DIMENSIONS OF USER SATISFACTION FOR DIFFERENT PRODUCT GROUPS

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ERDEM DEMİR

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_____
Prof. Dr. Canan Özgen
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

_____
Asst. Prof. Dr. Fatma Korkut
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science

_____
Assoc. Prof. Dr. Çiğdem Erbuğ
Supervisor

Examining Committee Members

Assoc. Prof. Dr. Mehmet Asatekin	(METU - ID)	_____
Assoc. Prof. Dr. Çiğdem Erbuğ	(METU - ID)	_____
Assoc. Prof. Dr. Erol Sayın	(METU - IE)	_____
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Signature :

ABSTRACT

DIMENSIONS OF USER SATISFACTION FOR DIFFERENT PRODUCT GROUPS

Demir, Erdem
M.S., Industrial Design
Supervisor: Assoc. Prof. Dr. Çiğdem Erbuğ

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User satisfaction information provides a supporting base for the industrial design processes. Satisfaction is measured via several methods in the industrial design practice. These measurements are not only helpful to direct the design, i.e. formative purposes, but they are also very beneficial to validate the final output of the design process, i.e. summative purposes. Due to its prominent role for shaping and validating the design, it is essential to define and measure satisfaction with household consumer products properly. However, the literature lacks a clear definition of the concept in the context of household consumer products. This remains to be the main obstacle on the way to propose sensitive measurement techniques.

This study mainly aims to clarify user satisfaction with consumer products by identifying its product-related dimensions. Firstly, the psychological background of satisfaction and the models of consumer satisfaction are reviewed to explain the processes underlying satisfaction response. Afterwards, the focus is shifted to the product design and ergonomics domains to come up with the aspects of products that influence user satisfaction. The literature survey provided product-related dimensions such as functionality, usability, product aesthetics, and emotional aspects of the interaction.

The main hypothesis of the study is that the importance of these dimensions for the overall satisfaction response varies in different product groups. In the field study that is conducted in order to question the validity of this hypothesis, the

importance of different product related dimensions for user satisfaction in ten different product groups is investigated via semi-structured interviews. The study revealed different prevailing dimensions for different product groups.

Keywords: User Satisfaction, Models of Satisfaction, Product Groups.

ÖZ

FARKLI ÜRÜN GRUPLARINDA KULLANICI TATMİNİ BOYUTLARI

Demir, Erdem
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Kullanıcı memnuniyeti bilgisi endüstriyel tasarım süreçlerini destekleyici bir zemin oluşturur. Kullanıcı memnuniyetini ölçmek için uygulamada bir çok yöntem kullanılır. Bu ölçümler tasarımı şekillendirmede yardımcı olduğu gibi, tasarım sürecinin son ürününün geçerlenmesinde de büyük yarar sağlar. Tasarımı şekillendirmede ve geçerlemedeki önemi dolayısıyla tüketim ürünleriyle ilgili kullanıcı memnuniyetini doğru bir şekilde tanımlamak ve ölçmek esastır. Literatürdeki geçmiş çalışmalar tüketim ürünleriyle ilgili kullanıcı memnuniyetini açıklığa kavuşturmakta yetersiz kalırlar. Bu da duyarlı ölçüm yöntemlerinin geliştirilmesi önünde önemli engellerden biridir.

Bu çalışma temelde tüketim ürünleriyle ilgili kullanıcı memnuniyetinin ürün bazlı boyutlarını belirlemeyi amaçlar. Çalışmada öncelikli olarak memnuniyet süreçlerini açıklamak üzere memnuniyetin psikolojik altyapısına ve tüketici memnuniyeti modellerine değinilir. Daha sonra kullanıcı memnuniyetini etkileyebilecek ürün özelliklerini tanımlamak amacıyla ürün tasarımı ve ergonomi alanlarına odaklanılmıştır. Literatür taraması sonucunda ürün bazlı memnuniyet boyutları fonksiyonellik, kullanılabilirlik, ürün estetiği, and etkileşimdeki duygusal boyut olarak belirlenmiştir.

Çalışmanın temel hipotezi farklı ürün gruplarında öne çıkan memnuniyet boyutlarının farklı olacağıdır. Bu hipotezi sorgulamak için yürütülen alan çalışmasında on ürün grubunda ürün bazlı memnuniyet boyutlarının öneminin nasıl

değiştiği yarı yapılandırılmış görüşme yöntemiyle araştırılmıştır. Çalışmanın sonucunda değişik ürün gruplarında değişik boyutların öne çıktığı görülmüştür.

Anahtar Kelimeler: Kullanıcı Memnuniyeti, Memnuniyet Modelleri, Ürün Grupları.

To Mom and Dad

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CHAPTER 1

INTRODUCTION

Satisfaction is a vague and complex term, when we constrain ourselves to the domain of user-product relationships. The literature is equipped with numerous diverse definitions for satisfaction. Apart from the sociological discussions pointing on the impossibility of satisfaction (Baudriallard, 1998), two major disciplines try to define the term; marketing and ergonomics. Marketing, aiming the success in the market, researches the needs of the consumers and evaluate the sufficiency in fulfilling these needs through the marketed products and services (Evans 1990). Whereas ergonomics comments on the appropriateness of the products to the human use and evaluates the success in designing the interaction (Pheasent 1986). The differences between two disciplines about the way they regard the human factor, cause the naming to differ as well. In the former discipline, human is the element that purchases the offered product / service, and satisfaction cannot be defined neglecting this notion. As the human is basically the purchaser, the term is named as “consumer/customer satisfaction”, whereas the latter mainly comments on the interaction and here the human uses the product, which results in the naming of “user satisfaction”.

The importance of gathering satisfaction information is apparent when we consider human as the consumer, since the main goal is to satisfy the consumer needs in that context. On the other hand, when we focus on the “user” notion, the satisfaction information is vital too. The recent studies comment that designer’s mental model during the design process may deviate widely from the mental models of the intended users (Norman 1988). In this respect, it is essential to incorporate the satisfaction information

coming from the user prior to actual marketing of the product in order to avoid its failure in the market. (Bias and Mayhew 1994). This approach, putting the focus on user and product usage, is named as "usability". In usability literature usable product is defined as the product that can be used *effectively, efficiently,* and most importantly for our study, in a way that results in the *satisfaction* of the user. (ISO 1998) The literature points to the importance of usability for *gaining the competitive edge in industry*. (Caplan 1994, Jordan 1997). Actually this shows the importance of incorporating satisfaction information into the design. In design domain, there are mainly two approaches trying to include usability aspects. First one, usability engineering (UE) is defined as a process where the usability of a product is specified after the design of the product, whereas user centered design (UCD) addresses early and continuous focus on users, empirical measurements, iterative design and multidisciplinary design teams (Buurman 1997, Kanis 1997). In both approaches user satisfaction is sought via direct observations, questionnaires, interviews, think aloud protocols, and the information gathered constitutes a direct input in designing the product.

In marketing literature, satisfaction is defined context specific that is to say for different products or services, different issues are raised involving satisfaction. Although this point of view is sensitive enough to grasp these differences, the poor interrelatedness of these studies result in the deficiency in generalization. (Giese and Cote 2000). Apart from the dimensions frequently mentioned in these studies focusing on the comments of consumers, the researches aim to achieve attractiveness in the market also contributes to the satisfaction. From these studies we can derive indirect definition of the satisfaction, mostly based on image and impression. In the other domain, usability, the dimensions of satisfaction concentrate on the ease of use, especially for the earlier studies. However, in recent years, the subjective part of usability is gaining importance and other aspects of the user-product interaction are also included as the dimensions of satisfaction. This term is referred in numerous studies under different names: pleasure of use (Jordan, 1997), emotional based marketing (Roth

1999), behavioral and emotional usability concept (Logan, 1994), sensuality in interface design (Hoffmeister et al, 1996, Nielsen, 1996).

The product testing domain is premature regarding the measuring user satisfaction. The techniques are mainly based on the questionnaires from the Human Computer Interaction (HCI) discipline. The questionnaires like Questionnaire for User Interaction Satisfaction (QUIS) (Chin et al. 1988), Software Usability Measurement Inventory (SUMI) (Porteous et al. 1993, Kirakowski 1996) are used for evaluating the usage satisfaction. However, these software oriented questionnaires cease to be a dependable tool for consumer products. In the context of industrial design, different from the products of HCI such as web pages, products that can be owned and used are concerned, e.g. refrigerators, vacuum cleaners, teapots, etc. The task and human performance oriented approach of HCI tools are unsuitable and insufficient for the consumer products domain. Here, it is expected that different dimensions prevail in the overall satisfaction, such as visual appeal, usefulness, usability, etc.

Aim of the study

In this study, it is aimed to clarify the satisfaction issues through the context of interaction with the consumer products. The effort has been made to present the product-related dimensions of user satisfaction. As it is reported by previous studies the prevailing dimensions for user satisfaction may vary among the product groups (Han et al. 2001, Giese and Cote 2000). However, to our knowledge, there is no comprehensive work in the literature analyzing the importance of the dimensions among different consumer product groups. The main goal is to fill this deficit of the literature. Therefore the main research question is:

- "What are the prevailing dimensions of overall user satisfaction for different product groups?

The main operational benefit that can be derived from the study is its implications for the product testing literature. Therefore the former question can also be adapted to a context specific one as:

- What are the dimensions that should be sought during product testing?

To be able to answer the main research question, some additional questions should be addressed to the literature in order to clarify and identify the terms. It is vital for the study to recognize the approaches of ergonomics and marketing disciplines where the term, satisfaction, has been defined and worked on. It will be beneficial for the study to find the resemblances and differences in defining the terms between two disciplines. The issues raised in product design literature are also essential for obtaining a complete list of dimensions. Therefore, sub-questions are:

- How is consumer satisfaction defined in marketing literature?
- What are the dimensions of consumer satisfaction in marketing literature?
- How is user satisfaction defined in ergonomics/usability literature?
- What are the dimensions of user satisfaction in ergonomics/usability literature?
- What are the dimensions of satisfaction raised in the product design literature?

Commenting on the appropriateness and sufficiency of current measurement techniques regarding the dimensions is essential in the study. Therefore, the current techniques should be analyzed carefully by asking the below questions:

- How is user satisfaction measured in practice?
- What are the dimensions sought in the product testing satisfaction surveys?

- How is consumer satisfaction measured in practice?
- What are the dimensions sought in the marketing research and post purchase satisfaction surveys?

This study will try to find answers to the following questions:

- Is there a “most influential dimension” for satisfaction and dissatisfaction?
- What is the significance of the visual appeal for overall product satisfaction/dissatisfaction?

Structure of the study

In the following two chapters the dimensions of satisfaction in the domain of household consumer products are to be deducted. Chapter 2 will focus on “consumer satisfaction”, and summarize the definitions of the consumer satisfaction. After gleaning the dimensions of satisfaction the chapter will look at the relationship between satisfaction and other related terms in marketing such as need, expectation, and attitude. Then user satisfaction will be defined. Chapter 3 will focus on the usage, shifting the main topics to ergonomics and design domain. Dimensions like functionality, usability, aesthetics will be investigated in detail. The chapter will also include emotional aspects and hedonic considerations.

The methods of satisfaction measurement are investigated in Chapter 4. Here, the primary methods of customer satisfaction and user satisfaction literature are analyzed. In Chapter 5, a field study answering our main research questions is presented. Different product groups are defined, and the dimensions of satisfaction are investigated via interviews in this chapter. In Chapter 6, the conclusions of the study are given.

CHAPTER 2

CONSUMER SATISFACTION

The goal of identifying the product related dimensions of user satisfaction can hardly be understood unless we include the studies in marketing discipline. The studies in this discipline do not pronounce the terms ‘user’ and ‘usage’ explicitly. Instead, the terms ‘consumer’ and/or ‘customer’ are utilized for the user, and the focus is given to purchase rather than usage. Nevertheless, most of the definitions made and the dimensions derived form the research are related with usage itself. In general, marketing activities are said to associate with identifying the particular wants and needs of a target market of customers, and then satisfying those customers better than the competitors (Beckman et al. 1973). This involves doing market research on customers, analyzing their needs, and then making strategic decisions about product design, pricing, promotion and distribution. The motive underneath the studies seems to be the satisfying of the needs of humanity. Although the studies focus on satisfying of the needs of humanity, the main objective of the research is obvious in the latest official definitions. Marketing is defined by American Marketing Association as “...an organizational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders.“ (Anonymous 1)

Here we can see the main consideration is the “benefit of the organization“, which may imply that, the customer comes after the organization itself. Nevertheless, one cannot deny the importance of the consumer element in the process. As customer stands in the core point on the way to derive this benefit for the organization, they deserve careful investigation. Consumer Behavior literature tries to model this

element. A popular definition of consumer behavior is “The study of individuals, groups, or organizations and the processes they use to select, secure, use, and dispose of products, services, experiences, or ideas to satisfy needs and the impacts that these processes have on the consumer and society.” (Hawkins et al. 2004, p.12)

This chapter will reveal the definition of consumer satisfaction after providing discussions about the related issues. It is complementary for the study to define and itemize needs for clarifying the dimensions of satisfaction, referring to economics, psychology and sociology. In the following section, consumer satisfaction is defined. After the discussions in literature regarding the nature of the concept are presented, consumer satisfaction models compiled from literature are provided to the reader. Another section is formed by the definitions and discussions regarding attitude. Attitude can be defined as the tendency to behave towards a specific product in a specific way. The term involves a first hand relation of human and product, and is closely related with satisfaction concept. In fact, in some product testing studies, satisfaction is defined based on attitude (Moven 1993). The main difference between the two terms is that satisfaction is commonly associated with a post purchase period, whereas attitude discussions in literature do not mention purchasing phase. The main operational benefit of this study is expected to be on product testing domain, where the product is tested by users who are ‘new’ to the product. In this context, the issue of purchasing is irrelevant and therefore, attitude, which is free of purchasing consideration, is found to some extent appropriate to define the user product relationship.

2.1 Needs and Satisfaction

The economists were first to analyze need concept in consumption process, apart from the classical philosophers, who cease to propose sufficient models for satisfaction of needs,. At the time the model was originated, the main consideration in economics was the scarcity of the food supply, and the economic models were based on this issue. However, today the situation is far different than the case in

eighteenth century, where the models were originated. Today, celebrating the abundance of alternatives, we are living in the "consumer society" and speaking about scarcity of food is somewhat old fashioned. In past, production was more important than consumption, so the models emphasized this side prominently. The consumer is regarded as somewhat static and of secondary importance in the models, which was not far from the truth for the time (Dubois 2000). The consumers are mentioned with the need concept and they "…would have to decide what to buy (and how much to buy) to satisfy their ever-present and basically unlimited needs "(Dubois 2000, p38).

Regarding consumers' needs and satisfaction of these needs, the model rises upon three hypotheses about the consumer. The first is the "transparency" hypothesis, which states the consumer is fully aware of his/her needs. The second hypothesis states that the preferences of the consumer are transitive; that is to say, if one prefers the first commodity over the second, and sticks to the second over the third, than the first is preferred over the third with certainty. Third hypothesis, which is the core of the model states that the individual tries to maximize the total utility, which is used as the synonym of satisfaction. With the other two essential component, price and income, the model is completed. An individual tries "to maximize marginal utility (or satisfaction) by dividing his or her purchases between different items according to the incremental satisfaction brought by consumption of one additional unit of a product, given its price." according to the model (Dubois 2000, p39).

The models, however, consider the dynamics of consumerist society, where the needs are created (Baudriallard 1998), and it is quite unrealistic to assume the consumer to know his/her own needs. Even if we are speaking about some "ideally conscious consumer", it again is far from reality to expect from consumer to know hundreds of different product alternatives. By the help of the previous studies, we know that "… an individual's knowledge of himself and of his environment is far from perfect and that there is a limit to the amount of information a human being can retain" (Dubois 2000, p42). The second hypothesis is showed to be invalid in cases where the alternatives are abundant in number. The third hypothesis , which is at the

heart of the model is deemed invalid due to consumer behavior research providing findings that state an individual does not look for the optimum but a 'satisfactory' level obtained on the key characteristics of the product. Although the debates on the validity of these assumptions continue, this model is important as it proposes a starting point for the analysis.

The economic models roughly mention about the consumer side. In order to detail the consumer process we have to get help from psychology. Discussions of satisfaction in psychology are commonly based on “motivation“ concept. Motivation refers to “...the process which causes people to behave in the way in which they do.“(Dubois 2000, p43) In many reference, motivation is explained by the biological term of “homeostasis“. This view considers individual in equilibrium when relaxed and relived. Whenever an internal or external stimulus disturbs the equilibrium of the individual and causes a need to occur, he/she seeks ways to satisfy this need (Scitovsky 1976). In literature, many works devoted for classification of needs. Another thing to mention here is that the motivations faced by may not always be under the rule of consciousness. Motivational research influenced by the Freudian approaches tries to reveal the role of sub-consciousness in our relations with the products. Here, satisfaction felt by the high end sport car owner is related to sexual connotations. In this study, the subconscious notion is also excluded while dealing with satisfaction with products.

The classification of Murray (1964) includes many dimensions of needs such as need to acquire, accomplish, exhibit, dominate, affiliate, play, order, recognize, respect, be autonomous or aggressive. A more general hierarchical scheme is proposed by Maslow (1954) ordering the needs in the Figure 2.1. In this figure, the bottom most level is the one having the most importance. The individual having satisfied with the needs in one level seeks ways to satisfy it needs in the later levels.

Although this scheme pointing to the ordering of the needs which finalizes at the up most point, promises “satisfaction”, in recent culture studies, it is stated that in consumer society ultimate satisfaction is nothing but just an illusion. According to Baudriallard (1998), analyzing the current situation with focusing on particular needs remains faint. The author rather comments on the “system of needs” which is the

result of the system of production. In this new system, needs are produced as a force of consumption and whenever satisfaction is achieved with a particular need a new one arises. Therefore the whole system is resembled to hysteria. In this respect satisfaction concept becomes volatile and short termed. In this study, we constrain ourselves with this short term satisfaction at expense of reproducing the current hysteria.

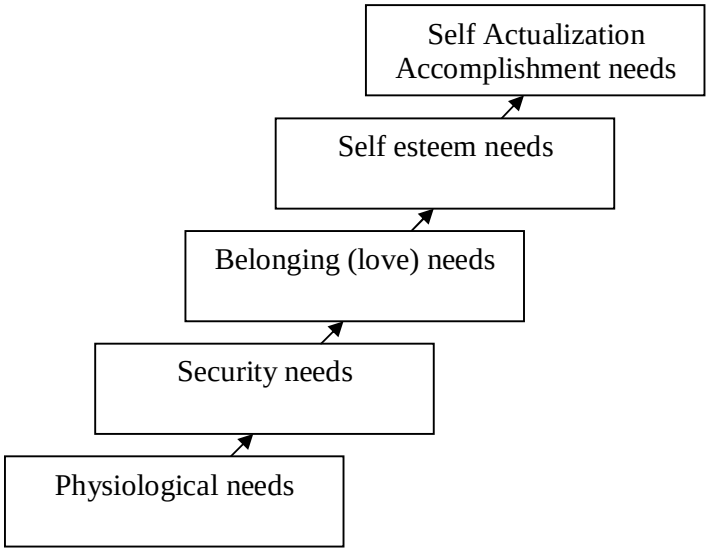

Figure 2.1. The hierarchy of needs according to Maslow (1954)

2.2 Definition of Consumer Satisfaction

Satisfaction, specifically consumer satisfaction, has been under the focus of numerous studies of consumer behavior discipline, since the initial appearance of the concept in the literature is with the work of Cardozo (1965). Many studies since then have tried to define and measure consumer satisfaction with different products and services (Mano and Oliver 1993, Oliver and DeSarbo 1988, Tse and Wilton 1988). These studies differed among each other significantly in the definition of satisfaction. Even the terms they used varied among the studies, which include consumer satisfaction (Oliver 1993, Spreng, MacKenzie, and Olshavsky 1996, Tse and Wilton 1988); customer satisfaction (Fornell 1992, Halstead, Hartman and Schmidt 1994);

and satisfaction (Mittal et al. 1999, Oliver 1992, Oliver and Swan 1989).

In the following subsections, definitions regarding consumer satisfaction are discussed. In addition, the nature and the dimensions of the this concept are mentioned. The prominent work of Giese and Cote (2000) should be noted. This is an extensive research about the definition of consumer satisfaction. The main motivation of the study is the lack of importance given to the definition of the term. The authors claim that many studies do not define the satisfaction concept or do not justify the appropriateness of their definition prior to the experimentation. According to the authors, the definition of the satisfaction should be clarified prior to measurement, as the measures used may be questionable otherwise. Apart from the necessity for correct measuring of the aspect, the definition is vital for relating the results of different woks and constructing the model of the concept as well. Although satisfaction concept is highly context dependent, the need for establishing a common ground remains sound. In order to fill this gap of the literature they aimed suggesting a definitional framework of consumer satisfaction which is both based on the former studies in the literature and valid through the consumers' views as well. The primary objective of Giese and Cote is stated as "… to resolve existing inconsistencies by proposing a framework that researchers can use to develop clear and conceptually consistent, context-specific definitions of the consumer satisfaction." (Giese and Cote 2000, p3) Their study is composed of three phases. In the first phase, they compare the definitions in the literature in order to detect the commonalities between the works. For this aim they cite twenty definitions used during the last 30 years period of consumer satisfaction research. Based on the commonalities, they propose a definitional framework validity of which is experimented via interview and focus group studies. At the end of the study they propose a definitional framework based on three dimensions:

- Satisfaction involves a summary affective responses of varying intensity,
- It is directed toward focal aspects of product acquisition and/or consumption,
- It is associated with a time-specific point of determination.

There are many debates about each of three components of satisfaction in literature. The nature of the response and focal aspects will be analyzed in detail in Section 2.3. There are different approaches for determining the satisfaction response. Giese and Cote (2000) give examples of different definitions involving different time dimensions. Although the concept is generally deemed to be a post purchase phenomenon, there are other examples which focus on post consumption or post choice phases (Tse and Wilton 1988, Westbrook and Oliver 1991). Although "consumption" is not used to define the interaction between human and product, post consumption approach is the most appropriate for our purposes as it also includes a notion of usage.

Prior to analyzing the satisfaction in detail, dissatisfaction concept should be clarified and related to satisfaction concept. There are mainly two views regarding dissatisfaction in literature. The first view sees dissatisfaction as the other end of the one dimensional satisfaction scale as opposed to satisfaction (Mittal et al. 1999). The other view deems satisfaction and dissatisfaction as separate dimensions (Mano and Oliver 1993, Westbrook and Oliver 1991). Dissatisfaction, in nature, shows some differences from satisfaction. For example, it is considered to involve a more intense affective component. That is to say, while satisfaction is stated with phrases including happiness and contentment, dissatisfaction commonly associates anger, disappointment and being upset. In addition, the dimensions may influence these two concepts separately. In some studies results show that consumers may yield a high dissatisfaction (i.e. very dissatisfied) and a neutral satisfaction rating at the same time (Giese and Cote 2000). Therefore, it is a convenient way to disintegrate these two components.

2.3 Nature of Satisfaction Response: Affective or Cognitive

Giese and Cote (2000) discuss the nature of the consumer satisfaction. The first group of works they refer to considers satisfaction as the entire evaluation of the product or service (e.g. Fornell 1992, Oliver 1981), whereas according to second group, it is the response to an evaluation process (e.g. Halstead, Hartman, and Schmidt 1994, Tse and Wilton 1988, Westbrook and Reilly 1983). Giese and Cote

(2000) claim that the “evaluation process“ definitions are problematic as they cannot differentiate determinative constructs from the resulting satisfaction construct. In their study, they try to define the term as a response to the evaluation process.

Studies defining the term as a response are more frequently seen in the literature. This notion is emphasized under different names such as fulfillment response (Oliver 1997), affective response (Halstead, Hartman and Schmidt 1994), global evaluative judgment (Westbrook 1987), and summary attribute phenomenon (Oliver 1992). There are debates about the nature of this response. The term is commonly referred by two components as cognitive and affective components. The studies defining the term sourcing from a cognitive basis commonly emphasizes terms like expectancy disconfirmation, or attribution (Tse and Wilton 1988, Bolton and James 1991). Whereas the affective approaches emphasizes emotional aspects in the response (Cadotte et al. 1987, Halstead, Hartman, and Schmidt 1994, Westbrook and Reilly 1983). There are also some models which incorporate both cognitive and affective aspects simultaneously (Oliver 1993, Keinonen 1998, Mano and Oliver 1993).

Cognitive Aspects of Satisfaction:

The first cognitive dimension of satisfaction response is the “expectation“. A commonly referred phenomenon related with cognition issues in satisfaction response is expectancy disconfirmation (Oliver 1981, Tse and Wilton 1988, Yi 1990). According to this model, the consumer form expectations prior to consumption, and then observe product as a whole or with related attributes of the products such as engine power of a car. Satisfaction response is formed via the comparison of these perceived qualities of the product with the prior expectancy set (Oliver 1993). The model of Cadotte et al. (1987) emphasizes the importance of expectations which can be seen in Figure 2.2.

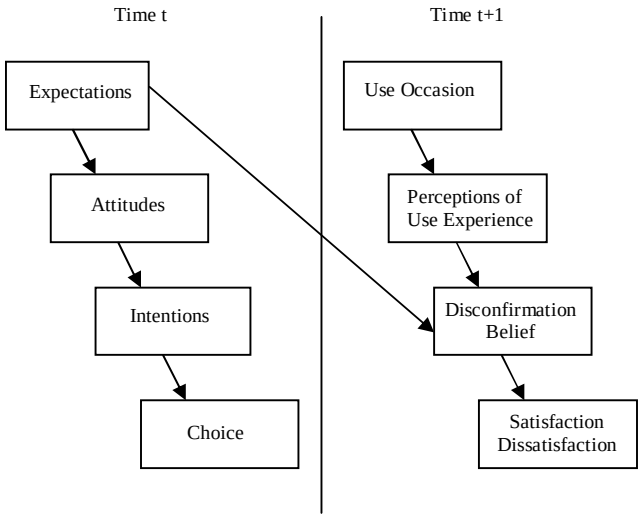

Figure 2.2. Conceptual model of disconfirmation-of-expectations process (Cadotte et al.1987).

Dubois (2000) refers to the importance of expectations in the satisfaction response and points to the relativity of the concept. A consumer with high expectations may not be satisfied with a product whereas a consumer with the less expectation may be quite content. Whenever the confirmation of expectation fails the consumer is consciously dissatisfied. In contrary, when the expectations are met, it is rarely noticed by the consumer him/herself (Keikonen, 1998): "The performance of the product must exceed expectations before emotional satisfaction takes place." (p32) Although in the satisfaction confirmation theory the direct influence of perceived performance is not taken into consideration, there are works in the literature which shows the direct link between the two (Tse and Wilton 1988; Spreng and Olshavsky 1993).

Expectation confirmation model is not the only cognitive process scheme proposed for consumer satisfaction model. There are studies in the literature that utilise attribution theory in order to identify the dynamics of satisfaction response. Attribution paradigm derived from the work of social psychologists is referred frequently. This paradigm stands on the attribution of the outcomes to certain agents of the process for reasoning. The relation to satisfaction is mainly based on three

dimensions, locus of causality (i.e. internal versus external source of the cause) stability, (i.e. the recurrence of the outcome if the same approach is taken), and controllability (i.e. the control of the consumer over the outcome) (Oliver and DeSarbo 1988). According to Dubois (2000), if the consumers attribute the erroneous situation face with the product to an external cause (e.g. product failure), they are more inclined to complain than the situation where it is attributed to internal factors. Weiner et al. (1978) claim that satisfaction describes internal locus attributions more frequently external attributions are reported to be related with appreciation and gratification.

Sourced from social psychology, equity theory is also referred in consumer behavior literature for satisfaction issues. According to the implications of this theory for this context, "..consumers can elicit inputs and outcomes for themselves and merchants, ... rate input/output combinations on fairness, ... and express their satisfaction/dissatisfaction with hypothetical inequitable situations."(Oliver and DeSarbo 1988, p495) This theory is based on the value of the satisfaction object on an exchange situation. As we constrain ourselves to product testing issues, where purchasing will not occur, this theory is of little use for our purposes.

Affective Aspects of Satisfaction:

More recent studies focus on the affective components of the satisfaction response. Generally, these studies utilise the emotion models from psychology in order to point to relevance in consumption experience. One of the mostly referred emotion schemes is the differential emotions scale of Izard (1977). Izard proposes ten basic emotions as interest, joy, surprise, anger, distress, disgust, contempt, fear, shame and guilt. These basic emotions are frequently used in order to define the affective considerations in consumption experience. (Westbrook 1987).

Westbrook (1987) states that the consumption experience involves emotional responses such as joy, excitement, pride, anger, etc. and utilizes this scale in order to propose new dimensions of satisfaction/dissatisfaction with automobiles and cable TV service providers. Westbrook comes up with two separate factors involving these basic emotions: the positive effect (related to "joy", "interest") and the negative

effect (related to “anger“, “disgust“, “contempt“). Westbrook and Oliver (1991) included a broader negative emotion, hostility, and a positive emotion, pleasant surprise, and interest. These dimensions are reported to explain 40-45% of the variance in various satisfaction measures.

Another model that is utilised in satisfaction studies is pleasure-arousal-dominance (PAD) model of Mehrabian and Russell (1974). This model is found appropriate for analysing basic emotional constructs that involve in consumption process. As the name implies PAD models the emotions on axes of pleasure , arousal and domination, for example anger is cited with low pleasure, high arousal and high dominance. Havlena and Holbrook (1986) has found that this model was eligible in identifying the affective issues in hypothetical consumption experiences.

