

Product Related Determinants of User Satisfaction for Different Product Groups

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Abstract:

This paper focuses on the product related determinants of user satisfaction. It presents the results of an empirical study conducted to reveal the impacts of product related determinants on different product groups. The significance of different determinants influencing overall satisfaction response was investigated for different product groups via semi-structured interviews followed by quantitative analysis. For each product group, the findings were summarized and sub-headings of factors were listed. The findings of the study suggest that the determinants of user satisfaction differs for different product groups.

Keywords: User satisfaction, Consumer satisfaction, Product groups.

Introduction:

In the last couple of years, following the rapid advancement in technology, companies continue to offer more and more choices for consumers (Lorenz, 1990; Norman, 1988; Thackara, 1997; Schmid, 2001) In relation to this abundance of alternatives users are asking for more from products. They are now after rich and pleasurable experiences with products (Demirbilek and Şener, 2003, Jordan 1999). Concurrently, designers are faced with huge amount of data coming from various disciplines such as engineering, marketing, social and behavioral sciences and obviously they are having a hard time making sense out of all these sources.

Particularly, designers refer frequently to social and behavioral sciences in accordance with their goal of understanding users and designing for them (Frascara, 2002). However, as Lawson (1990) states social and behavioral sciences remain largely descriptive while design is necessarily prescriptive, so the psychologists and sociologists have gone on researching and the designers designing, and they are yet to re-educate each other into more genuinely collaborative roles. Satisfaction, as it is discussed in consumer research literature (see Giese and Cote, 2000 for an overview) involves a similar problem.

‘Consumer/Customer satisfaction’ is defined as consumer’s post consumption response based on user’s expectations and influenced by affect aroused during the consumption experience (Oliver, 1993, Spreng et al., 1996, Westbrook and Oliver, 1991). This holistic definition, which acknowledges the role of affect in satisfaction response, fits the current aim of designing for experiences. However, unfortunately, the broad perspective of this domain does not unravel the links between product itself and satisfaction response, which implies an information gap between marketing and design domains. This gap in real practice hinders the support that satisfaction information can actually provide for the designer.

The user satisfaction information, as an informative resource, can maintain its value for designers when it presents product related determinants including basic aspects such as functionality and usability and others that influence user experience, e.g. meaning experience. Following this argument, this paper focuses on product related determinants of user satisfaction. It presents the

results of an empirical study conducted to reveal the impacts of different product related determinants on different product groups.

Identifying product related determinants influencing satisfaction:

In human-computer interaction and product design domains, some authors analyze the dimensions of user experience and some others propose criteria for designing positive experiences. These references, either implicitly or explicitly, point to the influence of several product aspects on user experience (see Alben et al., 1996, Huspith, 1997, Margolin, 1997), which can be analyzed under four main groups: functionality (products serving for a need in Alben et al. (1996), utility in Huspith (1997), inventive dimension in Margolin (1997)), usability (learnable and usable products in Alben et al. (1996), utility in Huspith (1997), operational dimension in Margolin (1997)), aesthetics (products that are pleasing in Alben et al. (1996), appeal in Huspith (1997), aesthetic dimension in Margolin (1997)), and meanings of products in relation to social and cultural contexts (products that are socially and culturally appropriate in Alben et al. (1996), ceremony in Huspith (1997), social dimension in Margolin (1997)). In the following paragraphs, these determinants are discussed in detail.

Usefulness:

In this paper, usefulness is defined as the appropriateness of functions offered by a product with respect to its user's needs. From this respect, usefulness resides at the base of the satisfaction response. Design research puts considerable effort to design for user needs and requirements (see Hasdoğan, 1996, Stanton, 1998), but unfortunately this effort often do not have a correspondence in real life cases. Gültekin (2003), targeting technology-driven products, claims that the excess functions offered by technologically advanced and highly capable products influence user's usability evaluation and user's satisfaction negatively.

Performance:

In consumer research domain, product performance is referred as a user expectation shaping overall satisfaction response. (Halstead et al. 1994, Tse and Wilton 1994). These works regard

performance as the extent to which the product can perform its aimed function.

