

The Correlation Between Soft Problems and User Characteristics

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ABSTRACT: *In this paper an exploratory study was conducted into the “soft” problems consumers have experienced using their electronic household products. The aim was to find relationships between consumers’ soft problems and their personal characteristics, encompassing demographical, personality, socioeconomic, and cultural aspects. A total of 64 Dutch and 59 South Korean subjects participated in the 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 relationship between “soft” problems and product categories were analyzed, comparing the differences between both national groups, and then tried to find the correlation between soft problems and user characteristics. The findings indicate that, first, there is a relationship between soft problems and product categories. These categories were based on operation complexity. Second, demographic variables such as gender and nationality are significantly related to product categories. Third, a number of user characteristics are related to soft problems characteristics. 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 and suggestion for further study are discussed.*

Keywords: “user characteristics,” “usability,” “soft problem,” “cultural diversity”

1. INTRODUCTION

There is a growing volume of published research on complaints about consumer products and the impact of a variety of factors on the delivery process. Most of this research focuses on complaint handling and service recovery, as a kind of curing symptoms without curing the real problems behind.

The continuous influx of new technology and the economic effects of globalization offer the possibility of creating products with unlimited functionalities. However, the same opportunities also create a great amount of dissatisfaction and complaining behavior [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. Thanks to the development of science and technology, consumer complaining seemed to decrease until the mid 90's. However, the average percentage of consumers complaining about new products has started to increase since the late 90's regardless of the advance of technology. Manufacturers were busy developing new electronic products without identifying increasing consumers' complaints because of time-to-market pressure. Consequently, more and more they have been confronting a significant portion of returns for which the technical problem was not found. According to a recent study, it turned out that about half of reasons of product returns have nothing to do with technical problems [2]. These unidentified consumer complaints in the consumer electronic industry is defined as “soft problems” which mean non-technical consumer complaints, as opposed to hard problems that have to do with technical failures. Presumably it resulted from an unexpected gap between actual product use and intended use by the manufacturer [3, 4]. This unprecedented phenomenon must be challenging to companies because they might lose a large amount of profit from product returns and it also might influence decision making in the new product development.

There are possible causes of occurrence 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 [5]. Secondly, manufacturers have kept developing consumer electronics only focusing on new technology. Technical excellence of products only is not enough to consumers as products have been absorbing the technological progresses resulting in larger complexity in terms of its characteristics and functionality [6]. Additionally, manufacturers intend to look at the similarities between people since the era of mass-production. Indeed, they have not taken into account the differences between people based on personal and cultural diversity.

Moreover, an electronic product is used by much bigger variety of users than in the past. For instance, computer science engineers were the only users of the computer in the 80's, while nowadays those who use the computer range from children to elderly people. Furthermore, tolerance of consumers and end-users for quality and reliability problems with products is decreasing [7].

Despite soft problems cause increased consumer dissatisfaction with consumer electronics, there are only a few studies to figure out what soft problems consumers experienced. Den Ouden et. al. [2] assessed over 20 new product development projects to understand the reasons behind the rising number of consumer complaints. Their study analyzed dissatisfaction with new products from various available sources. However, no soft problems were specified in detail in the study. A study conducted by Kim et al. [8] tried to make categorization of soft problems based on consumer survey and established 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's expectations and decrease dissatisfaction the root cause of these soft problems should be found as well. At present 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. However, the focus of most studies is on why people complain and not on the reasons for complaining: the product. And second, the studies are limited to marketing [9, 10] and service recovery [11-14]. In addition, there are a few studies to deal with user characteristics in usability but they empirically studied user diversity in the context of product usability [15-17]. Therefore, the focus in this study is on exploratively finding the correlation between user characteristics representing user diversity and soft problems experienced by users. As identifying the relationship between user characteristics and soft problems, the ambiguous diversity of users can be better understood. Furthermore, the outcome of this study can be used in the process of product development to define a target group, which will lead to ease-to-use and consumer satisfaction.