Westbrook and Oliver (1991) investigate the relationship between satisfaction and emotional patterns. They also utilised the emotion scale of Izard and come up with valuable results revealing the connection of emotions aroused during the consumption experience and the satisfaction response. Westbrook and Oliver group consumption experiences into five categories each of which involves different basic emotions . The categories are named as happy/content, pleasant surprise, unemotional, unpleasant surprise, and angry/upset. At the end of the study, they differentiated two bases for high satisfaction, one is ‘pleasure linked to surprise over the consumption experience’, and the other is ‘pleasure coupled with high interest’. In each cases satisfaction is considered to involve pleasure and pleasure is considered to be related with joy and interest.

2.4 Global Satisfaction versus Attribute Satisfaction:

Satisfaction is commonly considered as a global evaluative response and it is tried to be measured by open-end questions about the overall evaluation (Westbrook 1987). This overall evaluation approach may not be appropriate for correct measuring and may be is of little use for context specific cases according to Giese and Cote (2000). The authors refer to Marsh and Yeung (1999) and cite that “the meaning attributed to the items and the underlying nature of the measured ...

construct are changed by the context within which they appear“. This problem becomes more serious as the evaluation basis becomes more global, especially when satisfaction is measured with questions like “how do you feel about the product?“ (p4) They provide the example of Marsh and Yeung as:

> “..if the item ‘I feel good about myself’, appears on a survey in which all of the other items refer to academic situations, then respondents are more likely to respond in terms of how they feel about themselves academically. On the other hand, if all of the other items on the survey refer to their physical conditions, then respondents are more likely to respond to the same item in terms of how they feel about themselves physically.“ (p4)

Giese and Cote (2000) exemplifies the drawbacks of considering satisfaction as an evaluation response without the detailed definition with the following statements:

> “Without the definitional explication, true satisfaction can be elusive. A brief example may illustrate the relevance of a standardized definition of consumer satisfaction. Two automobile purchasers respond to the same seven-point satisfied-unsatisfied scale. Consumer A marks a '5' and Consumer B marks a '7'. Most likely, the interpretation is that consumer B is more satisfied than consumer A. given only this much information, however, it is virtually impossible to interpret what these consumers mean from the number that they have marked. How they define satisfaction is integral to interpreting their response.” (p5)

The literature bears several works which incorporates the dimensions of satisfaction instead of getting rid of the intricate components of satisfaction and extremely smoothing the definition. The very first classification of product attributes for analysis in consumer satisfaction comes from Swan and Combs (1976). In their study on clothing apparel, they classify the product attributes into satisfiers and dissatisfiers’ groups. They also differentiate two attribute groups as instrumental and

expressive attributes. The first group is composed of the physical components of the product and the second group is related with the non-product characteristic features, such as a friend's admiration. For the satisfaction, the expressive dimensions are more influential, whereas instrumental attributes plays the main role in dissatisfaction in the case of clothing apparel. However, the analysis of Maddox (1981) shows that the findings of Swan and Combs are not applicable to different product groups, such as durables.

Several works approach the subject in an indirect way due to the shortcomings of instrumental expressive model which involves direct influence of product attributes to satisfaction/dissatisfaction. These works try to detect the role of the attributes in affect formation towards product, which in turn influence overall satisfaction/dissatisfaction. In Oliver (1992) two dimensions are proposed for grouping the attributes of the automobiles on the basis of consumption stages. The first group is related with the continuing performance of the product such as acceleration, ride, fuel economy; those which are one-time (e.g. price), infrequently accessed (e.g. service), and unchanging characteristics (e.g. safety, quality). Oliver (1993) defines and analyses the influence of attribute satisfaction on satisfaction response for automobiles. In this study, the influence of attribute satisfaction/dissatisfaction on positive and negative affect and overall satisfaction/dissatisfaction is investigated. At the end of the study, attributes are found to be influential on satisfaction/dissatisfaction response both directly and through positive and negative affect. Attribute satisfaction turn out to increase positive affect and decrease negative affect. However attribute dissatisfaction only increase negative affect and has no significant influence on positive affect. From this we can understand that the dimensions related with the prominent attributes of the products may influence the satisfaction/dissatisfaction significantly.

2.5 Models of Satisfaction

In this section, a summary of the satisfaction models in literature are given . These models include both cognitive and affective components in general. The first

model is proposed by Oliver (1993), which can be studied in figure 2.3.

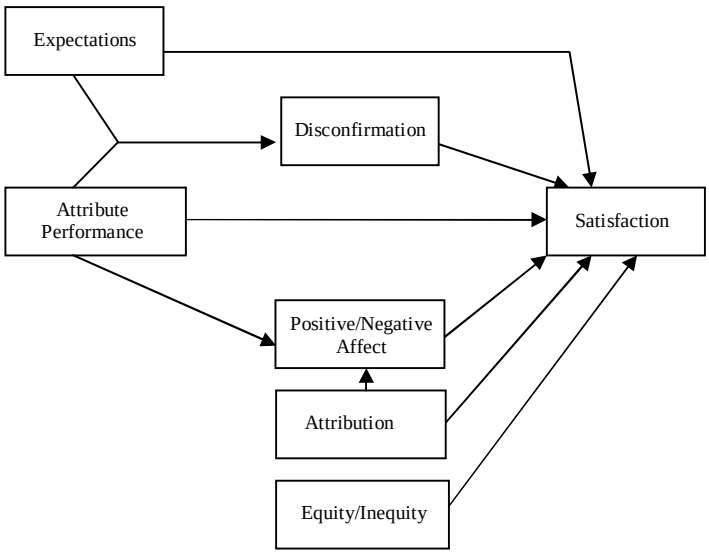

Figure 2.3. Combined cognitive and affect-augmented satisfaction model (Oliver 1993).

In figure 2.3, all theories stated in the literature is summarized by Oliver. These theories are expectation disconfirmation, attribution and equity/inequity theories. The independent variables are stated to be expectations of the consumer, attribute performance, attributional behavior of consumer, and equity/inequity issues depending on the perceptions of the consumer. The other intermediate dimensions are stated as disconfirmation and affect.

The extended version of the model, provided in Figure 2.4, emphasizes on the affective issues. Here the attributional and equity issues are discarded. attribute performance is included in the model implicitly in disconfirmation and attribute satisfaction/dissatisfaction dimensions.

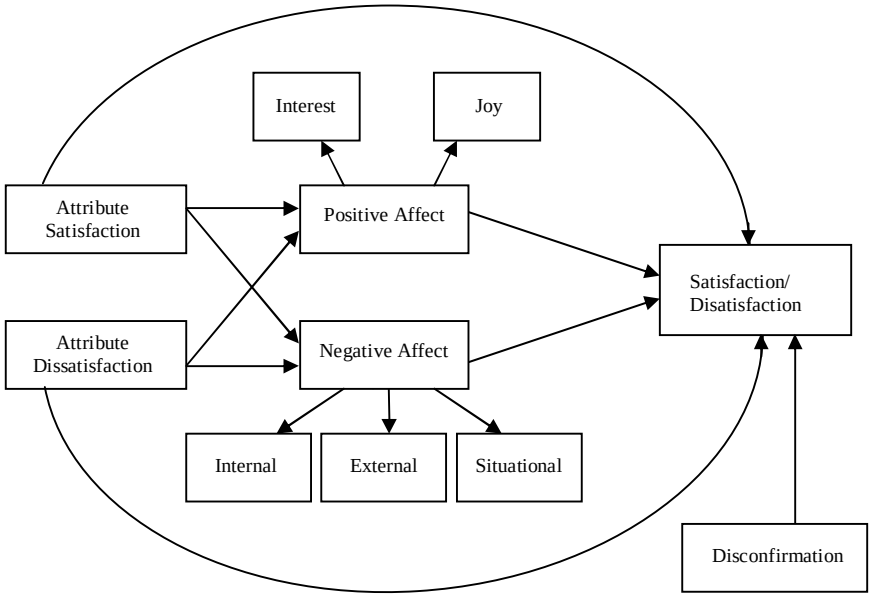

Figure 2.4. Expanded attribute-based satisfaction model of Oliver (1993).

Mano and Oliver (1993) propose a model in which they try to incorporate product evaluation criteria and two dimensional affect circumplex of Russell (1971), as the dimensions of satisfaction response. In the study, the evaluation is considered to take place on two basis: utilitarian basis and hedonic basis: " The first is the traditional notion of instrumental or utilitarian performance whereby the product is seen as performing a useful function. The second is that of hedonic and aesthetic performance ... whereby products are valued for their intrinsically pleasing properties."(p452) The authors claim that product evaluation process can be seen as the input for product related affect formation. The link between utilitarian evaluation and affect formation is consturcted in previous study of Fishbein and Anjen (1975). Additionaly, hedonic evaluation is trnaslated into more enduring summary forms according to authors. The affect circumplex of Russell is utilized in their study. This circumplex engage two dimensions as pleasureness-displeasureness and arousal-quiteness. A positive effect is achieved when there is high pleasurness and arousal involved according to this circumplex. the study investigates the validity of the model provided in Figure 2.5.

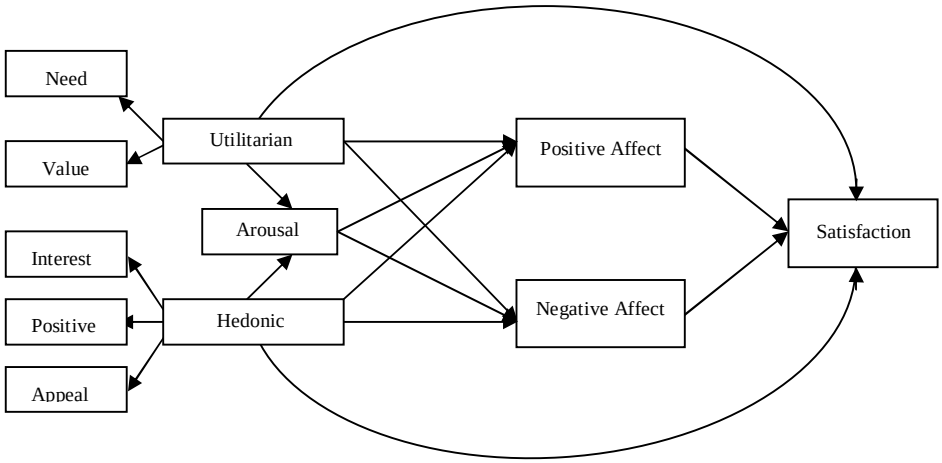

Figure 2.5. Evaluation, affect and satisfaction framework of Westbrook and Oliver (1993).

In the model proposed by Westbrook and Oliver, the factors of evaluation identified as need, value, interest, positive, and appeal. These are mainly related with the basic product adjectives such as vital, important, nice, appealing, intelligent, gathered from previous studies of Zaichkowsky's (1985) 20-item involvement inventory and Batra and Ahtola's (1990) hedonic and utilitarian scales. Statistical analysis result in grouping of this 25 item under the factors stated above.

What is important for the present study is that the connections reported between product evaluation and satisfaction. The previous research reports the satisfaction to be strongly related with to positive affect and the utilitarian scales. However, the loose connection between utilitarian evaluation and positive affect is another finding of the literature. The main dimension of positive affect turns out to be the hedonic evaluation in their study.

2.6 Attitude

Attitude is one of the key terms frequently referred in consumer behavior literature. Fishbein and Ajzen (1975) defined attitude as "… *a learned predisposition*

to respond in a consistently favorable or unfavorable manner with respect to a given object".(p78) According to Dubois (2000), attitude is "… an enduring inclination or tendency to respond towards the said product or brand in a specific way."(p84) According to the author, when there are more than one alternative in the evaluation context, the term 'preference' is used instead of attitude.

From the user satisfaction context we can see satisfaction and attitude as similar phenomena. In user satisfaction context, purchase phase, which is the main issue that differentiates the two terms, is not pronounced. Hence we can utilize literature on attitude in order to define user satisfaction later on in the study. Are attitude and satisfaction really different? From the consumer behavior discipline, they certainly are. However, there are examples of studies in usability literature that consider these two terms as equivalent: Melone (1990) claims that satisfaction and attitude are essentially the same thing, and satisfaction should be replaced by attitude due to the complex nature of the first. Keinonen (1998) summarizes the satisfaction definition of Bailley and Pearson (1983) as "the sum of an individual's negative and positive feelings about a set of variables"(p45) and points on the similarities between attitude and satisfaction. Due to its prospective use in defining the dimensions of user satisfaction, attitude deserves to be analyzed in detail.

In literature, attitude is commonly analyzed by three components: cognitive component, affective component and conative component. Cognitive component is related with beliefs, prior knowledge and associations linked to the product. Affective component includes all positive or negative feelings experienced with the product and emotions involved. Conative component is related with the behavioral results of the relationship with the product. These three components are commonly referred in almost every attitude study and they are of primary importance for influencing the relationship of the user with the product (Dubois 2000, Keinonen 1998).

Attitude formation processes are differentiated in the models for high and low involvement situations in literature. Here it is necessary to define what "involvement" is. According to Rotschild (1984), "Involvement is a state of motivation, stimulation or interest which cannot be observed. It is stimulated by an object or a specific situation and brings certain types of behaviors: certain forms of

search activities, information processing and decision making.“(pp219) A definition which considers the concept to be more observable comes from Dubois as “… individual’s state with regard to a domain of interest, the type and intensity of which can evolve according to circumstances.” (Dubois 2000). We can talk about a high involvement situation for a computer addicted juvenile about computer games. When the consumer is highly involved with the product, a high-involvement hierarchy should be utilized for analyzing attitude and product evaluation process (Holbrook 1986). According to this system, after consumer acquires information about a product, he/she constructs beliefs on the basis of this information. Although Holbrook states the emotional response to succeed this cognitive component, there is much debate on the order of cognitive and affective responses along the evaluation process. However, the literature agrees upon a consensus that these two components precede the conative part (Dubois 2000, Keinonen 1998). The consumer takes action after the product is evaluated referring to the first two components.

On the other hand, the cognitive component does not precede the affective one for the low-involvement situation, where the consumers are not motivated to gather extensive information about the product. Their evaluation is based on the few easily perceived attributes. Olhavsky and Granbois (1975) claim that the consumer does not form attitude until after the purchase. Here strong affective influence is followed by beliefs concerning the attitude object. This hierarchy, which is commonly referred as “Experiential hierarchy“ (Keinonen 1998, p63), is applicable to affective artifacts like music and entertainment services (Mowen 1993). This hierarchy can also be seen in high involvement situations where the evaluation is so hard to realize based on the cognitive component (e.g. buying a house (Keinonen, 1998). Like high involvement hierarchy, the same process is followed by the conative component.

Another hierarchy type, behavioral hierarchy points to the influence of environment and situational factors on attitude formation. Examples of where this approach may be valid can bee observed whilst shopping at grocery stores where “… arriving at a specific shelf, is not preceded by any beliefs or affects.“(Keinonen, 1998, p64).

The cognitive component is commonly referred as “beliefs“ which is the

construct linking product properties to user's ideas (Keinonen, 1998). According to Keinonen (1998, p.64) “Beliefs refer to the consumers' assumption that there is an attribute in the attitude object... An attribute may be any object, trait, property, quality, characteristic, outcome or event.“ Beliefs are formed by prior knowledge (i.e. internal search) and additional information acquired externally (i.e. external search). Beatty and Smith (1987) defines the external search as the behavior related to information acquisition (i.e. attention, perception, and effort directed toward obtaining environmental data or information related to a specific purchase under consideration). Highly involved consumers may not constrain external search to only prepurchase situations. These cases are named as “ongoing search“ (Bloch et al.1986). It should be noted that there are obvious differences between expert and novice consumers regarding the information requirements:

> “… novice consumers have a greater need for information acquisition than consumers with more prior knowledge, their ability to utilize new information is limited, because they lack the appropriate cognitive tools, situation-specific rules or decision plans, to categorize the new information in an appropriate way... In addition to the differences in the amounts of external search, the differences in prior knowledge influence the types of attributes and sources of applied information. Experts are considered to search using a bottom-up approach on a technical basis, while novices search for extrinsic attributes such as brand and price (Brucks 1985; Urbany et al. 1989).“ (Keinonen 1998, p65)

Keinonen (1998) also states that attributes that are salient to expert consumers at the first sight may be missed by the novice ones at the former evaluations, which point to the fact that in expert evaluation a wider range of possible attributes are evaluated.

Although it is generally stated after cognitive part, affective component may be the prevailing factor in attitude formation. Previous research has yielded results stating that cognitive and affective systems may well be activated independently

(Chapman and Jones 1980). Dubois (2000) gives examples from situations like purchasing jewelry, a house or even a can of coke, where emotions are the prevailing factors in evaluation of the attitude object and decision making. The models utilized to identify the affective issues in satisfaction response are also utilized for attitude formation as well.

The attitude formation may be due to direct experience or indirect sources such as advertisements or individual's environment (Keinonen 1998). Attitudes are formed because they serve a number of psychological and social functions. Melone (1990) summarizes the functions of attitude formation as:

- The utilitarian function refers to the principle of reward and punishment. To avoid punishments and gather rewards people form positive attitudes to objects those are related to rewarding experiences.
- The value-expressive function of attitude serves people’s needs to express their values and social identity. The product-related attitudes are not always formed because of the properties of the products themselves, but because of the values related to them.
- Ego-defensive function. They help people to adjust themselves to the requirements of environment and self by developing attitudes that make actions that have been taken seem reasonable and justified.
- The knowledge function of attitudes is formed to organize and simplify the environment of the subject. Attitudes help to categorize alternatives and assist in decision-making.

2.4 Summary of the Chapter

In this section, the consumer satisfaction concept is clarified. One of the important issues is the nature of the satisfaction response. It is reported that in many cases, satisfaction response is influenced by the cognitive process mainly focusing on the confirmation/disconfirmation of expectations. However, the affect dimension also plays an important role in the response. These dimensions are also relevant for the user-product interaction, as the satisfaction with a product is influenced from the

user's cognitive and affective processes.

In literature, satisfaction has also been considered on attribute basis. This view divides the product into attributes and defines the overall satisfaction response as the summary of the satisfaction with these attributes. In that sense, the view resembles to compensatory attitude formation models which presumes that product attributes may compensate for each other during attitude formation. That is to say a negative influence of a poor product attribute can be compensated by another good product attribute.

The literature differentiates satisfaction from dissatisfaction. This view is found sensitive as it is able to explain cases where a user yield a negative dissatisfaction score (i.e. not dissatisfied at all), and a neutral satisfaction score at the same time.

The difference between consumer satisfaction and user satisfaction is due to the difference of main considerations in these two terms. In consumer satisfaction, the product attributes like price, after sales service are of great importance in the satisfaction response. However user satisfaction response is tried to gathered free from these attributes.

Another important difference comes from the period of interaction that is available for the user until the response is measured. Consumer satisfaction response is reported to be gathered during various phases of consumer-product relationship in various studies (Giese and Cote 2000). However, frequent approach is to realize the satisfaction survey after sufficient time of exposure to product is achieved. That is to say, the user has the chance to use the product for sufficiently large number of times. However, user satisfaction, which is highly related with product testing studies, is a response gathered after the first use of the user. In this case, the user does not know the product thoroughly and, hence, some of the dimensions of consumer satisfaction concept can not be named under the name of user satisfaction.

CHAPTER 3

USER SATISFACTION

In chapter 2, the reader is given models of satisfaction, which are commonly related to the post purchase/consumption phase, and underlying psychological state of the human as well. These models are fairly helpful to explain the psychological processes of the consumers. Nevertheless, these models are of little use, when we try to elucidate user satisfaction with products. In this chapter, it is aimed to detach the issue from 'purchasing/consumption' and to carry it to "usage" context. Therefore, the analysis will be free of product attributes such as price and brand which are of primary importance in the former context. Product design, ergonomics and specifically usability domain will provide great help for the discussions as they focus on the usage. In addition, the influence of prior stages is to be analyzed by the help of disciplines such as aesthetics.

The importance of 'user satisfaction' concept was summarized in the introduction chapter. Design approaches such as Usability Engineering and User Centered Design were introduced in order to achieve the aim of designing usable products. Usability engineering is defined as a process whereby the usability of a product is specified quantitatively afterwards the design of the product. User centered design addresses early and continuous focus on users, empirical measurements, iterative design and multidisciplinary design teams (e.g. Buurman 1997). User satisfaction is a vital tool in both of these approaches.

The chapter starts with discussions about the dimensions of the user experience with products. In Section 3.2, the functionality and its influence on user satisfaction is

discussed. The next section focuses on usability of the products and user satisfaction. After stating the hedonic and emotional aspects in the interaction and their influence on user satisfaction in the next section, the less under focus Dimensions such as reliability and safety are summarized. The chapter is finalized by revealing the interactions between the mentioned Dimensions.

3.1 User Experience and User Satisfaction

The design literature is equipped with several studies focusing on the ‘user experience’. Actually the concept bares primary importance as it has a direct influence on the formation of the satisfaction response. The dimensions influencing user experience can be regarded as the dimensions influencing the satisfaction response as well. In addition, the criteria proposed for a satisfying experience with products can be regarded as necessities for the satisfaction response. Therefore it is beneficial to refer to the concept for a start.

The work of Alben et al. (1996) provides a list of criteria in order to achieve successful and satisfying experiences. The experience is defined as "…the way it feels in their hands, how well they understand how it works, how they feel about it while they're using it, how well it serves its purpose, and how well it fits into the entire context in which they are using it." This definition draws attention to several dimensions, some of which can be related to usability, performance, etc., at a first glance. The detailed list of criteria includes both product related dimensions and design process related dimensions as well. The product related dimensions can be itemized as follows:

- The product should meet a recognized ‘need’.
- The product should be ‘learnable and usable’ considering individual differences related with styles in problem solving.
- The product should be able to solve the right problem in an ‘appropriate’ fashion regarding social cultural, economic and technical factors.
- The product should be sensual and pleasing regarding ‘aesthetic’ properties.

Hudspith's (1997) framework for user experience considers three influential dimensions. The first is 'Utility' referring to how well the product accomplishes its intended task. In order a product to bare high utility it should satisfy the user's requirements in an easy manner. The second dimension is stated as 'ceremony'. This dimension is primarily related with social considerations. It can be interpreted as the social satisfaction felt during the usage of the product. The third dimension 'Appeal' refers to the emotional aspects of the user experience based on the perception of a product.

Margolin (1997) focusing on the use of products instead of mere functionality considerations, proposes four dimensions that should be considered for understanding the requirements of the users and creating a successful experience. These dimensions are:

- the social dimension referring with the conformance to the social values,
- the inventive dimension referring to match between the needs of the user and the utility of the product,
- the operational dimension referring to the simplicity of the product regarding usage,
- the aesthetic dimension referring to the individual values and how meaning is attached to products.

3.2 Functionality, Performance and User Satisfaction

Functionality resides at the origin of human-product relationships. It is referred as the most basic expectation of the user from a product (Jordan 1999). Functionality can be described as the process of gathering outputs utilizing inputs by means of certain systems, e.g. the process of grinding which turns coffee beans and physical force into

ground coffee via the mechanism of the coffee grinder (Roozenburg and Eekels, 1995). Miles (1961 in Chiang et al. 2001) differentiates function as primary and secondary function. Primary functions can usually be stated with a two word phrase: provide light (for a light source such as a light bulb), provide shelter (for an umbrella). Secondary functions should accompany to be able to deem a product 'functional', for example, although the primary function of a corkscrew is taking the cork out of the bottle, without a secondary function taking the cork without breaking into small parts the product can not considered as a functional product. According to Chiang et al. the main function of a can opener for example is not merely opening the lid but opening it cleanly and without leaving slivers of metals behind.

In consumer satisfaction literature product performance is frequently referred as a Dimension of overall satisfaction. In various works, it is explicitly pronounced among the expectations of the consumer (Halstead, Hartman, and Schmidt 1994, Tse and Wilton 1994). Performance is defined as the extent to which the product can perform its aimed function (i.e. whether it do what it should do in these studies). Here the relationship between performance and functionality can be seen. Actually, Chiang et al. (2001) claim that product performance and product functionality can be regarded as synonym terms.

Functionality is the 'raison d'etre' for a product from a modernist approach and obviously plays an important role in user satisfaction. The necessity for products to be functional is stated by international quality standards as well (ISO 2001). In literature, there are studies stating that functionality should be taken for granted by users, and these studies emphasize other issues in product design such as usability, pleasurability and emotions in interaction. (Jordan 1998, 2000, Demirbilek and Şener, 2003). However functionality remains at the core of the product-user relationship. In chapter 2, the influence of expectancy disconfirmation on overall dissatisfaction is mentioned. It is also added that dissatisfaction is associated with more severe emotional responses than satisfaction. When the product does not function, speaking about user satisfaction is nonsense. Chiang et al. (2001) provides examples where the main reason for product

failure lies under poor functionality of the products:

> "There are numerous products that are marketed as being sophisticated in terms of features they provide consumers, but routinely fail to perform the intended functions, or do so in a very unsatisfactory manner. For instance, the Eastman Kodak Company's disk camera was marketed as being a usable camera with nearly 50 usability features. However, due to the excessive noise in the output signal and its related negative effect on the quality of the pictures the camera took, the Kodak disk camera was considered a failure; the camera failed to provide the very basic intended function ± i.e., taking good or even acceptable photographs." (p.431)

In contrast, award winning designs, which also receive high acceptability in markets, generally is stated to provide adequate and convenient functionality. The Clio notebook computer and Crosspad XP can be given as examples (Nussbaum, 1999).

Apart from studies taking functionality for granted, there are studies involved in designing the functionality of products by a more user sensitive way. Identifying user requirements prior to design is claimed to be important for success of the product. Jordan et al. (1996) points to the importance of identifying user requirements as:

> "As the products that we use at home and in our workplaces become even more complex in terms of features and functionality, it becomes vital that those involved in the design of these products consider the needs and limitations of those who will be using them. If these are not taken into account, products that are created with the intention of delivering some benefit can end up being more trouble than they are worth." (p.17)

These requirements are identified by conducting direct research in some studies

(Marmaras 1997, Stanton 1998), whereas in others utilizing user models (Hasdoğan 1996). Whether directly or indirectly, the studies aim to prevent mismatches between product functions and user needs. However, in practice, where the notion of user requirements is still not pronounced, the mismatch between user and products continues. Especially for products where the technology is the main motivator in design, the resulting products turn out to be failures. In a recent study, Gültekin (2003) analyzes the user relationship with the technology driven products. The author states that the lack of user feedback on the functionality of the product causes poor usage quality. She also states excess functionality influence the motivation of the user for using these functions in a negative way. Sinkovics et al. (2002) claims when the products are enriched in content and functionality, the reflection of this enrichment in user satisfaction is mostly negative. Based on marketing findings (Lardner et al. 2001), the reason underneath is stated as the unawareness of users of the product features and functions.

3.3 Usability and User Satisfaction:

One of the most prominent Dimensions of user satisfaction is 'usability'. Interpretation of the word provides a meaning of being able to use a product. However, issues raised in this literature are more than a mere ability of using a product. In this section the details of the concept and their relation to user satisfaction are given. The section starts with the definition and dimensions of the concept, followed by its importance of the issue for users. The term will be clarified for electronics and everyday products and the section will be finalized by revealing the trends in usability literature.

3.3.1 Definition and Dimensions of Usability.

For an initial and basic definition of the term, one can refer to ISO (1994). Here the concept is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified

context of use.” It is quite useful to clarify these three dimensions of usability. According to Jordan (1999 - a):

> "Effectiveness refers to the extent to which a goal, task, is achieved, efficiency, to the amount of effort required to accomplish a goal, and satisfaction to the level of comfort that the user feels when using a product and how acceptable the product is to users as a means for achieving their goals." (p.207)

The first of the two dimensions of ISO definitions are related to "human performance" during the interaction of the user with the product. These dimensions can be measured objectively referring to number of steps to realize a specific task, number of errors occurred during the interaction and time to accomplish the task. The other dimension, which is the core topic of this study, is stated to be the ‘subjective evaluation’ (Keinonen 1998) component of the interaction. There is not consensus about the content of the "satisfaction" component in literature. An approach is to define this term as “… the comfort in achieving the goals and acceptability of the interaction” as in the definition of Jordan (1997) (p.151). The other authors include hedonic and emotional issues in the content of this component (Han et al, 2001). A more refined discussion about the content of this concept will be given at the end of this section.

Although the term is commonly related with the initially stated three dimensions, literature presents some other dimensions. Many authors include ***learnability*** referring the novices’ ability to reach a reasonable level of performance rapidly and ***retention*** as the ability to remember the usage (Nielsen 1993, Shneiderman 1992). The dimensions proposed by Nielsen (1993) can be easily related to dimensions proposed by ISO. ***Efficiency*** is another dimension and refers to the expert user’s level of performance regarding speed, ***errors*** refer to both the number of errors occurred in usage and ability to recover, and ***pleasing*** refer to the pleasure of use.

3.3.2 Importance of Usability for Product Acceptance

In marketing discipline, product acceptance is considered to be a higher degree response than product satisfaction (Dubois, 2000). In other words, when the user accept the product, the satisfaction is already a part of this response. In Human Computer Interaction (HCI) literature, the usability is deemed to be a Dimension of product acceptance by different authors. (Nielsen 1993, Shackel 1991)

Nielsen (1993) defines acceptability as the highest level concept in product perception. In his model, practical and social considerations are the main factors influencing acceptability of the software products. In fact acceptability is very important to define the attributes affecting the consumer evaluation and choice. According to Nielsen, together with utility, usability constructs an attribute called *usefulness*, which plays an important role in product acceptance. In this context, *utility* refers to the ability of the functions to help user, and usability refers to the specific way of this utilization. The product acceptance model of Nielsen (1993) is given in Figure 3.1.

