

'SOFT' PROBLEMS WITH CONSUMER ELECTRONICS AND THE INFLUENCE OF USER CHARACTERISTICS

Henri Christiaans¹ and Chajoong Kim

(1) School of Industrial Design Engineering, Delft University of Technology, the Netherlands
School of Industrial Design Engineering, Delft University of Technology, the Netherlands

ABSTRACT

The paper reports a study into the complaints of consumers about "soft" problems they have experienced using new electronic household products. These problems cannot be traced back to a specification violation, classified as No Failure Found (NFF). Reason why they are called 'soft'. The aim of this study is to find a relationship between consumers' soft problems and their personal characteristics, encompassing demographic, personal, and socioeconomic aspects. Moreover, the effect of cultural background is part of the study. A total of 64 Dutch and 59 South Korean subjects participated in an exploratory survey, a web-based questionnaire. The complaints reported by the subjects were classified into 7 categories of "soft" problems, which are related to usability. The findings indicate that, first, there is a relationship between type of soft problems and product categories. These categories were based on operation complexity. Second, demographic variables such as gender and nationality are significantly related to problem categories. Third, physical, cognitive, socioeconomic and cultural characteristics as well as personality traits show significant correlations with "soft" problem categories. On the basis of the data preliminary user profiles were made. The implications of these findings for the product development process and suggestions for further study are discussed.

Keywords: product usability, soft problems, user characteristics, cultural diversity

1 INTRODUCTION

Most content management professionals know very well the importance of user-based acceptance tests and understand the high stakes involved. If users fail to embrace a system (e.g., due to poor usability) generally speaking the project fails. Optimized User Interface Design requires a systematic approach to the design process. But, to ensure optimum performance, usability testing is required. This empirical test permits naïve users to provide data about what does work as anticipated and what does not work. Only when the resulting repairs are made can a product be deemed to have a user optimized interface. The important thing is that good user interface design can be the difference between product acceptance and rejection in the marketplace. But in spite of the many usability tests and methods available, and the thousands of papers about the importance of acceptance testing and in particular, usability testing by now, examples of poorly designed consumer products are legion. Although there are good ones, many have bad-to-horrible usability for two reasons: lack of incentive and the lack of a usability culture. The current culture of many companies is that direct costs and profits always have priority. As a consequence companies are facing increasing difficulties to obtain an acceptable level of consumer satisfaction and to guarantee the success of new products when released on the market.

At the consumer side there is a growing lack of product understanding. Research indicates that the number of product features is an important buying criterion for consumers; the more the product "can do", the better. But at the same time, consumer electronics service centres are triggered by the increasing number of return products caused by ignorant users [1].

Since consumer electronic products were launched on the consumer market, most complaints made by consumers have been about technical failure or malfunction of products. However, from the late 90's this trend has bent towards an increase in complaints again regardless of the technology. One of the causes could have been the rapid economic growth and consequently the time-to-market pressure. Manufacturers were much involved in developing new electronic products without identifying increasing customer complaint

is common in consumer electronic industries that customer complaints are dealt with by call centers and there hardly are direct links between these centers and the product development departments. Consequently companies have been confronted more and more with a significant portion of product returns for which the technical problem was not found. According to a recent study, about half of the reasons for product returns have nothing to do with technical problems, but are based on soft problems: problems that cannot be traced back to a specification violation failure, classified as No Failure Found (NFF), by Brombacher *et al.* described as 'soft reliability problems' [2]. Presumably it resulted from an unexpected gap between actual product use and intended use by the manufacturer [3, 4]. Fighting this unprecedented phenomenon must be challenging to companies because they might lose a large amount of profit from product returns. Research mentioned by [1] has demonstrated the increasing number of customer complaints on new products in the consumer electronics industry [5]. Moreover, analysis of these complaints indicates that to an increasing degree the cause of the complaint cannot be retrieved [6]; see Figure 1.

