0,38	0,40	0,36	0,34	0,44	0,47	0,39	0,34	0,45	0,47	0,41	0,45	0,44	0,48	0,44	0,32	0,48	0,47	0,33	0,41	0,52	0,52	1,00
sl4	0,20	0,35	0,25	0,22	0,26	0,32	0,26	0,25	0,35	0,30	0,35	0,29	0,29	0,41	0,26	0,33	0,33	0,44	0,29	0,32	0,42	0,48	0,36	0,32	0,39	0,43	0,36	0,42	0,39	0,47	0,41	0,37	0,50	0,50	0,34	0,42	0,52	0,53	0,79	1,00

5.5.1 Inputs of the Customer Satisfaction

In Figure 4.2, p.55, the preliminary model of customer satisfaction was including 11 latent variables and 40 manifest variables. After PLS analysis, the latent variables affected by related manifest variables are decreased to 9 variables as shown in Table 5.6, which are as follows: *Brand*, *showroom*, *sales personnel*, *customization*, *purchase procedure*, *delivery*, *assembly*, *product attributes* and *supplementary information*. This means that *price* variable is included in *product attributes* variable and *website* &*catalogue and printed documents* variables form the variable named as *supplementary information*.

Table 5.6 Final Latent Variables

Latent Variable	X Variance
Brand	0.406872
Showroom	0.445514
Sales Personnel	0.493473
Customization	0.526772
Purchase Procedure	0.568518
Delivery	0.592072
Assembly	0.612586
Product Attributes	0.635354
Supplementary Information	0.651825

The model explains %84 of the Y variable and %65 of the variance of the independent variables. MSE value of the model is 1.95, which shows that the error of the model is quite small.

The weights, ***w,*** of each variable reflect the covariance structure between the predictor and response variables. In this case, *w* values of each variable give the

effect of the latent variables on the customer satisfaction. Table 5.7 shows that the weights are listed between 0.177-0.311 and all latent variables have positive effect on customer satisfaction as it was expected and there are not big differences among them except *supplementary information* variable. *Delivery*, *brand* and *showroom* variables are the factors having highest positive effect on customer satisfaction. At the same time, *assembly*, *sales personnel* and *product attributes* have also important effects on the customer satisfaction. Lastly, the results show that *customization* and *purchase procedure* are more effective than *supplementary information* on customer satisfaction.

Another important indicator given in the Table 5.7 is the R^2 values of the latent variables. O'Loughlin et al. (2002) explained that R^2 values show the explanation capability of the manifest on the related latent variables. In this study, R^2 shows whether the customer satisfaction is well explained by that variable or not.

R^2 values in the model are listed between 0.796-0.841, which shows the capability of the latent variables to measure the customer satisfaction is very high. If R^2 values would be smaller than 0.5, the questions (the manifest variables) for the latent variables in the survey had to be changed.

Table 5.7 PLS Results for Customer Satisfaction

Latent Variable	Manifest Variable	Weight	R-Square
Brand	b1	0.303	0.796
	b2		
	b3		
Showroom	s1	0.307	0.824
	s2		
	s3		
	s4		
Sales Personnel	sp1	0.266	0.830
	sp2		
	sp3		
	sp4		
Customization	c1	0.221	0.836
	c2		
	c3		
	c4		
Purchase Procedure	pp1	0.257	0.838
	pp2		
	pp3		
Delivery	d1	0.311	0.839
	d2		
	d3		
	d4		
Assembly	a1	0.291	0.840
	a2		
	a3		
	a4		
	a5		
Product Attributes	pa1	0.277	0.840
	pa2		
	pa3		
	pa4		
	pa5		
	pa6		
	pa7		
	pa8		
Supplementary Information	sl1	0.177	0.841
	sl2		
	sl3		
	sl4		

The last step is the calculation of the *customer satisfaction index* numbers with the help of w values shown in the above Table 5.7. The scale for customer satisfaction index is 100 and the result will be between 0-100.

CSI for customer satisfaction is 80.41. This is the average customer satisfaction value of the customers and it shows the satisfaction level of the customer in this sector, when it is compared with other CSI values from other sectors.

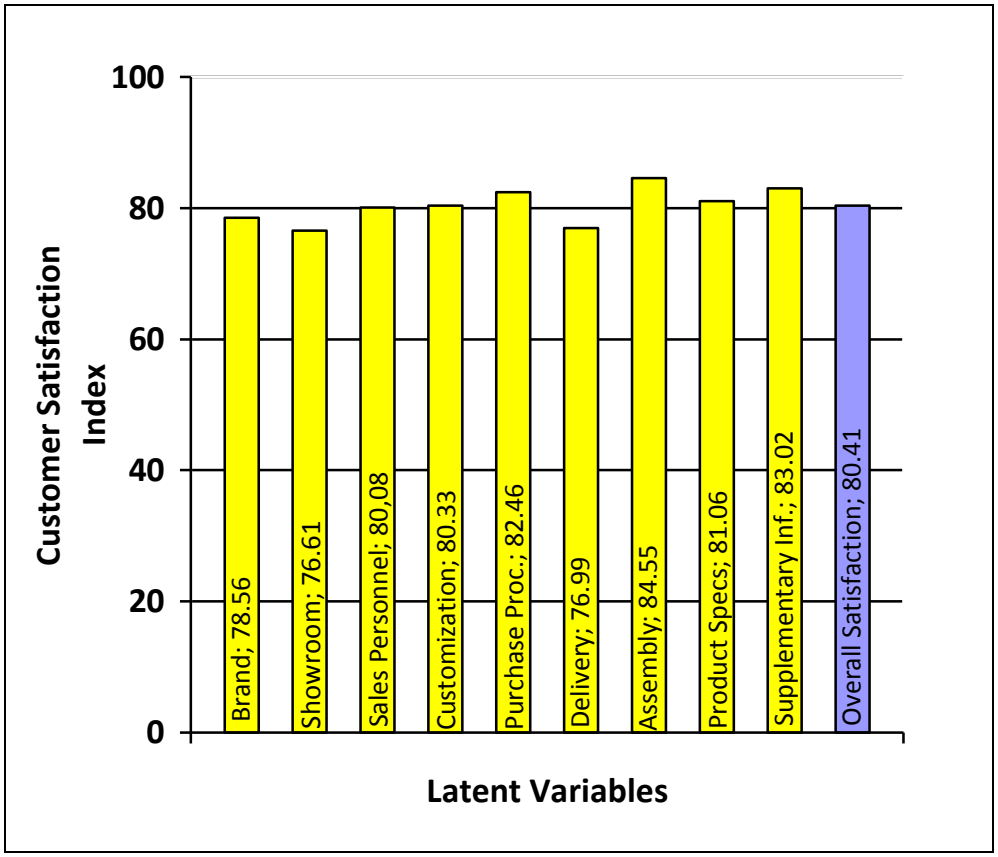

Figure 5.1 CSI Numbers of Latent Variables

The highest CSI value was calculated for *assembly* 84.55. Supplementary information and *purchase procedure* follows this value with CSI values 83.02 and 82.06. The lowest CSI value was found for the *brand* latent variable as 78.56.