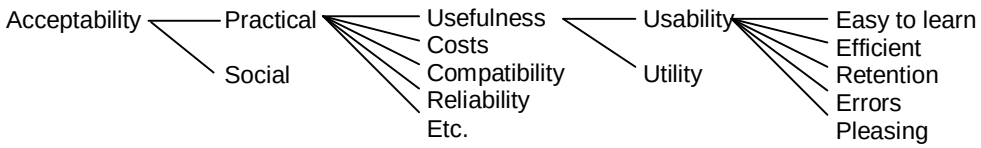

Figure 3.1. Product acceptance by Nielsen (1993)

Keinonen (1998) presents the approach of Shackel (1991). Shackel's approach resembles the one of Nielsen's in a way, both take the usability as an aspect for product acceptance. In this approach, acceptance is directly influenced by *utility* and *usability* as well as *likeability* and *costs*. *Likeability* is the emotional evaluation regarding the product, and *costs* refers to both financial and the social cost involved with the product. This model can be found in Figure 3.2.

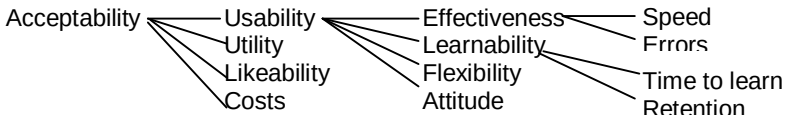

Figure 3.2. Product Acceptance by Shackel (1991)

Usability of a product is stated as one of the most important factors that the users consider in purchasing a consumer product. as well as functionality, price, and after sales service quality (Dumas and Redish, 1994). Therefore, it should be included as a Dimension of the user satisfaction. Actually, the literature has examples of works that investigate the importance of usability for consumer products. Keinonen (1997), for example, investigates the importance of usability in shaping user's product preferences. In his study with electronic heart rate monitors, the usability dimensions used are:

- *Affect*, the extent that the user feels good, warm, happy or the opposite as a result of interacting with the product, usefulness,
- *Usefulness*, the degree to which an individual beliefs that using a particular system would enhance his or her job performance,
- *Ease of use*, the capability to be used by humans easily and effectively, (excluding physical ergonomics),
- *Functionality*, users' believes concerning the adequacy of the features of a product,
- *Logic*, users' believes concerning the quality of the internal information structure of a user interface,
- *Presentation*, users' believes concerning the quality of directly perceivable user interface elements (e.g. familiarity, understandability, simplicity of labels and icons).

Keinonen's study (1997) yields insignificant influence of usability dimensions on

consumer preferences. When we carry the subject into satisfaction response, it is expected to have different results. As it is noted by Jordan (1999-a), today users are asking more than functionality and usability from products. Users will surely be dissatisfied with an unusable product. However, the power of usability in forming the satisfaction response is questionable. Han et al. (2001) refer to the current design practice of the consumer electronic products, and states that the main focus has been on aesthetic integrity of the interface rather than user performance. This tendency is judged to be a problematic approach by the authors, as it may result in stylish, affectionate but hard to use, hard to learn interfaces and products. When products influenced by the trends emphasizing aesthetic qualities dominate the market, they begin to form a stereotypic product (Crilly et al. 2004). At this point, usability can surely be a Dimension of satisfaction response.

3.3.3 Usability of Different Product Groups.

Usability is a term mostly mentioned in the literature of the Human Computer Interactions (HCI) discipline. With the technological advance in computer science, the products offered to consumers have evolved in a more complex nature. The concept actually aims to turn this complexity into an actual ease in the software domain (Gültekin 2004). However, the concept is also related to the design of everyday products such as kettles, lighters, table clocks, etc. (Kanis 1997).

The following sections summarize the product properties influencing usability of both technology involved products and everyday products.

3.3.3.1 Everyday Products and Usability.

Usability is relatively a new term in the domain of ‘everyday products’. An older discipline which has a direct influence on the usability of the product is product semantics. This discipline, which is firstly pronounced by Butter (Krippendorff and

Butter 1984), comments on the visual communication between users and products, which is the key issue in interaction. The discipline mainly deals with the symbolic qualities of man-made objects that relates to the usage and signification in the social context. Crilly et al (2004) mention the importance of form of the product in conveying messages about the mode-of-use, functionality, performance, efficiency, and ergonomics. The authors focus on the visual evaluations of the product. Excluding the 'symbolic'(p563) meanings attributed to the product by the form, Crilly et al. use 'semantic interpretations'(p559) to point to the cognitive response of the user based on visual perception of the form, associated with the functionality, usability, and ergonomics of the products.

Crilly et al. (2004) explain the dynamics of 'semantic interpretation' issue based on two main works in the literature. These are semantic functions of Monö (1997 in Crilly et al. 2004), and affordances, constraints, and mappings of Norman (1988). Crilly et al. summarize four semantic functions of Monö that clarify the means of conveying messages related with practical qualities of products:

- "Description refers to the way in which the outward appearance of a product presents its purpose, mode-of-operation and mode-of-use." (p.560)
- "Expression refers to the properties that the product appears to exhibit." (p.560)
- "Exhortation refers to the requests or demands that a product appears to make of those perceiving it.." (p.560)
- "Identification principally refers to the extent that the origin and affiliation of a product are conveyed." (p.560)

One or more of these functions can reveal the mode of usage of the products. "For example, the product's purpose may be described by the physical form and identified by the addition of text labels and graphics." (Crilly et al. 2004, p.561)

Another prominent work in the literature emphasizing the importance of visual information in usability of the product is the work of Norman (1988). Three main agents

are proposed by Norman for the visual narration of product usage. These agents are *affordances*, *constraints* and *mappings*.

Affordances can be defined as the implications of the products on possible manipulations that can be realized. Design of the product may allow (or afford) some specific manipulations. In contrast *constraints* limit the manipulations that can be performed on the product. The hurdles can be created by the correct usage of product semantics and this result in avoiding misusages of the products. Crilly et al. (2004) give the example of scissors to define both affordances and constraints as: "... with a pair of scissors the holes in the handle afford the use of fingers and the limited size of the holes place constraints upon the number of fingers that can be used in each handle." (p.562) As the last agent, *mappings* refer to the relationships between a user's actions and the corresponding behavior of the system. Norman (1988) uses the example of an electric car-seat-control panel where the levers required to move the seat are arranged so as to represent the seat itself. In this example, purely from its visual inspection, the mode-of-operation may be understood.

The usability of products can be enhanced by applying proper 'product semantics' during the design of the product. Wikström (1996 in Demirbilek and Şener 2003) states that the semantic manipulation of the product should make it comprehensible.

"Both the whole product and its individual parts should communicate the intended message, so that the user knows how the product should be handled merely by looking at it. for example a knurled knob says 'turn me'; a button so designed to say 'press me'; a form that invites particular handgrip, like a jack-plane; a teapot or kettle that says 'hold me here and I'll pour for you' a chair that softly welcomes your relaxed posture; a shape or form that indicates ' I move in this direction' or ' I fit into that part of your body'." (Demirbilek and Şener, 2003, p.1348)

3.3.3.2 Usability of Digital Products.

The visual messages transmitted via the form of a product can help only to a certain extent in digital products. Interaction mainly takes place in the digital interface in these products, where the functioning underneath the display is commonly cannot be followed by the user. Cooper (1999) states the difference between the digital products and others by emphasizing the help of physical and semantic knowledge that can be used to read the non-digital products. The author also adds that the functionality of these products is relatively restricted. Therefore the aimed task may not always be performed in the right way: "For instance, when using a microwave oven, user may wrongly cook one hour instead of one minute, or activate the wrong feature, and still may not recognize (Cooper 1999)."

In literature, there are various studies proposing means for handling the usage problems caused by obscure functionality and modes-of-use (Buurman 1997, Norman 1993, Sade 1999). The literature is dominated with checklists and design guidelines aiming to correct the mismatches between users' model of the digital product and the product itself. Nielsen (1993) defines the properties of a 'usable' digital interface. The most of the considerations are about dialogue menus. Keinonen (1998) summarizes some design guidelines collated from eight different sources in order to achieve usability for interfaces.

The literature presents numerous examples where the usability concept is applied to improve the usability of software user interfaces (e.g. Nielsen 1993, Shneidermann 1992, Mayhew 1992). There are also examples which incorporate usability research into consumer products (Caplan 1994, Logan 1994, Jordan 1997). As usability originates from HCI discipline, the definitions of usability are highly related with the user performance. Different dimensions pointing to users' performance are proposed such as ease of learning, efficiency of use, memorability, and making few errors (Nielsen 1993, Shneiderman 1992,), whereas, the subjective evaluation dimension, satisfaction, is deemed merely as a byproduct of great usability (Hasselzalh et al. 2001). However when

usability domain included the consumer products, new definitions of the term has also aroused in the literature.

Han et al. (2001) comments on the inadequacy of the traditional definitions of usability for evaluating consumer electronic products. The human performance oriented approach to usability, which focuses on the rate of task accomplishment, may be valid for the software products used. However, achieving a task is not the only issue in user experience with consumer products. According to Han et al. this fact necessitates the redefinition of the concept.

> "...using a consumer electronic product does not mean the same as using software. Using software implies completing an intended task with it. Thus, it has been agreed that usability is concerned mainly with how the user achieves results by using it (Bennet 1994). A consumer electronic product is, however, not only a tool with which the user performs a task but also a decoration in the living room or a means to express one's personality and lifestyle. So it should be very efficient and easy to use, and at the same time good-looking and fascinating." (Han et al., 2001, p.144)

Han et al. define two main groups of usability dimensions for consumer electronic products. The first group, called 'Performance', originates from the traditional usability concept. The dimensions listed in this group are measured objectively. The second group is named as 'image and impression', which the authors consider as equally important. This group is composed of items related with the sense or feelings about a product, the impression felt from it, or the evaluative feelings about the product. The final definition of usability is stated as satisfying the users in terms of both the performance and the image and impression felt by them.

Usability definition of Han et al. (2001) recurs as a definition at the later studies of Yun et al (2003), and Hand and Hong (2003), where satisfaction dimension of usability in cellular phones and audio/visual electronic products are investigated respectively.

3.3.4 Subjective Component of Usability

Human performance related dimensions of usability which can be evaluated objectively are of primary importance in the early studies in literature. Main purpose in these studies was the improvement of the objective dimensions of the software such as reducing the number of errors in realizing specific tasks, and reducing the time to accomplish these tasks. Therefore, user satisfaction was not mentioned in those studies at all (e.g Whitefield et al. 1991). Later studies, treating user satisfaction as a dimension of usability, and evaluating it, aroused in the literature (e.g. Kirakowski 1996). These studies were mainly focused on the user evaluation of performance related dimensions of the usage. However, with the appearance of usability as a marketing strategy for consumer products (Jordan 1997) the role of users in evaluation of the term is redefined. As Han et al. (2001) state that the user is the final decision maker (i.e. final evaluator of the usability) and products manufactured by neglecting this fact are simply rejected by the users. The subjective evaluation is considered as a more prominent dimension influencing the overall usability in this study.

In recent years, the literature witnessed the entrance of hedonic and emotional issues into the domain of usability. These aspects of usability are also stated in the standard definition of ISO (1998) as well. Different terms are proposed pointing to the same issue by different authors: behavioral and emotional usability concept (Logan, 1994), pleasure of use (Jordan, 1997),and sensuality in interface design (Hoffmeister et al, 1996, Nielsen, 1996). The number of studies has increased and the content of the issue has developed so that the hedonic aspects of the interaction become to constitute an individual discipline of its own. Today, satisfaction dimension of usability is due to

subjective evaluation of the interaction based on the human performance again.

Jordan (1999-a) defines ‘subjective evaluation’ (p.207) component based on the acceptability in achieving the goals mainly. Therefore, the hedonic evaluations made and emotions derived during the interaction are excluded from the component. It can be said that the satisfaction dimension of Jordan is relatively restricted. Jordan, who is a cult researcher about the hedonic side of the interaction, studies the "pleasure of use" as a concept beyond the usability domain (Jordan 1997).

In this study, the term usability is referred to indicate the human performance evaluation of the user. The hedonic and emotional aspects of the user-product interactions are examined under Section 3.3 and they will be referred excluding the ease of use dimension. However, the interactions between both dimensions will also be provided in Section 3.5. A similar approach is undertaken in the study of Lindgaard and Dudek (2003). In their study, user satisfaction concept in websites is elucidated in this study, and usability evaluation of the user is itemized as a separate dimension and named as ‘perceived usability’ (p.432). The hedonic and emotional aspects are studied under the name of aesthetics, emotion and likeability. A last dimension of user satisfaction is stated as ‘expectations’ (p.432) which is based on consumer satisfaction literature.

Han et al. (2001) define twenty-three dimensions for the evaluation of ‘performance’ related usability dimensions in consumer electronic products. These dimensions are the result of the refinement of initial group of sixty dimensions collected from the literature. Han et al. divides these dimensions in three subgroups, which differ in terms of phases of the usage: perception / cognition (i.e. related with perceiving and interpreting the interface like explicitness, responsiveness, simplicity, etc.), learning / memorization (i.e. addition to learnability and memorizability, consistency, informativenes, etc.), and control / action (i.e., accessibility, efficiency, etc.).

3.4 Hedonic/Emotional Interaction and User Satisfaction:

In Chapter 2, the significance of expectations in forming the satisfaction response is revealed. What users expect from products is an issue which is hard to identify as it is hard to generalize the expectations of users coming from different social groups, income classes, education levels and cultures. Nevertheless, design discipline speaks about the tendency of users toward products that satisfy their hedonic and emotional needs. Jordan (1999-a) proposes a concept of pleasurability, which describes as: “The emotional, hedonic and practical benefits associated with products.” (p.210) Although the definition includes the practical benefits, it is found convenient to examine the practical benefits under functionality and usability dimensions and focus on the hedonic aspects of the interaction under this item. The emotional aspects of the interactions are also investigated separately in our study due to nuances between the terms of pleasure and emotion. Pleasure is described in Oxford English Dictionary as "...the condition of consciousness or sensation induced by enjoyment or anticipation of what is felt or viewed as good or desirable; enjoyment delight, gratification. The opposite of pain." (p.751) In this definition, emotions such as joy and happiness are regarded as the cause of pleasure. Emotions, on the other hand, are more general and complex constructs, identification of which is generally realized based on the item of pleasure (e.g. pleasure-arousal Circumplex of Russell (1971), pleasure-arousal-dominance (PAD) model of Mehrabian and Russell 1974). Therefore in this study, the term pleasure is identified with the hedonic benefits of the user. However, the author is also aware of the fact that these items are highly interrelated and the distinction of hedonic benefits from other benefits can not be realized in most of the times .

In his work, Jordan (1999-a) also includes the modification of the need hierarchy of Maslow (1954) to locate the hedonic associations with the products in the domain of user needs. Jordan defines the user need items as, functionality, usability and lastly pleasurability. Functionality and usability aspects of user-product interaction have already been discussed in the previous sections. Figure 3.3 indicates the order and

importance of these items.

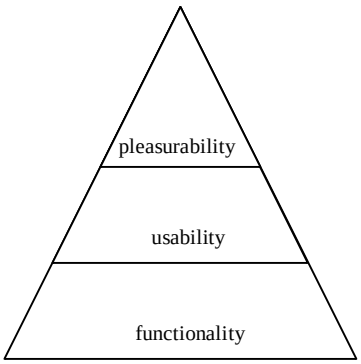

Figure 3.3 User needs from Jordan (1999-a)

The order of the user needs in Figure 3.3 follows a similar scheme of Maslow (1954). Functionality is at the bottom of the triangle. Once the product does not perform as it should do, no utilitarian need is satisfied in the domain (Jordan, 1999-a). Usability is then sought by the user once the function need is satisfied according to Jordan. The user should believe that he/she is able to use the product effectively and efficiently. Satisfied with the usability qualities of the product, users seek for satisfying their hedonic needs. Whenever the users do not see any problem regarding the functionality and usability of the product, then pleasurability becomes a key dimension to form the satisfaction response.

Recently, in ergonomics and usability fields, which are mainly interested in human performance in interaction, there has been a greater interest on dealing with the hedonic and emotional experience of the users with products then before. In the editorial of the special issue of Ergonomics journal, Helander and Tham (2003) state the trend in ergonomics through the pleasurable interaction as: "In the past there were two sets of dependent variables: those related to human performance (time and error) and those relate to physical and psychological pain. We will now consider affect or pleasurable design."(p.1270) The literature about the hedonic side is blooming so fast that a necessity to differentiate this subdiscipline from its ancestor, ergonomics, with a

different name has occurred. Helander and Tham name this new discipline as "... Hedonomics,- from the Greek 'hedone' (pleasure-akin to sweet) and 'nomos' (laws, principles). It is a different perspective: It is not how to evaluate the user; it is how the user evaluates (p.1271)." This new discipline is primarily trying to utilize former models to construct the theory of affective interaction.

Product design discipline rather tries to generalize the concept of 'pleasure' and tries to carry the issue to the domain of emotions. They generally focus on the experience of the user in his/her relationships with the product. Design should be realized for experiencing according to some authors (Sanders 1999) and towards a context for others (Wenseeven 1999). The domain focuses on the nature and dimensions of the emotional interaction between users and products (Desmet 2004). As enriching the experience of the users and increasing the satisfaction by evoking emotions are the primary goals of the field, means for both identifying and measuring emotions towards certain product qualities (Desmett 2002) and characterizing the Dimensions of the emotional interaction are emerged research directions in the field (Desmett and Hekkert 2002, Demirbilek and Şener 2003).

Whether it is named as pleasurable or emotional, the subjective experience of the user plays a great deal in user satisfaction. Demirbilek and Şener (2003) mention the expectations of users or customers are changing. Provided that functionality, attractiveness, ease of use, affordability and safety are taken for granted, today, the new trends are for objects that inspire users, enhance their lives, and evoke emotions and dreams in their minds. Accordingly, these issues may play the prominent role in defining the overall satisfaction and should be analyzed in detail (Demirbilek and Şener, 2003). In this section, first the pleasurability aspect of products is described by providing the model of Jordan. Secondly, the issues raised in the 'design and emotion' domain. Afterwards the primary Dimension of the hedonic/emotional response, aesthetics, is studied. The section will conclude with discussions on the symbolic associations which could influence the response of the user towards the product.

3.4.1 Pleasurability Aspect

Pleasure that can be derived from products is a complex issue. Superficial approaches to the subject surely do not achieve the impact on the user side. Hasselzahl et al.(2003) provide an extensive literature search on pleasurability with software products and provides a critique of handling ways of the issue in the software literature. Although the critique is based on software products, it can also apply to consumer products. According to Hasselzahl et al. (2003) three traps in defining pleasure with products can be seen as:

> *"Usability reductionism* supposes that joy of use simply results from usable software and that the answer to the question of how to design for enjoyment is already known. The only problem is how to put usability engineering into practice. So, joy of use appears to be just a natural consequence of excellent usability. This perspective discounts the qualitative differences between simply doing a job and enjoying doing a job." (Hasselzahl 2003, p.4)

> *"Design reductionism* reduces joy of use to a quality that graphical and industrial designers add to software. Designers "possess the [..] skills that combine science and a rich body of experience with art and intuition. Here is where 'joy' and 'pleasure' come into the equation: joy of ownership, joy of use." This perspective assumes that joy of use is concerned more with superficial than with deeper qualities, such as interaction style and functionality. Therefore, it fails to acknowledge the complex interplay of visual, interactional, and functional qualities." (Hasselzahl 2003, p.4)

> "*Marketing reductionism* reduces joy of use to a simple marketing claim. This opinion is comparable to the perception of usability at its advent: user friendliness. It is mainly a claim with no substance."(Hasselzahl 2003, p.4)

The prominent work of Jordan (1999-a) provides an extensive pleasure definition. He utilizes the categorization of pleasures of Tiger (1992 in Jordan 1999-a) under four different dimensions:

First of the dimensions is related with the senses (Physio-p). Pleasures "...connected with touch, taste, and smell as well as feelings of sexual and sensual pleasure" (p.209) are considered under this item. Apart from the primary interaction agent for the products visual pleasure, this dimension involves tactile pleasures (associated with holding and touching a product) and olfactory pleasures (associated with the smell of the product). For example, smell of a new car may be an influential aspect for the user, as well as providing an olfactory pleasure.

Second pleasure type is named as Socio-p by Jordan. It refers to "enjoyment derived from the company of others"(p.210). The possibility for a product to initiate and facilitate positive social interaction can be seen as a source for pleasure in the social context. Social identity reflected by the product is an important dimension that may give pleasure to the user. This issue will be raised later in this section which will focus on the social meanings of the products.

The third item under the pleasure domain of Jordan is related with the psyche. It is mainly related with pleasure gathered from accomplishing the tasks. A product is pleasurable to an extent, and this helps the users to accomplish their tasks. This item is the pleasure is due to superior functionality and usability qualities of the product. The author exemplifies this type of pleasure with. "...a word processor which facilitated quick and easy accomplishment of, say, formatting tasks..." (p. 210)

Ideo-pleasure is the last item in the classification and it "... refers to pleasures derived from the 'theoretical' entities such as books as, music, art."(p.211) This dimension is influenced mostly from the symbolic associations that the product carry. As an example using a product made of biodegradable materials would feed user's need of caring for the environment, and using such a product could satisfy his/her ideological needs.

3.4.2 Emotions and User Satisfaction

Researches in psychology show that interactive experience with products involves an affective component (Lindgaard and Dudek 2003). “Some authors argue that (LeDoux, 1996, p. 154), affective reactions that often accompany judgments of objective properties cannot be voluntarily controlled (Zajonc, 1980). It is thus likely that an interactive experience involves some affective component, and that this influences the level of what we call ‘user satisfaction’ (Lindgaard and Dudek 2003, p.432) .”

During user-product interactions, different emotions can be observed. Desmet (2002) proposes emotion typologies involved with the products on appearance basis. He based his study on the previous emotion schemes in the literature. One of these schemes is the two dimensional (pleasure-arousal) representation of Russell (1971), which is already mentioned in the former Chapter 2. The author criticizes this scheme (Desmet 2004), due to its inability in definite differentiation of basic emotions. For example anger and fear, at which one can not differentiate the level of neither pleasantness nor arousal. The basic emotion sets are found to have more strength for defining the emotions with products. In this study, the six-itemed scale of Ekman (1971 in Desmet 2004) is utilized. The basic emotions in this scale are: ***surprise***, ***joy***, ***sadness***, ***disgust***, ***fear***, and ***anger***. An immediate critique of this scheme comes from Desmet (2004) due to its inability in covering product related emotions such as boredom and desire. Another critique is that the inadequacy of the basic emotion items (e.g. anger) for pointing on the nuances (e.g. the relationship between anger and derivatives of anger such as dissatisfaction; indignation; aversion). The emotions that are to be experienced in response to consumer products are related to those proposed by Ekman (1971 in Desmet 2004) and given in Table 3.1.

Table 3.1 Basic and subordinate-level product emotion types from Desmet (2004)

Basic emotion derivates					
Surprise	***Joy***	***Sadness***	***Disgust***	***Anger***	
Unpleasant surprise	Joyful	Disappointment	Disgust	Irritation	
Alarmed	Amusement			Indignation	
Amazement				Dissatisfaction	
Astonishment					
Pleasant surprise					

Nonbasic emotion derivates					
Contempt	*Desire*	*Stimulation*	*Boredom*	*Admiration*	*Satisfaction*
Contempt	Desire	Fascination	Boredom	Admiration	Satisfaction
	Avaricious	Curiosity			
	Yearn	Stimulation			
	Softened	Inspiration			
	Eagerness				

It can be seen that satisfaction is included as an individual emotion item, which can be elicited due to product appearance. It is necessary to recall that the final list is proposed in the light of the evaluations of the subjects. Here, one may not raise a satisfaction keyword explicitly. Nevertheless, the other raised emotion responses are highly related with satisfaction response as it is mentioned in Chapter 3.

Desmet (2004) states that although it is proposed to cover emotions regarding appearance issues, the typology preserves validity for owning and using phases as well. Witsenburg and de Boer (2003 from Desmet 2004) "...examined to what extent the emotions that are experienced in response to owning or using a product differ from those found in the study that focused on appearance. It was found that all emotion types that are shown in Table 3.1 (except for desire) can also be experienced in response to owning or using a product. They also found two additional emotion types, that is, security (e.g. relaxed, trusty), and insecurity (e.g. insecure and embarrassed)." (p.12)

Desmet and Hekkert (2002) investigate the basis underlying product emotions. According to the authors the emotions are evoked as a result of certain appraisals. In this process of appraisal, the product is assessed with respect to a certain concern. Three main concern types are noted in the study: goals, attitudes, and standards.

- The utilitarian goals are mainly related with the previously stated dimensions such as functionality and usability of the products. Another subgroup of goals is raised points to the hedonic goals such as being attractive, having a unique product, etc.
- Another concern for the assessment of the product is attitude. This concern is related with appealingness of the product. The appealingness of the product is influenced from mere basic visual elements of the product, or symbolic issues which gain meaning in a social context, such as kitsch appearance referring to a cheap lifestyle.
- The third concern, standards, is related with the norms and values of the individual. The conformance of social issues related with the product to the standards of the individual may cause praiseworthiness.

Desmet and Hekkert (2002) define 5 subclasses of product emotions based on these three concerns. According to the authors 'instrumental emotions' are evoked when the goals are attained. In particular satisfaction is regarded as only one instrumental emotion. The aesthetic emotions such as desire, disgust, are evoked according to the intrinsic pleasantness of the products. The other concern standards play an important role in generation of "social emotions" such as indignation, admiration, etc.

For the other two product emotion groups no related basis of concern is mentioned. The first group, surprise emotions are evoked by the novelty of the product. Surprise may be either pleasant or unpleasant depending on the interpretations of the user. The last group is 'interest emotions'. These emotions are related with the ability of the product to stimulate the user. Boredom and fascination are raised as examples in this

group.

Demirbilek and Şener (2003) emphasize the importance of happiness and joy in the domain of emotional response towards products and provide list of product qualities that induce happiness and enrich the emotional aspects of the product. Accordingly, the emotional domain of the product can be improved by several factors such as senses, fun, cuteness, familiarity, metonymy and colors. However, the influence of these dimensions is not included in the study.

3.4.3 Aesthetics as a Primary Dimension of Emotions

Appreciation of products for merely the sake of visual pleasure has been studied for centuries. Aesthetics discipline is equipped with many theoretical and experimental studies that try what is ‘beauty’. However, the application for design is relatively new and unsaturated (Crilly et al. 2004). Nevertheless, this dimension is very influential in user decisions for many product groups where the functionality and usability problems seem to be solved. "Vegetable peelers, wireless phones, car-washing buckets, and lawn tractors are all being designed with attention to the aesthetic value" (Bloch et al. 2003 p.551).

As visual domain is the first communication medium between users and products, it is the most essential domain that influences user evaluations (Sevener 2004). In fact, the literature bares several examples of purchasing habits which are simply based on the evaluations of the user focusing on the messages conveyed in the visual medium. This shows that aesthetic qualities of products do not simply employ a mean for revealing "beauty", but also influence the impressions of users regarding several other product qualities such as ease of use, durability, etc., which can not be evaluated during the purchasing phase (Bloch et al. 2003).

3.4.3.1 Theories of Aesthetics

Lindgaard and Dudek (2003) refer to aesthetics as a dimension for user satisfaction with websites. "Mere-Exposure" theory of Zajonc (1970 in Lindgaard and Dudek 2003) can be summarized as an example theory in the work. It incorporates the influence of getting exposed to some specific stimulus on the aesthetic preferences of the subject, that is to say the more frequently exposed to a specific stimulus, the more likely for the human to perform a positive visual response to that stimulus. However, this approach denies the effect of novelty and considers only the negative sides of the arousal.

Crilly et al. (2004) identify aesthetic impression as a cognitive response of the user towards the product and compiles the theory of aesthetics from the literature. The authors refer to the product aesthetic theory of Coates (2003 in Crilly et al.2004) which base the resulting scheme on the two bipolar dimensions: objectivity-subjectivity and information-concinnity. The first dimension sources from the discussion about the existence of universal beauty. The authors refer to the modern practices like Bauhaus and gestalt psychologists. "Certain lines, proportions, shapes and colors were believed to be inherently attractive. This approach suggests that each object will have an ideal form, which once attained will tend to be considered attractive by everyone."(p.552) another opinion comes from Crozier (1994 in Crilly et al.) "Crozier suggests that ‘the presence of demonstrable differences between peoples’ judgments makes it difficult to believe in universal aesthetic principles [and that] inherent responses [may be] a mirage’. He suggests that the visual appeal of objects is also influenced by socio-cultural, socio-economic, historical and technological factors." (p.553)

The second dimension refers to trade off between novelty/arousal and commonality/boredom. Specifically these dimensions are stated as information relating to both novelty and contrast, which may serve to arouse a consumer’s interest and concinnity relating to the order and sense perceived in a design, which may assist the consumer in understanding the product. These opposing qualities should be in balance

for user to achieve visual delight.

Crilly et al. summarizes four combinations on these two dimensions as follows (p.554):

- “Objective information is the novelty due to product. A product of a strikingly different color from the other products and background.
- Subjective information is the novelty perceived in the design formed by the familiarity of the user to the form of the product
- Objective concinnity is the order perceived in the design. This is determined by the application of design principles such as the Gestalt Rules.
- Subjective concinnity is the extent to which the design appears to make sense to the viewer. This is determined by the consumer’s personal, cultural and visual experiences that assist them in understanding the product.”

These theories of aesthetics provide valuable insight for the relationship of users with product on the basis of visual appeal.