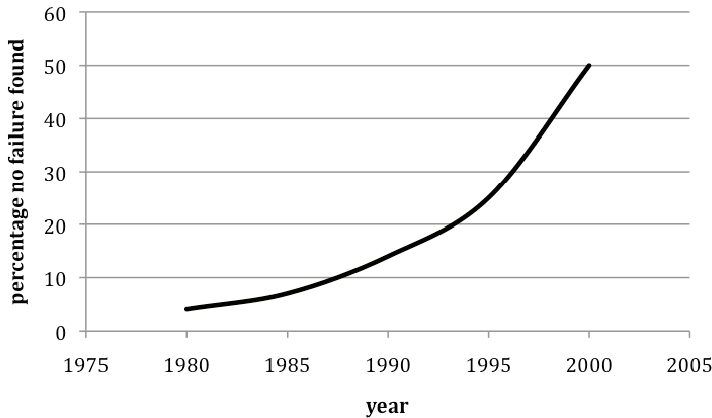


Figure 1: Percentage NFF in modern high-volume consumer electronics. [6]

What are possible causes of soft problems? First, individual electronic products such as radio, digital camera, mobile phone have become integrated into one single product. This leads to a complex product or black box design that confuses consumers in perception, expectation and use [4]. Secondly, manufacturers' continued developing consumer electronics from a technology point of view neglecting the user. Technical excellence of products only is not enough to consumers as products have been absorbing the technological progresses, resulting in larger complexity regarding its characteristics and functionality [7]. Additionally, since the era of mass-production manufacturers tend to look at the similarities between people. Indeed, they have not taken into account the differences between people based on personal and cultural diversity. Moreover, an electronic product is used by a much bigger variety of users than in the past. For instance, in the 80's computer science engineers were the only users of the computer, while nowadays computer users range from children to elderly people. In addition, tolerance of consumers and end-users for quality (soft) reliability problems with products is decreasing [8].

Despite increased consumer dissatisfaction with consumer electronics caused by soft problems, there are only a few studies to figure out what soft problems consumers experienced. Den Ouden *et al.* [9] assessed over 20 new product development projects to understand the reasons behind the rising number of consumer complaints. However, no soft problems were specified in detail in the study. A study conducted by Kim *et al.* [10] tried to categorize soft problems based on a consumer survey and defined 9 categories of soft problems. The focus of these studies was on exploring the kind of soft problems consumers experienced, not on factors that influence complaining about soft problems. However, in order to develop products that meet consumer expectations and decrease dissatisfaction the root cause of these soft problems should be found as well. Presently, there is a lack of information on the causes of such soft problems.

One of the factors that should be studied is user diversity as expressed in user characteristics. The literature indicates that there is a relationship between user characteristics and complaining behavior. But complaining

behavior, which means *taking action*, is different from experiencing soft problems with consumer products. Nevertheless, information about real complaining behavior may in a way help the research about experiencing soft problems. Regarding the variables that influence consumers complaining behavior, several studies have shown that there is a relationship between complaining and demographic variables (e.g. consumer personality and attitude toward firms) and product characteristics. A study on complaint behavior in Chile Valenzuela et al. [11] give an overview of the literature. This study is partly repeated here.

Demographic variables are studied by Keng et al. [12] and Heung and Lam [13]. They concluded that female consumers are more inclined to complain, while the study by Manikas and Shea [14] show totally opposite. Regarding the role of education, research has shown that there is a direct relationship between level of education and complaining [15][16][17][18].

In relation to psychographic factors, such as personality and attitude, Davidow and Dacin [19] conclude that these factors are the major reasons of complaint behaviour. In the same line, other researchers have concluded that consumers who complain are more socially responsible and willing to take risks such as the risk of embarrassment when complaining [20] [21] [21]; non-complainers considered that complaining was not worth by people with little else to do and it would be futile [12].

Concerning attitude toward firms, several researchers have concluded that there is a positive relationship between responsiveness and complaining [12] [21] [22].

With regard to the relationship between product characteristics and complaining behaviour, Day and Laroche [16] and Keng et al. [12] concluded that it is more likely for a consumer to complain if the product is performing as promised and this situation can have a negative impact on their image of the firm. It was demonstrated that there is a direct relationship between price and complaining behaviour, meaning that a consumer will engage in complaining behaviour if the product they are dealing with is more expensive.

In their own study in Chile Valenzuela et al. [11] find that Chileans feel somehow embarrassed when complaining, and if this characteristic is added to the fact that Chileans do not consider complaining a right or social responsibility, it might lead to a low rate of consumer complaints. Furthermore, they find evidence that gender and social class are not relevant in this matter, which is different from those conclusions made in other research. Statistically significant is the type of complainer. Active complainers have a more positive attitude while passive or non-complainers have a more negative attitude toward complaining. This result is in line with what was concluded by Chulmin et al. [23] regarding that it is more likely that consumers who have a more positive attitude toward complaining will engage in such a behavior. As can be seen from those studies, the focus is on why people complain and not on the reasons for complaining: the problems with products.