Usability:

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). In addition, usability is stated as a factor influencing product acceptance (Nielsen 1993). The concept is commonly defined with its underlying dimensions: effectiveness, i.e. the extent to which a goal in product usage is achieved, efficiency, i.e. effort required to accomplish a goal, and satisfaction, i.e. comfort of use (ISO, 1998). For interactive electronic products, the list of underlying dimensions includes ease of learning 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).

Aesthetics:

Visual aesthetics basically refers to the visual pleasure that a product gives to its user, i.e. gratification of the visual sense (Hekkert, 2006). In consumer literature, visual aesthetics is generally discussed regarding its influence on user's product preferences and purchase decision of user (Veryzer, 1993). Furthermore, St. James and Taylor (2004) raises aesthetics as a cause of another post consumption notion, consumer delight, which is considered to be extreme consumer satisfaction.

This title also includes pleasure due to senses other than sight, i.e. tactile pleasures and olfactory pleasures. This item is related with Jordan's (1999) physio pleasure. In literature, no work focusing on the influence of these aspects on satisfaction is noticed.

Meanings of products

Experience of meaning of a product can be considered as an influential factor on the overall satisfaction response. Literature provides several different types of meanings that product may carry.

Dittmar (1992) asserts that certain material possessions, individually and in combination express an individual's identity in society. She discusses categorical and self expressive meanings associated with material possessions. Categorical meanings allows user to express his social status, connecting him to a particular social group. Whereas self-expressive meanings allow individuals to communicate their individual values and attributes in addition to their personal characteristics, differentiate them from the others and evoke feeling of uniqueness. Govers' (2004) argues that consumers prefer products that carry visual personality characteristics similar to their personality characteristics.

In addition to meanings having a social focus, products may also carry private meanings. (Richins, 1994) Main aspect of the private meaning is the owner's personal history in relation to the object. Csikzentmihalyi and Rochberg-Halton (1981) relates private meanings to repeated interaction with the product and psychic energy invested in the product. The authors argue that these products objectifies a person's past, present and future as well as his or her close relationships.

Dewey (1980) discusses 'Intellectual Experiences' involving intellectual conclusions from signs and symbols that objects carry, these may include political and ideological inferences made by decoding the signs and symbols. Jordan's (1999) notion of ideo-pleasure derives from those experiences.

Identifying product groups:

This paper focuses on satisfaction response in relation to domestic consumer products. Several product classifications that are used by international classification organizations such as WIPO (WIPO, 2003), online catalogues of large retail stores such as Sears (Sears Retail Store, 2005), and classifications used by design awards such as Good Design Awards (Good Design awards, 2005) are analyzed to propose a sensitive product grouping. With the light of these classifications, a classification is adapted based on typical context in which each product is used. The list of product groups and exemplar products in these groups are provided in Table 1.

Table 1: Product groups and examples

Product Group	Examples
White Goods	Refrigerator, range, oven, microwave oven, dishwasher, washing machine, etc.
Small Kitchen Appliances	Blender, food processor, kettle, toaster, grill, etc.
Kitchen Utensils	Pan, knife set, bottle opener, can opener, corkscrew, knife holder, dish basin, etc.
Furniture	Seating unit, table, coffee table, stool, chair, cabinet, wardrobe, etc.
Home Electronics	TV, audio system, cable telephone set, answering machine, etc.
Small Appliances	Vacuum cleaner, iron, hair dryer, etc.
Computer Equipments	Monitor, mouse, keyboard, computer box, etc.
Stationary – Office Equipments	Pen, pencil sharpener, studying lamp, CD holder, note holder, punch, stapler, etc.
Personal Products	Wallet, backpack, mechanic watch, handbag, etc.
Personal Electronics	Cellular phone, laptop, digital photo camera, etc.

The empirical study:

The significance of different determinants influencing overall satisfaction response were investigated for different product groups via semi-structured interviews followed by quantitative analysis. A typical interview session took 45 minutes to 1 hour. The sessions started with the explanation of the study carried out and the structure of the interview to the participant. After the introduction phase, the participants were asked to report an owned and used product that provides a satisfactory experience, followed by investigation of underlying reasons via semi structured interviews. The interviews were conducted in the homes of the participants to facilitate user reports and enrich the discussion.