3.4.3.2 Visual Message as a Dimension of Hedonic/Emotional Satisfaction

Products convey messages not only about their mode-of-use and functionality but also their personality. Their visual qualities definitely bare meanings which can be decoded in the social context. (Griffin 1999). The meaning encarved into the product allows the users "...to communicate their identity through products ... to ‘project a desirable image to others, to express social status and to make visible their personal characteristics’"(Crilly et al. 2004 p.556). In that sense all products hold symbolic associations and these associations may influence the attitude of the user towards a product.

Dittmar (1992) propose two different type of symbolism associated in products. The first one is the self-expressive symbolism. This stands on the view that says consumers represent their identities through the products they posses. The personality of

the product formed by the visual cues in a specific culture with predetermined values becomes the personality of the user. Whereas, categorical symbolism, refers to associations related with the position of the user in the social domain.

Crilly et al. comment on this purpose of products as follows: "The categorical symbolism associated with products allows the expression of group membership, including social position and status. These categorical meanings serve to integrate the consumer with those that surround them. Indeed, one of the principal approaches to expressing membership of a social group is through shared consumption symbols." (p.557)

In this regard, the symbolic association that a product holds may play the prominent role for users' preferences in products. A man who wants to express his/her strength by a car may seek for a strong looking car, or a juvenile who wants to receive acceptance by his friend hood may seek for a high end cellular phone. In each case the symbolic qualities of the product influence the satisfaction response of the user.

3.4.4 Image and Impression and User Satisfaction

The usability literature presents several studies that define user satisfaction based on image impression aspects as stated in section 3.2.3.2. In this section these studies are summarized. As stated before, Han et al. (2001) defines usability based on performance and image-impression. There are 25 dimensions, in the image and impression group, which are extracted from a total of 350 relevant expressions collected from both literature and product design departments. These expressions are basically similes and metaphoric expressions to describe the image and expressions about feelings towards them. Han et al. refer to several disciplines such as linguistics, consumer behavior, cognitive psychology to propose a model for the transition of the image and impression of a product. Image and impression dimensions classified in the three phases are named in the model as: basic sense (i.e., feelings regarding shape , color, brightness, texture, translucency, balance, heaviness, volume), description of the image (metaphoric design image, elegance, granularity, harmoniousness, luxuriousness, magnificence, neatness,

rigidity, salience, dynamicity), and evaluative feeling (acceptability, comfort, convenience, reliability, attractiveness, preference, satisfaction). Although the last subgroup of image impression dimensions seems to be influenced from 'performance' dimension, the authors did not mention this interrelation at all. They define satisfaction as the degree to which a product is giving contentment or making the user satisfied. They do not elaborate on how this dimension of usability relates to the other dimensions. Another point worthwhile to mention is that the 'feelings' of the user about the product is the main consideration. Even the dimensions which require a time period to be assessed such as reliability are evaluated on the basis of "feelings".

Yun et al. (2003) exemplify the practical application of this study in cellular phones. They, moreover, investigate the relationship between the design features of cellular phones and the image and impression formed due to design elements. This effort includes identifying image/impression attributes in mobile phone design, impression elicited by the image, significant characteristics of the products associated with the image and impression dimensions, and the relationship between image dimensions and design variables.

Satisfaction dimensions included in this study were luxuriousness, simplicity, attractiveness, colorfulness, texture, delicacy, harmoniousness, salience, ruggedness, and overall satisfaction. The users evaluated just the hardware parts of the phone buttons, displays and body merely based on appearance. Information on technical equivalence of the phones is not provided and the method for eliminating the bias for brand information is missing. This information is essential as different phones of various brands are used in the study. Answers for overall satisfaction may depend on various other information which may disturb the robustness of the results commenting on the significance of design characteristics and dimensions of satisfaction stated.

3.5 Safety, Reliability, Durability

The dimensions raised in this section are essential product properties that have been studied since 1970's. According to Kirk and Ridgeway (1970) all consumer products should have superior qualities regarding these properties. Although safety, reliability, and durability are taken for granted by many, and may not be stated as a prominent Dimension of satisfaction, absence of these qualities will result in critical problems. Norris and Wilson (1999) point to the importance of product safety by reporting that in United Kingdom 4,000 people die and three million get injuries every year due to home accidents concerning consumer products.

3.6 Interactions Between the Dimensions

In section 3.1, the relationship between functionality and usability is briefly stated. The survey of Gültekin (2004) provides various findings about the interaction of functionality and usability for the digital products. These products, where the functions are determined by the technological advance instead of user requirements, are found to lack superior usability qualities. That is to say the easy usage of these functions is hindered by the abundance of supporting functions, which shows the conflicting nature of number of functions to be performed by a particular product and its usability.

Feist (1994) emphasizes the importance of emotional aspects of human perception in problem solving, decision making and overall cognitive processes. The authors claim can be interpreted as the importance of emotional interaction on the perception of other utilitarian qualities of the product. This view is supported by experimental findings revealing the loose relationship between apparent (or perceived) usability and actual usability. Tractinsky et al. (2000) propose evidence on the influence of visual appeal on the usability evaluation of the user. In the study, the users evaluate an array of Automatic Teller Machine (ATM) interfaces with identical content which are different in aesthetic appeal and in actual usability both before and after the usage of the

interface. The results show that the primary Dimension of the usability evaluation of the user is visual appeal. That is to say the controlled variations in actual usability levels have no effect on perceived usability, but the usability response is formed by visual appeal.

Lindgaard and Dudek (2003) reports contradictory findings regarding the findings of Tractinsky et al. (2000). In the study, the websites which are determined as ‘having good aesthetics qualities’ and ‘evoking positive emotions’ do not receive high usability scores. In contrast, the visual appeal evaluation of these sites reveals higher scores than the other sites that are found to be ‘usable’.

Novelty is reported to be an agent to create arousal and evoke positive emotions during product usage by Hasselzahl et al. (2003). However, according to the authors, the search for novelty may result in poor usability qualities. "Usability and joy of use might be partially incompatible, because the former requires consistency and simplicity, whereas the latter requires surprise and a certain amount of complexity. Designers need to introduce novelty with care. User interfaces that are too novel and unfamiliar are likely to evoke strong adequacy concerns instead of hedonic quality perceptions. What is needed is a way to determine an optimal level of novelty."(Hasselzahl et al. 2003, p.8)

3.7 Different Product Groups Different Dimensions

In consumer behavior literature, consumer satisfaction is considered to be a product/service specific issue (Giese and Cote 2000). The guidelines for designing satisfaction surveys emphasize the need for identifying case specific satisfaction items.

This issue is also raised in other disciplines. Lindgaard and Dudek (2003) give an example from the HCI literature. "In a work environment in which computer use is mandatory, one would expect judgments of ‘user satisfaction’ to be based primarily on the degree to which the system in question enhances productivity. By contrast, productivity is probably not the prime motive driving people when they play computer games or surf the Internet in their leisure time. It is therefore reasonable to assume that

the notion of ‘user satisfaction’ will rest on quite different criteria in the two environments. However, in either case we believe that ‘user satisfaction’ is the subjective sum of the interactive experience." (p.430)

Although Lindgaard and Dudek state that the expectations regarding the content and appearance of a government website to differ from those of an interactive game site or a site selling consumer goods, they consider the user satisfaction as the summative response and do not focus on the importance of satisfaction dimensions for particular product groups. Since the goals associated with different websites may be far different than each other, the prevailing dimension of satisfaction may also differ.

Han et al. (2001) are among the first researchers showing sensitivity to differentiating the satisfaction dimension for consumer products. They adapt the traditional human performance based usability definition for consumer electronic products, which results in restructuring the satisfaction dimension. They basically point to the difference between software products and consumer products regarding the issue of owning which is missing for the software products.

Following the usability and user satisfaction definitions of Han et al., Yun et al. (2003) mention about the difference regarding satisfaction items between different consumer product groups. “Obviously, the dimensions are different from product to product. For example, satisfaction dimensions for audio products are different from those for automobiles. An automobile look ‘speedy’, which is not an adequate feeling towards an audio player such as a CD player." (Yun et al. 2003, p.1427)

The importance of appearance and symbolic associations may be more for the products which represent the user in the social context (Crilly et al. 2004). Here the user satisfaction may be defined solely on the appearance dimension.

These comments reveal the necessity for a study for identifying the prevailing satisfaction dimension for different product groups. The findings of the study will be highly beneficial for user involved design and evaluation processes, providing the appropriate satisfaction definition and Dimensions.

3.8 Summary of the Chapter

This chapter presents the dimensions that influence user satisfaction/ dissatisfaction with household consumer products. In Section 3.1, general discussions related with the user-product experience are given. The criteria, such as social , operational, aesthetic, inventive criteria, raised for a satisfactory experience proposes a comprehensive framework for the analysis of the dimensions.

Section 3.2 discusses the issues related with the functionality of the products. The functionality can be considered through two aspects, performance, which is related with the quality of the job done and adequate functionality which is defined the level of functionality satisfying the needs.

In Section 3.3, the discussions related with the usability of consumer products are summarized. The usability of hardware and software components is differentiated and subdimensions of usability are revealed. of both of the products are revealed.

Section 3.4 reveals the issues related with Hedonic/Emotional interaction. The issues like pleasurability and emotions evoked by the products are analyzed in order to come up with proper dimension definitions. The classifications of the pleasure with products and emotions related with products give a sound basis for defining correct dimension for user satisfaction. The aesthetics dimension is discussed in this section as well. These discussions include not only the basic appreciation of the visual qualities of the product but also appreciation due to the image and symbolic associations.

The next chapter summarizes the significance of the dimensions such as safety, reliability, and durability. After giving a brief discussion about the interactions between dimensions raised in previous sections in Section 3.6, the chapter concludes by the arguments taken from the literature that supports our main hypothesis stating different dimensions prevail in different product groups.

CHAPTER 4

MEASURING SATISFACTION

The previous two chapters summarize and identify the major determinants of user satisfaction. This chapter focuses on how the concept is treated regarding measurement in different domains. The measuring tools are summarized and the issues that are raised using these tools are mentioned. The chapter starts with approaches and studies that focus on the measuring satisfaction from consumer behavior and marketing point of view. Then, the user satisfaction measurement methods are summarized. The chapter finalizes with the discussions about measuring the hedonic/emotional interaction.

4.1 Customer Satisfaction Indices

Customer satisfaction is an important issue for any organization that aims success in the market by its products and services. In fact, there are various standardizations and indexes defining and measuring the customer satisfaction with products and services, in US and Europe. American Customer Satisfaction Index (ACSI) and European Customer Satisfaction Index (ECSI) are among the prominent examples. These schemes try to quantify the customer responses mostly based on expectancy disconfirmation models. These are general models which require case specific adaptations. The general models of ACSI and ECSI can be studied in Figure 4.1 and Figure 4.2, respectively. The influence of different dimensions on certain evaluation bases such as influence reliability of perceived value can be seen in these figures

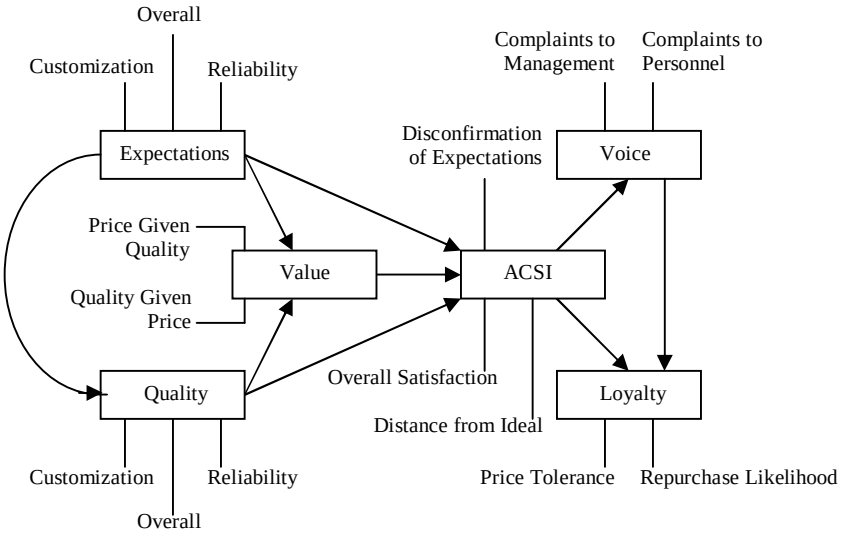

Figure 4.1 The American Customer Satisfaction Index (ACSI) Model
(Anderson and Fornell, 2000)

In both models, the reader can see the former expectation dimension regarding the performance of the product is reappearing. The two models show similarities, for example they both emphasize dimensions like perceived quality, perceived value, which influence the satisfaction response and behavioral outcomes (e.g. customer loyalty and complaints). In the figures 4.1 and 4.2, the dimensions for the present study are quality and expectations dimensions. Here the quality refers to customers' perception of quality due to recent consumption experience, and expectations relates to the formerly gained information of the user about the product and service. The dimensions "value", which is named as equity in Chapter 1, involves price considerations, is excluded from the present study. Other dimensions which appear after confirmation/disconfirmation stage (i.e. consequences of satisfaction) are also of little importance for this study and they are also excluded from this study. The main difference between ACSI and ECSI is the "image" dimension which is pronounced in ECSI only. This dimension stands for the

impressions of the consumer regarding the brand. Therefore, it is again not a primary dimension for this study either.

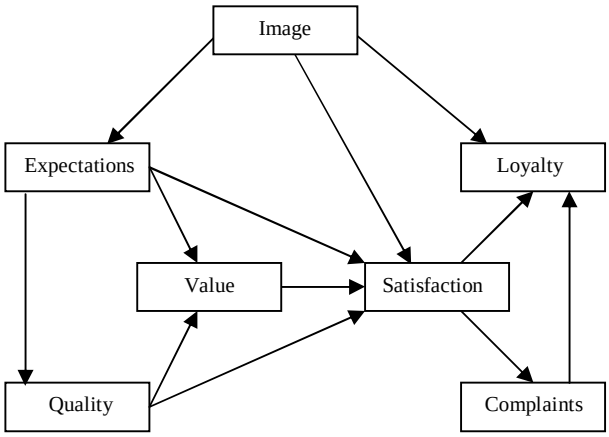

Figure 4.2 The European Customer Satisfaction Index (ECSI) Model (Bayol et al. 2001)

The dimensions stated in these models are called ‘latent variables’(Bayol et al. 2001). The model differentiates two types of variables: dependent variables which are influenced by some other dimensions (i.e. a dimension in the model figures with an incoming arrow) and independent variables which are not influenced by any variables (i.e. a dimension without any incoming arrow). The models primarily focus on the significance of the dimensions on the resulting satisfaction index using various statistical methods.

The latent variables are more general constructs and they are divided into sub variables called manifest (measurement) variables. The questionnaires which are designed to measure the index values for the manifest variables include questions directly addressing to these variables. For example, customer expectation latent variable is detailed under three measurement variables, which are overall expectations, expectations regarding customization, and expectations regarding reliability. The models also try to derive equations for the resulting latent variable value and the values for the related manifest variables. The groups of manifest variables and related latent variables

are given in tables 4.1 and 4.2 for ACSI and ECSI models respectively.

Table 4.1 Measurement variables used in the ACSI model (Fornell et al. 1996)

Measurement variable	**Latent Variable**
1. Overall expectation of quality (prepurchase) 2. Expectation regarding customization, or how well the product fits the customer's personal requirements (prepurchase) 3. Expectations regarding reliability, or how often things would go wrong (prepurchase)	Customer Expectations
4. Overall evaluation of quality experience (postpurchase) 5. Evaluation of customization experience, or how well the product fit the customer's personal requirements (postpurchase) 6. Evaluation of reliability experience, or how often things have gone wrong (postpurchase)	Perceived Quality
7. Rating of the quality given price 8. Rating of price given quality	Perceived Value
9. Overall satisfaction 10. Expectancy disconfirmation (performance that falls short of or exceeds expectations) 11. Performance versus the customer's ideal product or service in the category.	ACSI
12. Judgment of customer complaint according to its formality	Customer Complaints
13. Repurchase likelihood rating 14. Price tolerance (increase) given repurchase 15. Price tolerance (decrease) to induce repurchase	Customer Loyalty

The data collection tool of the both models is a questionnaire. The related manifest variables are questioned via Likert scales (Bayol et al. 2001). In these questionnaires, statements indicating a specific view are evaluated on a bipolar dimension; where there are different grades varying from strongly disagree to strongly agree. In ACSI and ECSI, the scale varies between 1-10. The respondents fill in the questionnaire by choosing one of the scale varying between 1 and 10 according to their acceptance for the given statement.

Table 4.2 Measurement variables used in the ECSI model (Bayol et al. 2001)

Measurement variable	**Latent Variable**
1. Company can be trusted in what it says and does 2. Company is stable and firmly established 3. Company has a social contribution to the society 4. Company is concerned with its customers 5. Company is innovative and forward looking	Image
6. Expectations for the overall quality of product/service supplier 7. Expectations for product/service supplier to provide products and services to meet customer's personal need 8. Rating of frequency of wrong things happening to the product/ service supplier	Customer Expectations of the Overall Quality
9. Overall perceived quality 10. Customer services and personal advices offered 11. Quality of the services used 12. Variety of services and products offered 13. Clarity and transparency of information provided 14. Reliability and accuracy of the products and services provided 15. Technical quality of product/service supplier	Perceived Quality
16. Rating of the fees and prices paid for product/service according to given quality 17. Rating of the product service provider according to given fees and prices	Perceived Value
18. Overall satisfaction 19. Fulfillment of expectations 20. Comparison of product/service supplier and ideal ones	Customer Satisfaction
21. Rating of handling of customers' formal complaints 22. Rating of what extend the product supplier cares about complaints	Customer Complaints
23. If a new product supplier would be chosen, rating of the possibility of choosing same product/service supplier again 24. When the substitute supplier (the other supplier) lower its price, rating of level of difference (in percent) to change supplier. 25. Rating of the possibility to recommend the product/service supplier to others.	Customer Loyalty

4.2 General Customer Satisfaction Measurement Studies

Hayes (1998) identifies the main steps in measuring customer satisfaction as: (1) determining the customer requirements; (2) developing and evaluating questionnaire; and (3) using the questionnaire. For our study, the first phase is essential. The influential dimensions of user satisfaction can also be deduced from user requirements analysis under the light of general customer satisfaction measurement methods.

The purpose of determining customer requirements is stated by Hayes to provide a comprehensive list of all the important quality dimensions that describe the service or product. Two methods are proposed by Hayes that identify the quality dimensions. The first one is Quality Dimension Development Approach. This approach is realized by the people who provide the service or product. "They should be in a good position to understand the purpose and function of the service or product. These people could range from individuals within a quality circle addressing a particular problem to individuals working independently to better understand their customer's requirements." (Hayes 1998 p.24)

This approach consists of two steps identification of dimensions and defining these definitions with specific examples. According to Hayes (1998), dimensions can be generated in various ways, using different sources of information, such as related literature. Hayes provide examples from service and support staff quality researches, where referring to trade literature provide vital insight. In the second step, by establishing specific examples, dimensions are clarified.

The second approach stated in Hayes (1998) is Critical Incident Approach. The approach identifies the quality dimensions based on customer views. According to Hayes, as the customers are final recipients of the product or service offered, leaning on their evaluation is a reasonable way to define the quality. The author defines a critical incident as "an example of organizational performance from the customer's perspective. That is, critical incidents are those aspects of organizational performance in which customers come in direct contact. As a result, these incidents usually define ... product

quality..."(p62) The incidents can be both positive and negative. However, a good critical incident statement should be; (1) specific; and (2) able to describe the product with certain adjectives, e.g. a car with inadequate luggage space. Individual and group interviews are the main methods to extract the critical incidents data.

Giese and Cote (2000) utilize the critical incident approach in order to define satisfaction. The authors raise questions about good and bad experiences with particular products in order to extract satisfaction and dissatisfaction definitions of users. The aim of the questions is not to address the specific determinants of the satisfaction concept, but to elaborate on the view of the users in defining the satisfaction.

Referring to previous experiences of the users for the definition of satisfaction may be a good idea for identifying the determinants of satisfaction. In fact, some of the user statements include comments about the importance of the specific issues like ‘uniqueness’. Uniqueness can be considered as a symbolic association and it is the main determinant for the user satisfaction.

After identifying the critical incidents, the next step in this approach is the categorization of the incidents into satisfaction items by grouping similar incident statements. Statements which contain the same verbs can be grouped under the same item. Then, different satisfaction items can be grouped to achieve customer requirement items. This is step can be realized by interjudge agreement, i.e. two judges, each realizing the categorization separately. An index is computed by dividing the number of times both judges put a satisfaction item into the same requirement title to the total number of requirement items. For example, if two judges agreed upon 6 requirement items out of 10, the value of the index is 0.6 Hayes reports that an index exceeding 0.8 is acceptable to finalize the customer requirement items.

The satisfaction items are then transformed into declarative statements which are evaluated by the respondent of the questionnaire on a Likert scale. Other alternative is a checklist response format which allows only "yes" or "no" as responses. However, Hayes reports that Likert scale more sensitive to the variations in the answers. Likert scales are stated to be suitable for statistical analyses that may be used for identifying the

most prominent satisfaction item for customers as well.

4.3 Attitude Measurement:

As it is noted in Chapter 2, "attitude" concept in consumer behavior literature is closely related with the user satisfaction. Therefore it is quite convenient to summarize attitude measurement methods in this chapter. The attitude formation models mainly deal with the evaluation by the consumer during a purchase stage. Hence, the models are designed for the evaluation and selection from a set of alternatives, which is 'preference'. In this study, preference concept is not investigated. Nevertheless, the models proposed can be used for the evaluation of an individual product, regardless

Attitude formation is commonly described by the multi attribute models (Dubois 2000). This approach divides the product to different attributes, such as price attractiveness, consumption and after sales service. Different ratings of these product attributes may be directly added up to yield a final evaluation score for a particular product. This approach, which assumes that product attributes compensate for each other (i.e. low score of one attribute can be compensated with a higher score of another attribute), is known as value-expectancy models (Keinonen 1998). The attributes can also have some weight of importance in some evaluation methods. In these cases, the scores of attributes are multiplied by the regarding importance weight and then summed up (Rosenberg and Fishbein 1963 in Dubois 2000). Rosenberg's attitude formation model is given below:

$$A_o = \sum_{i=1}^{n} (I_i \, V_i)$$

A_o = attitudes towards object o

I_i = 'perceived instrumentality', that is, the perceived capacity of the object to procure a value expressing a desirable result

V_i = importance of this value for the individual

n = number of ‘values’ or desirable qualities.

Fishbein's approach (1975 in Dubois 2000) to attitude formation shows differences. According to Fishbein the attitude towards objects can be explained by the knowledge of the object's attitudes and by the value attached to each attribute. The related model can be formulated as follows:

$$A_o = \sum_{i=1}^{n} (B_i\ A_i)$$

In this formula:

B_i = strength of the perceived relationship between attribute i and object o (that is, the probability that the object possesses the attribute); and

A_i =value of attribute i.

Dubois (2000) provides an extension of this model. Former model assumes that the more attributes present in the object, the more positive the resulting attitude will become. However in Dubois model, notion of ideal level of the attribute is included in the model.

$$A_o = \sum_{i=1}^{n} (\,|\,Ii - A_i\,|\,B_i)$$

Here A_o, A_i and B_i definitions are as before, and I_i stands for the ideal level of the attribute i.

As mentioned, value expectancy models are compensatory models. Dubois (2000) presents other models for attitude formation. In certain cases, these models are not capable of explaining the attitude formation process, where a poor score for an attribute is the prevailing factor for not approaching to the product. These models, which use thresholds for excluding products with not satisfactory attribute ratings, are known as *conjunctive* methods (Dubois 2000). These methods may not provide an outright

winner but simply isolate the products that fulfill all the requirements. For example, a consumer for whom visual aesthetics is a key factor influencing his/her overall attitude, may avoid an unappealing product, no matter how the product is superior regarding other attributes. Another, less frequently used, model is stated as *disjunctive* model (Dubois 2000). Here, the consumer is expected to choose the products because of their superiority in one or other of different criteria. An example of this case can be seen from the relationship of elder people with digital products. An elderly who is not computer literate and has problems in using digital products may stick to a cellular phone for just its superior ease of use.

A last model mentioned in Dubois (2000) is the lexicographic model, where a set of alternatives are ordered based on the evaluation of attributes. The model assumes that the consumer gives different importance values for different attributes, and the selection is performed starting from the most important attribute. The alternative which has the greatest score for the most important attribute is selected as the best alternative. Whenever a tie occurs between products, the evaluation is performed considering the attribute coming next regarding the importance. As this model aims at ordering of several alternatives, it is not beneficial for the purpose of this study.

4.4 User Satisfaction Measurement

In Human Computer Interaction discipline, user satisfaction of software is measured using questionnaires. The literature is well equipped with various user satisfaction questionnaires. Keinonen (1998) summarize some of these questionnaires for subjective assessment of usability, such as Technology Acceptance Model (TAM) and Software Usability Measurement Inventory (SUMI).

TAM is a computer attitude questionnaire, in which the usefulness and ease of use of the product are assessed. The interpreted model of the attitude formation towards products of Davis (1993 in Keinonen 1998), creator of TAM questionnaire, by Keinonen, takes usefulness and ease of use as the main factors in attitude formation. The

usefulness consists of accomplishment and efficiency and the other factor efficiency is evaluated regarding the factors such as learnability control and mental effort (Keinonen 1998). TAM offers subjective assessment examples about both perceived usefulness and perceived ease of use, like “using product X increases my productivity” or “I found product X cumbersome to use”, and tries to gather the users’ perception. In fact, TAM is stated to be a good example in separating beliefs and affect from attitudes.

SUMI (Porteous et. al.1993) is a usability inquiry that aims at measuring the perceptions and feelings of a typical user of the product. It is possible to relate the scores of an individual measurement to the SUMI database and get an overview of the usability of a product without having to compare several alternatives. There are five subscales in SUMI. These are: affect, efficiency, helpfulness, control, learnability. Each subscale consists of ten items. In the questionnaire these items can be marked as agree; undecided; or disagree. ‘Affect’ refers to *“the user feeling good, warm, happy or the opposite as a result of interacting…[it is] independent of operational aspects and to be about plain feelings.”* ‘Efficiency’ is a measure of the user’s perception of temporal efficiency and mental workload caused by the interaction. ‘Helpfulness’ refers to the perceived quality of the messages the system provides. ‘Control’ addresses the responses the product gives to the user’s actions. This diverse scale ranges from perception of reliability through error handling, willingness to discover alternatives, flexibility, speed of performance, length of sequences, and ease of navigation. ‘Learnability’ refers to the perceived effort of learning, memorability, and quality of documentation. (Keinonen 1998)

Lindgaard and Dudek (2003) utilize Web site Analysis MeasureMent Inventory (WAMMI) as the user satisfaction measurement questionnaire in their study investigating user satisfaction with websites. The authors provide the following discussion about WAMMI:

> "The WAMMI is a measure of ‘global satisfaction’ and it is said to tap five dimensions of the user experience, namely (1) attractiveness (“the pages on this

web site are very attractive”), (2) control (“I feel in control when I am using this web site”), (3) efficiency (“I feel efficient when I am using this web site”), (4) helpfulness (“this web site helps me find what I am looking for”), and (5) learnability (“learning to find my way around this web site is a problem”). The presentation of web sites, interview, and the WAMMI were counter-balanced to avoid serial order effects."(Lindgaard and Dudek 2003, p437)

4.5 Hedonic/Emotional Measurement:

The domain of hedonic/emotional interaction measurement is relatively new in the fields of product and ergonomics. Kansei engineering method as proposed by Nagamachi (1995), is one of the methods that used frequently in both academy and industry. This method is an empirical technique aimed at linking design characteristics of a product to user's responses to that product. A Kansei engineering case study of Ishiara et al. (1997) trying to figure out the relationship between coffee can design and the impression of the users is reported in Jordan (1999-b). Jordan explains the study as follows.

"72 alternative designs of coffee can were presented to a panel of ten subjects. Each member of the panel was asked to rate each of the designs according to how they fitted with a series of descriptor adjectives. These adjectives are known as 'elements'. There were 86 of these elements. Panelists rated each of the 72 designs according to the 86 elements by marking 5 point Likert Scales to indicate the degree to which they felt each of the designs exhibited each of the elements. …examples of elements used in the case were: showy, calm, masculine, feminine, soft , individual, high-grade, sweet, milky, etc." (p210)

Jordan’s study is appended with a cluster analysis that produces groupings of can designs according to their common elements. The study gave distinct groups. One of the

groups is named by the elements ‘milky’, ‘soft’, ‘sweet’ and characterized by use of beige on the majority of the can surface. Another group named by the elements ‘unique’, ‘sporty’, ‘individual’ is characterized by the use of blue and white coloring in the design.

From the very first appearance the method has been used in many different applications such as car interiors (Tanooue et al. 1997); speedometer design (Jindo and Hirasago 1997); automobile construction machinery (Nakada 1997); shoe design (Ishihara et al 1997), cyber-shopping mall design (Kim and Moon 1998); and mobile phone design (Chuang et al. 2001).

Sensorial Quality Assessment (SEQUAM) (Bandini et al. 1997) is another method for assessing the qualities relating to the hedonic experience of the user. In this method, the user is asked to evaluate the tactile qualities of product alternatives. The tool for gathering user responses and impressions regarding the tactileproperties of the product is questionnaire in this case too.

Another frequently used method to assess the emotions evoked by products is semantic differential method, (Chen and Owen 1997, Hofmesteer et al. 1996, Ishihara et al. 1997, Maurer et al. 1992, Wikstrom 1997). Semantic differential method utilizes Likert scales in which the two extremes of the bipolar continuum are constituted by two contrasting adjectives e.g. beautiful-ugly, appealing-repelling, interesting-boring, etc. The success of the study is determined by the appropriateness of the adjectives selected.