2 METHOD

In order to investigate what soft problems users experience with electronic consumer products and to measure their personal characteristics a questionnaire was developed. South-Korean and Dutch subjects were recruited to participate.

2.1 Subjects

A total of 123 subjects participated in the survey: 64 Dutch and 59 South Korean people, living in their home country, were randomly recruited through discussion forums on the Internet and through the network of researchers. The gender is: 73 male and 50 female. Their ages broadly range from late teens to 60. It turned out that 14 subjects reported that they had no complaints about their electronic products. It would have been interesting to compare complainers with non-complainers, but (1) this was not the aim of the study, and (2) the number of non-complainers was too small. They were, therefore, excluded in the study.

Sample selection in this way is not scientific if the aim is to generalize findings to the total population from which the sample has been selected. However, this study had an exploratory character meant to develop a hypothesis for a next study.

2.2 Questionnaire

Two open-ended questions were formulated to discover the causes of the soft problems experienced by users. The first question was with what product subjects feel most dissatisfied with, other than technical problems regarding interacting with electronic household products. In the second question participants were asked to explain for the product, mentioned in question 1, what specific dissatisfaction or complaints they had.

other questions were about user characteristics, which consist of cognitive, personality, social, physical, cultural aspects (Table 1). The variables were selected on the basis of research findings in the field consumer complaining behavior and consumer (dis)satisfaction [9, 10, 18-22]. Donoghue's concept framework [23] on consumers' complaint behaviour was another source for our selection. He makes distinction between causal attribution, consumer-related and product-specific variables. This division is used in our study as well. For cultural characteristics, Hofstede's cultural dimensions were used to measure cultural backgrounds since culture plays a role in the field of product design [24, 25]. For most questions a five-points scale was used while some were dichotomous (yes or no) and multiple choice. In order to increase the reliability of the scores on some variables questions were asked twice, with the same content but different formulation. In the analysis the mean of the two similar questions was taken as data. In Table 1 variables with an asterisk (*) include that type of questioning.

Table 1: List of User Characteristics measured

User characteristics	Measured variables
Cognitive	Language*, Technical skill*, Spatial reasoning*, Literacy*, Memory*, Adaptability*, fixation*, Brand fixation, Prerequisite content knowledge, Reading a manual
Personality	Motivation (visceral, behavioral, reflective, or economical reasons), Patience*, Changeability*, Self-efficacy, Religion, Locus of control, Sensitivity to advertising, Sensitivity to stereotyping*, Attitude to life*, Perfectionism*, Exposure to advertising*
Socioeconomic	Social participation*, Annual income, Educational level, Marriage, Having a child, Growth environments, Living environments, Buying decision
Physical	Physical handicap, Age, Gender, Glasses
Cultural	Nationality, Power distance (PDI), Individualism (IDV), Masculinity (MAS), Uncertainty Avoidance (UAI), Long-term orientation (LTO)

2.3 Procedure

The subjects participated in the survey by filling in either a web-based questionnaire or a questionnaire paper. Through discussion forums for product review and the network of the researchers people were invited to visit a website where the questionnaire were uploaded or to fill in the questionnaire on paper. The answers given by them were automatically saved into a database on the Internet. The second way to recruit participants was through the researchers' network of people who live either in Korea or in the Netherlands. All the answers from both the web-based and the paper questionnaire were input into a SPSS data sheet then were statistically analyzed.

3 RESULTS

The survey came up with 167 complaints which have no relation with technical failure. Some subjects reported more than one complaint. The soft problem categories 'trend' and 'third party', as defined in previous study [8] were hardly reported (3 times in total). Because both categories do not relate directly to usability they were excluded from the analysis. Therefore, the statistical analysis was based on 164 complaints in total. First, demographic variables of the sample will be presented and next the complaints reported are classified based on the seven soft problem categories and on three consumer electronic product categories [8]. Third, the relationships between soft problems and product categories will be explored followed by the interaction between user characteristics and product categories and soft problems.