5.5.2 Outputs of the Customer Satisfaction

The preliminary model in this study includes the inputs and outputs of the customer satisfaction. In previous part, the relation between the inputs and customer satisfaction was explained.

The outputs of the model include the outputs, *repurchase*, *reward*, *recommendation* and *price tolerance*. Table 5.8 shows the measuring capability of the customer

satisfaction on each output variable. R^2 values are changing between 0.541-0.672 and are above the critical limit 0.5, but they are not as effective as R^2 values of the latent variables on customer satisfaction.

Table 5.8 PLS Results for Outputs of the Customer Satisfaction

Output Variable	R-Square	CSI Number
Repurchase	0,655638	77.36
Recommendation	0,630741	79.87
Reward	0,672075	74.44
Price Tolerance	0,541453	69.59

CSI numbers are between 69.59-79.87, which shows that *recommendation* has highest index number, but the *price tolerance* has the smallest index number.

Also, the significance of all output variables is summarized in the Table 5.9. The relation between *customer satisfaction* and its *outputs* are significant under $p<0.05$ level. On the other side, the *MS errors* are listed between the range of 4.38-5.43 and explain that the errors of the model rather small.

Table 5.9 Significance of Customer Satisfaction Outputs

Analysis of Variance for repurchase					
Source	**SS**	**DF**	**MS**	**F**	**P**
Regression	1	2400.21	2440.21	517.87	0.000
Residual Error	272	1281.67	4.71		
Total	273	3721.88			
Analysis of Variance for recommendation					
Source	**SS**	**DF**	**MS**	**F**	**P**
Regression	1	2300.96	2300.96	464.61	0.000
Residual Error	272	1347.07	4.95		
Total	273	3648.03			
Analysis of Variance for reward					
Source	**SS**	**DF**	**MS**	**F**	**P**
Regression	1	2443.91	244391	557.46	0,000
Residual Error	272	1192.46	4.38		
Total	273	3636.37			
Analysis of Variance for price tolerance					
Source	**SS**	**DF**	**MS**	**F**	**P**
Regression	1	1744.61	1744.61	321.18	0,000
Residual Error	272	1477.48	543		
Total	273	3222.09			

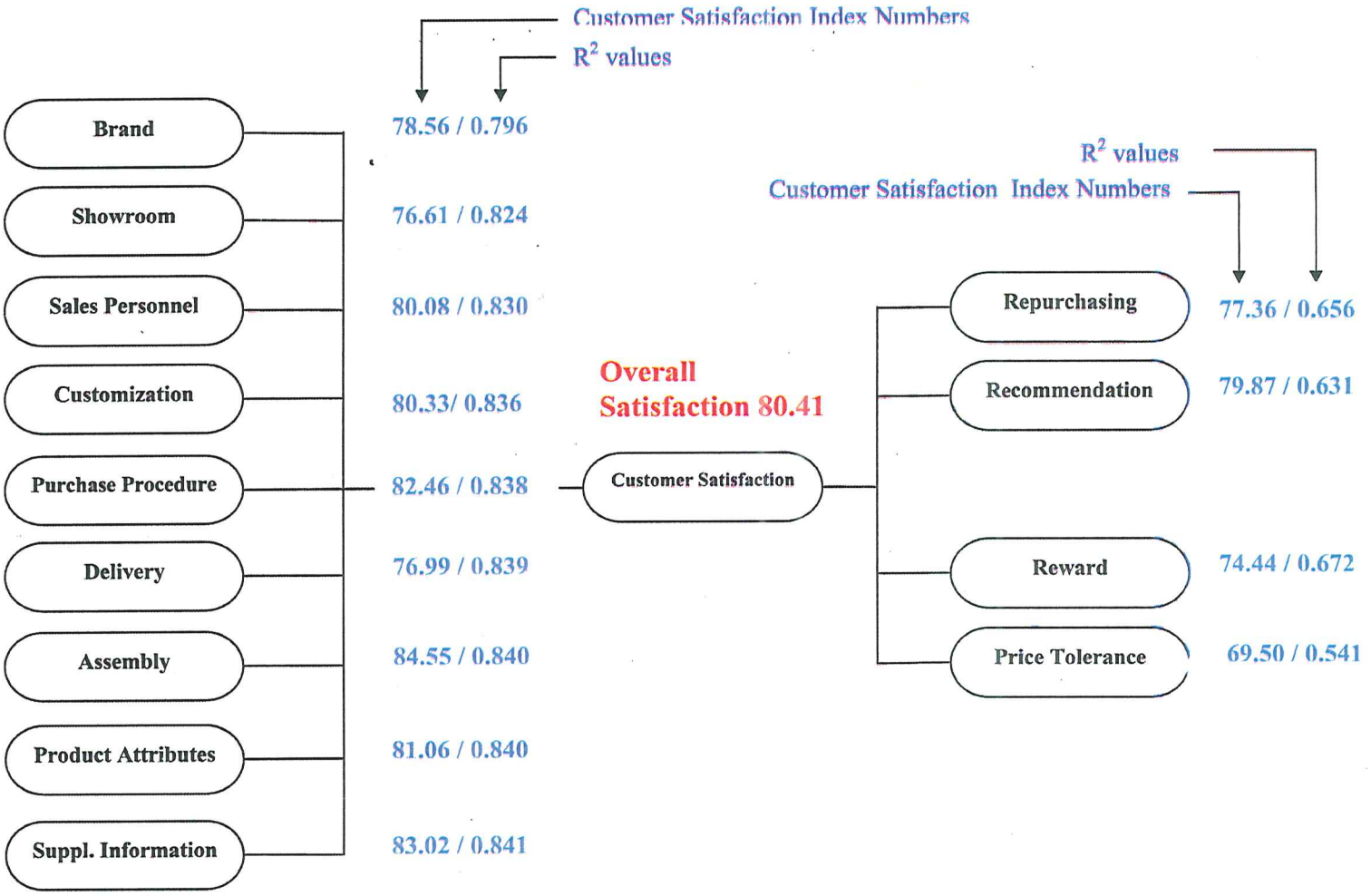

Figure 5.2 Final Model with Values

5.6 Differences between Groups

As explained in Chapter 4, the study includes four different subgroups. The logic of the grouping depends on kitchen buying date and the decoration place.

Mann-Whitney U test was applied in the analysis of the differences between the groups, because of the fact that the data are categorical data and they do not satisfy the normality assumption. The Chi-Square tests of each variable in Man-Whitney U test were given in Appendix B.