The analysis of the data collected through interviews are realized by linking the comments of the participants to previously mentioned determinants via inter-judge agreement approach. In this

phase, the sub-headings of these main determinants were also analyzed and itemized. This phase is followed by a quantitative analysis of the significance of each group that influences satisfaction response for different product groups. When a participant raised a comment tied to a determinant as causing satisfaction, this determinant was marked as 'raised'. All determinants that are raised by a participant for a satisfactory product were assumed to have equal significance. Then for each product group the significance indices are averaged over all participants.

The study was carried out with 10 participants of different age groups. Middle and high socio-economic status participants were selected to reduce the effect of price and to focus on product related qualities. All of the participants were living on their own and the products that they used were either purchased by themselves, or given as a gift, or inherited.

Results:

The study showed that the most frequently mentioned satisfaction determinants differ according to product groups. For each product group, the findings were summarized and sub-headings of determinants were provided. The study also revealed that durability and safety should also be considered as satisfaction determinants. As these determinants appeared under one heading, they are not represented in the tables. The raw data of the study is presented in Figure 1.

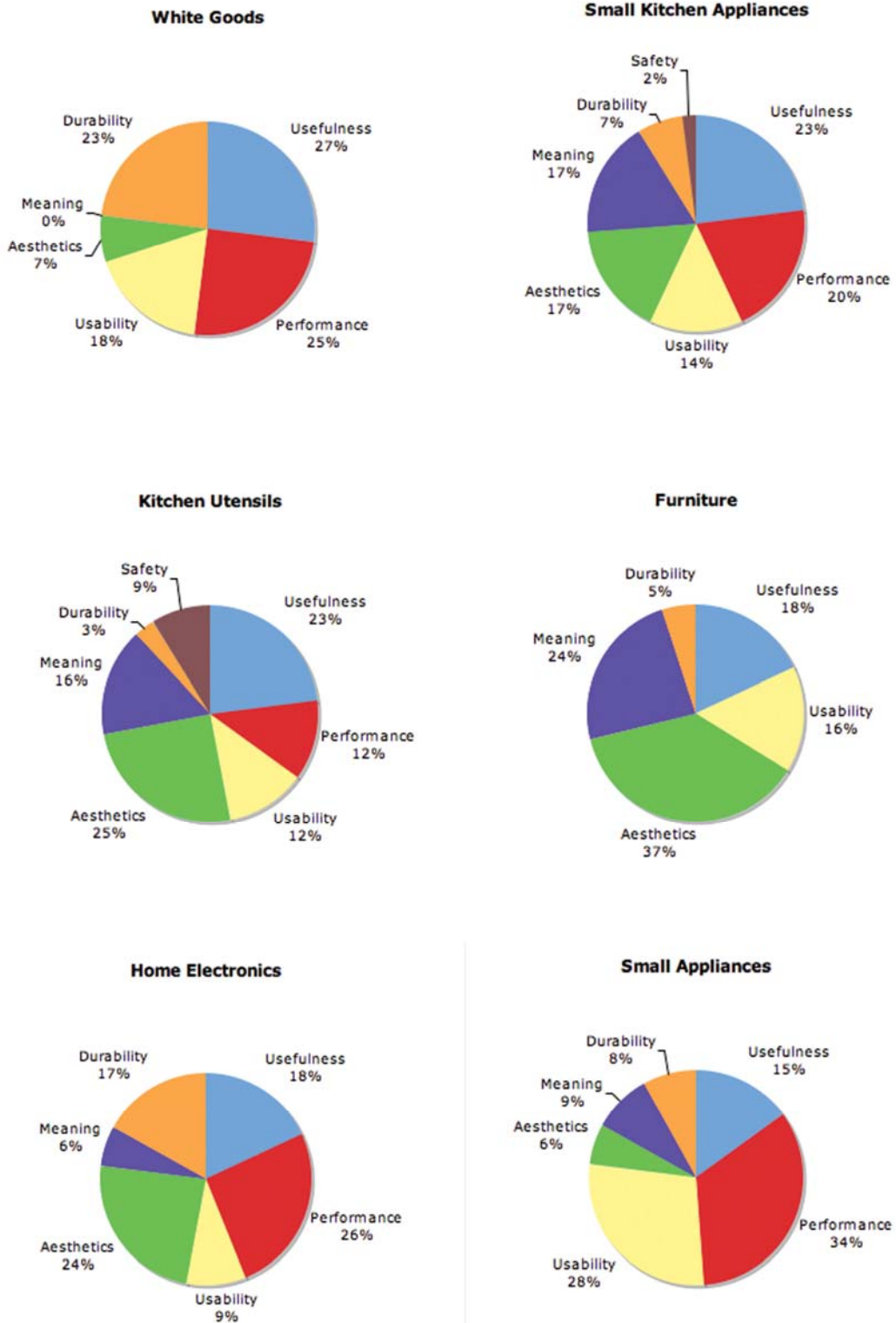


Figure 1: Significance Indices for Different Product Groups

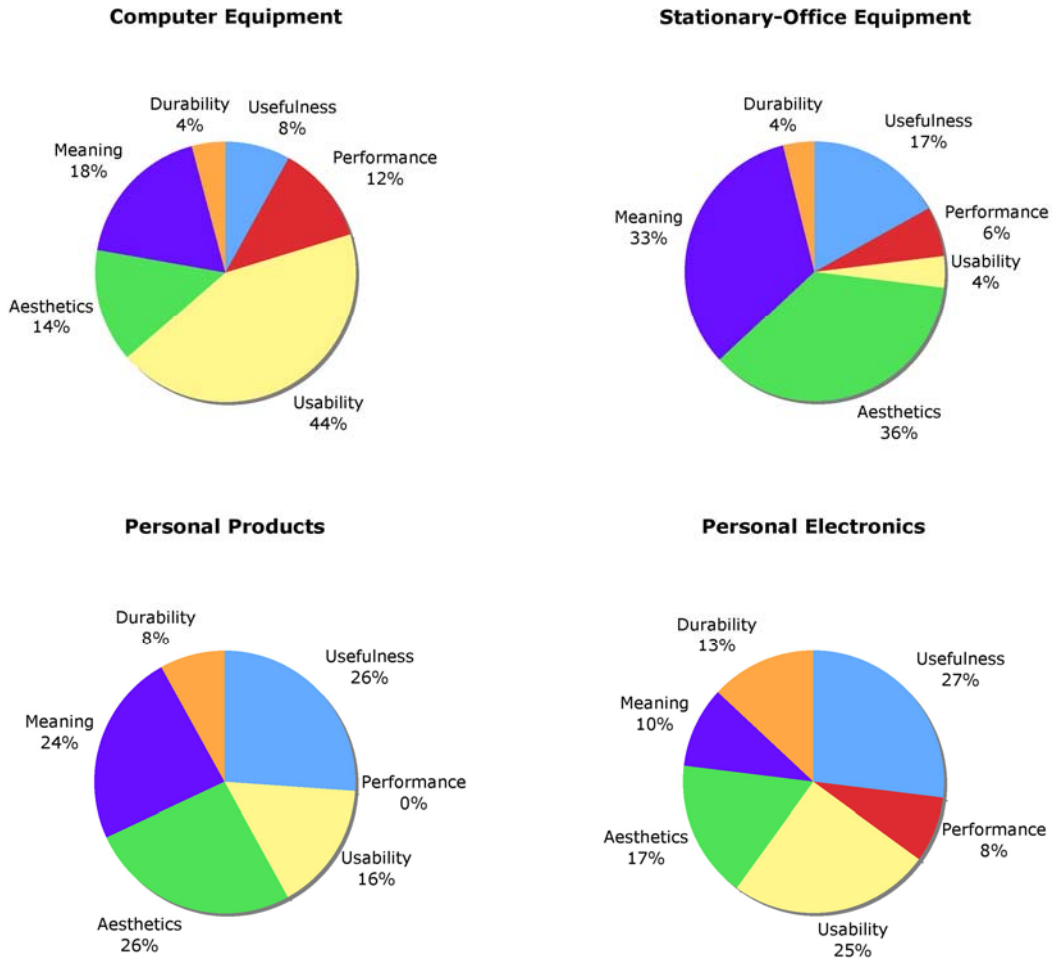


Figure 1 (cont'): Significance Indices for Different Product Groups

White goods:

For this group, participants mostly referred to hard functionality issues as underlying reasons for satisfaction. The three most significant determinants were Durability, Performance and Usefulness of the product. For some participants, these determinants were so important that some negative aspects of the product, e.g. unpleasant smell of the material of a freezer, could be neglected as long as the product provided the needed output. Usability and Aesthetics turned out to be of secondary importance for this group of products. The respondents did not comment on the influence of experiential issues on their overall satisfaction response.