3.1 Demographic variables

Demographic factors of the sample are presented in the Figures 1 and 2. The pie charts are based on the number of 164 complaints. The sample will not be representative for the total population between 20 and 30 years old. Because most participants are not recruited or selected other than through a Web-platform, the sample will probably be representative for the population of internet visitors: more men than women, most from the age group between 20 and 30, highly educated and low income (students and starters). Nevertheless, for the purpose of this study this 'biased' sample can offer interesting insights into the relationship between user characteristics and soft problems.

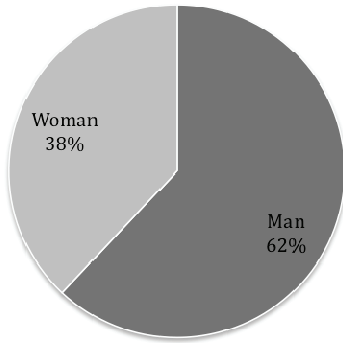


Figure 2: Complainers by Gender (in %)

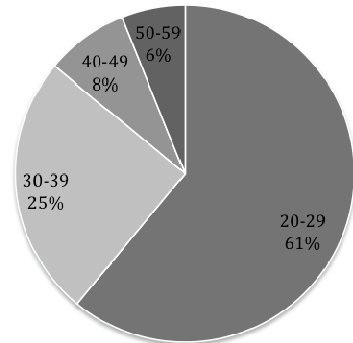


Figure 3: Complainers by Age (in %)

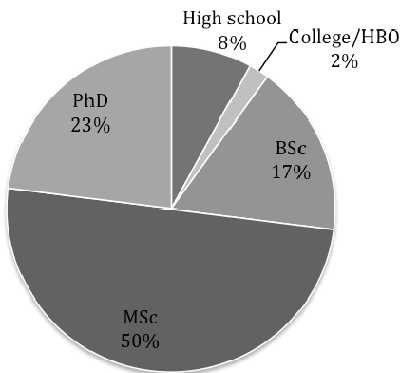


Figure 4: Complainers by Education (in %)

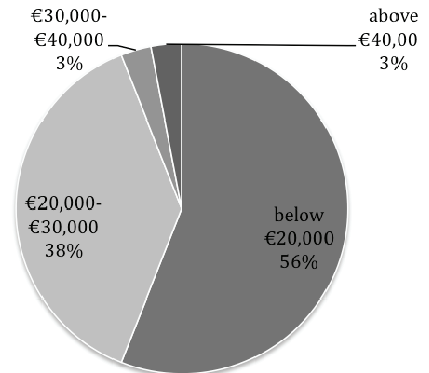


Figure 5: Complainers by Annual Income (in %)

3.2 Soft problems

Since there was variance in consumer complaints across different types of products, the products were divided in three categories according to the cognitive load involved. For instance, more mental load is invested in using a laptop computer, which belongs to category 3, than a coffee machine, which belongs to category 1. Mobile phones and navigators belong to category 2 since it requires less cognitive load than a computer. Next, the complaints were categorised according to the type of complaint, as follows:

- *Low performance*: low efficiency, compatibility, and battery life.
- *Low understanding*: difficulties in understanding functions.
- *Lack of structure*: a product lacks a necessary function, is not improved compared with its previous version, and gives insufficient information despite a consumer need for feedback or feedforward.
- *Product maintenance failure*: dissatisfaction with service, cleaning, special care, durability.
- *Product constraints*: complaints about wiring and cable system, connection, mechanical structure, and shape.
- *Sensation*: poor sound and touch quality, and heat generated by products.
- *Health problems*: physical fatigue or tiredness of the product or software.

The percentages of complaints for each category 1, 2 and 3 are presented in Table 2. The results indicate soft problems are partly dependent on product category. The structure problem is biggest in category 1 products while understanding plays a dominant role in category 2 products.

Table 2: Percentage of complaints in three categories of products

Type of complaint	Type of product		
	Category 1 e.g. coffee machine, vacuum cleaner	Category 2 e.g. mobile phone, navigator	Category 3 e.g. computer
Understanding	10	39	23
Performance	22	12	31
Structure	23	16	15
Maintenance	19	10	8
Constraint	14	10	8
Sensation	8	12	15
Health	4	1	-
	100	100	100

In order to test the significance of this relation between problem and product category a non-parametric square analysis was used. The results show that complaints on understanding and performance are dependent on product category (Tables 2 and 3). This means that the complaints on understanding and performance in category 1 products are significantly less than in the two other product categories. It shows that a lack of understanding is a major soft problem in category 2 products.