2. METHOD

As stated before this study has an exploratory character. It is a first effort to get insight into the relationship between soft problems and user characteristics. A questionnaire was developed to investigate what soft problems users experience with electronic consumer products and to measure their personal characteristics. South-Korean and Dutch subjects were recruited to participate.

2.1 Subjects

Both Dutch and South Korean people were selected as subjects to the questionnaire survey because comparison on cultural aspects is part of the study. 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 the researchers. Their ages broadly ranged from late teens to 60's and they consist of 73 male and 50 female. 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 the study, and (2) the number of non-complainers was too small. They were, therefore, excluded in the study because this study focuses on the relationships between user characteristics and their use complaints.

Because of the explorative character of the study we were not intending to find a representative sample of users of electronic household products. The focus in this study is on the types of problems people experience and the possible relationships between these problems and their own personal background. See also section 3.1.

2.2 Questionnaire

Two open-ended questions were formulated to discover the causes of the soft problems experienced by users. The first question was 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. The other questions were about user characteristics, which consist of cognitive, personality, social, physical, and cultural aspects (Table 1). The variables were found in the literature on user characteristics in the field of

consumer complaining behavior and consumer (dis)satisfaction [9, 10, 18-22]. Donoghue [23] suggested a conceptual framework aimed at gaining a better understanding of consumers' complaint behaviour regarding the performance failure of major electrical household appliances. Causal attribution, consumer-related and product-specific variables in his study were used as factors for user characteristics to large extent. For cultural characteristics, Hofstede's cultural dimensions were used to measure cultural backgrounds since culture plays a role in the field of product design as well as management in business [24, 25]. Most of the questions were answered on five-points scales while some were dichotomous (yes or no) and multiple choices. In order to increase the reliability of the scores on some variables questions were asked twice, with the same content but with different formulation. In the analysis the mean of the two questions was taken as data. In Table 1 the 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*, Use 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, Grown-up 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 on 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 and 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 the 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 total number of 164 complaints. The sample will not be representative for the total population between 20 and 60 years old. Because most participants are not recruited or selected other than through a Web-platform, they will probably representative for the population of internet visitors: more men than women, most of them 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.

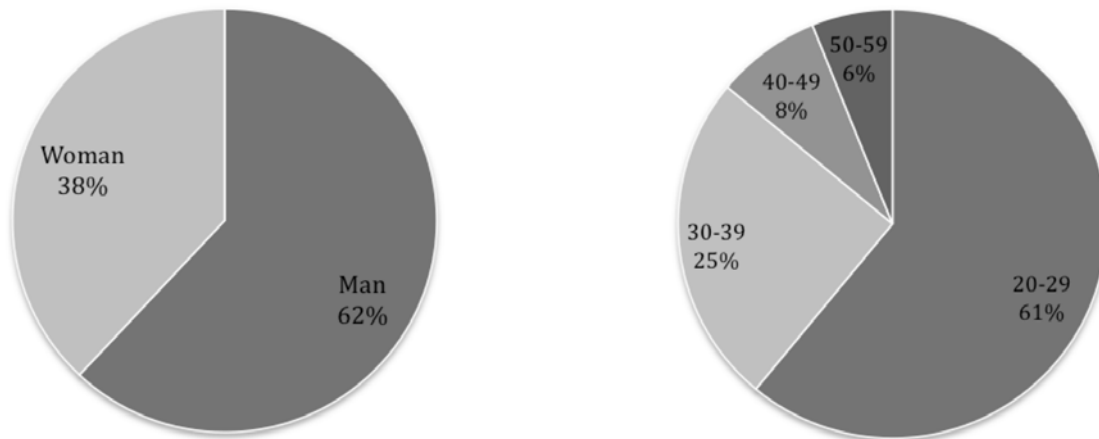


Figure 1: Percentage of Complaints by Gender (left) and Age (right)