Jordan (1999-b) reports the study of Jordan and Servaes (1995 in Jordan1999-b) where the users’ reactions to pleasurable products are gathered via semi-structured interviews. The authors ask the users about their most pleasurable products, and record their verbal reactions. They try to identify the product properties evoking pleasure based on these responses.

Dubois (2000) gives examples from the physiological methods available and justifies their suitability for measuring emotions of consumers against products. The author mentions that the emotional experience will cause a change in the physiological state of the human and these changes can be measured by specific apparatus, such as skin galvanometer for measuring the changes in sweating. However, these techniques

are criticized as they are hardly practical to use on consumers. The author mentions about "warmth monitor" tool, which is used for measuring the emotions of the consumers. It is "...an instrument which, like the encephalograph, draws the curve of emotions experienced by a consumer (directly transcript by him or her by a penrevolving on a drum) as they watch advertisements. (McGinnis and Price 1987 in Dubois 2000)"

4.5 Summary of the Chapter

In this chapter the satisfaction measurement methods are discussed. The raised approaches to measuring satisfaction are useful for this study in shaping the research methodology. The raised dimensions provide help for solidifying the dimensions of user satisfaction with consumer products.

Firstly the statistical methods like American Consumer Satisfaction Index and European Consumer Satisfaction Index are discussed. These methods try to compute a numerical value for the level of satisfaction of the consumer with a product or a service. These methods are based on the expectation confirmation theory discussed in Chapter 2.

The chapter continues by revealing the main steps for designing a satisfaction measuring study. The main stages of the study are stated as determining the customer requirements, developing and evaluating the questionnaire, and using the questionnaire. Quality dimension development approach and critical incident approach are discussed for detecting customer requirements related with different dimensions.

In Section 4.4 the attitude formation models are discussed. These models generally come up with a final attitude influenced by the particular attributes of the products. The final attitude is formed by the importance of the attributes and perceptions regarding these values.

In Section 4.5, referring to the user satisfaction questionnaires, the dimensions of user satisfaction are collected from HCI domain. In general the dimensions are related with the product’s utility, usability, and visual appeal, which is less frequently pronounced relative to others.

The chapter ends with the measurement techniques related with hedonic and emotional interaction. Kansei engineering, which tries to structuralize the relationship between the image and the impression it generate, is a frequently used method. The studies using Likert scales in semantic differential studies are also frequent in the literature.

CHAPTER 5

FIELD STUDY

This chapter presents a field study in order to assess the influence of the product related dimensions to satisfaction response for different product groups. The chapter starts with clarification of the aim of the field study, and then the product groups are identified in the second section. The third section reveals method and materials of the study and the next section provides the list of satisfaction dimensions used in the study. After providing the particular findings for particular product groups, the chapter concludes with a discussion on the differences about the prevailing dimensions among product groups.

5.1 Aim of the Study

The main aim of the study is to demonstrate that the significant satisfaction dimensions differ among the product groups. The study should start by proposing a product grouping that considers design related issues such as usage cycle and context of use. After this initial objective is attained, the prevailing dimensions of satisfaction response for each of the product groups should be identified, which constitutes the main aim of this field study. In Chapter 2, it is noted that dissatisfaction response should be considered separately from satisfaction. Following this view, the prevailing dimensions of dissatisfaction response are to be identified in the study. The identification of the less important dimensions for the satisfaction response is a supportive objective for ensuring the results obtained.

The questions to be answered for reaching the objectives are to find out

- Which of the product related dimensions are significant for the user satisfaction

with different product groups?

- Which dimensions prevail the user dissatisfaction with different product groups?

5.2 Product Groups

The initial step in the field study was to solidify "different product groups". Industrial design domain covers a great variety of products such as, medical products, industrial products, transportation products. For this study, the household consumer products are chosen to be the product group of the study. The underlying reason for this choice is that the household products are commonly owned and used by most of us and the related satisfaction information is easier to gather and more refined due to the repetitive product experience.

In order to construct the groups for household consumer products, the 8th edition of the International classification of industrial designs of WIPO (Locarno Classification, 2003) is referred firstly. This classification is provided in Table 5.1.

This classification is constructed regarding the relevance of the technical parts and features of the products that are considered to be in the same group. However technical resemblance is not an appropriate criterion for differentiating the products in the current study. For example, in class 4, ‘Brushware’, products like toothbrushes, toilet brushes and paint brushes are included. However, the user satisfaction considerations for these different products may vary in a great deal, as they are used for quite different purposes in extremely different contexts. Since the context of use plays a primary role for a satisfying user experience, this classification is adapted for a more context dependent classification which stems from the design domain (Margolin 1997).

In order to shift the classification to a more 'design' related domain, the classifications referred in design awards are utilized. The categories used by Good Design Awards are given in Table 5.2.

Table 5.1 The Classification of industrial designs in Locarno (2003)

(Anonymous 2)

Class	Definition
Class 1	Foodstuffs
Class 2	Articles of clothing and haberdashery
Class 3	Travel goods, cases, parasols and personal belongings, not elsewhere specified
Class 4	Brushware
Class 5	Textile piecegoods, artificial and natural sheet material
Class 6	Furnishing
Class 7	Household goods, not elsewhere specified
Class 8	Tools and hardware
Class 9	Packages and containers for the transport or handling of goods
Class 10	Clocks and watches and other measuring instruments, checking and signaling instruments
Class 11	Articles of adornment
Class 12	Means of transport or hoisting
Class 13	Equipment for production, distribution or transformation of electricity
Class 14	Recording, communication or information retrieval equipment
Class 15	Machines, not elsewhere specified
Class 16	Photographic, cinematographic and optical apparatus
Class 17	Musical instruments
Class 18	Printing and office machinery
Class 19	Stationery and office equipment, artists' and teaching materials
Class 20	Sales and advertising equipment, signs
Class 21	Games, toys, tents and sports goods
Class 22	Arms, pyrotechnic articles, articles for hunting, fishing and pest killing
Class 23	Fluid distribution equipment, sanitary, heating, ventilation and air-conditioning equipment, solid fuel
Class 24	Medical and laboratory equipment
Class 25	Building units and construction elements
Class 26	Lighting apparatus
Class 27	Tobacco and smokers' supplies
Class 28	Pharmaceutical and cosmetic products, toilet articles and apparatus
Class 29	Devices and equipment against fire hazards, for accident prevention and for rescue
Class 30	Articles for the care and handling of animals
Class 31	Machines and appliances for preparing food or drink not elsewhere specified
Class 99	Miscellaneous

Table 5.2 Product groups in Good Design Awards (Anonymous 3)

Class	**Examples**
Automotive/Transportation	Cars, Motorbikes, etc.
Building Products	Bulldozers, construction vehicles, etc.
Children's products	Cradles, baby stools, etc.
Electronics	TVs, amplifiers, DVD players, cam recorders, mobile phones etc.
Fabric/Textiles	Various Fabrics
Floorcovering	Carpets, rugs, etc.
Furniture	Chairs, stool, sitting units, office furniture, tables, bookshelves, etc.
Graphic-Packaging Design	Various graphic and packaging design
Hardware/Tools	Handheld equipments, drills, etc.
Household Products	Cleaning devices, tableware, kitchen utensil, washing machines, etc.
Kitchen and Bath	Sinks, bathtubs and Jacuzzis, ovens, microwaves, corkscrews, etc.
Medical Equipment	MR machines, Ultrasound equipments, etc.
Office Products	Laminators, label dispensers, etc.
Personal Products	Watches, instant cameras, booklights, pens, backpacks, etc.
Sports and Recreation	Bikes, helmets, skis, snowboards, etc.
Tabletop	Corkscrews, spoons, cutleries, tableware, kettles, etc.
Urban Furniture	Benchs, public phone cabinets, etc.

This classification gives a more contextual classification, i.e. personal products. However it does not provide a detailed classification and some of the groups are interrelated (i.e. some of the corkscrew products nominated for the award are listed in 'Tabletop' and some others are listed in 'Kitchen and Bath' groups.) In addition, groups like Electronics consists of products of varying scale, (e.g. cellular phones, camera recorders, music systems.) In fact, some of the products under this category are mostly subjected to individual use. Therefore, it is insensitive to combine these products, such as, cellular phones or laptops in the same group with other electronics such as cabled telephone sets, Audio and Video systems, which do not mainly propose a personal use. Veefkind (2003) defines the personal product as: "...portable products that offer the user a ‘nomadic lifestyle’ due to the absence of data or power cords. Examples that illustrate the advance of these personal products are the Walkman, the laptop computer and the mobile telephone."

In order to overcome the deficiencies of this grouping and in order to refine it, the product group lists from the internet web sites of a grand retail store, Sears, is utilized. The product groupings for Sears can be found in Appendix-A. The resulting grouping which emphasizes the context of use information and examples of products

in these groups is provided in Table 5.3.

Table 5.3 Grouping of household consumer products

Class	Code	Examples
Kitchen		
White Goods	K1	Refrigerators, ranges and ovens, microwave ovens, dishwashers, washing machines, etc.
Small Kitchen Appliances	K2	Blenders, food processors, kettles, toasters, grills, etc.
Kitchen Utensils	K3	Pans, knife sets, bottle openers, can openers, corkscrews, knife holders, dish basins, etc.
Living		
Furniture	L1	Seating units, tables, coffee tables, stools and chairs, cabinets, wardrobes, etc.
Home Electronics	L2	TVs, audio systems, cable telephone sets, telesecretaries, etc.
Small Appliances	L3	Vacuum cleaners, irons, hair dryers, etc.
Working		
Computer Equipment	W1	Monitors, mouse, keyboards, computer chases, etc.
Stationary - Desktop Equipments	W2	Pens, pencil sharpeners, studying lamps, CD holders, note holders, punches, stamplers, etc.
Personal Products		
Conventional Personal Products	P1	Wallets, backpacks, mechanic watches, handbags, etc.
Personal Electronics	P2	Cellular phones, laptops, digital photo cameras, etc.

5.3 Method and Materials

The method of this study is selected among the methods which incorporates direct user information. The methodologies that rely on the observations of the researcher rather than the assessments of the users themselves, e.g. ethnography, are discarded at once as they cease to glean the individual evaluations, thoughts and feelings about the subject of the research question.

The two alternative candidates for the methodology to be adopted were questionnaire and interview techniques. Actually, the research questions required a large sample of users (e.g. between 30-35 for model constructing and more than 100 for measuring satisfaction, Hayes 1998) to end up with results that can be generalized. Questionnaires are easier to conduct on large samples, and therefore

have a relative advantage over interview technique (Gillham 2000). However, the answers to the research questions are too complex to be gathered via questionnaires as the depth of the responses was very important. Gillham (2000) states that the interview method is appropriate when most of the questions are 'open' and require an extended response with prompts and probes. The author adds that interview method is appropriate when depth of meaning is central and when research aims mainly insight and understanding instead of revealing facts and summary. In this study, the effort has been devoted to providing a comprehensive insight rather than to coming up with generalizable results. Therefore, the structured interview method is used in this study

A set of interviews took place at the homes of the users. A typical session took 45 minutes to 1 hour. The sessions started with the explanation of the study carried out and the outlining the interview to the participant. After the introduction phase, the users were asked to choose an owned and used product which gives a satisfactory experience. They are also asked to choose another one causing dissatisfaction for each of the product groups. The reason for realizing this study on the basis of owned products is that the users had the chance to experience the product for a sufficient period of time. In this case the assessments of the products are based on real experiences and interpretations rather than mere impressions and therefore the other dimensions such as functionality and usability can be evaluated thoroughly.

Realizing the interview in their homes facilitated recalling these satisfactory and dissatisfactory products. This made it easier for them to recall the specific properties, which in turn, enriched the evaluations. The users were asked to evaluate those satisfactory (unsatisfactory) products based on the question set provided in Appendix-B. For the satisfactory (unsatisfactory) product the user was asked for the reason for the satisfaction. The answers given and comments made were enriched by asking further questions not pointing on a specific dimension but trying to grasp the underlying satisfaction (dissatisfaction) reason. The users were also asked several questions for identifying their attitudes for different products groups. Specifically their usage rate and their interest for these selected products were asked in order to comment on the relationship between involvement level and satisfaction.

Interview were carried out with 10 participants of different age groups. All of

the participants were living on their own and the products that they use were either purchased by themselves, or given as a gift, or inherited. The participants were selected from the mid to high income classes in order to reduce the influence of the price considerations in satisfaction response and to focus on the product related qualities instead. The general characteristics of the participants are listed in Table 5.4.

Table 5.4 General characteristics of the participants.

Participant	**Occupation**	**Age**	**Gender**
P1	Designer	20-30	F
P2	Architect	20-30	M
P3	Engineer	20-30	M
P4	Engineer	20-30	F
P5	Medical Doc.	30-40	M
P6	Medical Doc.	30-40	F
P7	Urban Plan.	30-40	M
P8	Designer	40-50	F
P9	Architect	40-50	M
P10	Housewife	40-50	F

The list of products that are evaluated by each participant is provided in Table 5.5. Some of the participants did not mention about an unsatisfactory experience about a product among the ones that they owned.

Table 5.5 Products evaluated by participants

			Participants									
			P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Kitchen	K1	S	Washing M.	Microwave O.	Refrigirator	Dishwasher	Dishwasher	Refrigirator	Washing Mac.	Dishwasher	Refrigirator	Dishwasher
		D	-	-	-	-	-	-	Refrigirator	-	-	Refrigirator
	K2	S	Hand Blender	Food Slicer	Countertop Blender	Kettle	Feed. Bottle Heater	Toaster	Blender	Kettle	Food Processor	Kettle
		D	Food Processor	Juicer	-	Bread Roaster	Fryer	Hand Blender	Toaster	Food Processor	Toaster	-
	K3	S	Beef Fork	Peeler	Bottle Opener	Knife Holder	Can Opener	Corkscrew	Corkscrew	Pans	Knife Holder	Utensil Holder
		D	Teapot	-	Corckscrew	Teapot	Garlic Squeezer	Teapot	Containers	Can Opener	Teapot	Decanter
Living	L1	S	Sofa group	Lamps	Dinner Table	Sofa group	Sofa	Seating Group	Sofa	Sofa Group	Sofa group	Coffee Table
		D	-	-	Coffee Table	Drawer	Armchair	Sofa	Wardrobe	Chairs	Chairs	Sofa Group
	L2	S	CD Player	TV	DVD Player	TV	DVD Player	Telephone	Telephone	TV	Audio Set	TV
		D	-	VCD Player	TV	Telephone	Video Player	Audio Set	-	-	-	-
	L3	S	Hair Dryer	Press Iron	Vacuum Cleaner	Vacuum Cleaner	Vacuum Cleaner	Hair Dryer	Hair Dryer	Vacuum Cleaner	Vacuum Cleaner	Vacuum Cleaner
		D	Vac. Clean.	Vac. Clean.	-	Hair Dryer	-	Iron	Vac. Clean.	-	-	-
Working	W1	S	Keyboard 1	Keyboard	Mouse	Mouse 1	Mouse	Mouse	Monitor	Chasis	-	Mouse
		D	Keyboard 2	Chasis	Chasis	Mouse 2	Keyboard	Monitor	Chasis	Mouse	-	-
	W2	S	Tabletop Lamp	Note Holder	Pen	Small Bins	Stamp Remover	Pen	Penholder	Pencils	Tabletop Lamp	-
		D	-	Note Paper Dispenser	Stampler	CD Holder	Cachet	-	-	Stampler	-	-
Personal	P1	S	Watch	Handbag	Watch	Handbag	Backpack	Purse	Sun-glasses	Keyring	Jackknife Set	Watch
		D	-	-	-	Watch	Wallet	Backpack	-	-	-	Purse
	P2	S	-	Laptop Computer	Mobile Phone	D. Photo Cam.	Laptop	D. Photo Cam.	D. Photo Cam.	Mobile Phone	Mobile Phone	Mobile Phone
		D	MP3 Player	Mobile Phone	-	-	Mobile Phone	Mobile Phone	Mobile Phone	-	Headset	-

S: Product causing satisfaction / D: Product causing dissatisfaction

5.4 Itemization and Definition of Dimensions

The dimensions raised in the previous chapters, such as functionality, usability, aesthetics, and emotional interaction issues are utilized in the field study. However, it is required to refine these dimensions in order to avoid possible misevaluation of participant statements that unclear dimension definitions may yield. The dimensions are itemized and defined as follows:

Safety (S): This dimension is related with the qualities of the product that inhibits or causes dangerous situations at home.

Solidity-Soundness (SS): As the name implies, this dimension is related with the soundness of the product. Problems related with the unfit product parts, and the comments related with the possibility of physical breakage are included in this dimension.

Durability (D): This dimension is related with the lifetime and the technical problems during the lifetime of the product. The comments focusing on the functioning of the product are considered to be under this dimension.

Functionality-Usefulness (FU): This dimension is related with the satisfaction of the need and the utility of the product. The statements pointing to the benefit of the product characterizes this dimension. The benefit may be the function itself or elimination of various difficulties. For example, a comment on the dark colored cushioning of furniture which does not requires frequent cleaning, is considered to be related with this dimension. Other comments include “it really helps me a lot”; “I don't need these functions”; “this is the most frequently used product”.

Functionality-Performance (FP): It is related with the quality of the work done. The quality can be defined by the superiority of the output and economical usage of the resources as well. For example, the silent working of a washing machine, or low energy requirement of a dishwasher are considered as qualities related with this dimension. Other example statements are “I am delighted with the quality of sound of these amplifiers”; “I think everybody should have a knife like this which can cut

everything", etc.

Usability (U): It is related with the ease and comfort in the whole usage cycle of a particular product. These phases include storage and cleaning cases as well. The subdimensions compiled from the literature are efficiency, effectiveness in stages like cleaning, using and storing, physical comfort of use, understandability, clarity, ease of navigation. Statements like "I do not have to push this can opener so hard"; "I could not learn how to use the menu of the phone", are included in this dimension.

Aesthetics (A): This dimension is related with pure visual appeal. It is characterized by the statements about conformance of the visual product qualities, such as form, color, and texture, to taste of the participants. The example statements are "I like the form of this Kettle, it is so simple"; "The color of this cellular phone attracted me when I first saw it."; "I like the lusterless texture of our refrigerator, it looks really nice."

Emotion-Basic pleasure (EB): This dimension includes the statements related with pleasurability other than visual pleasure; specifically it is related with tactile and olfactory pleasure/displeasure.

Emotion-Complex (EC): This dimension is related with the emotions caused by the issues which can not be named under the former dimensions. The subdimensions are based on the subclasses of product emotions proposed by Desmet (2003). These subclasses are instrumental, aesthetic, social, interest, and surprise emotions. The statements pointing to utilitarian instrumental emotions related with functionality-usability-utility of the product are discarded in this dimension and they are accounted for the related dimension stated above. However, when the instrumental emotion is due to the attainment of a hedonic goal, such as feeling good due to confidence provided by a high-end cellular phone, the corresponding statement is issued under this dimension.

The aesthetic emotions, when reflects basic visual appeal are included in **Aesthetics** dimension. However, if emotions due to interpretations of the visual messages and symbolic associations are detected in the statements, than these statements are included in this dimension. The associations can be related with the personality of

the product, characterized by statements such as “this kettle looks really cute, it looks like a toy”, “I like this watch, it is not kitsch, it does not show off, it is not formal, it is just like whoever I want to be”. In addition, the statements can also be related with the identity of the user represented by the product. Example statements are “I like to use a wide screen laptop, it is really different form the others … I feel better when I saw the ones using older models.”

The social emotions are related with the conformity of the product to the social standards, as Desmet and Hekkert (2002) propose, and facilitating and enriching the social interaction, as defined in the socio-pleasure concept in Jordan (1999-a). The interest and surprise emotions are included in this dimension when the cause of these emotions can not be related with formerly stated utilitarian dimensions such as functionality, usability, or aesthetics. Another emotion considered under this dimension is ideo-pleasure (Jordan 1999-a).

5.5 Results and Discussions

In this section, the results of the field study are revealed for particular product groups separately. For each product group, the dimensions prevailing the satisfaction response as well as dimensions prevailing dissatisfaction responses are revealed based on numerical analyses. For commenting on the significance of a dimension on satisfaction response, the positive statements about this dimension of the satisfactory product were referred. Likewise, for the significance of a dimension on dissatisfaction response, the negative statements about this dimension of the dissatisfactory product were utilized in the analyses.

The primary task in the analysis was to classify the comments under the previously stated dimensions. This task was realized by relating the keywords in the statements to subdimensions stated in the definition of dimensions in Section 5.4. When the statement could not be related with any of the subdimensions a new subdimension of the related dimension is defined. By this way a list of subdimensions is generated.

Revealing the significance of a dimension in a particular product group is realized on an individual basis firstly. If the participant gave one or more positive comments for a particular dimension, this dimension is marked as 'raised'. Then, the relative significance of a ‘raised’ dimension for this participant is calculated by dividing one to total number of 'raised' dimensions. Relative significance of any dimension not raised is taken as zero. Having computed the relative significance values for each of the participants, these are averaged over all participants. This normalization of individual effect was necessary to avoid the bias due to the participants who raise relatively more comments than the others.

Another way for finding relative significance could have been using number of comments instead of checking whether one dimension raised or not. However the number of possible comments vary greatly from a dimension to another, for example regarding usability of a mobile phone the participant may comment on the comfort of holding in relation to form of the product; clarity of the display area; ease of pushing buttons in relation to physical dimensions; understandability of the menu titles. In contrast, the participant may not state so many aspects regarding the durability of the cellular phone. This dimension is considered to be a binary construct, e.g. a mobile pone may be evaluated as durable or not, regarding the functioning problems. Hence, an analysis based on number of comments yields a bias for the dimensions which has relatively more subdimensions and therefore was not followed in the study.

The subsections of this section reveal the relative significance of different satisfaction dimensions for different product groups. The prevailing dimensions for the dissatisfaction response, and the dimensions that may not be considered of primary importance for the users.

5.5.1 White Goods (K1)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart

respectively in Figure 5.1.

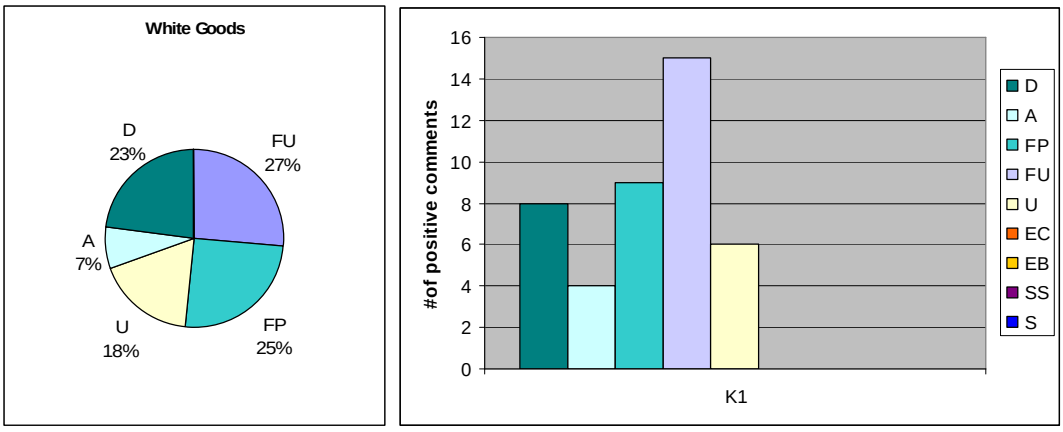

Figure 5.1 The relative significance and positive comment graphs for *white goods*

The prevailing dimensions for the white goods are **Functionality-Usefulness** (27%), **Functionality-Performance** (25%) and **Durability** (23%). The participants also raised statements related with **Usability** and **Aesthetics**; however these considerations seem to be secondary considerations. The other dimensions such as **Emotion-Basic**, **Emotion-Complex**, **Safety**, and **Solidity-Soundness** are not raised at all. As a result, the primary consideration for the satisfaction for *white goods* seems to be the utility of the product.

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.6, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

The importance of the utility is supported by the absence of unsatisfactory products for this group for 8 out of the 10 participants. Although there are minor problems reported with the products in this group, the participants did not raise them as problematic since they were content with the overall functioning and utility of the product. The other 2 participants reported dissatisfaction because the products were not functioning properly, e.g. the refrigerator of **P7** that frequently breaks down.

Table 5.6 Subdimensions of satisfaction in *white goods*

Dimension	Subdimensions
D	No function related problem for a long period
FP	Satisfied by the output Satisfied by the way of performing
FU	Add-in functions Customization Facilitating the housework Frequently needed Match between need and physical dimensions of the product Match between need and product complexity
U	Efficiency / number of steps Sense of control
A	Color and Texture Form Style Visually pleasing environment

During the interview, three of the participants raised a nominee for an unsatisfactory product, followed by the negative aspects of the products which are not seen as important. For example, **P4** raised the absence of the any feedback regarding operation progress for her washing machine. However, as the participant is satisfied with the quality of the output the product was not deemed to be 'unsatisfactory'. Similarly, during dissatisfaction discussions, the participant **P8** mentioned the refrigerator having found the dimensions insufficient. Likewise the former example, the participant referred to this product satisfactory in the overall.

The benefit that the products in this group give seems to be so significant that the minor defects such as unpleasant odor of a freezer (**P6**), malfunctioning button of a dishwasher (**P5**), or even severe disliking of the appearance of the microwave oven (**P2**) can be discarded and the product failing in these secondary aspects is still found satisfactory.

Nevertheless, the case pointing to the importance of other dimensions such as **Usability** (e.g. exterior water/ice dispenser given by **P9** given in Figure 5.14) and **Aesthetics** were also raised as dimensions of satisfaction by 4 out of 10 participants.

Figure 5.2 The refrigerator of **P9**

5.5.2 Small Kitchen Appliances (K2)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.2.

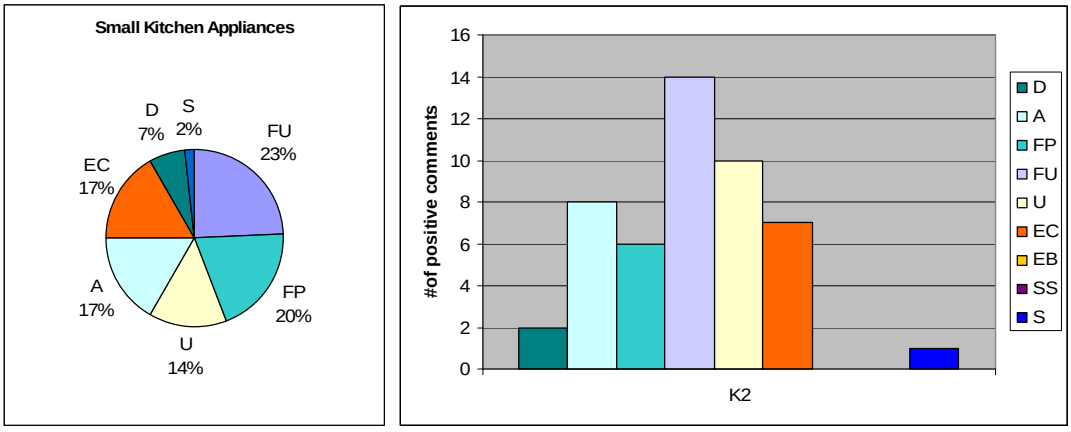

Figure 5.3 The relative significance and positive comment graphs for *small kitchen appliances*

It is hard to propose an individual dimension as the prevailing dimension based on figure 5.2. The significant dimensions appear to be **Functionality-Usefulness** (23%), **Functionality-Performance** (20%), and **Usability** (14%), which are related with the utility of the product. The hedonic dimensions such as **Aesthetics** (17%) and **Emotion-Complex** (17%) may also be stated as influential for this product group.

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.7, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

Table 5.7 Subdimensions of satisfaction in *small kitchen appliances*

Dimension	Subdimensions
S	Prevention of accidents
D	No function related problem for a long period
FP	Satisfied by the output Satisfied by the way of performing
FU	Facilitating the housework Match between need and physical dimensions of the product Match between need and product complexity Match between a specific need and function
U	Comfort of use (in relation to form, physical dimensions) Ease of cleaning (in relation to detachable parts, dimensions, form) Efficiency / number of steps Ease of use due to flexibility in the process
A	Color Form Style Visually pleasing environment
EC	Ideo-pleasure (sense of designedness,) Social pleasure / emotion (product of process) Interest emotion (way of interacitng) Symbolic association (unimposingness, brand and trust)

As most of these products are used on the countertop (e.g. kettle), the physical dimensions of these products are of high importance. Match between product dimensions and form and context of usage is one of the main considerations for that satisfaction response. 7 out of 10 participants raised 'small size' as a desirable quality for a countertop kitchen appliance. ".. In addition, the water boiled by it (kettle) at once is enough for me no matter for what I use it for. As it is small, it does not occupy much

space on the countertop as well." (**P8**)

An alternative for realizing the processes realized by most of these products (e.g. hand blender, food processor, juicer) is realizing the process by hand. (i.e. using a knife for slicing an onion). The product should propose an advantage over this option, e.g. "absence of odor of onion when using a slicer"(**P7**). The advantage can be related with the performance regarding the output as well, e.g. "it (the blender) mashes the potato better than i can" (**P1**). However this advantage should be equipped with ease of use throughout the usage process. One of the frequently raised subdimensions of the Usability dimension for this group is 'easy to clean'. When the product requires many additional steps to achieve the utility of the product it seems to result in an unsatisfactory user-product experience, e.g. "... if I were to realize many steps and use this product to do something which I can do with my hands, it is meaningless to use it" (**P1**).