To compare the group medians following hypothesis are build for Mann Whitney U test:

5.6.1 Customer Satisfaction Questions & Decoration Place

Hypothesis 1

H_0: There is no difference in the median values of the participants according to *customer satisfaction questions,* who are grouped according to the *decoration place*

H_1: There is a difference in the median values of the participants according to question *customer satisfaction questions,* who are grouped according to the *decoration place.*

The results show that:

- There is no difference in the median values of the customer satisfaction questions and H_0 is not declined and the significance level of Hypothesis 1 is more than 0.05.

Table 5.10 Differences in CS & Decoration Place

Ranks				
	Decoration place	N	Mean Rank	Sum of Ranks
q_41	Where I live	162	146.18	2368100
	Where I'll move	112	124.95	13994.00
	Total	274		
q_42	Where I live	162	144.81	23459.50
	Where I'll move	112	126.92	14215.50
	Total	274		
q_43	Where I live	162	142.71	2311900
	Where I'll move	112	129.96	14556.00
	Total	274		

Test Statistics (a)			
	q_41	q_42	q_43
Mann-Whitney U	7666.000	7887.500	8228.000
Wilcox on W	13994.000	14215.500	14556.000
Z	-2.208	-1.863	-1.327
Asymp. Sig. (2-tailed)	.057	062	.185

5.6.2 Customer Satisfaction Questions & Buying Date

Hypothesis 2

H_0: There is no difference in the median values of the participants according to *customer satisfaction questions*, who are grouped according to the *buying date*.

H_1: There is a difference in the median values of the participants according to question *customer satisfaction questions*, who are grouped according to the *buying date*.

The results show that:

- There is a difference in the median values of the customer satisfaction questions and H_0 is declined and the significance level of Hypothesis 2 is less than 0.05.

Table 5.11 Differences in CS & Buying Date

Ranks				
	buy date	N	Mean Rank	Sum of Ranks
q_41	never	111	107.44	11926.00
	any time	163	157.97	25749.00
	Total	274		
q_42	never	111	103.54	11492.50
	any time	163	160.63	26182.50
	Total	274		
q_43	never	111	105.19	11676.50
	any time	163	159.50	25998.50
	Total	274		

Test Statistics (a)			
	q_41	q_42	q_43
Mann-Whitney U	5710.000	5276.500	5460.500
Wilcox on W	11926.000	11492.500	11676.500
Z	-5247	-5.938	-5.646
Asymp. Sig. (2-tailed)	.000	.000	.000

5.6.3 Output Questions & Decoration Place

Hypothesis 3

H_0: There is no difference in the median values of the participants according to *customer satisfaction output questions*, who are grouped according to the *decoration place*

H_1: There is a difference in the median values of the participants according to question *customer satisfaction output questions*, who are grouped according to the *decoration place*

The results show that:

- There is no difference in the median values of the customer satisfaction output questions and H_0 is not declined and the significance level of Hypothesis 3 is more than 0.05.

Table 5.12 Differences in the Outputs of CS & Decoration Place

Ranks				
	Decoration place	N	Mean Rank	Sum of Ranks
q_44	Where I live	162	143.43	23235.00
	Where I'll move	112	128.93	14440.00
	Total	274		
q_45	Where I live	162	137.90	22340.00
	Where I'll move	112	136.92	15335.00
	Total	274		
q_46	Where I live	162	142.25	23045.00
	Where I'll move	112	130.63	14630.00
	Total	274		
q_47	Where I live	162	144.00	23328.50
	Where I'll move	112	128.09	14346.50
	Total	274		

Test Statistics (a)				
	q_44	q_45	q_46	q_47
Mann-Whitney U	8112.000	9007.000	8302.000	8018.500
Wilcox on W	14440.000	15335.000	14630.000	14346.500
Z	-1.506	-.102	-1.205	-1.648
Asymp. Sig. (2-tailed)	.132	.919	.228	.099

5.6.4 Output Questions & Buying Date

Hypothesis 4

H_0: There is no difference in the median values of the participants according to *customer satisfaction output questions*, who are grouped according to *buying date*

H_1: There is a difference in the median values of the participants according to question *customer satisfaction output questions*, who are grouped according to *buying date*

The results show that:

- There is a difference in the median values of the customer satisfaction questions and H_0 is not declined since the significance level of Hypothesis 4 is more than 0.05.

Table 5.13 Differences in the Outputs of the CS & Buying Date

Ranks

	buy date	N	Mean Rank	Sum of Ranks
q_44	never	111	107.17	11896.00
	any time	163	158.15	25779.00
	Total	274		
q_45	never	111	108.37	12029.00
	any time	163	157.34	25646.00
	Total	274		
q_46	never	111	106.50	11821.00
	any time	163	158.61	25854.00
	Total	274		
q_47	never	111	111.68	12396.00
	any time	163	155.09	25279.00
	Total	274		

Test Statistics (a)

	q_44	q_45	q_46	q_47
Mann-Whitney U	5680.000	5813.000	5605.000	6180.000
Wilcox on W	11896.000	12029.000	11821.000	12396.000
Z	-5.288	-5.074	-5.394	-4.492
Asymp. Sig. (2-tailed)	.000	.000	.000	.000

CHAPTER 6

CUSTOMER RELATIONSHIP MANAGEMENT

6.1 Definition of CRM

A brief definition of CRM by Dyche in CRM Handbook is as follows:

> *"The infrastructure that enables the delineation of and increase in customer value, and the correct means by which to motivate valuable customers to remain loyal-indeed, to buy again."*

Rigby et.al (2002) stated that Customer relationship management (CRM) includes the processes that a company uses to track and organize its contacts with its current and prospective customers. Improving services given to customers and using customer contact information are typical CRM targets to realize.

CRM includes many aspects which relate directly to one another:

- Front office operations
- Back office operations
- Business relationship
- Analysis (Rigby et al., 2002).

Actually, CRM is not a new concept and it is possible to come across with "CRM notation" in USA media in 1989s, but only few. In a study realized in 2000, this number has reached to 14.000 (Website of Microsoft Company).

There are various types of CRM are defined in the literature: in the Website of Wikimedia Foundation, Inc as follows: Operational CRM, Sales Force Automation

(SFA), Analytical CRM, Sales Intelligence CRM, Campaign Management, Collaborative CRM, Geographic CRM

6.2 Artificial Intelligence

Artificial intelligence (AI) is the intelligence of machines and the branch of computer science which aims to create it. Major AI textbooks define the field as

> "the study and design of intelligent agents," Mackworth and Goebel

John McCarthy, who coined the term in 1956, defined it as

> "the science and engineering of making intelligent machines."