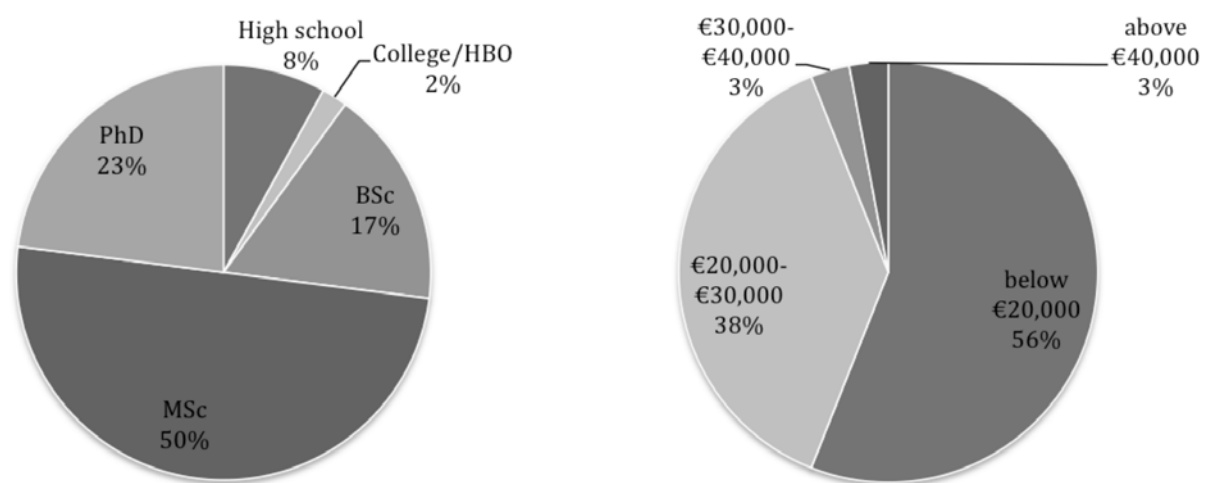


Figure 2: Percentage of Complaints by Educational Background (left) and Annual Income (right)

3.2 Soft problems

The complaints reported were ranked according to the categorization of soft problems (Fig. 3). The most commonly occurring complaint is the low *performance* of the subject's electronic product, which means low efficiency, compatibility, and battery life. The complaints on *understanding* (23%) refers to difficulties in understanding functions. *Structure* is ranked in the third place: 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. The next one is *product maintenance*. Subjects expressed dissatisfaction with service, cleaning, special care, durability. Fifth, the subjects had complaints about product *constraints* such as wiring and cable system, connection, mechanical structure, size and shape. *Sensation* scores 10% of the complaints mentioned which is linked to human sensual dissatisfaction such as sound quality, touch, and heat generated by products. *Health* is least mentioned; this complaint refers to physical fatigue or tiredness of the product or software.

Since there was variance in consumer complaints across different types of products, the complaints were ranked in each product category based on the cognitive effort required for use: product category 1, 2 and 3 (CAT 1, 2 and 3). 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. The results indicate that soft problems are partly dependent on product category: the importance of soft problems differs according to product category (Fig. 4, 5 and 6). The structure problem is biggest in category 1 products while understanding plays an dominating role in category 2 products.