3.3 Demographic characteristics and Product categories

Gender, nationality, age, annual income, and educational background were analyzed as major demographic factors. Significant differences on gender and nationality can be observed in category 1 and 2 products (Tables 6 and 7). Female and Dutch subjects are more likely to complain on category 1 products than male and South Korean users. In the category 2 products Dutch users are less expected to have complaints than South Korean users. Male users are more likely to complain about category 2 products than female users.

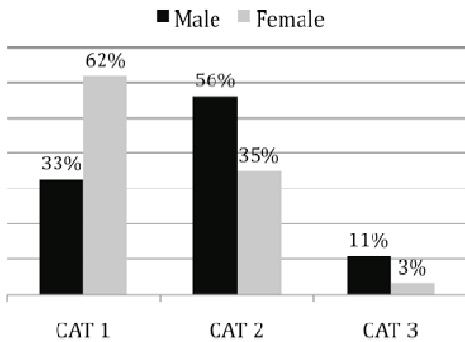


Figure 6: Gender and Product category

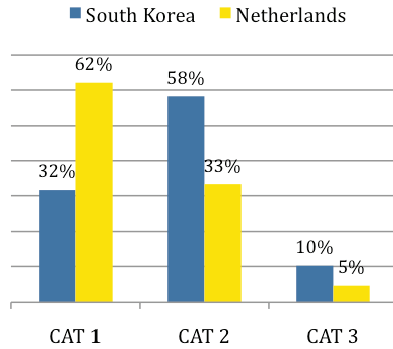


Figure 7: Nationality and Product category

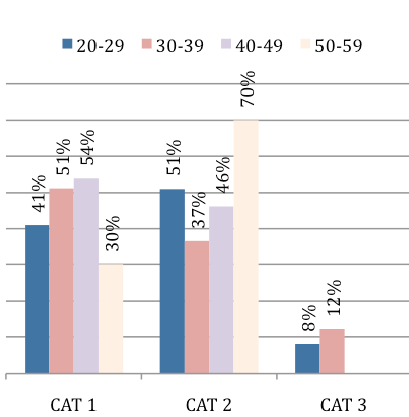


Figure 8: Age and Product category

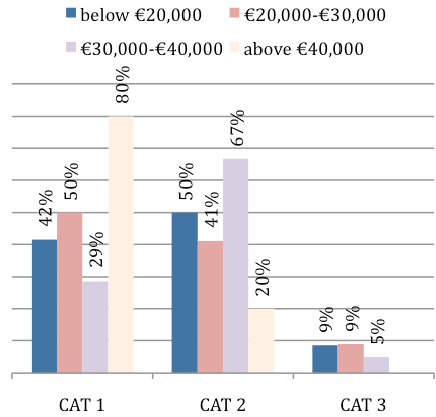


Figure 9: Income and Product category

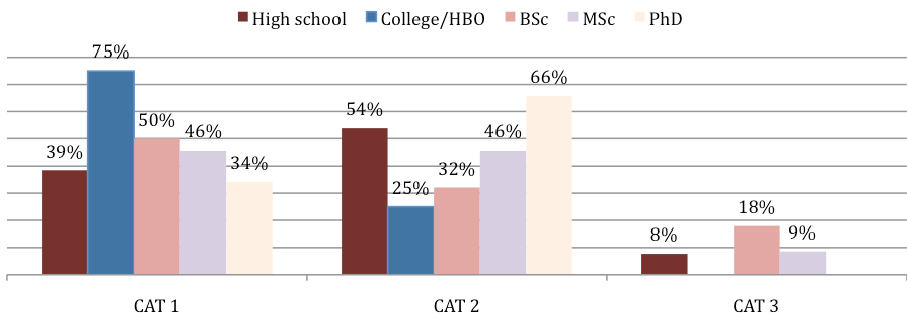


Figure 10: Educational background and Product category

Subjects whose age ranges from 50 to 59 appeared to have more complaints on category 2 products than other age groups (Fig. 9). In addition, people who earn high annual income seemed to complain on category 1 and 2 product rather than category 3 products (Fig. 8). A majority of complainers in category 1 product are low-educated people compared to the higher-educated people in category 2 (Fig. 9). However, nationality and gender were significantly related to product categories according to Chi-square independent test.