The tools of AI were defined in the literature as follows:

Search and optimization, Logic, Probabilistic methods for uncertain reasoning, Classifiers and statistical learning methods, neural networks, Control theory, specialized languages

In this study, neural network tool will be used to build a forecasting and decision support tool in customer satisfaction survey.

6.3 Artificial Neural Networks

Jancikova et al. (2008) explained that "*Neural networks use the distributed parallel processing of information during the execution of calculations, which means that information recording, processing and transferring are carried out by means of the whole neural network, and then by means of particular memory places".* Learning was defined by them as a basic and essential feature of neural networks, while knowledge was explained as being recorded through the strength of linkages between particular neurons.

Jancikova et al. (2008) admitted that that the linkages between neurons resulting in a "correct answer" are strengthened and linkages resulting in a "wrong answer" are weakened by means of the so-called training set.

Neural networks are suitable to be used for their learning back propagation algorithms, the adaptation of which are called “supervised learning”. Multilayer feed forward network learning including three layers of neurons: input, output and at least one inner layer (Figure 6.1), can be found by using this algorithm (Jancikova et al., 2008).

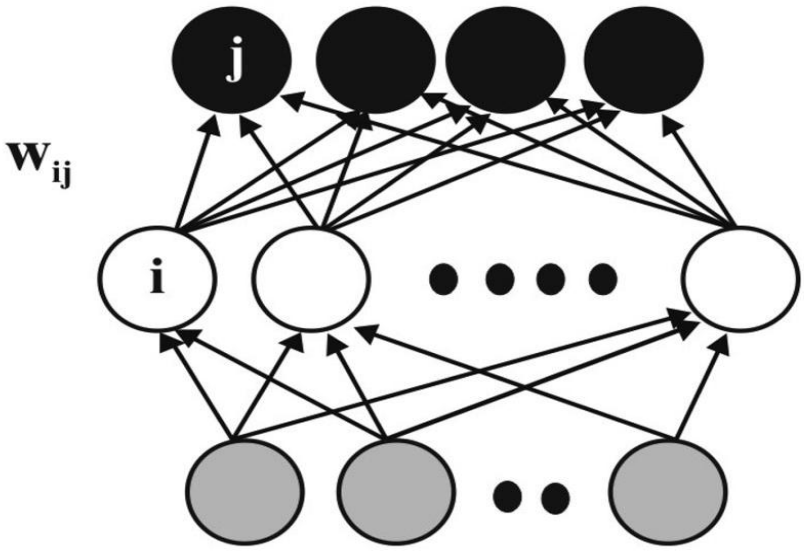

Figure 6.1 Topology of a multilayer feed forward neural network (Jancikova et al., 2008).

6.4 Development of the Model

There are totally 55 questions in the questionnaire applied during the survey. 47 of them are about measuring the customer satisfaction of the participant’s and 8 questions are to measure the demographic features of the participants. The statistical results in Chapter 5 showed that *Sales Personnel*, *Brand* and *Product Attributes* are from the factors having high significant effect on customer satisfaction. Thus, 3

Exogenous Variables from the Final Satisfaction Model were taken to develop a Neural Network model.

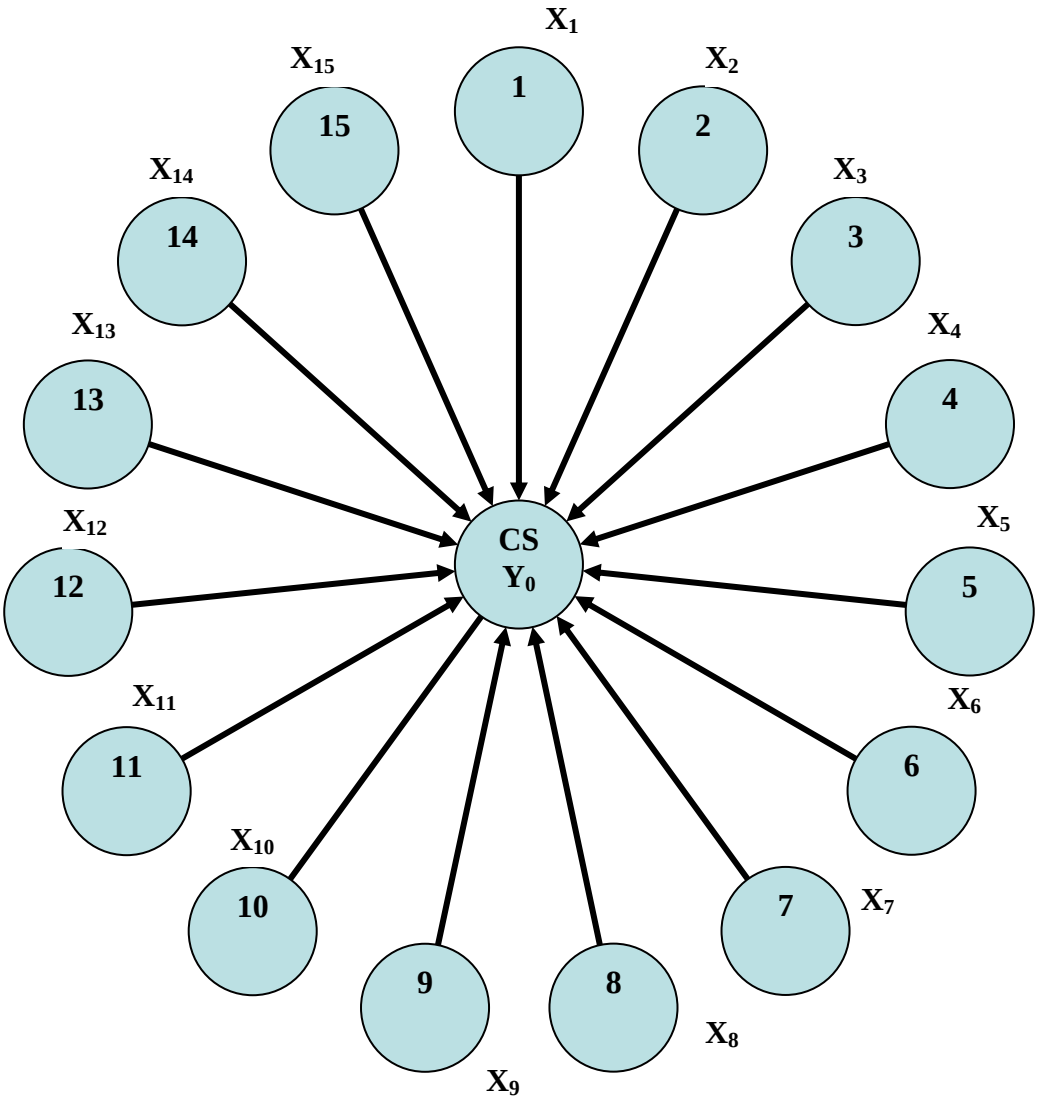

Figure 6.2 Artificial Neural Networks for Customer Satisfaction

The numbers given in the circles in Figure 6.2 represents:

1 Brand Reputation
2 Reliability
3 Effect on Purchasing Decision
4 Sales Personnel Attitude
5 Knowledge Level
8 Product Quality Level
9 Functionality
10 Ergonomic Aspects
11 Safety Level
12 Finishing Characteristics

6 Communication Skills	13 Mechanism and Accessory V.
7 Sufficiency of the information provided	14 Price Level
	15 Perceived Value for Money

Artificial neural network model of the study was shown in Figure 6.2 above. Neural network is trying to estimate the customer satisfaction by the help of variables like *brand*, *sales personnel* and *product attributes*.