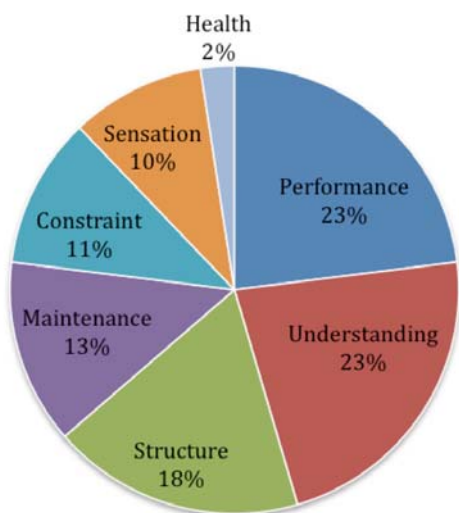


Figure 3: % of total number of Soft Problems

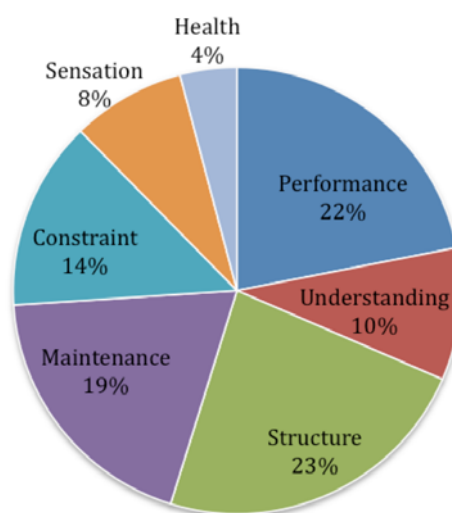


Figure 4: % of Soft Problems on Category 1

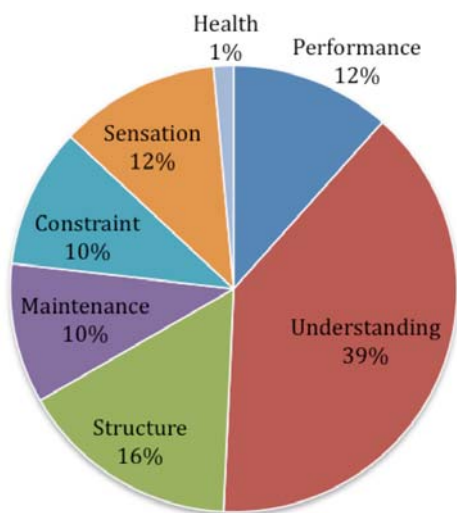


Figure 5: % of Soft Problems on Category 2

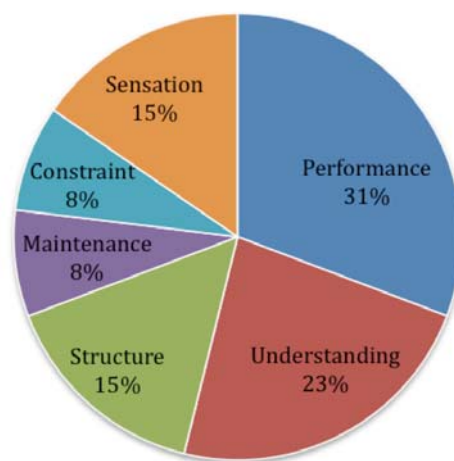


Figure 6: % of Soft Problems on Category 3

Table 2: Percentage of Soft Problems Among Complaints and No-complaints on Category 1 product in consumer electronics products

Soft problem	Complaint on CAT 1 ($\underline{n}=72$)	No complaint on CAT 1 ($\underline{n}=92$)	$\chi^2(1)$	p
Understanding	13.9	48.9	22.23	.001
Performance	33.3	48.9	4.02	.001

Table 3: Percentage of Soft Problems Among Complaints and No-complaints on Category 2 product in consumer electronic products

Soft problem	Complaint on CAT 2 ($\underline{n}=79$)	No complaint on CAT 2 ($\underline{n}=85$)	$\chi^2(1)$	p
Understanding	55.7	12.9	33.58	.001

In order to test the significance of this relation between problem and product category a non-parametric chi-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.