Figure 5.4 The satisfactory (hand blender) and the unsatisfactory (food processor) products of **P1**

16 out of 25 total comments were in relation to **Functionality-Usefulness** and **Usability** dimensions. As a specific example, two of the participants referred to food processor as unsatisfactory product, since the resource it requires (i.e. the space occupied, number of steps required for set up and cleaning) is more than the benefit it proposes (i.e. satisfaction of need for sliced, grated food in various different shapes and dimensions).

Two other significant dimensions are **Aesthetics** and **Emotion-Complex**. In **Aesthetics** dimension the most frequently raised subdimension is related with form. 6 out of 10 participants referred to visual appeal as a reason for the satisfaction response.

The other significant hedonic dimension, **Emotional-Complex,** can be analyzed under two items. The first one includes emotional issues related with the interaction. Two participants, who stated not to be into food preparation, reported emotional interaction statements due to the interaction, e.g. "...it is quite enjoyable to use this gadget (food slicer). I press after the vegetable has torn into pieces again and again. More, moooree, (he laughs as he uses the slicer)" (**P3**). The second item focuses on the image, impression and personality of the product, e.g. "I like its (blender's) unimposingness, it does not shout I'm here, generally I like these kind of unpretentious objects... I am sort of unpretentious, as well.."(**P1**).

5.5.3 Kitchen Utensils (K3)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.4.

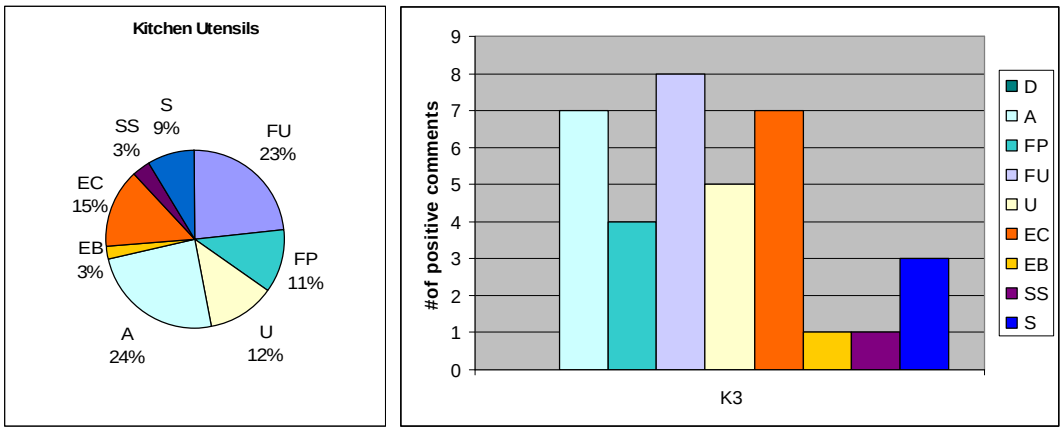

Figure 5.5 The relative significance and positive comment graphs for *kitchen utensils*

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.8, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

Table 5.8 Subdimensions of satisfaction in *kitchen utenils*

Dimension	Subdimensions
S	Prevention of accidents
SS	Good fit among the parts
FP	Satisfied by the output
FU	Facilitating the housework Frequently needed Match between need and physical dimensions of the product Match between need and product form Match between a specific need and function
U	Comfort of use (in relation to form, mechanism) Ease of use (in relation to error prevention, control)
A	Color Form
EC	Ideo-pleasure (sense of designedness,) Interest emotion (cuteness, sense of humor, way of interaction) Symbolic association (simplicity)
EB	Tactile pleasure

The **Aesthetics** dimension seems to be the prevailing for user satisfaction for *kitchen utensils,* no matter the product is placed on the countertop (e.g. knife and utensil holders) or in drawer (e.g. bottle opener, corkscrew). Only two subdimension is noted for this dimension: form and color. This dimension is followed by **Functionality-Usefulness**. The major subdimension is 'facilitating the housework' in this group

For the dissatisfaction, the focus should be shifted to **Usability** dimension. Among the 15 negative comments raised for the unsatisfactory products, 7 of them were related with **Usability** dimension (raised by 5 out of 10 participants). Most of these comments were related with comfort of use affected negatively by the form, mechanism, weight of the product (e.g. opening mechanism of spice jars, general form of the can opener not fitting to hand, weight of the crystal decanter). The importance of **Aesthetics** can also be seen for dissatisfaction. (5 of 15 negative comments for unsatisfactory products). Specifically, teapot is a problematic product regarding this sample. 4 of 10

participants stated that they are dissatisfied by their teapot, and 3 of them stated that visual repel is the sole issue for their dissatisfaction. (e.g. "...I have no problems with its functioning, it does its job pretty well, the tap is turned and the tea does not spill from the tap while pouring, it is easy to hold, etc. But none of these positive aspects make me like the product."(**P1**), the photo of teapot is provided in Figure 5.6.)

Figure 5.6 The teapot of **P1**

Another important dimension is the **Emotion-Complex** dimension. This dimension can not be seen as a dissatisfaction dimension; however it plays an important role for satisfaction. The 'interest emotion due to way of interaction' subdimension is raised by 3 participants (of a total of 5 participants who raise EC dimension). This subdimension is raised due to the joy of mechanic interaction with products like corkscrew, canopener, vegetable peeler. (e.g. "...if a bottle of wine should be opened, and there is a corkscrew like this one, I run to open the bottle, it really gives me a strange pleasure to use this gadget. It resembles a man weaving his hands" (**P6,** the corkscrew is provided in Figure 5.7), "...I like to use this can opener, when a can should be opened i jump for the duty. It really goes smooth..."(**P5**), "... using this peeler is enjoyable, I enjoy trying to obtain a continuous peel." (**P2**))

The safety dimension is pronounced most frequently for this product group. These products are generally operated by hand and they are open to accidents, which generates comments regarding safety. (e.g. "..I like this can opener. My mom cut her hand while trying to open a can with a knife and one of my friends cut his, while using

and electrical can opener. This one do not cause any problems, it is secure to use this."(**P5**))

Figure 5.7 The corkscrew of **P6**

5.5.4 Furniture (L1)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.8.

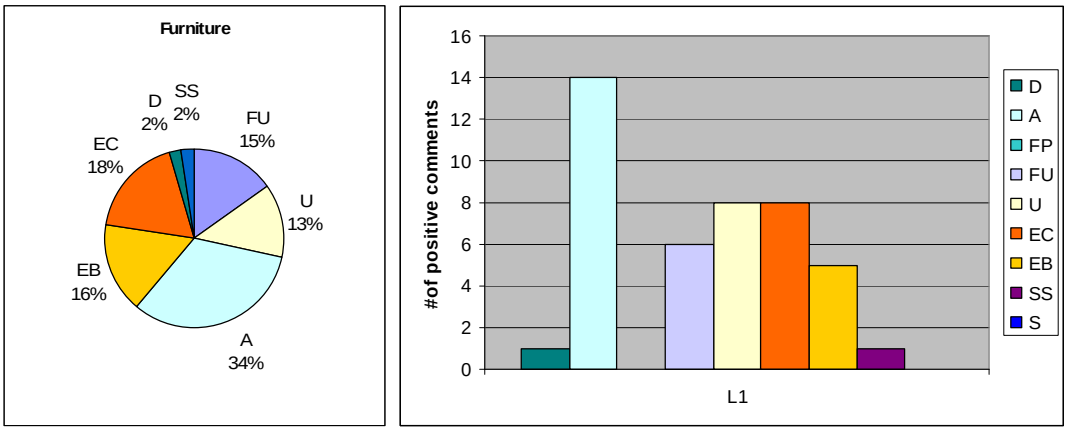

Figure 5.8 The relative significance and positive comment graphs for **furniture**

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.9, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

Table 5.9 Subdimensions of satisfaction in *furniture*

Dimension	Subdimensions
D	No function related problem for a long period
SS	Good fit among the parts
FU	Secondary function in relation to form Facilitating the housework Match between context and physical dimensions of the product
U	Comfort of use (in relation to form, material, dimensions) Ease of cleaning (in relation to detachable parts, material) Ease of carrying (in relation to weight)
A	Color Form and style Texture Visually pleasing environment
EC	Socio-pleasure (facilitate social interaction) Symbolic association (authenticity, pleasant memories, recalling of a loved one, uniqueness, relaxation)
EB	Tactile pleasure

The **Aesthetics** (34%) dimension seems to be the main dimension for the satisfaction with *furniture*. The conformance of these products to the taste of the users is the main issue. This dimension is raised by all of the participants. In fact, **aesthetics** stated to be the main consideration during the purchase stage by 4 out of 10 participants. The users can not evaluate other dimensions such as usefulness, usability, durability, unless they use the product a considerably long period of time, e.g. comfort of a chair after sitting for a long period, ease of cleaning of the fabric of the sofa, etc.

Sometimes, problems related with these other dimensions can be discarded due to the solid visual appeal, e.g. ease of cleaning of a sofa for a participant employing a cleaning lady, comfort of a couch when used occasionally as a bed. And sometimes the other dimensions, especially Usability and Functionality-Usefulness, solidify the satisfaction response on the positive attitude formed by visual appeal: "...I decided at once when I saw this sofa. It was just due to appearance. There was not a simple sofa at

anywhere at those times, all of them were ornamented ones... however as I used, I loved it more. The fabric parts can be detached and can be washed in the machine; the cushions of it are so comfortable you can fall into sleep on it easily... "(**P8**))

When the usability qualities (i.e. comfort of use, easy cleaning) are not approved by the user, the product is considered as an unsatisfactory product (7 of 17 negative comments for unsatisfactory products). However, FU seems to be a supporting dimension for the satisfaction response. A particular FU subdimension that is raised by two participants (2 of 4 positive comments in FU) is related with the wide flat side handles of the sofa which can be used as a coffee table.

The second important dimension is Emotion-Complex. The symbolic associations related with products are gaining variety for this product group. Pleasure felt de to the authenticity of the wooden material of a seating group, uniqueness of the style of the lamb, 'Scandinavian'ness of the sofa can be named as symbolic associations that play an important role in satisfaction. Another important subdimension is social emotion related with the usage of the product in social interactions, e.g. a round dining table where everyone see each others face, a corner seating unit that provides a warm environment due to seating locations.

The dimension EB, related with basic pleasures received by senses other than sight, is raised more frequently relative to other product groups. This is due to the tactile properties of the materials, such as wooden legs of a coffee table, or soft and fluffy cushioning of a sofa. (5 of 10 participants).

5.5.5 Home Electronics (L2)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.9.

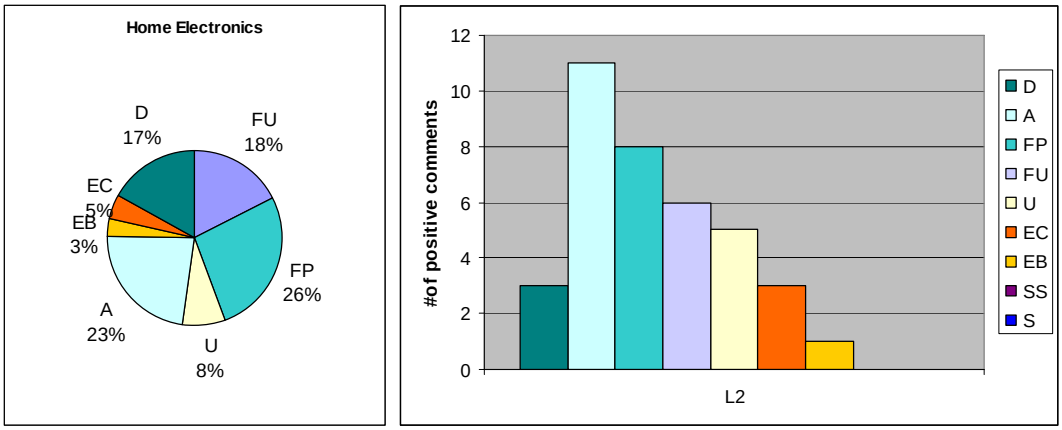

Figure 5.9 The relative significance and positive comment graphs for *home electronics*

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.10, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

Table 5.10 Subdimensions of satisfaction in *furniture*

Dimension	Subdimensions
D	No function related problem for a long period
FP	Satisfied by the output
FU	Frequently needed Match between need and product complexity
U	Comfort of use (in relation to form) Ease of storage (in relation to dimensions and weight) Ease of navigation Guessability/ understanability/ speaking the user's language
A	Color Form and style Texture Visually pleasing environment
EC	Ideo-pleasure (technology) Interest emotion (in relation to the product of the process) Symbolic association (high tech image)
EB	Tactile pleasure

Functionality -Performance (26%) dimension seems to be the prevailing dimension for the *home electronics* group. Actually, this dimension is mainly related with the quality of the output of the sound and vision devices such as TV, DVD Player, and CD player. The second important dimension is **Aesthetics** (23%). As these are located in prominent points in the living room, these products contribute to the visual environment by their appearance. 7 out of 10 participants raised **Aesthetics** related basic comments such as “i like the form”, “i like the look of material” as a reason for their satisfaction.

A secondary dimension is **Functionality-Usefulness** dimension. For low-involved participants, who are not interested in these products and have low expectations from this group, (**P6** telephone set, **P10** TV) the benefit it brings with the most basic functions becomes an important issue. The subdimensions raised by high-involved participants (**P3** DVD player, **P7** telephone set) are quite different from the former group of participants. These participants ask for more than the basic functions, e.g. Mp3 playing option for a DVD player, and caller ID, baby alarm features for a telephone set.

Another important dimension is **Durability** (17%) for this group, which can be reasoned by high prices of the products in this group with respect to other groups excluding white goods. Another reason for this can be due to the low expectations of the low-involvement participants who feel satisfied at the absence of any functioning problem.

Although its influence for the satisfaction seems faint, **Usability** is the most significant dimension for the dissatisfaction (5 out of 11 negative comments raised for unsatisfactory products). The problems are generally related with the ease of use due to improper guessability, understandability (e.g. “...I can not decide how I proceed to find a specific menu item. The menu structure is not logical.. I can not understand the words either. What is 'baz ayarı' for god’s sake?” (**P4,** the telephone is provided in Figure 5.19)) and efficiency due to number of steps to be realized for a task(e.g. “It is very time consuming to tune the channel, i feel very tired when I try to record something with this Video” (**P5**). No finding related with the relationships between number of functions and

ease of use can be obtained from the sample.

Figure 5.10 The telephone of **P4**.

5.5.6 Small Appliances (L3)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.11.

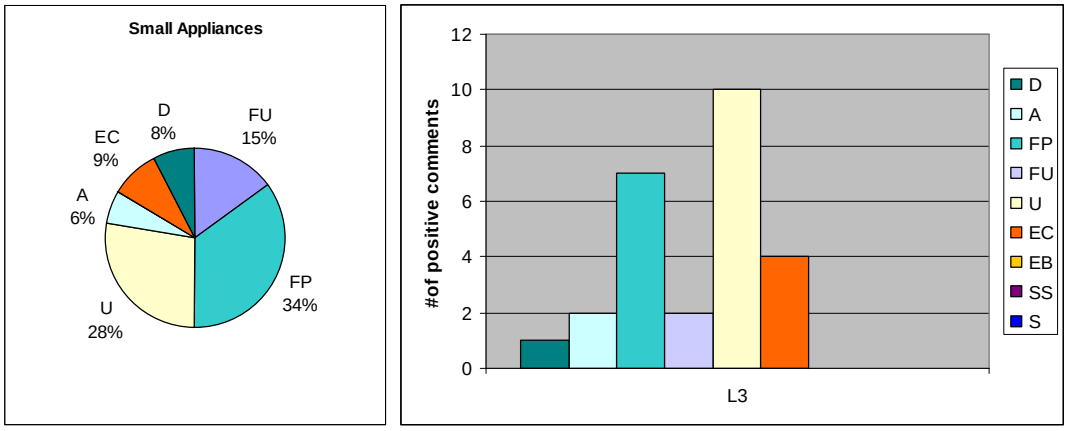

Figure 5.11 The relative significance and positive comment graphs for *small appliances*

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.11, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

Table 5.11 Subdimensions of satisfaction in *small appliances*

Dimension	Subdimensions
D	No function related problem for a long period
FP	Satisfied by the output
FU	Facilitating the housework
U	Comfort of use (in relation to long cable, dimension, weight, form) Ease of carrying (in relation to detachable parts) Ease of storage (in relation to dimensions, compactability) Ease of navigation Guessability/ understanability/ speaking the user's language
A	Color Form
EC	Interest emotion (in relation to cuteness, way of interaction) Symbolic association (sense of tidyness)
EB	Tactile pleasure

The relative significance of **Functionality-Performance** (34%) dimension is higher that the other dimension for *small appliances* group. The satisfactory products of this group consist of 6 vacuum cleaners, 3 hairdryers and 1 press iron. At each product types performance related comments were raised. For each product type the output is the main consideration for the satisfaction response. The major dissatisfaction reason is also the performance of the product according to this sample. The 5 out of 9 negative comments raised for unsatisfactory products are related with performance of the product.

Usability is another significant dimension for these products. Although the relative significance score of **U** is less than **FP** dimension, the number of comments raised for **U** is larger than **FP** (10 comments for **U** / 7comments for **FP**). The major issues for the usability are ease of carrying (3/10), ease of storage (3/10) and comfort of use due to weight and dimensions (4/10).

The other dimensions have secondary significance. One interesting issue is the insignificance of **Aesthetics** dimension for this group. Only two comments were raised

regarding the visual appeal of these products. Actually, the aesthetic issue is so insignificant for two of the participants for vacuum cleaners, that they raised their vacuum cleaners as satisfactory products even they hate their appearance. "..It is necessary for sweeping off the mites; however its appearance is really disgusting. It is definitely American" (**P8**),"...I know there are nicer ones (vacuum cleaners), which have more beautiful colors, in a more cute form. But anyway, I am satisfied with its ease of use." ('**P5**') When the reason underlying using a vacuum cleaner that is visually disgusting is asked, the participant stated that this product is not a visual entity in her home. She added "...I just do my cleaning and conceal this one to the closet afterwards" (**P8**).

5.5.7 Computer Equipments (W1)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.12.

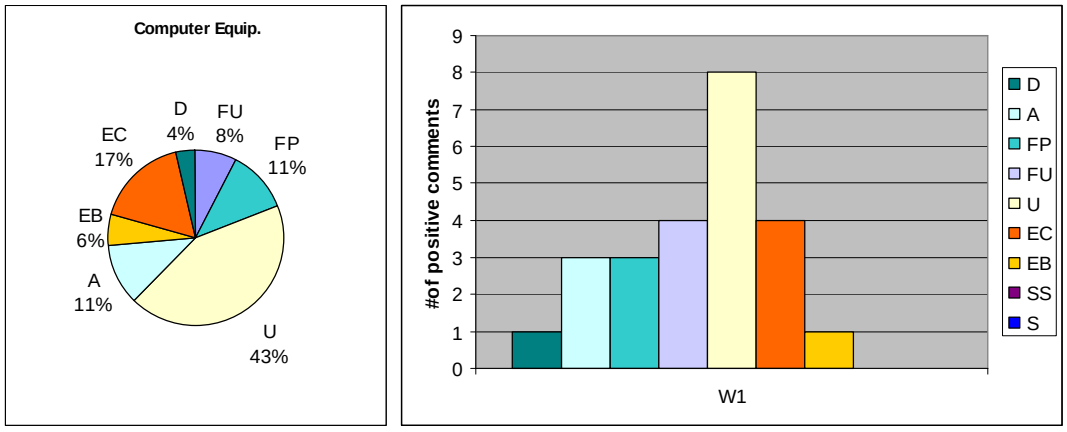

Figure 5.12 The relative significance and positive comment graphs for *computer equipments*

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.12, and the detailed list of subdimensions and

examples for each subdimensions are provided in Appendix-C.

Table 5.12 Subdimensions of satisfaction in *computer equipments*

Dimension	Subdimensions
D	No function related problem for a long period
FP	Satisfied by the output
FU	Facilitating the process Match between context and physical dimensions of the product
U	Comfort of use (in relation to form) Ease of carrying (in relation to form) Ease of storage (in relation to dimensions, compactability) Efficiency due to shortcuts
A	Form and style
EC	Interest emotion (in relation to sense of humor) Socio-pleasure (facilitating the comunication) Symbolic association (referring to authenticity,high quality, technology)
EB	Tactile pleasure

Usability (43%) seems to be the key dimension both satisfaction and dissatisfaction for *computer equipments*. 6 participants raised **Usability** as an influential dimension in satisfaction. The usability subdimensions include comfort of use due to form (e.g. wristrest of a keyboard, form of mouse), ease of carrying (e.g. ergonomic handling for a computer chassis, flat monitor carried like a notebook), efficiency (e.g. scroll wheel of a mouse, which facilitates scrolling)

The other influential dimension is **Emotion-Complex**. The comments raised for these groups include 2 symbolic association keywords (e.g. symbolic association of the flat monitor giving reference to 'high-tech', authenticity of the keyboard material which gives the impression of high quality).

5.5.8 Stationary -Office Equipments (W2)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.13.

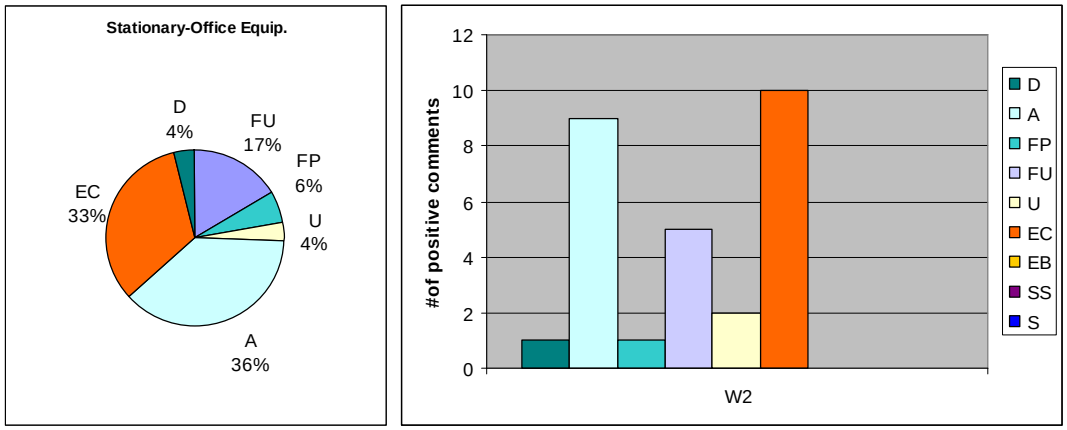

Figure 5.13 The relative significance and positive comment graphs for *stationary-office equipment*

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.13, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

Table 5.13 Subdimensions of satisfaction in *stationary-office equipments*

Dimension	Subdimensions
D	No function related problem for a long period
FP	Satisfied by the output (regarding the price)
FU	Adjustability Facilitating the process Match between need and physical dimensions of the product Match between context and physical dimensions of the product
U	Comfort of use (in relation to form, weight) Ease of carrying (in relation to form) Ease of storage (in relation to dimensions, compactability) Efficiency due to shortcuts
A	Color Form Style Texture
EC	Ideo pleasure (appreciation of cretive process and creativity) Interest emotion (in relation to novel mechanism, enjoyment during interaction, cuteness) Socio-pleasure (facilitating the comunication) Symbolic association (referring to unimposingness, high quality, technology, pleasant memories,)
EB	Tactile pleasure

The study yielded **Aesthetics** (36%) and **Emotion-Complex** (33%) as the prevailing dimensions for satisfaction with *stationary-office equipments***.** (10/28 positive statements for **EC**, and 9/28 positive statements for **A**). Referring to the subdimensions of **EC**, it can be said the simple design solutions may refer to the 'unimposingness' (e.g. table top lamp). At the other extreme interesting design solutions may generate interest emotions and yield satisfaction response. However, there is the risk that the mechanism proposed to arouse interest may be found 'overdesigned' because of the inefficient use of material of inefficient way of usage. One specific example about dissatisfaction reveals this aspect. **P2** comments on his note dispenser: "... I really hate this dispenser; I can't throw it as my aunt gave it to me. It is completely nonsense. You have to push a button so that it gives you a piece of paper, which you can take without any mechanism. You have to take the pen clinging to the frame with a magnet from this narrow clearance, and you have to take it back again. It is not useful, not usable, not beautiful. It is just crap." The dispenser can be seen in Figure 5.20.

Figure 5.14 The note dispenser of **P2**.

Other symbolic associations, like cuteness of a small bin may make the user like the product as well. Usability considerations such as comfort of use (stampler),

efficiency of use (CD holder), prevail the overall dissatisfaction. (5 out of 13 negative comments for unsatisfactory products.)

5.5.9 Conventional Personal Products (PP1)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.15.

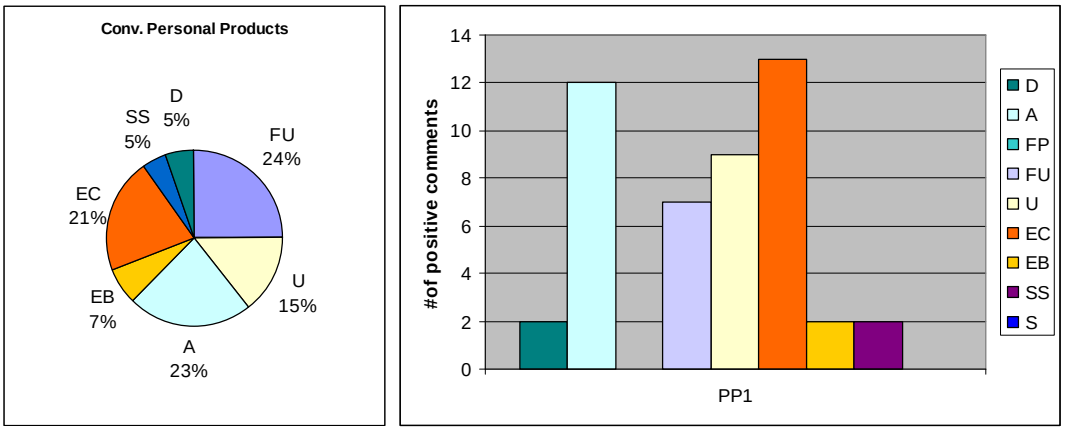

Figure 5.15 The relative significance and positive comment graphs for *conventional personal products*

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.14, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

According to the relative significance values, the prevailing dimensions for the *conventional personal products* group are **Functionality-Usefulness**, **Aesthetics**, and **Emotion-Complex**. Five of the satisfactory products are used to carry something, e.g. handbag, backpack, purse, keyring. Therefore, the main subdimension of **FU** is 'match between need and product dimensions'.

Table 5.14 Subdimensions of satisfaction in *conventional personal products*

Dimension	Subdimensions
D	No function related problem for a long period Repairable
SS	Good fit among the parts
FU	Add-in functions Frequently needed Match between need and physical dimensions of the product Match between need and product complexity
U	Comfort of use (in relation to material, weight, form) Ease of use (clarity, form) Ease of storage (in relation to dimensions, compactability) Efficiency (few number of steps to be realized)
A	Color Form Style Texture
EC	Ideo pleasure (emphasizing science and technology) Interest emotion (in relation to cuteness) Socio-pleasure (facilitating the communication) Symbolic association (referring to a refined taste, accordance to the user's identity, informality, naturalness, unimposingness, uniqueness, recalling a loved one, attractiveness, sportiveness, rhe brand)
EB	Tactile pleasure

A and **EC** are the other prevailing dimensions for the satisfaction response. (13 out of 47 positive comments for **A**, 13 out of 47 positive comments for **EC**). The subdimensions of **EC** are mostly related with the symbolic associations, image and impression of the product. The raised comments in this dimension reveal positive emotions, such as appreciation and admiration, as a result of the evaluation of the images of the products. These evaluations include keywords such as "not kitsch", "unimposing", "attractive", "sportive", "natural", "informal", and "unique". In fact, these findings are in accordance with the arguments raised in Section 3.3.3.2, which is related with the visual messages that the products convey. The image keywords that are stated in positive comments are the properties that users want to have, e.g. "..I really love this watch. It just suits me very well. It has an unimposing style. I am in general an unimposing person." (**P1**)

Although **Usability** does not seem to be a primary dimension for satisfaction, it is one of the prevailing dimensions for dissatisfaction. The total number of negative

comments regarding unsatisfactory products is insufficient to deduce arguments that can be generalized. However one specific example is very explanatory: ".. I really liked the appearance of the watch, I still do. At the purchase I thought that I could read the time despite of the dial divided into 10 portions, but I could not. The dial misled me many times." (**P4)** The watch can be seen in Figure 5.16.

Figure 5.16 The watch of **P4**.

5.5.10 Personal Electronics (PP2)

The relative significance of the dimensions and the number of positive statements with respect to different dimensions are given in pie chart and column chart respectively in Figure 5.17.