And the equation (1) of the model is as follows:

$$y_0 = a_{01}x_1 + a_{02}x_2 + a_{03}x_3 + a_{04}x_4 + a_{05}x_5 + a_{06}x_6 + a_{07}x_7 + a_{08}x_8 + a_{09}x_9 + a_{10}x_{10} + a_{11}x_{11} + a_{12}x_{12} + a_{13}x_{13} + a_{14}x_{14} + a_{15}x_{15}$$

- y_0 is the output of the model, denotes the *customer satisfaction* of the model.
  $y_0 \in \{0,1,2,3,4,5,6,7,8,9,10\}$

- a_{0i} is the relative impact value of the nodes, denotes the weights of the variables of *brand*, *sales personnel* and *product Attributes*.
  $i \in \{0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16\}$

- x_i is the input of the model, denotes value of the variables of *brand, sales personnel* and *product attributes.*
  $x_i \in \{0,1,2,3,4,5,6,7,8,9,10\}$

The neural network model was build with the help of Microsoft Excel macro applications. The algorithm was written in Visual Basic Language. *The Gradient Descent Supervised Learning Algorithm* was applied to build the neural network.

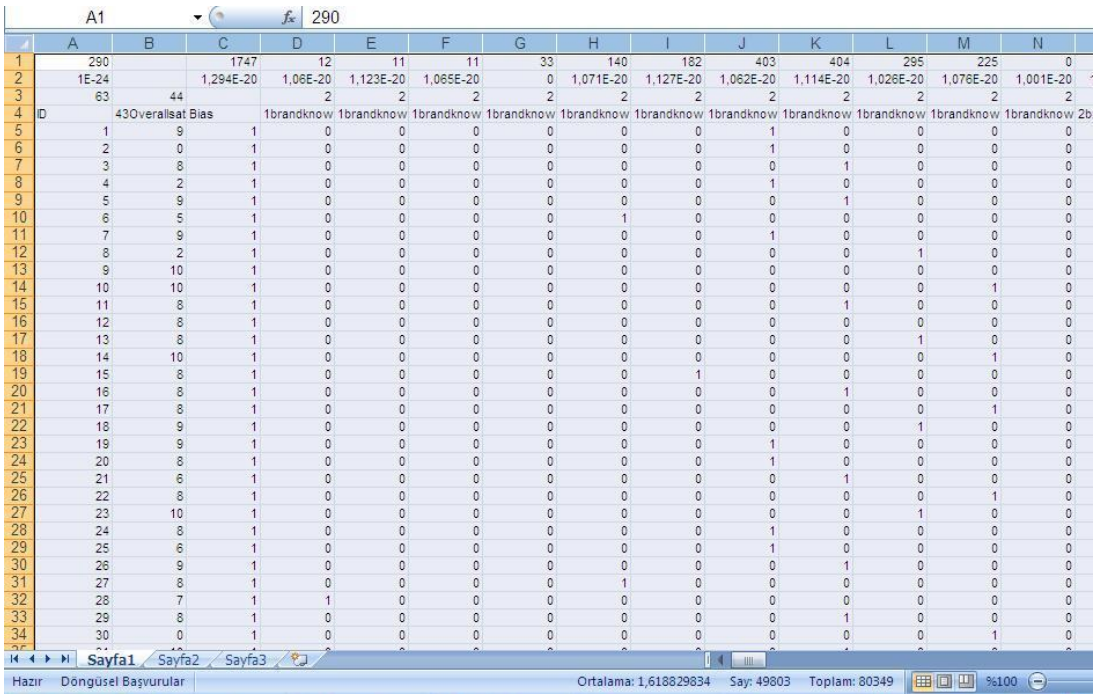

Figure 6.3 Microsoft Excel Pages of Data for Neural Network

Totally 290 survey papers were used to train neural network models for each *brand*, *sales personnel* and *product attributes* variables. Each neural network model is tested for alternative learning rate settings. After each implementation, the number of successful estimates is reported. The learning rate with the maximum number of successful estimates over survey data is selected. The data collected from 260 participants are used to train neural network models. Trained neural network models for each question are used to generate resulting customer satisfaction.

6.5 The Estimation Phase

After 250 samples given to the program the train the effects of the factors of *brand*, *sales personnel* and *product attributes*, the program started to estimate the customer satisfaction of the remaining 40 surveys with the help of the variables of *brand*, *sales personnel* and *product attributes*. The program gave 6 correct answers among 40 questions. The proportion of the true estimates can be enhanced by going over the learning phase. Similar trials can be performed by building new models and changing the variables. The aim of CRM application was to build a basic forecasting

and decision support tool. In real life, companies can use ERP integrated and complex softwares to estimate the expectation and buying behavior of their customers.

Table 6.1 Estimation of the Overall Satisfaction

ID	Overallsatisfaction	Bias	Forecast	Error	True?
201	8	1	7,53783	0,1068	T
202	9	1	8,44588	0,15352	F
203	7	1	6,92586	0,00275	T
204	8	1	7,97886	0,00022	T
205	8	1	8,4781	0,11429	T
206	7	1	9,17777	2,37134	F
207	6	1	8,62064	3,43387	F
208	5	1	11,131	18,7945	F
209	9	1	9,48681	0,11849	T
210	7	1	9,96469	4,39469	F
211	9	1	9,12954	0,00839	T
212	9	1	7,56138	1,03481	F
213	8	1	7,70534	0,04341	T
214	9	1	9,32536	0,05293	T
215	7	1	4,92831	2,14595	F
216	8	1	5,52524	3,06222	F
217	7	1	8,49216	1,11328	F
218	7	1	7,20527	0,02107	T
219	6	1	9,25101	5,28453	F
220	6	1	7,48658	1,10496	F
221	9	1	8,03515	0,46546	F
222	8	1	7,03603	0,46462	F
223	8	1	9,15642	0,66865	F
224	7	1	7,62431	0,19488	T
225	8	1	6,06285	1,87627	F
226	8	1	7,85797	0,01009	F
227	8	1	5,2354	3,8215	F

CHAPTER 7

DISCUSSION

In this final chapter the results, which were found in Chapter 5, will be discussed and compared with the results of similar studies. This chapter consists of the following parts:

- Customer Satisfaction Indices
- PLS regression results in the modular kitchen sector
- Differences between the study groups
- Comparison of the study with the studies in similar sectors
- Conclusion

7.1 Customer Satisfaction Indices

The history of the customer satisfaction index studies is based a two-decade-old period over the world. In Turkey, the first studies with this method were applied in 2005 (KalDer – Turkish Society for Quality). The aim of the customer satisfaction indices is to evaluate the performance of the companies from a customer point of view and to build a comparison tool for both companies and customers. The national index ratings show the general customer satisfaction in that country and also can be seen as an indicator for quality of life (Türkyılmaz, 2007).