3.4 User characteristics and soft problems

In Table 3 the correlations are presented between the type of complaint (soft problems) and user characteristics. The results show that there are a number of statistically significant relationships between characteristics and soft problems. The relationships are presented below in the form of 'profiles' base each soft problem category. Again, this is an exploratory study and the profiles are only preliminary. Some of the correlations seem spurious and difficult to explain.

Understanding

People who complain on *understanding* are characterized by having high technical skill, low literacy, memory, strong external locus of control, being pessimistic in life, being a lot exposed to advertising, earning high annual income, belonging to an older generation; regarding Hofstede's dimensions scoring on power distance, high on individualism and high on uncertainty reduction, used to reading manuals when comes with a new product, and being male.

Performance

People who complain on *performance* are characterized by having low technical skill, high literacy, low efficacy, not seeking for perfectionism, being young people, scoring low on Hofstede’s uncert reduction; and are not used to reading a manual that comes with a new product.

Table 3. Pearson Correlations between Variables and Soft usability problems in Study I

Variables	Understand	Performance	Sensation	Structure	Maintenance	Constraint
Demographics						
Annual income	-.225**					
Age	-.203**	.215**		-.180*		
Cognition						
Prerequisite knowledge						.277**
Technical skill	-.174*	.167*				
Spatial reasoning			.218**			
Literacy	.240**	-.175*				
Memory	.162*					
Adaptability			-.175*			
Use fixation			.196*	.185*		
Socioeconomics						
Grown-up environment						.182*
Personality						
Patience				.183*		
Flexibility			-.253**			.207**
Self-efficacy		.203**			-.224**	
Locus of control	.217**			-.181*	-.214**	-.186*
Sensitivity to stereotyping			.182*			
Attitude to Life	.155*			-.342**	-.175*	
Perfectionism		.204**	-.312**			.231**
Exposure to advertising	-.181*				.156*	.250**

*Coefficients are significant at $p < .05$.

** Coefficients are significant at $p < .01$.

Sensation

People who complain on *sensation* are characterized by having low spatial reasoning ability, high ability to adapt to new products, low use fixation, high changeability, low sensitivity to stereotyping, seeking perfectionism; buying products for visceral or reflective reason, taking buying decision together with family members. They are mainly Korean people.

Structure

People who complain on *structure* are characterized by having low use fixation, low patience, strong internal locus of control, being optimistic in life, belonging to an older generation, and buying products for economical reason.

Maintenance

People who complain on *maintenance* are characterized by having high self-efficacy, strong internal locus of control, being optimistic in life, being rarely exposed to advertising, scoring high on a collectivistic attitude (Hofstede), and used to reading the manual that comes with the new product.

Constraint

People who complain on *constraint* are characterized by having low prerequisite content knowledge, low changeability, strong external locus of control, not seeking for perfectionism, being hardly exposed to advertising, growing up at countryside, having short-term aims, and buying products for reflective economical reason.

4 DISCUSSION

The contribution of the present study lies foremost in the emphasis on the importance of considering user diversity related to the occurrence of soft problems. The aim of this exploratory study was to find a relationship between soft problems and the personal background of the participants. The results indicate (1) complaining behaviour has a relationship with users' characteristics, (2) it is possible to distinguish different user profiles with different types of soft problems. We will discuss below the different findings of this study.

Soft problems and product categories

The category 1 products are relatively simpler and easier than the other categories on product use. It means that the subjects had fewer complaints on understanding or finding functions in using category 1 products. On the contrary, complaints related to category 2 products were dominant. An obvious explanation is that people have more difficulty in understanding functions on complex products than on simple products. However, it is not consistent that there was no relation between understanding category 3 products because this category is even more complex and requires more cognitive load than the other categories.

Demographic characteristics and product categories

Both national culture and gender make differences in category 1 and 2 products. Dutch people are more complainers in category 1 products while South Korean people are in category 2 products. It might be assumed that South Korean people individually use more category 2 products than Dutch people, and vice versa in category 1 products. Women complained more than men in category 1 products in the study might be because they are the main users of the products. With this assumption, it could be explained that men were major complainers in category 2 products but we can not jump to a conclusion since there will be many other factors that influence the relationships. The other demographic variables seemed to interact with product categories but they were not significant in statistical analysis. This appears to result from a limitation that subjects are not representative samples of users.