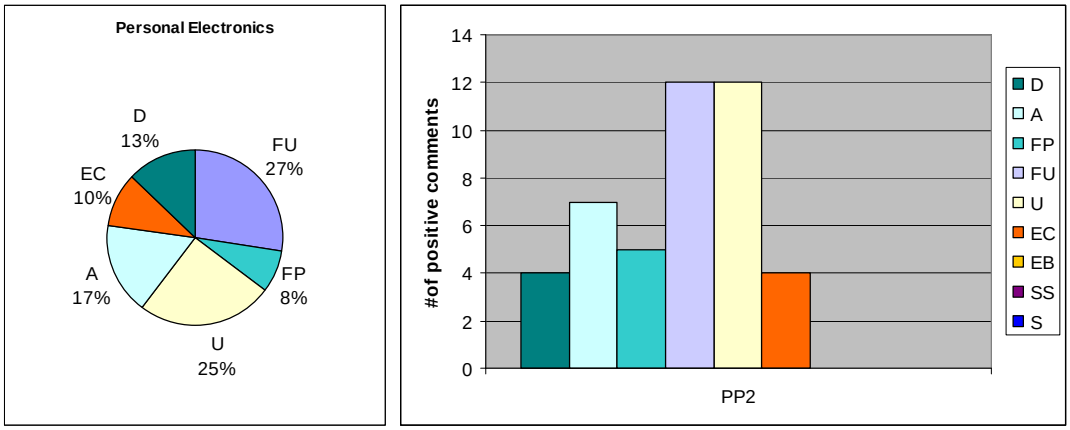

Figure 5.17 The relative significance and positive comment graphs for *personal electronics*

The subdimensions raised in the positive statements can be grouped under the headings are provided in Table 5.15, and the detailed list of subdimensions and examples for each subdimensions are provided in Appendix-C.

Table 5.15 Subdimensions of satisfaction in *electronic personal products*

Dimension	Subdimensions
D	No function related problem for a long period
FP	Satisfied by the output
FU	Add-in functions Facilitating the process Frequently needed Match between context and product functionality Match between need and functionality Match between need and product complexity
U	Comfort of use (in relation to weight, form) Ease of carrying (in relation to physical dimensions) Ease of learnability Ease of navigation Ease of use (clarity, form) Guessability/ understanability/ speaking the user's language
A	Color Form and Style
EC	Ideo pleasure (emphasizing science and technology) Interest emotion (in relation to cuteness) Socio-pleasure (facilitating the communication) Symbolic association (referring to simplicity, authenticity, in accordance to user's identity, uniqueness)
EB	Tactile pleasure

The most significant dimensions are **Functionality-Usefulness** (27%) and **Usability** (25%) dimensions for *Personal Electronics*. **FU** dimensions refer to the ease that the product brings to the process for digital photograph camera. This facilitation is so significant that even when not satisfied by other aspects such as **Aesthetics**, the user still mention this product as an overall satisfactory product. (**P3**, **P7**)

Mobile phone is another significant product in this group. It is raised 4 times as a satisfactory product and 4 times as a dissatisfactory product. When raised as a satisfactory product usability issues such as ease of learnability, ease of navigation, and clarity are put forward. When the prevailing dimensions for this group are compared with home electronics group, it can be seen that **Usability** gains more importance for this group. This finding may be due to the general problems experienced due to the insufficient display area combined with the product complexity. (e.g. "...I can use this phone quite easily, it has a larger display area from my former one. The display of the former one was very small, and crowded, I was not very comfortable with that one. I like this one..." (**P3**))

Aesthetics, although seems like a secondary dimension, plays an important role in the overall satisfaction. The appearance of the hardware of these electronic gadgets may give clues about the software as well. "... I don't check the menus during the purchase stage; I have the impression that if the outer is designed well, the inner should also be designed well." (**P2**)

Usability is the most significant dimension for dissatisfaction. The 7 out of the 16 negative statements about the unsatisfactory products are related with the usability. 3 of them are hardware related, e.g. uncomfortable form of the head set and mobile phone the others software related insufficient feed back.

The influence of exceeded expectations can be seen in the case of a wide screen laptop user (**P2**) who uses the computer for graphic and architectural design works. Aware of the negative reviews made on the influence of the wide screen proportions on the proportions of the design works, the user hesitated during the purchase stage, but end up purchasing it due to its low price. As the user used the product, the comfort of using a

wide screen laptop turned out to be more than expected which yield a solid satisfaction response for the user. An opposite case occurred when another participant (**P6**) which is impressed by the smart tap opening mechanism of a mobile phone. After usage phase, the user realized that it was not comfortable to open the tap by one hand. The disconfirmation of the comfort expectation caused the user to be dissatisfied with the product.

5.6 Summary of the Results and Discussion

In this section, the prevailing dimensions of satisfaction are summarized for different groups. The results of the study are summarized in summary graphs. In Figure 5.18, the relative significance pie charts are provided for each of the product groups. The number of positive comments raised for satisfactory products is provided in Figure 5.19 and the number of negative comments raised for unsatisfactory products is given Figure 5.20.

From the summary graphs, it can be seen that there are significant differences regarding the prevailing dimensions of satisfaction. According to the findings, the most important dimensions for *white goods* are related with the utility of the product. **Functionality-Usefulness**, **Functionality-Performance** and **Durability** seems to be the prevailing dimensions. When the focus is on the *small kitchen appliances*, in addition to these dimensions, other dimensions such as **Aesthetics**, **Emotion-Complex** and **Usability** are likely to be important dimensions having a significant influence on the satisfaction response. For the smallest scale products in kitchen, *kitchen utensils*, the **Aesthetics**, **Functionality-Usefulness** and **Emotion-Complex** dimensions seem to play the important role.

For the *furniture* group, the hedonic dimensions come to front: **Aesthetics**, **Emotion-Complex**, and **Emotion-Basic** are the prevailing dimensions. For home electronics, the basic concerns of the users seem to be the performance regarding the output of the product and its visual appealingness, i.e. prevailing dimensions are **Aesthetics** and **Functionality-Performance**. **Usability** and **Performance** of the *small*

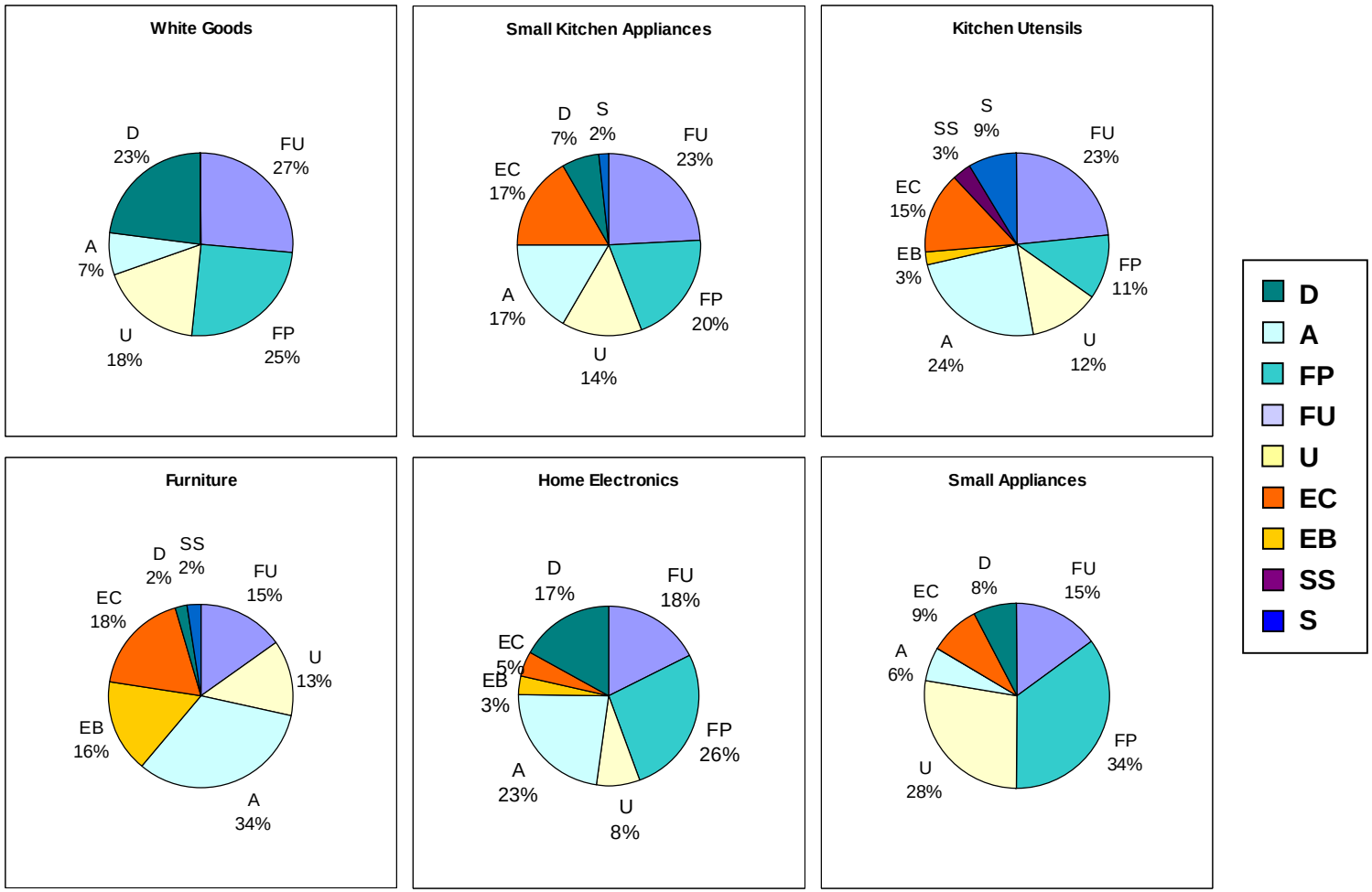

Figure 5.18 The significance percentages of different dimensions for different product groups

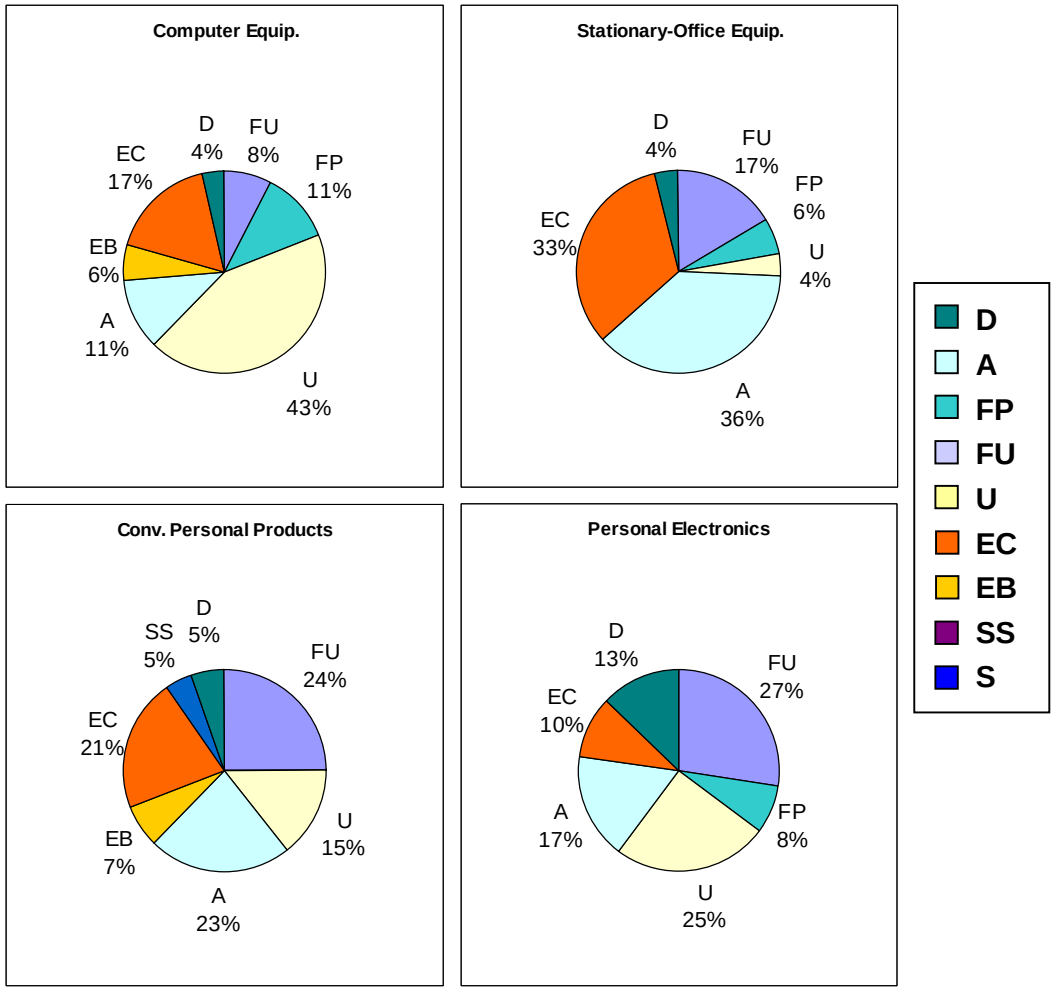

Figure 5.18 The significance percentages of different dimensions for different product groups (Cont'd)

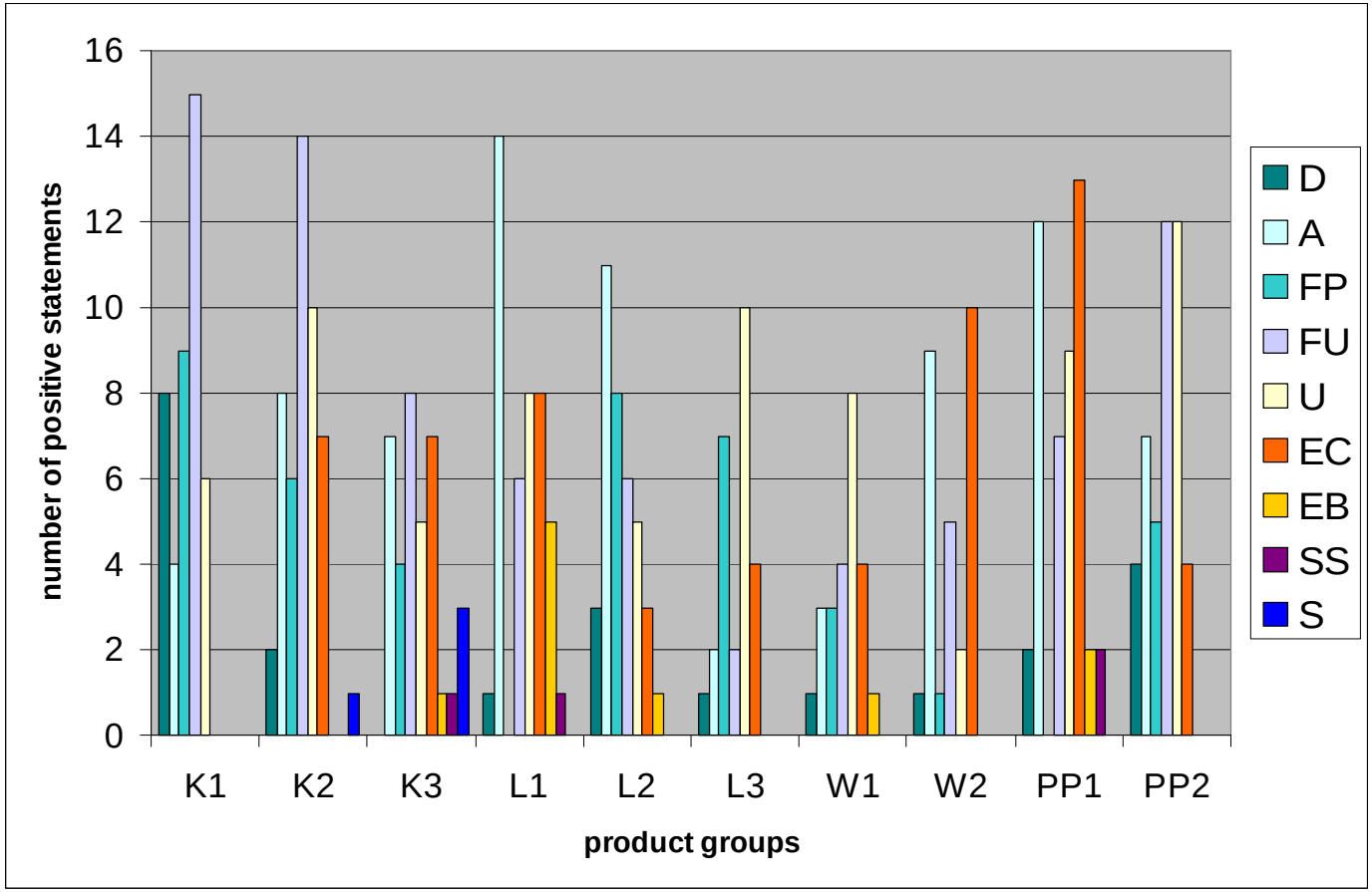

Figure 5.19 The number of **positive** comments raised for different dimensions of **satisfactory** products in each product group

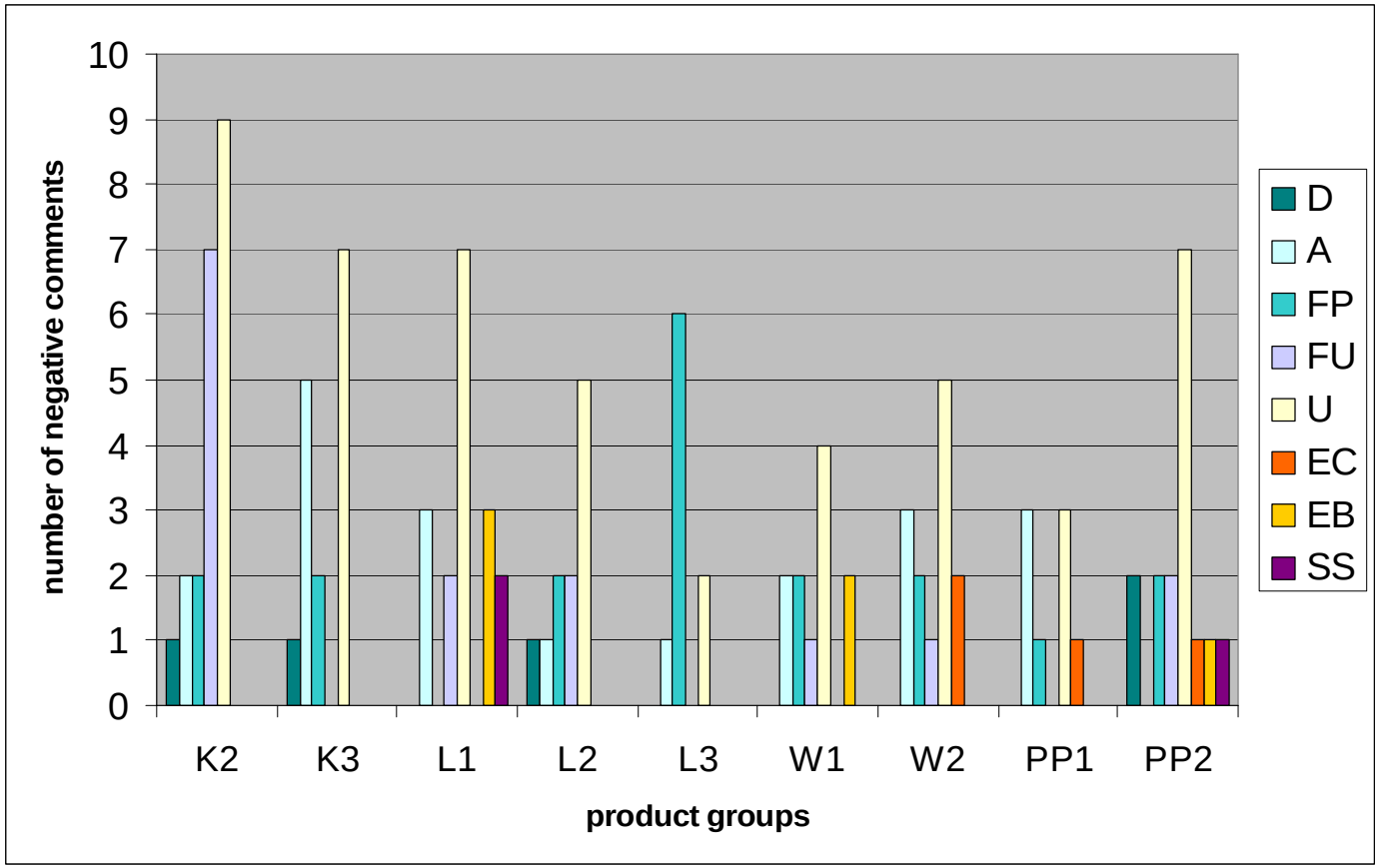

Figure 5.20 The number of **negative** comments raised for the different dimensions of **unsatisfactory products** in each product group

kitchen appliances seem to be the most important dimension for the satisfaction response.

The prevailing dimensions are found to be **Aesthetics** and **Emotion-Complex** for the *stationary-office equipment*s. For the other group in working environment, *computer equipments,* **Usability** seems to be the prevailing dimension. For the personal products having no electronic components the **Aesthetics**, **Emotion-Complex** dimensions are the most important dimensions together with the **Usefulness** they bring. However, when the *electronic personal products* are focused, these hedonic dimensions come in second place. The prevailing dimensions seem to be the **Usefulness** and **Usability** of the product.

Generally speaking, a product is considered to be unsatisfactory, when it has a problem related with **Usability**. For all of the product groups except *small appliances* (L3), most of the negative comments are related with this dimension. For *small appliances* the number of negative comments related with **Functionality-Performance** is greater than the negative comments related with **Usability** dimension. The subdimensions for the dissatisfaction response can be found in Appendix-D.

CHAPTER 6

CONCLUSION

This chapter presents a summary of the research conducted in order to clarify the user satisfaction with consumer products and to answer research questions. The raised conclusive arguments are presented in the following sections.

6.1 Consumer Satisfaction Models and User Satisfaction

The psychological background of the satisfaction response was summarized briefly and several models for the consumer satisfaction were presented in the first chapter. The common notion in most of these models was that they differentiated two components influencing the final satisfaction response. These were cognitive and affective components. The cognitive component emphasized the concept of 'expectations' as the main determinant of the satisfaction response, whereas the other component focused on the influence of affect.

The field study revealed that users' expectations played an important role on their satisfaction with the products. When the prior expectations were exceeded by a product, the satisfaction response tended to be intense. In contrary, when the expectations regarding the product failed to be met, the dissatisfaction response was highly probable to occur.

As it was noted in Chapter 2, the expectations vary greatly among individuals. The user's involvement in a particular product was given as the main reason for these differences. The field study supported the validity of this reasoning. It was observed that the high-involved users expected more from the products relative to low-involved users.

In the case of low-involvement, the user may depend solely on the visual appeal and bare functioning of the product to feel satisfied.

Another finding of the field study was related with the affective component of the consumer satisfaction models. According to the findings of the field study, the emotional issues are observed to be the prevailing dimension of satisfaction for some specific product groups such as personal products with no electronic components, and stationary-office products.

The equity model, which was outlined in Chapter 2, was helpful to model the dissatisfaction with products. In the field study, it was frequently observed that when the outputs of a product, i.e. the utilitarian and hedonic benefits that could be derived, were exceeded by the resources required, i.e. money, space, effort to use, the product causes dissatisfaction. Equity evaluations were raised for the products having unused functions and features which generally increase the price of the products (e.g. stereo TV), and the products that are not needed frequently and occupying large space (e.g. food processors).

6.2 Prevailing Dimensions in Different Product Groups

The insight provided by consumer satisfaction literature remained faint to investigate the main topic of the study, user satisfaction. In order to clarify the concept, the focus was shifted to the product related satisfaction dimensions in Chapter 3. Since this product-oriented point of view has not been adopted in the previous research in literature, a list of product related dimensions had to be compiled referring to design and ergonomics disciplines. The final list included usefulness, performance, usability, aesthetics, emotional aspects, durability, soundness and safety. These dimensions were used to define the user satisfaction with consumer products.

The main argument of the study was the necessity to differentiate the definition of user satisfaction for different product groups. Accordingly, the main hypothesis of the study was that different dimensions could prevail for the overall satisfaction response in different product groups. The field study was conducted mainly for questioning the

validity of this hypothesis. After the grouping of the products based on the context of use, several semi-structured interview sessions were conducted.

The study provided results supporting the validity of the hypothesis. For example, for products bearing complex mechanism such as white goods and home electronics, the utility and proper functioning of the products were observed to be the main considerations for the satisfaction response. Whereas, visual appeal and emotional issues played the important part for satisfaction with the product groups bearing simpler mechanisms such as kitchen utensils, stationary-office equipment, and conventional products. Definition of dissatisfaction did not showed a difference for most of the product groups. Usability was found to be the important dimension for dissatisfaction for almost all product groups.

6.3 Influence of Aesthetics on Overall Satisfaction

As it was mentioned in Chapter 3, the product-user interaction starts in the visual domain. The evaluation of the aesthetic qualities, which can take place in this initial phase of the interaction, precedes the evaluation of the other dimensions such as functionality and usability. As attitude formed by formerly evaluated dimensions may influence the later evaluations and general attitude towards the product, aesthetics may influence overall satisfaction. Actually, literature presents examples of studies indicating the positive effect of visual appeal on the usability evaluation of the user for the web pages.

By the help of the field study, the influence of aesthetics for satisfaction with consumer products was investigated. Aesthetics was not observed to be sufficient on its own to produce satisfaction response. Even in groups such as personal products, for which the aesthetics is observed to be the prevailing dimension, the deficiencies in other dimensions can eliminate the positive effect of visual appeal.

Although, mere visual appeal was insufficient for the generation of the satisfaction response, visual repel was observed to be the sole reason for the user to feel

dissatisfied. Some of the users who were satisfied regarding utilitarian needs reported severe visual repel as a reason for their dissatisfaction for different product groups such as kitchen utensils or electronic products.

6.4 Benefits - Drawbacks of the Study and Future Research Directions

The study provides a starting point for elucidating the satisfaction issues in the domain of consumer products. The emphasis on the product related dimensions provides information about the user expectations related with products and enriches the previous satisfaction discussions, which generally highlights the user related dimensions. Besides, the study is also valuable for proper measurement of satisfaction. With the identification of the important dimensions and subdimensions for different product groups, it is possible to propose group-specific methodologies for measuring satisfaction based on the evaluation of the important dimensions for that group.

The main obstacle for achieving results that can be generalized was the small sample size. The satisfaction response is highly influenced by the individual characteristics, and the small sample sizes may not reflect the population. However, the study preserves its value as a research scheme, which can be used in further studies with larger sample sizes.

Based on the findings of the current study, structural models combining the user dimensions such as expectations, emotions and attitudes with product-related dimensions can be constructed in future. As those comprehensive models will provide a more sensitive approach to define satisfaction, they will be useful for designing more sensitive measuring methodology as well.

APPENDIX A

Product Classifications of Sears

Appliances

- Air Cleaners
- Compactors & Disposers
- Cooking
  - Cooktops
  - Drop-In Ranges
  - Freestanding Ranges
  - Microhood Combinations
  - Modules & Accessories
  - Range Hoods
  - Slide-In Ranges
  - Wall Ovens
  - Warming Drawers
- Dehumidifiers
- Dishwashers
- Fans
- Floor Care (Vacuum and Floor Cleaners)
- Freezers
- Heaters
- Humidifiers
- Kitchen
  - Bakeware(Kek kalıbı, cake pans, muffin pans)
  - Barware(Tirbüşon)
  - Clean Up (Dish drainer,utensil basket)
  - Cooks Tools & Gadgets (peeler, wooden spool,botle opener, kitvhen timer,trays)
  - Cookware(Tencere tava cezve)
  - Cutlery & Sharpeners (Bıçaklık,bıçak)
  - Specialty Food
  - Storage & Organization
  - TV Trays
- Laundry Care (Washer and Dryers))
- Microwaves
- Personal Care
  - Aerobeds
  - Hair Care & Mirrors (Trimmer, mirror hair dryer, hair cut kit)
  - Health Care
  - Massagers

    - Oral Hygiene
    - Shavers, Clippers & Trimmers
    - Sound Therapy
    - Spa & Relaxation
- Refrigeration
- Room Air Conditioners
- Sewing Center(sewing machines, cabinets for sewing machines)
- Small Kitchen Appliances
    - Blenders
    - Breadmakers
    - Can Openers
    - Coffee, Espresso & Tea Makers
    - Food Processors & Slicers
    - Fryers, Griddles & Skillets
    - George Foreman Grills
    - Ice Cream & Dessert Makers
    - Irons, Steamers & Accessories
    - Juicers
    - Mixers
    - Mixers Accessories
    - Multi-functional Appliances
    - Slow Cookers, Steamers & Roasters
    - Specialty Appliances
    - Toasters & Toaster Ovens
    - Vacuum Sealers
    - Waffle Makers
- Water Heaters
- Water Treatment

Baby

Clothing

Computers and electronics

- Cameras & Camcorders
- Car Electronics
- Computers
    - Accessories
    - Desktop Computers
    - Digital Cameras
    - Digital Printers
    - Digital Projectors
    - Drives & Storage
    - Handheld Organizers - PDAs
    - Monitors
    - MP3 Players
    - Notebook Computers

    - Printers
    - Scanners
- DVD Movies
- DVD, VCR & Other Video
- Home Audio
    - Accessories
    - Home Theater Systems
    - Karaoke Machines
    - Radios
    - Receivers
    - Speakers
    - Stands & Brackets
    - Stereo Systems
    - Turntables
- Music
- Office & Communications
    - Accessories
    - Answering Machines
    - Calculators
    - Caller ID
    - Corded Phones
    - Cordless Phones
    - Fax Machines
    - Handheld Organizers - PDAs
    - Shredders
    - Two Way Radios
- Portable Electronics
    - Boom Boxes
    - Handheld Organizers - PDAs
    - MP3 Players
    - Net MD Walkman Recorders
    - Personal CD Players
    - Personal Radios & Cassettes
    - Personal Speakers
    - Portable DVD Players
    - Pure Recorders
    - Two Way Radios
- Software
- Televisions
- Video Games

For the home

- Bath
    - Bath Accessory Collections

- Bath Rugs
- Furniture & Storage
- Shower Curtains
- Towels

- Bedding
- Christmas Trees & Decorations
- Furniture & Storage
  - Accent Furniture
  - Bedroom
  - Closet
  - Closet Organization
  - Dining Sets & Seating
  - Home Entertainment
    - Bookcase (8)
    - CD & Stereo Storages (45)
    - Entertainment centers (21)
    - Game table (3)
    - TV Stands (43)
  - Home Office
    - Bookcase (16)
    - Chair (6)
    - Desk (27)
    - Filing cabinet (1)
  - Kids Room
  - Kitchen
    - Baker's rack (15)
    - Bar (3)
    - Bar stool (19)
    - Buffet (5)
    - Cupboard (7)
    - Dining seating (9)
    - Dining set (12)
    - Hutch (8)
    - Island or cart (40)
    - Pantry cabinet (7)
    - Pub table (2)
    - Trash bin (6)
    - Utility stand (2)
    - Vegetable bin (1)
    - Wall shelf (1)
    - Wine storage (10)
    - Work center (3)
  - Various Coordinates
- Home Decor

    - Housewares
        - Air Cleaners
        - Fans
        - Floor Care
        - Heaters
        - Humidifiers
        - Microwaves
        - Sewing Center
        - Small Appliances
        - Water Treatment
- Kids Room
- Kitchen & Dining
- Lighting
- Luggage
- Mattresses
- Personal Care
- Small Kitchen Appliances
- Ty Pennington Style
- Windows

Gifts

Jewelry

Lawn & garden

Movies, music & games

Sporting goods

Tools and toys

APPENDIX B

Interview Questions

Bu çalışma Orta Doğu Teknik Üniversitesi Endüstri Tasarımı Bölümü Yüksek Lisans programı tezim için yaptığım bir çalışmadır. Sizinle 45 dakika bir saat arası sürecek olan bir mülakat yapacağız. Değişik ürün gruplarında biri memnun olduğunuz diğeri memnun olmadığınız ikişer ürün belirtmenizi istiyeceğim, ve bu ürünleri değerlendirmenizi isteyeceğim. Mülakat 45 dakika- 1 saat arası bir süre alacak. Başlamadan önce sormak istediğiniz bir soru var mı?