The customer satisfaction index was found as 80.41 in this study. This result is an indicator to compare the customer satisfaction of the modular kitchen sector with the results of other sectors. Some examples from other sectors are as follows:

- The top federal government agency was NASA, which was rated 86 by educators participating in their programs (Fornell, 2000).

- The Customer Satisfaction Index rate in the cellular phone sector in Turkey was found as 64 (Türkyılmaz, 2007).

- The study about Metropolitan Ambulance Service found the customer satisfaction as 89 (Scott, 2001).

- Customer Satisfaction at Electric Utilities in Brazil among 3 different groups, commercial, residential and industrial were rated 71, 61, 64 (Barcellos, 1998).

7.2 PLS Regression Results of the Study

The preliminary model for customer satisfaction in Figure 4.2 was including 11 latent variables and 40 manifest variables. Before starting the PLS regression of the study, the reliability and validity of the model were checked with unidimensonality and ANOVA for validity of the model tests. The results showed that the model is applicable and the predictions of the model were also finding quite high R^2 values**.**

The number of final latent variables were decreased to nine components after the PLS analysis of the results. The former *product specifications* and *price* latent variables formed *product attributes*, also *website* and *catalogue and printed documents* variables formed *supplementary information* variables.

All of the latent variables have significant effect on customer satisfaction ($p<0.001$). ***W*** values, regression coefficients of the latent variables, are between 0.177-0.311. Except *supplementary information* having ***w*** value of 0.177, all the other latent variables have quite similar impacts on customer satisfaction. *Delivery, brand* and *showroom* variables have impact values of 0.311, 0.303 and 0.307. These factors were found as major factors affecting customer satisfaction in modular kitchen sector. The result of this can be explained that the modular kitchen sector was dominated mainly by brands and brand kitchens were exhibited usually in big and

easy reachable showrooms. And all of the products have specific delivery times. Delivery time has always been one of the customer complaints in furniture sector and the situation is the same for the kitchen production. Making the kitchens modular gives also the opportunity of small time of production and delivery to the manufacturers. Timing of the delivery and conditions of the delivery was seen therefore very effective on customer satisfaction by the participants. *Assembly*, *product attributes* and *sales personnel* variables follow the first three items with impact values of 0.291, 0.277 and 0.261. In modular kitchen sector brand companies give high importance on product attributes like ergonomy, safety, quality and price. They try to differentiate the products in this way from the no name companies and carpenters in the sector. Another improvement is that the architects or civil engineers are mainly hired to design the kitchens in brand companies. This process is used to be performed by carpenters for no name companies. Therefore, the sales personnel, mainly the architects, are found having high impact on customer satisfaction in this study. And assembly phase is performed usually by professional assemblers in the modular kitchen in brand companies.

Purchase procedure and *customization* variables have smaller impact values 0.257 and 0.221 compared to latent variables discussed above, but the difference is not very big and these variables are also effective in customer satisfaction. *Supplementary information* having $\boldsymbol{w}$ value of 0.177 is the least effective variable. This means that showrooms are much more effective than catalogues or printed documents for the customers and the habit of using internet in Turkey to decide on buying a kitchen needs still some time.

The outputs of the customer satisfaction were also rated in the study and it was shown in Table 5.6 that customer satisfaction have significant relations with all output variables, *repurchase*, *recommendation*, *reward* and *price tolerance*.

7.3 Differences between Groups

As it was shown in Table 4.1, the study consists of four different subgroups. The logic of the grouping depends on the participant's *kitchen buying experience* and the *decoration place.*

In Chapter 5, the differences between different groups were checked with Mann-Whitney U test, since the data was categorical and did not satisfy the normality assumption.

- **Differences according to the participant's kitchen buying experience**
  The difference in customer satisfaction between two groups (people bought already a kitchen and people never a bought a kitchen) was found significantly different. This means that the customer satisfaction expectation of the people is changing, when they buy a kitchen. Similarly, the output variables of the customer satisfaction in the model *(recommendation, repurchase, reward* and *price tolerance*) are also significantly different between two groups.

- **Differences according to the decoration place**
  The difference in customer satisfaction between two groups (decoration at the same house-decoration at a new house) was found significantly different for only question 41 in the survey, but the questions 42&43 showed no significant difference. All output variables of the customer satisfaction in the model (*recommendation, repurchase, reward* and *price tolerance*) are significantly different between two groups.

Consequently, it was tested that the *customer satisfaction* variable and *output variables of the customer satisfaction* have mostly significant differences in two different groups in the survey. The logic of grouping of the participants was the expectation that they will have significant differences incase of customer satisfaction

and outputs of the customer satisfaction. This situation was verified in the statistical analysis of the results.

7.4 Comparison with Other Furniture and Modular Kitchen Studies

The results of this study are compared with similar studies from modular kitchen and furniture sector. Kösali (2006) concluded that the main factors affecting the buying behavior of the consumers are *quality*, *durability* and *brand* in his study. The results of this study showed in Chapter 6, that the factors, which have significant effect on customer satisfaction in modular kitchen sector, are *Delivery, brand, showroom, product attributes, assembly, customization, purchase procedures* and *sales personnel* and lastly *supplementary information.* Except *supplementary information* factor, other factors were observed having similar impact values on the customer satisfaction.

7.5 Conclusion

The study showed that the PLS methodology can be successfully applied to the field of determinants of customer satisfaction. It agreed with work by other researchers that aspects of *delivery, brand, showroom, sales personnel,* assembly, *product attributes* and *customization, purchase procedure, supplementary information* are important factors in modular kitchen. The significance results for these variables are under $p<0.05$ level.