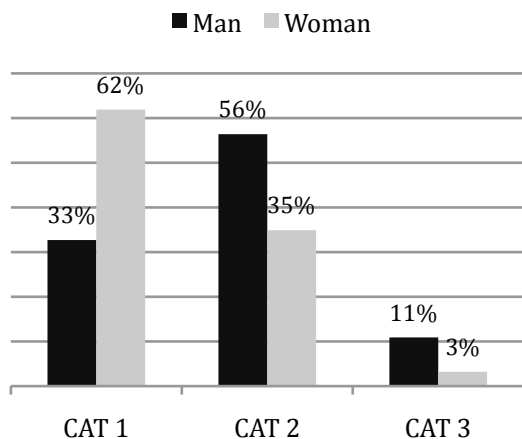


Figure 7: Gender and Product category

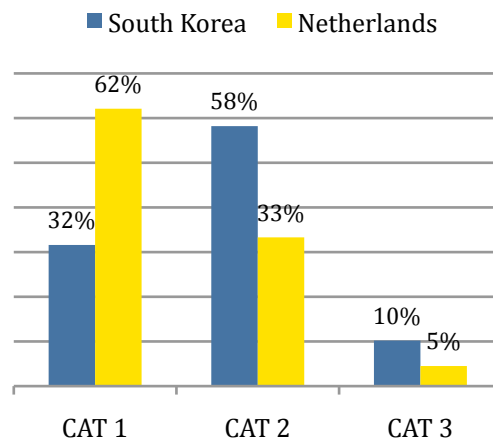


Figure 8: Nationality and Product category

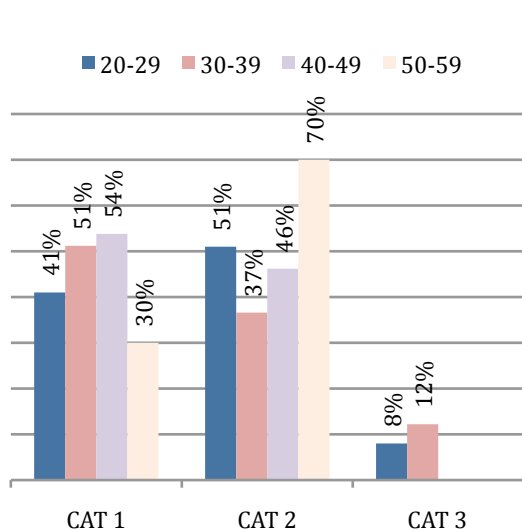


Figure 9: Age and Product category

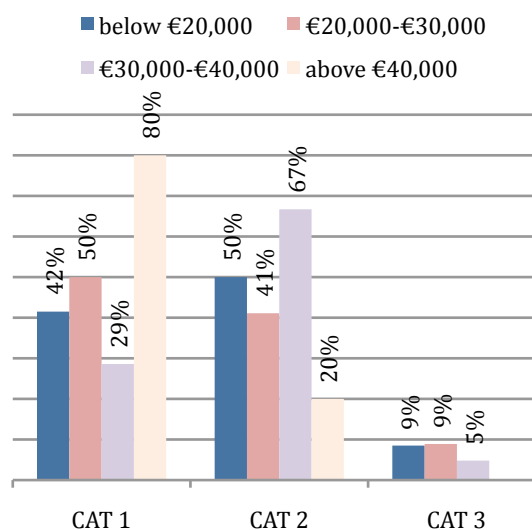


Figure 10: Income and Product category

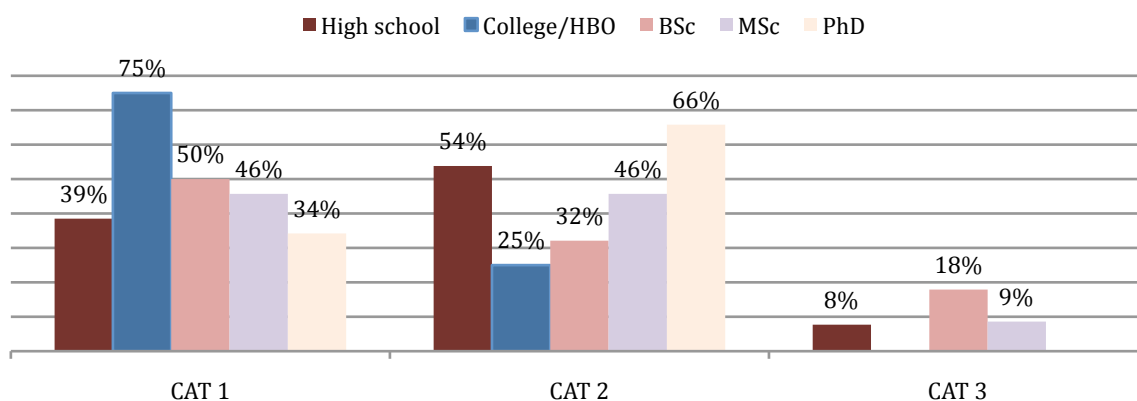


Figure 11: Educational background and Product category

Table 4: % of User Characteristics Among Complaints and No-complaints on Category 1 products

User Characteristics	Variables	Complaint on CAT 1 (n=72)	No complaint on CAT 1 (n=92)	$\chi^2(1)$	p
Personality	Visceral	13.9	42.4	15.66	.001
Cultural	Nationality	43.1	72.8	14.89	.001
Physical	Gender	45.8	73.9	13.47	.001

Table 5: % of User Characteristics Among Complaints and No-complaints on Category 2 products

User Characteristics	Variables	Complaint on CAT 2 (n=79)	No complaint on CAT 2 (n=85)	$\chi^2(1)$	p
Personality	Visceral	40.5	20.0	8.22	.001
Cultural	Nationality	72.2	48.2	9.74	.001
Physical	Gender	72.2	51.8	7.19	.001

3.3 Demographic characteristics and Product categories

In this part the relationship between demographic variables and product categories was investigated. Gender, nationality, age, annual income, and educational background were analyzed as major demographic factors. There seemed differences on gender and nationality in category 1 and 2 products (Fig. 7 and 8). Subjects whose age ranged from 50 to 59 appeared to have more complaints on category 2 products than the 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. 10). In category 1 products, low-educated people appeared a majority of complainers and in category 2 highly-educated people (Fig. 11). However, only nationality and gender were significantly related to product categories according to Chi-square independence test (Table 4 and 5).

Nationality and gender seem to play a role in forming complaints on category 1 products. According to the analysis, Women and Dutch subjects are more likely to make a complaint on category 1 products than men and South Korean users.