...ürün grubunda memnun olduğunuz, sevdiğiniz, hoşunuza giden bir ürün var mı?
...ürün grubunda memnun olmadığınız, sevdiğiniz, hoşunuza giden bir ürün var mı?

<u>Bu ürünle genel ilişkisi.</u>

- Bu ürün dışında başka ... kullandınız mı?
- Çevrenizde bu ürünü kullanan tanıdıklarınız yakınlarınız var mı?
- Bu üründen yeni bir tane alacak olsanız nasıl bilgi toplarsınız?
- Bu ürün grubundaki ürünlere karşı özel bir ilgi hissediyor musunuz?

Memnunsa:

- Sizce bu üründen memnun olmanızın temel sebebi ne?
- Nesinden hoşlanıyorsunuz bu ürünün?/Sevdiğiniz özellikleri neler?
- Bu ürün çeşidinde başka hoşunuza giden bir ürün var mı?
- Sizin ürününüzü diğerlerinden ayıran şey ne?
- Bu ürünün pazardaki alternatifleri hakkında bilginiz var mı? yeni alsam şunu almayı düşünürdüm dediğiniz bir ürün? Nedeni ne?

Önemsiz boyutlar

- Bu ürünle ilgili herhangi bir problem yaşadınız mı?
- Ürünün değiştirmek isteyeceğiniz özellikleri var mı?/Sevmediğiniz özellikleri var mı?/ Nesi hoşunuza gitmiyor?
- Hoşunuza gitmeyen bu özellik memnuniyetinizi etkiliyor mu? Mesela değiştirmek için yeni bir ürün alırmıydınız?

Memnun değilse:

- Sizce bu üründen memnun olmamanızınızın temel sebebi ne?
- Bu üründe hoşunuza giden özellikler var mı?

APPENDIX C

Subdimensions of Satisfaction for Each Product Group

White Goods (K1)

Subdimensions of Durability are:

- No functioning problems for a long period

Subdimensions of Functionality-Performance are:

- Doing its job properly / well (e.g. washing better than washing on hand for dishwasher, silent drying for washing machine)

Subdimensions of Functionality-Usefulness are:

- Add-in functions (e.g. shock-freezers, and, built in containers for refrigerators)
- Customization (e.g. detachable dishwasher drawers)
- Facilitating the housework (e.g. washing machine)
- Frequent need (e.g. microwave oven)
- Satisfaction of need (e.g. dimensions for refrigerator)
- Match between need and product complexity (e.g. Few basic functions of dishwasher)

Subdimensions of Usability are:

- Efficiency (e.g. in searching in refrigerator due to transparent material used, due to small number of steps in taking cold water supplied by exterior water dispenser)
- Ease of use due to in user's control (e.g. control of the interface of the dishwasher)

Subdimensions of Aesthetic are:

- Color and Texture
- Form
- Style (e.g. modernist lines conforming taste of participant)

- Makes the environment look pleasing (e.g. refrigerator as a note board)

Small Kitchen Appliances (K2)

Subdimensions of Durability are:

- No functioning problems for a long period.

Subdimensions of Functionality-Performance are:

- Doing its job properly / well (e.g. blender slicing onions quickly just as liked, feeding bottle heater sensitive to small temperature differences , kettle providing hot water)
- Not requires maintenance (e.g. kettle not requiring lime remover)
- The quality of the output (e.g. grill with teflon sides cooking healthy)

Subdimensions of Functionality-Usefulness are:

- Frequently need (e.g. grill to heat the frozen food, kettle to boil water for meals)
- Facilitating the housework (e.g. kettle easining the meal preparing process, blender that makes slicing onions easily)
- Match between need and product complexity (e.g. blender with just two knives)
- Match between need and product dimensions (e.g. kettle meeting the volume requirements)Match between context and product dimensions (e.g. blender occupying a small space over countertop, small kettle)
- Match between a specific need and function (e.g. feeding bottle heater)

Subdimensions of Usability are:

- Comfort of use due to form (e.g. general form of hand blender providing a comfortable hold, handle of kettle, curved top of a juicer part of a food processor)
- Comfort of use due to dimensions (e.g. a small kettle that is easy to operate while holding)
- Ease of cleaning due to detachable parts(e.g. detachable knife of blender which

can be cleaned separately)

- Ease of cleaning due to dimensions (e.g. small feeding bottle heater)
- Efficiency due to number of steps (e.g. kettle that can be switched on when grasping the handle, and turned off when leaving it)
- Ease of cleaning due to form (e.g. juicer without intricate form details)
- Ease of use due to flexibility (e.g. a blender which can be left in the bowl in the middle of the operation)

Subdimensions of Aesthetics are:

- Form (e.g. hand blender with)
- Style of form (e.g. food processor with modernist lines)
- In harmony with other products (e.g. plain kettle not)
- Form and color (e.g. kettle with form and colors conforming tastes)

Subdimensions of Emotion-Complex are:

- Ideo-pleasure due to sense of 'designedness' (e.g. liking the blender due to approval of the baby lock giving sense of 'designedness' for a designer)
- Social pleasure/emotion due to the product of the process (e.g. blender used for preparing margarita for parties)
- Interest emotion due to way of interaction (joy of play) (e.g. the enjoyable process of slicing vegetables at once for a food slicer, enjoyment due to crushing ice with a pulse blender)
- Symbolic association referring to unimposingness (e.g. positive appraisal of a kettle due to the plain and unimposing appearance)
- Symbolic association due to advertisements (e.g positive appraisal of the appearance of a feeding bottle heater due to brand identity)

Subdimensions of Safety are:

- Prevention of accidents (e.g. cutters of blender which gives sense of control)

Kitchen Utensils (K3)

Subdimensions of Functionality-Performance are:

- Doing its job properly / well (e.g. bottle opener, corkscrew, vegetable peeler)

Subdimensions of Functionality-Usefulness are:

- Facilitating the housework (e.g. knifeholder which can be accessed easily)
- Match between context and product form (e.g. on-wall knifeholder which does not occupy any space on the countertop)
- Frequently needed (e.g corkscrew for user drinking wine on a regular basis)
- Match between need and product dimensions (e.g. small pans meeting the volume requirements for meal heating for the baby)

Subdimensions of Usability are:

- Comfort of use due to form (e.g. physical comfort due to form of a beef fork, physical comfort due to form of can opener)
- Comfort of use due to mechanism (e.g. mechanism of a corkscrew)
- Ease of use due to error prevention (e.g. open knife holder where the knives are seen and taking the wrong knife is less probable)
- Ease of use due to control (e.g. control of usage of can opener)

Subdimensions of Aesthetics are:

- Form
- Color

Subdimensions of Emotion-Complex are:

- Interest emotion due to cuteness (e.g. a beef fork giving reference to an imitation of devil's pitchfork)
- Interest emotion due to sense of humor /cuteness (e.g. a corkscrew giving reference to a man weaving his arms)
- Interest emotion due to way of interaction (joy of play) (e.g. corkscrew which has an enjoyable mechanism, vegetable peeler which challenges user to a complete peel of the vegetable, a can opener which gives pleasure of mechanical interaction)
- Ideo-pleasure due to sense of 'designedness' (e.g. liking the beef fork due to approval of the form specifically designed form to deal with beefs)

- Symbolic association referring to simplicity (e.g. reassuring of the user's identity with the simple form of the bottle opener)

Subdimensions of Emotion-Basic are:

- Tactile pleasure due to texture and physical qualities (e.g. wooden material used at the handle of bottle opener)

Subdimensions of Strength and Soundness are:

- Good fit among the parts (e.g. a sound corkscrew)

Subdimensions of Safety are:

- Prevention of accidents (e.g. knifeholder which preserves sharp edges, mechanical canopener which prevents accidents that occurred while using substitutes, such as knife and electrical can opener)

Furniture (L1)

Subdimensions of Durability are:

- No functioning problems for a long period.

Subdimensions of Functionality-Usefulness are:

- Secondary function due to form (e.g. side handles of sofa used as coffee table)
- Match between context and product dimensions (e.g. small coaches fitting in a small living room)
- Facilitating the housework (e.g. coffee table which does not require frequent cleaning due to color)

Subdimensions of Usability are:

- Comfort of use due to material (e.g. cushioning of the sofa)
- Comfort of use due to dimensions (e.g. large sofa)
- Comfort of use due to form (e.g. head supporting side panels for the armchair)
- Ease of cleaning due to detachable parts (e.g. removable cushion cover of the sofa)
- Ease of carrying due to weight (e.g. lightweight sofa)
- Ease of cleaning (e.g. easy to clean plain texture of the sofa)

Subdimensions of Aesthetics are:

- Color
- Form
- Texture
- Color and texture
- Form and texture
- Style of form (e.g. Lamps conforming to the “style of 70's”)
- Style of form (e.g. Minimalist form of the sofa)
- In harmony with other products (e.g. sofa following the same concept of textured furniture)

Subdimensions of Emotion-Complex are:

- Symbolic association referring to authenticity and high quality (e.g. massive wooden seating unit)
- Social pleasure/emotion due to facilitate social interaction (e.g. round dining table where everyone see each others face, removable cushions of sofa, which are used to “build homes for the children”)
- Symbolic association referring to pleasant memories (The form of a seating unit resembling user's childhood)
- Symbolic association referring to recalling of a loved one (e.g. dining table used by a parent previously)
- Symbolic association referring to uniqueness (e.g. the retro style of lambs which can not be found at the stores)
- Symbolic association referring to spare time and relaxation (e.g. armchair specifically used for reading books with partner)

Subdimensions of Emotion-Basic are:

- Tactile pleasure due to sense of warmth (e.g. short feathered cushioning of the sofa)
- Tactile pleasure due to texture and physical qualities (e.g. liked feeling pf touching wooded material of the dining table, rough texture of the dining table, soft texture

of sofa)

Subdimensions of Strength and Soundness are:

- Technical properties of the material (e.g. strength of the sofa)

Home Electronics (L2)

Subdimensions of Durability are:

- No functioning problems for a long period.

Subdimensions of Functionality-Performance are:

- Doing its job properly / well (e.g. TV with proper visual output, VCD player with sufficiently good visual output regarding price)
- Good performance due to technical properties (e.g. the audio quality of the audio set)

Subdimensions of Functionality-Usefulness are:

- Frequently needed (e.g. cordless telephone set, TV)
- Match between need and product complexity (e.g. A DVD player which can also run DivX and play Mp3, telephone set with caller ID screening, baby alarm properties)

Subdimensions of Usability are:

- Comfort of use due to form (e.g. comfortable form of the remote control of DVD player
- Ease of navigation (e.g. basic menu structure of DVD Player)
- Ease of use due to guessability / understandability / speaking the user's language (e.g. understandability of the terms in the menu)
- Ease of storage due to dimensions and weight (e.g. slim and light VCD player, which can be located very narrow spaces on the shelf)

Subdimensions of Aesthetics are:

- Color and Texture (e.g. The dull texture of the Audio set)

- Form (e.g. slim form of DVD Player, curved shape of telephone set)
- In harmony with other products (e.g. plain and simple look of TV, the neutral color of the TV)
- Style (e.g. plain simple lines of the TV, sharp angled form of the audio set)
- Texture (e.g. texture of TV)

Subdimensions of Emotion-Basic are:

- Tactile pleasure due to texture and physical qualities (e.g. soft texture of the switching knob of a CD player)

Subdimensions of Emotion-Complex are:

- Ideo-pleasure due to "high-tech" (e.g. the latest model of DVD Player with many functions)
- Interest emotion due to the product of the process (e.g. the DVD player feeding the user's cinema taste)
- Symbolic association referring to technology (e.g. pleasure of having a technologic product with its slim look)

Small Appliances (L3)

Subdimensions of Durability are:

- No functioning problems for a long period.

Subdimensions of Functionality-Performance are:

- Doing its job properly / well. (e.g. vacuum cleaner with sufficient engine power, hair dryer with adequate power)
- Good performance due to technical properties (e.g. vacuum cleaner with superior vacuum power)

Subdimensions of Functionality-Usefulness are:

- Facilitating the housework (e.g. vacuum cleaner of a house lady, press iron of a user who wears easy to iron clothes like t-shirt and sweatshirts)

Subdimensions of Usability are:

- Ease of carrying due to detachable parts (e.g. detachable former-head of hairdryer)
- Comfort of use due to technical properties (e.g. long electric wire of vacuum cleaner)
- Comfort of use due to dimension (e.g. small vacuum cleaner that can work in small spaces)
- Ease of storage due to dimension (e.g. small vacuum cleaner)
- Ease of storage due to compactibility (e.g. neat compact vacuum cleaner which can be stored in small lockers)
- Ease of carrying due to compactibility (e.g. vacuum cleaner with all the features attached on)
- Comfort of use due to form, (e.g. stabile form of vacuum cleaner preventing it turning upside down)
- Comfort of use due to weight, (e.g. light vacuum cleaner that is comfortable to use)

Subdimensions of Aesthetics are:

- Colors (e.g. fancy colors of vacuum cleaner)
- Form (e.g. round form of vacuum cleaner)

Subdimensions of Emotion-Complex are:

- Interest emotion due to cuteness. (e.g. cute round form and littleness of hair dryer)
- Interest emotion due to way of interaction (joy of play) (e.g. joy felt due to the feeling of vacuum)
- Symbolic association referring to the sense of cleanness tidiness (e.g. positive feelings towards the vacuum cleaner due to the product)

Computer equipment (W1)

Subdimensions of Durability are:

- No functioning problems for a long period.

Subdimensions of Functionality-Performance are:

- Doing its job properly / well (e.g a mouse functioning better than the substitutes)
- Good performance due to technical properties (e.g.an optic mouse more sensitive to movements than ball-mouse)

Subdimensions of Functionality-Usefulness are:

- Facilitating the process (e.g. computer providing abroad communication)
- Match between context and product dimensions (e.g. computer)
- Facilitating the process (e.g. optic mouse without a requirement of cleaning)

Subdimensions of Usability are:

- Comfort of use due to form (e.g. wrist rest of a keyboard, form of mouse)
- Ease of carrying due to form (e.g. ergonomic handling for a computer chassis)
- Ease of use due to technical properties (e.g. a mouse with a USB plug)
- Efficiency due to shortcuts (e.g. scroll wheel of a mouse)
- Ease of carrying due to form (e.g. flat monitor carried like a notebook)

Subdimensions of Aesthetics are:

- Style of form (e.g. over-designed chassis, e.g. technologic look of a flat monitor)
- Form (e.g. small form of mouse)

Subdimensions of Emotion-Complex are:

- Interest emotion due to sense of humor. (e.g. kitsch over designed chassis making fun of technology)
- Social emotion due to the communication function (e.g. pleasure felt due to the communication with daughter abroad)
- Symbolic association referring to authenticity and high quality (due to the tactile properties, and the typing sound of the keyboard)
- Symbolic association referring to technology (e.g. technologic connotations of the flat monitor,)

Subdimensions of Emotion-Basic are:

- Tactile pleasure due to texture and physical qualities (e.g. smooth touch of the

keyboard)

Stationary-Office Equipment (W2)

Subdimensions of Durability are:

- No functioning problems for a long period.

Subdimensions of Functionality-Performance are:

- Adequate performance regarding the price (e.g. cheap but functioning desktop lamp)

Subdimensions of Functionality-Usefulness are:

- Match between context and product dimensions (e.g. small desktop lamp on a small working space)
- Adjustability (e.g. desktop lamp that can be adjusted for focusing light to different points on the drawing table)
- Match between need and product dimensions (e.g. computer desk which provides a large studying environment)
- Facilitating the process (e.g. stamp remover)

Subdimensions of Usability are:

- Comfort of use due to form (e.g. shallow bins providing comfortable usage)
- Comfort of use due to weight (e.g. solid pen giving the feeling of holding)

Subdimensions of Aesthetics are:

- Texture (e.g. texture of the material of the desktop lamp)
- Form (e.g. form of a stamp remover, form of a note holder)
- Color and texture of the material (e.g. texture of the base of the note holder, texture and color of the desktop lamp)
- Style of form (e.g. simple lines of pen)
- Color (e.g. color of a pen, color of a stamp remover)

Subdimensions of Emotion-Complex are:

- Symbolic association referring to unimposingness (e.g. simple, small, cheap table

lamp)

- Symbolic meaning referring to high quality. (e.g.)
- Interest emotion due to the novel mechanism. (e.g. clicking mechanism of pen arousing interest)
- Interest emotion due to way of interaction (e.g. enjoyment of interaction due to mechanism of the pen, enjoyment due to mechanism of a stampremover, sense of play while removing the stamp with stampremover, liking the mechanic components to adjust the desktop lamp)
- Interest emotion due to cuteness (e.g. puppet shaped small bins)
- Symbolic association referring to pleasant memories (e.g. pencils reminding a loved one and childhood)
- Ideo-pleasure due to the story of the design (e.g. the creation process and creativity yielding the novel mechanism of a pen)

Conventional Personal Products (PP1)

Subdimensions of Durability are:

- No functioning problems for a long period.
- Possible to repair (e.g. watch that can be repaired unlike other substitutes)

Subdimensions of Functionality-Usefulness are:

- Add-in functions (e.g watch showing the date)
- Frequently needed (e.g. watch)
- Match between need and product dimensions (e.g. handbag large enough to carry notebooks, purse large enough to hold all credit cards and money, large sunglasses which protects a large region from sun)
- Match between need and level of functionality (e.g. handbag with many sections with specified use)

Subdimensions of Usability are:

- Comfort of use due to material (e.g. clothed strap of the watch which does not pull

hair on arm, fluffy material of the backpack)

- Comfort of use due to weight (e.g. light watch)
- Ease of use due to clarity (e.g. large, readable interface of the watch)
- Ease of use due to form (e.g. keyholder that can be hanged on pants)
- Efficiency due to number of steps (e.g. keyholder not concealing the keys inside a cover)
- Comfort of use due to form (e.g. sunglasses fitting the shape of the face, e.g. ergonomic form of backpack)
- Efficiency due to number of steps (e.g. light parts of sunglasses which provides clear sight without removing the sunglasses in dark)

Subdimensions of Aesthetics are:

- Style (e.g. watch and backpack with outdoor qualities, sunglasses with fancy form)
- Color
- Form (e.g. watch, handbag, jackknife)
- Texture (e.g. texture of the metal parts of the watch, wooden parts of the jackknife)

Subdimensions of Emotion-Complex are:

- Ideo-pleasure due to importance given to science and technology (e.g. keyholder of “science and technology museum”)
- Interest emotion due to sense of humor /cuteness. (e.g. keyholder with cute decorative parts)
- Symbolic association referring to a refined taste (e.g. watch that is not named as 'kitsch' unlike other substitutes)
- Symbolic association referring to accordance to identity of the user (e.g. camel trophy handbag giving impressions of 'outdoor' and 'adventure' due to material used and brand)
- Symbolic association referring to informality (e.g. informal attitude of the watch due to general appearance)
- Symbolic association referring to naturalness (e.g. jackknife with natural wooden

parts)

- Symbolic association referring to recalling of a loved one (e.g. purse given by a loved one)
- Symbolic association referring to unimposingness (e.g. watch that is not flashy conforming to the user's identity)
- Symbolic association referring to uniqueness (e.g. purse that is purchased from New York by a relative, and can not be found elsewhere at the stores)
- Symbolic association referring to brand (e.g. Diesel sunglasses referring to a specific lifestyle)
- Symbolic association referring to attractiveness (e.g. the contribution of the sunglasses to the appearance of the user)
- Symbolic association referring to sportiveness (e.g. handbag, backpack, and watch giving impression of a sportive look due to form , materials used and brand)

Subdimensions of Emotion-Basic are:

- Tactile pleasure due to texture and physical qualities (e.g. soft leather of the purse, leather strap of watch)

Subdimensions of Strength and Soundness are:

- Technical properties of the material (e.g. sense of soundness of a watch due to the material and brand, strong backpack which can resist heavy loads like laptop)

Personal Electronics (PP2)

Subdimensions of Durability are:

- No functioning problems for a long period.

Subdimensions of Functionality-Performance are:

- Doing its job properly / well (e.g. laptop, digital photograph camera, mobile phone)
- Good performance due to technical properties (e.g. superior memory and hard disk qualities of a laptop, good visual qualities of the flat screen)

Subdimensions of Functionality-Usefulness are:

- Facilitating the process (e.g. digital photograph camera facilitating the taking and retrieving the photos)
- Match between need and product complexity (e.g. digital photograph camera with many manual options, e.g. mobile phone with few basic functions)
- Frequently needed (e.g. cellular phone and laptop)
- Add-in function (e.g. digital photograph camera that can record video streams)
- Match between need and functionality (e.g. laptop that can be carried everywhere, widescreen laptop required for Photoshop applications)
- Match between context and proposed functionality (e.g. laptop that makes working independently in a crowded working environment possible)

Subdimensions of Usability are:

- No experienced problem (e.g. digital photograph camera)
- Comfort of use due to weight (e.g. light mobile phone,)
- Comfort of use due to form (e.g. mobile phone that is large in width slim in depth and therefore easy to handle)
- Ease of use due to error prevention (e.g. accomplishing tasks on a digital photograph camera without erasing other photos)
- Ease of navigation (e.g. basic menu structure of the digital camera)
- Ease of learnability (e.g. mobile phone with basic functions, simple interface of the mobile phone that is guessable ['yes/no' buttons])
- Ease of use due to clarity (e.g. large display area of a mobile phone)
- Ease of carrying due to dimensions (e.g. small laptop which can also be carried in the backpack)

Subdimensions of Aesthetics are:

- Form (e.g. curved mobile phone, a stocky mobile phone, tiny digital photograph camera)
- Colors (e.g. different colors of mobile phone suiting well to each other)
- Style of form (e.g. simple basic lines of the mobile phone)

Subdimensions of Emotion-Complex are:

- Symbolic association referring to simplicity (e.g. pleasure of using a simple mobile phone which satisfy all the user's requirements)
- Symbolic association referring to authenticity and high quality (e.g. laptop of high quality performance and appearance characteristics like wide screen monitor)
- Symbolic association referring to accordance to identity of the user (e.g. the accordance of general appearance characteristics to the user's taste and identity)
- Symbolic association referring to uniqueness (e.g. a laptop that no one else has)

APPENDIX D

Subdimensions of Dissatisfaction for Each Product Group

Subdimensions of dissatisfaction in **kitchen appliances**

-A Form **(P1)**

-A Style of form **(P7)**

-D Functioning problems occurring before expected **(P5)**

-FP Not doing its job well due to technical problems (**P2), (P5)**

-FU Lack of customization**(P4)**

-FU Mismatch between context and product dimension **(P1), (P4), (P7)**

-FU Match between need and product complexity **(P1)**,

-FU Rarely needed **(P8)**, **(P6)**

-U Comfort of use (due to form and mechanism **(P5)**, dimensions **(P1), (P4)**, force required **(P9)**, sense of control **(P9), (P5)**, weight **(P9)**)

-U Ease of cleaning due to features **(P9)**

-U Efficiency due to number of steps **(P1)**

Subdimensions of dissatisfaction in **kitchen utensils**

-A Color and texture of the material **(P6)**

-A form and style **(P9)**

-A Style of form **(P6)**, **(P7)**,

-D Functioning problems occurring before expected **(P3)**

-FP Poor performance (due to technical problems) **(P9) (P5)**

-U comfort of use due to (force required **(P5)**, form and mechanism **(P4) (P8) (P7)**, weight **(P10)**)

-U Ease of use due to effectiveness (inability to use) **(P8)**

-U Efficiency of use due to number of steps **(P7)**

Subdimensions of dissatisfaction in **furniture**

-A Form **(P6)**

-A Form and style**(P9)**,**(P10)**

-EB Tactile pleasure due to (texture and physical qualities **(P3)**, the cold texture and physical qualities **(P6)**, the texture of the material **(P9))**

-FU Mismatch between need and functionality due to dimension **(P4)**

-FU Mismatch between need and product complexity **(P7)**

-SS Not fitting parts **(P7)**

-SS Technical properties of the material **(P5)**

-U Comfort of use due to (the form and softness of the material **(P8)**, the sense of fragileness **(P3)**, form **(P5)**, form and mechanism **(P10)**, material **(P6),(P9)**)

-U Ease of cleaning due to form

Subdimensions of dissatisfaction in **home electronics**

-A Style **(P2)**

-D Functioning problems occuring before expected **(P6)**

-FP Not functioning due to technical properties **(P6)**

-FP Not functioning parts **(P5)**

-FU Mismatch between context and proposed functionality **(P4)**

-FU Mismatch between need and level of functionality (excess functions) **(P3)**

-U Ease of carrying due to weight **(P5)**

-U Ease of use due to guessability / understanability / speaking the user's language **(P4)**, **(P5)**

-U Efficiency due to number of steps **(P4)**, **(P5)**

Subdimensions of dissatisfaction in **small appliances**

-A Form **(P2)**

-A Style of form **(P7)**

-EB Audio displeasure **(P5)**, **(P3)**

-FP Poor performance due to technical problems **(P6)**

-FU Mismatch between context and proposed functionality **(P8)**

-FU Requires regular maintenance **(P4)**

-U comfort of use due to (force required **(P5)**,form **(P4)**)

-U Ease of cleaning due to form **(P7)**

-U Ease of learnability **(P1)**

Subdimensions of dissatisfaction in **computer equipment**

-A Form **(P2)**

-A Style of form **(P7)**

-EB Audio displeasure **(P5)**,**(P3)**

-FP Poor performance due to technical problems **(P6)**

-FU Mismatch between context and proposed functionality **(P8)**

-FU Requires regular maintenance **(P4)**

-U comfort of use (due to force required- **(P5)**; form**(P4)**)

-U Ease of cleaning due to form **(P7)**

-U Ease of learnability **(P1)**

Subdimensions of dissatisfaction in **stationary-office equipment**

-A Form **(P2)**

-A Form texture and color **(P4)**

-A Style of form **(P8)**

-EC Ideo pleasure due to sense of 'designedness' **(P2)**

-EC Symbolic association referring to overdesignedness **(P8)**

-FP Not doing its job well due to technical properties. **(P3)**

-FP Poor performance (due to technical problems) **(P5)**

-FU Rarely needed **(P2)**

-U Comfort of use (due to form and mechanism) **(P3)**

-U Ease of carrying due to dimension **(P5)**

-U Efficiency due to number of steps **(P4)**, **(P2)**

Subdimensions of dissatisfaction in **conventional personal products**

-A Color and texture of the material **(P6)**

-A Form **(P6)**

-A Obsolete look **(P10)**

-EC Symbolic meaning referring to accordance to identity of the user **(P6)**

-FP Not functioning well due to obsoleteness **(P10)**

-U Ease of carrying due to dimensions **(P5)**

-U Ease of storage due to form **(P6)**

-U Ease of use due to clarity **(P4)**

Subdimensions of dissatisfaction in **personal electronics**

-D experienced problems **(P1)**

-D Functioning problems occurring before expected **(P1)**

-EB Audio displeasure **(P6)**

-EC Symbolic association referring to old fashion **(P7)**) **(P7)**

-FP Poor performance (due to technical problems) **(P5)**) **(P5)**

-FU Mismatch between need and level of functionality (requires more functions) **(P1)**, **(P7)**

-SS Not robust to shocks **(P1)**

-U Comfort of use due to (form and mechanism **(P6)**, form and texture **(P9)**)

-U Ease of use due to insufficient feedback **(P1)**, **(P6)**)

-U Ease of use to recurrent errors **(P9)**

-U Efficiency due to (dimension of display **(P1)**, number of steps **(P6)**)