The results of the study should be evaluated by the companies in this sector from different aspects. The factors found as effective in customer satisfaction in modular kitchen sector mainly show the importance of the institutionalizing. The companies should focus on branding; have easy reachable and big showrooms; improve the delivery performance and invest on human force to design the kitchens and also to assembly the kitchens. Product attributes, mainly: quality, design, safety, ergonomy, functionality and price of the kitchen have high effects on people's buying behavior. The companies should invest on R&D to produce well-designed, high-quality and

optimum priced products. This will be a key element in the competition in the future of this business as well. It should also be noted that the companies have to focus on differentiation to show their advantages to the potential customers to go a step further in the increasing competition.

Another finding of the study is the changing buying behavior and expectations between the study groupings. Decoration place and buying experience were found as having significantly difference on customer satisfaction and outputs of the customer satisfaction.

Chapter 6, which is focused on CRM, tried to help to the companies in building a forecasting and decision support tool to know the expectations of their customer and to take action to increase the customer satisfaction. A basic decision support and forecasting tool in the study was established using a neural network application and it is possible to enhance it to build an ERP integrated and complicated software to collect the data from the customers and use the same data to guess the expectations of the new customers and also to measure the customer satisfaction with building a customer satisfaction survey. A complicated software using neural network application can keep a wide range of customers portfolio knowing the ratings of the customers on the factors affecting the customer satisfaction and when a new customers come to the showroom, the expectation of his/her can be estimated while entering his/her demographic features into the software like a-28 years old-single-man gives priority to brand and assembly.

To sum up, the companies in the modular kitchen sector should continuously invest on R&D and CRM applications to survive in the increasing competition of this business and they should be as close as possible to their customers to feel their expectations closely and then to measure their satisfaction or dissatisfaction at the end of the procedure.

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APPENDIX A

QUESTIONNAIRE

FACTORS AFFECTING CUSTOMER SATISFACION IN MODULAR KITCHEN SECTOR

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This survey has been designed to collect data on your thoughts and perceptions of the critical factors affecting customer satisfaction in modular kitchen sector.

You are not asked to identify yourself. Your response will be anonymous.

Answering the questions

After most questions there is a scale marked from 1 to 10.
Read each question and mark the position on the scale that is closest to what you think. You do this by putting a circle around that number. An example is:

Poor **Excellent**
1 2 3 4 5 6 7 8 9 10 DK

If a question does not apply to you, or if you cannot respond, the circle DK (Don't Know) category at the end of the scale**:**

Poor **Excellent**
1 2 3 4 5 6 7 8 9 10 DK

If you make a mistake when you are answering a question put a cross through the mistake and circle the number you meant to use.

Poor Excellent

1 2 3 4 5 6 7 8 9 10 DK

Consider each of the following statements and think about your past or expected modular kitchen buying experience. Rate your response on the scale indicated.

Brand Image

	Poor Excellent
1 Reputation of the brand	1 2 3 4 5 6 7 8 9 10 DK
2 Reliability of the brand	1 2 3 4 5 6 7 8 9 10 DK
3 Brand Effect on purchasing decision	1 2 3 4 5 6 7 8 9 10 DK

Showroom

4 Ease of Access	1 2 3 4 5 6 7 8 9 10 DK
5 Spaciousness	1 2 3 4 5 6 7 8 9 10 DK
6 Model and modul variety	1 2 3 4 5 6 7 8 9 10 DK
7 Physical Arrangement	1 2 3 4 5 6 7 8 9 10 DK

Sales Personnel

8 Attitude	1 2 3 4 5 6 7 8 9 10 DK
9 Knowledge level	1 2 3 4 5 6 7 8 9 10 DK
10 Communication skills	1 2 3 4 5 6 7 8 9 10 DK
11 Sufficiency of the information provided	1 2 3 4 5 6 7 8 9 10 DK

Customization

12 Software Adequacy	1 2 3 4 5 6 7 8 9 10 DK
13 Response time for custom projects	1 2 3 4 5 6 7 8 9 10 DK
14 Number of alternatives offered	1 2 3 4 5 6 7 8 9 10 DK
15 Project adequacy	1 2 3 4 5 6 7 8 9 10 DK
16 Adequacy of infrastructure projects	1 2 3 4 5 6 7 8 9 10 DK

Purchase Procedure

17 Purchase procedures and documentation	1 2 3 4 5 6 7 8 9 10 DK
18 Contract and project information details	1 2 3 4 5 6 7 8 9 10 DK
19 Payment alternatives offered	1 2 3 4 5 6 7 8 9 10 DK

Delivery

20 Delivery time	1 2 3 4 5 6 7 8 9 10 DK
21 Delivery promptness	1 2 3 4 5 6 7 8 9 10 DK
22 Delivery closure	1 2 3 4 5 6 7 8 9 10 DK
23 Delivery pre-notification	1 2 3 4 5 6 7 8 9 10 DK

Assembly

24 Product kitchen fit level	1 2 3 4 5 6 7 8 9 10 DK
25 Presence of all components	1 2 3 4 5 6 7 8 9 10 DK
26 Assembly team professional experience	1 2 3 4 5 6 7 8 9 10 DK
27 Assembly team housekeeping	1 2 3 4 5 6 7 8 9 10 DK
28 Assembly team technical knowledge	1 2 3 4 5 6 7 8 9 10 DK

Product Specs

29 Quality level	1 2 3 4 5 6 7 8 9 10 DK
30 Functionality	1 2 3 4 5 6 7 8 9 10 DK
31 Ergonomics aspects	1 2 3 4 5 6 7 8 9 10 DK
32 Safety level	1 2 3 4 5 6 7 8 9 10 DK
33 Finishing characteristics	1 2 3 4 5 6 7 8 9 10 DK
34 Mechanism and accessory variety	1 2 3 4 5 6 7 8 9 10 DK

Price

35 Price level	1 2 3 4 5 6 7 8 9 10 DK
36 Perceived value for money	1 2 3 4 5 6 7 8 9 10 DK

Website

37 Sufficiency of information	1 2 3 4 5 6 7 8 9 10 DK
38 Easy to surf website	1 2 3 4 5 6 7 8 9 10 DK

Catalogue and Printed Documents

39 Catalogue model variety	1 2 3 4 5 6 7 8 9 10 DK
40 Visual support for decision making	1 2 3 4 5 6 7 8 9 10 DK

	Strongly Disagree									**Strongly Agree**	
41 The kitchen meets the idea of an ideal kitchen	1	2	3	4	5	6	7	8	9	10	BM
42 The kitchen has met the expectations	1	2	3	4	5	6	7	8	9	10	BM

	Poor									**Excellent**	
43 Overall satisfaction with the kitchen	1	2	3	4	5	6	7	8	9	10	BM

	Unwilling									**Very willing**	
44 Willingness to re-purchase another kitchen from the same company when it is needed	1	2	3	4	5	6	7	8	9	10	BM
45 Willingness to recommend others to buy	1	2	3	4	5	6	7	8	9	10	BM
46 Willingness to reward	1	2	3	4	5	6	7	8	9	10	BM
47 Willingness to re-purchase another kitchen if the price increased by % 10 percentage	1	2	3	4	5	6	7	8	9	10	BM

DEMOGRAPHIC FEATURES and GENERAL INFORMATION

Please tick each question in the box that applies to you.