In the category 2 products Dutch users are less expected to have complaints than South Korean users, opposed to the results of category 1 products, Finally, there was a significant difference between gender and complaints on category 2 products. Namely, male users are more likely to complain about category 2 products than female users.

3.4 User characteristics and Soft problems

The results show that there are a number of statistically significant relationships between user characteristics and soft problems. The relationships are presented below in the form of 'profiles' based on 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, low 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 low on power distance, high on individualism and high on uncertainty reduction (Table 6), used to reading manuals which comes with a new product, and being male (Table 7).

Performance

People who complain on *performance* are characterized by having low technical skill, high literacy, low self-efficacy, not seeking for perfectionism, being young people, scoring low on Hofstede's uncertainty reduction (Table 6); and are not used to reading a manual that comes with a new product (Table 8).

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 for perfectionism (Table 6); buying products for visceral or reflective reason, taking buying decision together with family members. They are mainly Korean people (Table 9).

Table 6: Intercorrelations for User Characteristics and Soft Problems

	Variables	Understanding	Performance	Sensation	Structure	Maintenance	Constraint
Cognitive Characteristics	Language					-.231**	
	Technical skill	-.174*	.167*				
	Spatial reasoning			.218**			
	Literacy	.240**	-.175*				
	Memory	.162*					
	Adaptability			-.175*			
	Use fixation			.196*	.185*		
Personality Characteristics	Prerequisite knowledge						.277**
	Patience				.183*		
	Changeability			-.253**			.207**
	Self-efficacy		.203**			-.224**	
	Locus of control	.217**			-.181*	-.214**	-.186*
	Sensitivity to stereotyping			.182*			
	Life	.155*			-.342**	-.175*	
Socioeconomic Characteristics	Perfectionism		.204**	-.312**			.231**
	Exposure to advertising	-.181*				.156*	.250**
	Annual income	-.225**					
Physical Characteristics	Grown-up environment						.182*
	Age	-.203**	.215**		-.180*		
Cultural Characteristics	PDI	.169*					
	IDV	-.267**				-.258**	
	UAI	-.229**	.259**				
	LTO						.165*