Table 2: Determinants and sub headings for satisfactory white goods

Determinant	Sub-Heading	Example
Performance	Quality of the output	Washing machine washing delicately
	Energy requirements	Energy efficient dishwasher
Usefulness	Useful primary function	Microwave-oven cooking quickly
	Useful secondary functions	Freezer feature of a refrigerator
	Basic functions	Dishwasher having only required programs
	Adjustability	Removable trays of a dishwasher
	Physical dimensions	Large refrigerator satisfying the requirements of the user
Usability	Efficiency (add-in function)	Refrigerator with water dispenser
	Efficiency (materials)	Refrigerator with transparent shelves
	Sense of control	Dishwasher with basic functions
Aesthetics	Color	
	Form	
	Texture (visual)	

Small kitchen appliances:

The study showed that the important determinants for this group are Usefulness, Performance, Usability, Aesthetics, and Meaning issues. In general, the comments focused on the benefit-cost evaluation about the usage of the product. For instance, a blender is found to be satisfactory based on the large benefit it provided, i.e. fine mixing that can not be achieved manually, and its small cost, little space occupied on the countertop, easy cleaning.

Table 3. Determinants and sub headings for satisfactory small kitchen appliances

Determinant	Sub-Heading	Example
Performance	Quality of the output	Juicer that takes the entire juice out
Usefulness	Useful primary function	Kettle which boils water quickly
	Useful add-in functions	Ice crushing blender
	Basic functions	Hand blender instead of food processor.
	Physical dimensions	Large kettle satisfying the requirements of the user
Usability	Comfort of use	Hand Blender fitting hand
	Ease of use (form)	Easy to clean juicer
	Efficiency (detachable parts)	Toaster that is easy to clean
	Efficiency (number of steps)	Kettle that can be turned on/off while holding
	Flexibility	Hand blender that can stand on the countertop
Aesthetics	Form	
Meaning	Ideological-Intellectual	Kettle that gives the feeling of “designed”
	Product personality	Modest hand blender
	Social interaction	Hand blender that is used to make cocktails for friends

Kitchen utensils:

Aesthetics and Usefulness were the significant determinants for this group. The respondents also raised meaning related comments frequently. One particular type of comment was related with the enjoyment arising from the physical interaction with products such as corkscrew, can-opener, and vegetable peeler.

Table 4. Determinants and sub headings for satisfactory kitchen utensils

Determinant	Sub-Heading	Example
Performance	Quality of the output	Sharpness of a knife
	Useful primary function	Vegetable peeler
Usefulness	Useful (physical dimensions)	Pot set that is suitable for every amount of food
	Useful (form)	On-wall knife holder saving space on countertop
Usability	Comfort of use (form)	Service fork
	Comfort of use (mechanism)	Corkscrew not requiring too much force exertion
	Error prevention	Open knife holder not concealing knives
Aesthetics	Form	
	Color	
	Texture (tactile)	Pleasing material in bottle opener
Meaning	Ideological-Intellectual	Corkscrew representing bohemian life style
	Personal memories	Knife evoking memories of dinners with loved one
	Physical interaction	Can-opener offering play like interaction
	Product personality	Cute bottle opener

Furniture:

Aesthetics turned out to be more influential determinant on the overall satisfaction response. A strong visual appeal was sufficient to produce overall satisfaction despite some problems related to other determinants, such as difficulty in cleaning, discomfort of a couch when used occasionally as a bed. In addition, other determinants such as Usefulness, Usability, and Meaning also have influence on the formation of satisfaction response. There was a variety of comments about the meaning of the products for this group. Authenticity of the wooden material of a seating group, uniqueness of a lamb, ‘Scandinavian’ness of a sofa, etc. constitute some of the comments of the respondents. Another important sub-heading is social meanings related to 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.