User characteristics and soft problems

Some correlations resulting from intervening variables such as language ability were skipped in the study although they were statistically significant. There are still some variables that show unclear correlations: they were included in the study since this study aimed at explorative investigation on user characteristics and soft problems. The outstanding finding is the number of personality and cultural characteristics that have a significant relationship with (the occurrence of) soft problems. This implies that consumer electronics products are experienced in different ways between individuals and between different cultural backgrounds.

Overall, the number of subjects and the sample bias give a limitation to this study. Compared with the number of variables measured, it is relatively not enough to draw a conclusion on the relationships between user characteristics and soft problems. In addition, some variables do not seem to be relevant to the concept of product usability. They could be relevant to explain the complaining behaviour of consumers themselves in terms of complaints in product use. In spite of these pitfalls, this study is meaningful in the sense that it gives an overview of how user characteristics interact with product usability. This study can contribute to a better understanding of user profiles in estimating the seriousness of the complaint and in designing better products that people love to use.

Improvement of the design process

The group of customer complaints for which no cause can be determined is denoted as No Failure Found (NFF). Research into this increasing number of customer complaints by Den Ouden [5] indicates that 85% of the complaints can be traced back to decisions made in the product creation process. In other words, most of the customer complaints in consumer electronics are predominantly caused by a wrong decision in the product creation process. In order to reduce the number of future problems with consumer electronics products, she suggests to improve the decision making processes in the product creation process by supporting it with up-to-date and rich information about customer use preferences. However, as can be seen from practice, just information will not be sufficient. According to Geudens (2008), six major market trends can be distinguished that lead to a higher complexity and therefore more soft (reliability) problems. These

trends are:

- 1 Increasing product functionality (i.e. performing multiple tasks)
- 2 Increasing market globalization (i.e. the same products are sold around the world)
- 3 Increasing sales price reduction (i.e. high competition causes lower prices)
- 4 Increasing warrant coverage (i.e. consumers have a high warranty demand)
- 5 Decreasing time to market (i.e. to gain market share a product has to be one of the first on the market)
- 6 Increasing industry globalization (i.e. products are developed and realized in factories around world).

To effectively reduce the number of soft problems, companies have to obtain a proactive approach to better cater to these market trends. As a consequence of the six major market trends, companies are forced to design their products according to changing conditions. Some of these conditions are the shorter development time and the need for a product that is “adoptable” by a wider variety of consumers, a whom have different needs. Although these conditions have been changed during the last decade, companies still use the same approach when developing new products in which the increasing number of soft problems are not taken care of. Due to this insufficient approach, companies fail to focus on the specific consumer needs and the individual consumer expectations are not fully known.

REFERENCES

- [1] de Visser, I.M. (2008). *Analyzing User Perceived Failure Severity in Consumer Electronics Product Development Incorporating the User Perspective into the Development Process*. Eindhoven University of Technology: Eindhoven, the Netherlands.
- [2] Brombacher A.C., Sander P.C., Sonnemans P.J.M. and Rouvroye J.L. (2005), 'Managing product reliability in business processes 'under pressure'', *Reliability Engineering and System Safety*, Vol. 88, 137-146.
- [3] Goodman, J.A., Ward, D., and Broetzmann, S. (2002). It might not be your product. *Quality Progress*, 35(4): p. 73, 6pgs.
- [4] Broadbridge, A. and Marshall, J. (1995) Consumer complaint behaviour: the case of electrical goods. *International Journal of Retail & Distribution Management*, 23: p. 8-18.
- [5] Ouden, P.H. den (2006). *Development of a Design Analysis Model for Consumer Complaints: Revealing a New Class of Quality Failures*. PhD-thesis. Eindhoven: University of Technology Eindhoven.
- [6] Brombacher, A.C., Sander, P.C., Sonnemans, P.J.M., Rouvroye, J.L. (2004). Managing product reliability in business processes 'under pressure'. *Reliability Engineering and System Safety*, Vol 88, 1-10,
- [7] De Melo, A.F. and Gontijo, L.A. (2000). Evaluation of Usability in Home Appliances. in *Proceedings of the XIVth Triennial Congress of the International Ergonomics Association and 44th Annual Meeting of the Human Factors and Ergonomics Association, 'Ergonomics for the New Millennium'*.
- [8] Brombacher, A.C. (2005). Reliability in strongly innovative products; a threat or a challenge?. *Reliability Engineering and System Safety*, 88: p. 125.
- [9] den Ouden, E., Yuan, L., Sonnemans, P. J. M., & Brombacher, A. C. (2006). Quality and reliability problems from a consumer's perspective: an increasing problem overlooked by businesses?. *Quality Reliability Engineering International*, 22(7): p. 821-838.
- [10] Kim, C.J., Christiaans, H.H.C.M., and van Eijk, D.J. (2007). Soft Problems in Using Consumer Electronic Products. in *IASDR conference*. Hong Kong.
- [11] Valenzuela, F., Pearson D., Epworth, R. Llanos, O., & Vilches, S. (2005). Consumer Complaint Behavior: The Case of a South American Country, Chile. *Contemporary Management Research* (01), 1-12
- [12] Keng, K., Richmond, D., & Han, S. (1995). Determinants of consumer complaint behaviour: a study of Singapore consumers. *Journal of International Consumer Marketing*, 8(2), 59-76.
- [13] Heug, V., & Lam, T. (2003). Customer complaint behaviour towards hotel restaurants services. *International Journal of Contemporary Hospitality Management*, 15(5), 283-289.
- [14] Manikas, P., & Shea, L. (1997). Hotel complaint behaviour and resolution: a content analysis. *Journal of Travel Research*, 36(2), 68-73.