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

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

Table 7: Percentage of User Characteristics Among Complaint and No-complaints on Understanding

User Characteristics	Variables	Understanding problem (n=55)	No Understanding problem (n=109)	$\chi^2(1)$	p
Cognitive	Manual	81.8	51.4	14.32	.001
Socioeconomic	Child	27.3	11.9	6.08	.001
Physical	Gender	72.7	56.0	4.34	.001

Table 8: Percentage of User Characteristics Among Complaint and No-complaints on Performance

User Characteristics	Variables	Performance problem (n=69)	No Performance problem (n=95)	$\chi^2(1)$	p
Cognitive	Manual	50.7	69.5	5.94	.001
Personality	Religion	34.8	51.6	4.57	.001
Physical	Glasses	36.2	61.1	9.85	.001

Table 9: Percentage of User Characteristics Among Complaint and No-complaints on Sensation

User Characteristics	Variables	Sensation problem (n=35)	No Sensation problem (n=129)	$\chi^2(1)$	p
Personality	Visceral	51.4	24.0	9.86	.001
	Reflective	37.1	12.4	11.58	.001
Socioeconomic	Buying	57.1	34.9	5.70	.001
Cultural	Nationality	82.9	53.5	9.87	.001

Table 10: Percentage of User Characteristics Among Complaints and No-complaints on Structure

User Characteristics	Variables	Structure problem (n=51)	No Structure problem (n=113)	$\chi^2(1)$	p
Personality	Economical	35.3	17.7	6.11	.001

Table 11: Percentage of User Characteristics Among Complaints and No-complaints on Maintenance

User Characteristics	Variables	Maintenance problem (n=35)	No Maintenance problem (n=129)	$X^2(1)$	p
Cognitive	Manual	77.1	57.4	4.55	.001
Personality	Reflective	0.0	22.5	9.56	.001
	Religion	65.7	38.8	8.10	.001

Table 12: Percentage of User Characteristics Among Complaints and No-complaints on Constraint

User Characteristics	Variables	Constraint problem (n=35)	No Constraint problem (n=129)	$X^2(1)$	p
Personality	Reflective	34.3	13.2	8.45	.001
	Economical	40.0	18.6	7.08	.001
Physical	Glasses	65.7	46.5	4.06	.001

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 (Table 6), and buying products for economical reason (Table 10).

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) (Table 6), and used to reading the manual that comes with the new product (Table 11).

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 (Table 6), and buying products for reflective or economical reason (Table 12).

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. As an explorative study the aim was to find any relationship between soft problems and the personal background of the participants. The results indicate that (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 makes sense 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 dominantly on understanding. 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 and 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 major 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. It might be because they are the main users of the products. With this assumption, it could be explained why

men were major complainers in category 2 products but we can not jump to a conclusion since there would 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 appear to result from the 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 but they were included in the study since this study aimed at explorative investigation on user characteristics and soft problems. The outstanding finding is that the number of personality and cultural characteristics that have a significant relationship with (the occurrence of) soft problems. This implies that consumer electronic 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 context of product usability. This made it difficult to use them for finding relationships with soft problems. They could be relevant to explain consumers' complaining behaviour instead 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. Companies can also gain insight into their consumers and this study can contribute to better understanding users in the product development process. In the follow-up study, variables, which are significant in user and usability interaction, will be selected and tested in more reliable number of subjects including more diverse cultures such as Dutch, South Korean and American people. In that study a representative sample will be selected so that results can be generalised to the population.

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