Table 5. Determinants and sub headings for satisfactory furniture

Determinant	Sub-Heading	Example
Performance	Quality of the output	Table that can stand heavy weights
Usefulness	Useful primary function	Coffee table which makes the room tidy
	Useful secondary function	Large side handles of a sofa that can be used as coffee table
Usability	Comfort of use (dimension)	Large seating unit
	Ease of use (weight)	Light-weight easy to move sofa
	Ease of use (material)	Easy to clean material of sofa
	Ease of use (detachable parts)	Detachable cover of sofa making it easier to clean
Aesthetics	Form	
	Color	
	Texture (visual)	
	Texture (tactile)	Pleasing touch feelings related to a sofa
Meaning	Personal memories	Corner seating unit evoking childhood memories
	Product personality	Uniqueness of the material of lamb
	Social interaction	Round table facilitating social interaction

Home Electronics:

The prevailing determinants of this group are found to be Performance and Aesthetics. Usefulness and Durability related comments were of secondary importance. Usability and Meaning were rarely mentioned in relation to satisfaction from home electronics.

Table 6. Determinants and sub headings for satisfactory home electronics

Determinant	Sub-Heading	Example
Performance	Quality of the output	Quality of the audio output of a music set
Usefulness	Useful primary function	TV set that is usable.
	Useful secondary functions	TV set that is compatible with DVD player
Usability	Comfort of use (form)	Form of a remote control fitting the hand
	Ease of use (navigation)	Easy to navigate menu structure for a DVD player
	Ease of use (guessability)	Understandable wording in the menu of a DVD player
Aesthetics	Form	
	Color	
	Texture (visual)	
	Texture (tactile)	Knob of a Hi-fi system
Meaning	Product personality	“High-tech” looking product
	Social interaction	DVD Player allowing movie sessions with friends

Small Appliances:

The respondents referred to hard functionality issues like Performance, Usability, and Usefulness. Aesthetics or Meaning determinants turned out to be less influential on the overall satisfaction response.

Table 7. Determinants and sub headings for satisfactory small appliances

Determinant	Sub-Heading	Example
Performance	Quality of the output	Motor power of a vacuum cleaner
Usefulness	Useful primary function	Vacuum cleaner
Usability	Comfort of use (weight)	Little force required to iron
	Ease of use (detachable parts)	Ease of storage due to detachable parts
	Ease of use (dimensions)	Small vacuum cleaner that is used in narrow corridors
	Ease of use (form)	Stable vacuum cleaner that does not overturn
Aesthetics	Form	
	Color	
Meaning	Product personality	Playful hairdryer

Computer Equipments:

The major determinant of this group is Usability. The other determinants were more or less equally significant for the overall satisfaction response.

Table 8. Determinants and sub headings for satisfactory computer equipments

Determinant	Sub-Heading	Example
Performance	Quality of the output	Optical mouse that responds properly
Usefulness	Useful primary function	Computer itself allowing communication through internet
	Comfort of use (form)	Comfortable mouse form
Usability	Comfort of use (add-in parts)	Keyboard with ankle rest
	Ease of use (dimensions)	Flat screen that is easy to carry
	Ease of use (form)	Handle of a computer box making it easy to carry
	Efficiency (short cuts)	Mouse with roller
Aesthetics	Form	
	Sound	Pleasant sounds of keyboard buttons
	Texture (tactile)	Smooth feeling of the tactile qualities of a keyboard
Meaning	Ideological-Intellectual	Computer box making fun of “high tech” products
	Product personality	“Elegant sophisticated” flat computer monitor
	Social interaction	Computer allowing communication with relatives

Stationary-office equipments:

The study yielded Aesthetics and Meaning determinants as the most influential ones. For instance, simple design solutions interpreted by participants as “unimposing” were found satisfactory, e.g. table top lamp. At the other extreme interesting and complex design solutions attracted interest and yielded satisfaction response, e.g. pen with a novel clicking mechanism.

Table 9. Determinants and sub headings for satisfactory stationary-office equipments

Determinant	Sub-Heading	Example
Performance	Quality of the output	Table top lamp which works well
Usefulness	Adjustability	Movable table lamp
	Physical dimensions	Small table lamp not occupying much space
Usability	Comfort of use (form)	Shallow stamp bins that is easy to reach bottom
	Comfort of use (weight)	Pen with an appropriate weight
Aesthetics	Form	
	Color	
	Texture (visual)	
Meaning	Ideological- Intellectual	The creative process behind a novel pen
	Personal memories	Memories related with old-fashioned pencil sharpener
	Product personality	Cuteness of a pen holder

Personal Products:

Usefulness, Aesthetics, and Meaning issues were the most influential determinants for this group of products. The sub-headings of Meaning Issues were mostly related with the personality of the product. The raised comments for this determinant reveal positive emotions, such as appreciation and admiration, in response to product personality. These evaluations include keywords such as “not kitsch”, “unimposing”, “attractive”, “sportive”, “natural”, “informal”, and “unique”. The image keywords that are stated in positive comments are the identities that users want to possess, e.g. “..I am quite satisfied with this watch. It just suits me very well. It has an unimposing style. I am in general an unimposing person.”