48 Gender

Male □ 1

Female □ 2

49 Age Group

18 – 24 □ 1

25 – 34 □ 2

35 – 49 □ 3

50 – 59 □ 4

60 or older □ 5

50 Suborb

Your City

□□□□□□□□□□□

51 Marital Status

Single □ 1

Engaged □ 2

Married □ 3

Divorced □ 4

52 Education

High school or before □ 1

Pre-Graduate □ 2

Graduate □ 3

M.S. Graduate or further □ 4

53 Income Status

Less than 2.000 TL □ 1

Between 2.000-5.000 TL □ 2

Between 5.000-10.000 TL □ 3

More than 10.000 TL □ 4

54 Decoration will take (took) place

Where I live □ 1

Where I will move □ 2

55 When did you lastly buy a kitchen?

Never □ 1

Less than two years ago □ 2

Between two years and five years ago □ 3

More than five years ago □ 4

Are there any other comments you would like to make?

Thank you for completing this survey

Please get in contact with the below person for your questions or any kind of point you would like to inform

Grad.Student Semih Özer
e116295@metu.edu.tr
Industrial Engineering Department
Natural and Applied Sciences / METU

APPENDIX B

Chi Square Test for Decoration Place Criteria & Customer Satisfaction

For Question 41

H_0: There is no relation between the participants grouped according to the decoration place and question 41

H_a: There is a relation between the participants grouped according to the decoration place and question 41

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.633(a)	10	.004
Likelihood Ratio	26.313	10	.003
Linear-by-Linear Association	10.973	1	.001
N of Valid Cases	274		

Since %36 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

For Question 42

H_0: There is no relation between the participants grouped according to the decoration place and question 42

H_a: There is a relation between the participants grouped according to the decoration place and question 42

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.876(a)	9	.002
Likelihood Ratio	27.259	9	.001
Linear-by-Linear Association	8.813	1	.003
N of Valid Cases	274		

Since %35 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

For Question 43

H_0: There is no relation between the participants grouped according to the decoration place and question 43

H_a: There is a relation between the participants grouped according to the decoration place and question 43

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.117(a)	9	.024
Likelihood Ratio	19.806	9	.019
Linear-by-Linear Association	6.918	1	.009
N of Valid Cases	274		

Since %35 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

Chi Square Test for Buying Date Criteria & Customer Satisfaction

for Question 41

H_0: There is no relation between the participants grouped according to the criteria of having bought a kitchen and question 41

H_a: There is a relation between the participants grouped according to the criteria of having bought a kitchen and question 41

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	94.638(a)	10	.000
Likelihood Ratio	105.279	10	.000
Linear-by-Linear Association	55.025	1	.000
N of Valid Cases	274		

Since %36 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 42

H_0: There is no relation between the participants grouped according to the criteria of having bought a kitchen and question 42

H_a: There is a relation between the participants grouped according to the criteria of having bought a kitchen and question 42

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	80.018(a)	9	.000
Likelihood Ratio	86.429	9	.000
Linear-by-Linear Association	56.951	1	.000
N of Valid Cases	274		

Since %35 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 43

H_0: There is no relation between the participants grouped according to the criteria of having bought a kitchen and question 43

H_a: There is a relation between the participants grouped according to the criteria of having bought a kitchen and question 43

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	84.746(a)	9	.000
Likelihood Ratio	93.577	9	.000
Linear-by-Linear Association	56.198	1	.000
N of Valid Cases	274		

Since %35 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

Chi Square Test for Decoration Place Criteria & Customer Satisfaction Outputs

for Question 44

H_0: There is a relation between the participants grouped according to the decoration place and question 44

H_a: There is a relation between the participants grouped according to the decoration place and question 44

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.620(a)	10	.009
Likelihood Ratio	24.763	10	.006
Linear-by-Linear Association	4.086	1	.043
N of Valid Cases	274		

Since %32 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 45

H_0: There is a relation between the participants grouped according to the decoration place and question 45

H_a: There is a relation between the participants grouped according to the decoration place and question 45

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	47.733(a)	10	.000
Likelihood Ratio	54.175	10	.000
Linear-by-Linear Association	.703	1	.402
N of Valid Cases	274		

Since %32 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 46

H_0: There is a relation between the participants grouped according to the decoration place and question 46

H_a: There is a relation between the participants grouped according to the decoration place and question 46

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.813(a)	10	.011
Likelihood Ratio	23.451	10	.009
Linear-by-Linear Association	3.467	1	.063
N of Valid Cases	274		

Since %27 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 47

H_0: There is a relation between the participants grouped according to the decoration place and question 47

H_a: There is a relation between the participants grouped according to the decoration place and question 47

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.318(a)	10	.019
Likelihood Ratio	21.763	10	.016
Linear-by-Linear Association	3.270	1	.071
N of Valid Cases	274		

Since %27 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

Chi Square Test for Buying Date Criteria & Customer Satisfaction Outputs

for Question 44

H_0: There is no relation between the participants grouped according to the criteria of having bought a kitchen and question 44

H_a: There is a relation between the participants grouped according to the criteria of having bought a kitchen and question 44

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	71.879(a)	10	.000
Likelihood Ratio	76.357	10	.000
Linear-by-Linear Association	35.419	1	.000
N of Valid Cases	274		

Since %32 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 45

H_0: There is no relation between the participants grouped according to the criteria of having bought a kitchen and question 45

H_a: There is a relation between the participants grouped according to the criteria of having bought a kitchen and question 45

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	67.687(a)	10	.000
Likelihood Ratio	72.393	10	.000
Linear-by-Linear Association	31.535	1	.000
N of Valid Cases	274		

Since %32 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 46

H_0: There is no relation between the participants grouped according to the criteria of having bought a kitchen and question 46

H_a: There is a relation between the participants grouped according to the criteria of having bought a kitchen and question 46

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	65.729(a)	10	.000
Likelihood Ratio	70.560	10	.000
Linear-by-Linear Association	35.716	1	.000
N of Valid Cases	274		

Since %27 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.

for Question 47

H_0: There is no relation between the participants grouped according to the criteria of having bought a kitchen and question 47

H_a: There is a relation between the participants grouped according to the criteria of having bought a kitchen and question 47

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	55.218(a)	10	.000
Likelihood Ratio	56.998	10	.000
Linear-by-Linear Association	19.424	1	.000
N of Valid Cases	274		

Since %27 of the cells have expected count less than 5, H_0 is declined by looking at the linear by linear association (M^2 statistics). The significance level of this association is under 0,005 level.