- [15] Beardon, W., & Mason, J. (1984). An investigation of influences on consumer complaint reports. J Kinnear (Ed.), *Advances in Consumer Research* (Vol. 11).
- [16] Day, R., & Lando, E. (1977). Toward a theory of consumer complaint behaviour. In W. e. al. (Ed.) *Consumer and Industrial Buying Behaviour*. New York: North Holland.
- [17] Jacoby, J., & Jaccard, J. (1981). The sources, meanings and validity of consumer complaint behavior: a psychological analysis. *Journal of Retailing*, 57(3), 4-24.
- [18] Morganosky, M., & Buckely, H. (1986). Complaint behaviour: analysis by demographics, lifestyle and consumer values. *Advances in Consumer Research*, 14, 223-226.
- [19] Davidow, M., & Dacin, P. (1997). Understanding and influencing consumer complaint behavior: improving organizational complaint management. *Advances in Consumer Research*, 24.
- [20] Fornell, C., & Westbrook, R. (1979). An exploratory study of assertiveness and consumer complaint behavior. *Advances in Consumer Research*, 6, 105-114.
- [21] Lau, G., & Ng, S. (2001). Individual and situational factors influencing negative work of m behavior. *Revue Canadienne des Sciences de l'Administration*, 18(3), 163-178.
- [22] Richins, M., & Verhage, V. (1985). Seeking redress for consumer dissatisfaction: the role of attitude and situational factors. *Journal of Consumer Policy*, 18(1), 29-44.
- [23] Chulmin, K., Sounghie, K., Subin, I., & Changhoon, S. (2003). The effect of attitude and perceptio on consumer complaint intentions. *Journal of Consumer Marketing*, 20(4), 352-371.
- [24] Hofstede, G. (2003). *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*. 2 ed. London: Sage Publications, Inc.
- [25] Kim, C.J., Christiaans, H.H.C.M. and Diehl, J.C. (2006). Exploring the influence of culture on consumer electronic products. in *16th World Congress on Ergonomics IEA 2006*. Maastricht, Netherlands: International Ergonomics Association.
- [26] Geudens W.H.J.M. (2008). *Developing a preventive consumer test concept to avoid Soft Reliability Problems*, Phd thesis, Eindhoven University of Technology, Eindhoven, the Netherlands.

ACKNOWLEDGEMENTS

The authors would like to thank Senter-Novem in the Netherlands who has financed the IOP-IPCR project 0631, Design for Usability.

Contact:

Henri Christiaans PhD
 Delft University of Technology
 School of Industrial Design Engineering
 Landbergstraat 15
 2628 CE Delft
 The Netherlands
 tel +31152783063
 fax +31152787179
h.h.c.m.christiaans@tudelft.nl

Henri Christiaans PhD is associate professor at the School of Industrial Design Engineering, Delft University of Technology. He received his PhD in the field of creativity in design. His research specializations are in areas of design thinking, information processing and cognitive ergonomics. He published a lot in these areas. He wrote a book on Research Methods for the designer and engineer. He is editor-in-chief of the *Journal of Design Research*.