Table 10. Determinants and sub headings for satisfactory personal products

Determinant	Sub-Heading	Example
Usefulness	Useful add-in functions	Watch informing about date
	Useful primary function	Frequently needed watch
	Useful secondary functions	Handbag having many sections for specific purposes
	Physical dimensions	Key-ring that can carry lots of keys
Usability	Comfort of use (material)	Strap of a watch that prevents sweat
	Comfort of use (weight)	Light watch
	Ease of use	Clarity of a watch due to graphical elements
	Efficiency	Few number of steps to be realized to use key-ring
Aesthetics	Form	
	Color	
	Texture (visual)	
	Texture (tactile)	Pleasant feeling of the material used for a purse
Meaning	Ideological-Intellectual	Key holder symbolizing technology and advancement
	Personal memories	Purse (given as a gift) recalling its giver
	Product personality	Sportive wallet

Personal Electronics:

Usefulness and usability turned out to be the most significant determinants of satisfaction from personal electronics. Visual Aesthetics, although seemed like a secondary determinant, played an important role in the overall satisfaction. It appeared that the appearance of the hardware of these electronic gadgets might 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."

Table 11. Determinants and sub headings for satisfactory personal electronics

Determinant	Sub-Heading	Example
Performance	Quality of the output	Laptop working fast
Usefulness	Useful primary function	Digital camera facilitating the photo taking activity
	Useful secondary functions	Digital camera with automatic control features
	Physical dimensions	Large screen of a laptop allowing multiple tasks
	Basic functions	Cellular phone without any excess functions
Usability	Clarity (dimensions)	Large readable icons of a cellular phone
	Comfort of use (dimensions)	Buttons of a cellular phone that are comfortable to press
	Comfort of use (form)	Cellular phone comfortable to hold
	Comfort of use (weight)	Light cellular phone that is easy to carry
	Ease of use (navigation)	4-directed button of a cellular phone
	Ease of learnability	Menu structure of a cellular phone
	Error prevention	Clear warnings of a cellular phone
Aesthetics	Form	
	Color	
Meaning	Product personality	Modesty of a cellular phone

Conclusions

The findings of the study suggest that the determinants of user satisfaction differs for different product groups. Considering the diversity in product aspects, it cannot be claimed that product design is an easy process. It would be very beneficial for the designer if the information on satisfaction is categorized according to product groups rather than generalizing it to all consumer products.

The study revealed sub-determinants that can be analyzed in detail to provide more satisfactory products in the market. For instance, the usefulness of a refrigerator turned out to be the prevailing determinant for satisfaction. However, current examples of this product in the market do not exploit usefulness. A refrigerator is not something that the users tend to renew in short intervals, furthermore users tend to keep such products for a long time. During this period, user's lives and as a consequence their needs show drastic changes. In this particular context, focusing on usefulness of a refrigerator would enable the designer to detect these changing needs, which in turn would probably lead to more dynamic products that are able to satisfy these changing needs.

Literature review on consumer satisfaction showed that the main determinant of the satisfaction response is consumer's expectations. It is certain that these expectations are mainly shaped by the market itself: the satisfaction response is strongly tied to what has been offered to the user, and what the user knows about the market. In the light of this argument, it can be said that the comments of the participants in this study also reflects their expectations from the other products that they will purchase and use in the future. Having that in mind, designer may also adopt a perspective to offer something new for the determinants that are found less significant by this study. This would lead to exceeding of expectations of users, which would result in extreme satisfaction. For instance, the meaning aspects of a refrigerator may give more than a user asked for the product.

Although the sample size of the study is relatively small, it led to certain findings. However, in order to generalise the findings for the comparison of other types of products may require a further study.

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