USER EXPERIENCE IN PUBLIC PRODUCTS:
THE EFFECTS OF PRESENCE OF OTHER PEOPLE

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ABSTRACT

USER EXPERIENCE IN PUBLIC PRODUCTS: THE EFFECTS OF PRESENCE OF OTHER PEOPLE

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User experience with public products needs special attention considering the specific context. Different from other consumer or personal products that users own, public products do not belong to the user; they are shared with and used in front of other people. Thus, different concerns and problems are incorporated affecting the user experiences. This thesis dwells on the effects of presence of other people on user-public product interaction. The relationships between social context, users' feelings, and task performances constitute the basis of the thesis. These relationships were investigated by consulting to the literature, but mainly by conducting three empirical studies. All these studies revealed that the presence of other people affects the users' feelings and task performances greatly.

Keywords: user experience, public products, presence of other people, feelings, task performances

ÖZ

ORTAK KULLANIMA AÇIK ÜRÜNLERDE KULLANICI DENEYİMİ: SOSYAL BAĞLAMIN ETKİSİ

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Ağustos 2011, 141 sayfa

Ortak kullanıma açık ürünlerde kullanıcı deneyimi ürünlerin içinde bulunduğu özel bağlam nedeniyle özel ilgi gerektirmektedir. Bu ürünler, kullanıcıların sahip oldukları kişisel ürünlerden farklı olarak kullanıcıya ait değildir; başkalarıyla ortak ve başkalarının önünde kullanılmaktadır. Bu yüzden farklı endişe ve sorunlar ortaya çıkabilmektedir. Bu tez başkalarının varlığının kullanıcı ve ortak kullanıma açık ürün etkileşimine etkisi üzerinde durmaktadır. Sosyal bağlam, kullanıcıların duyguları ve ürün kullanım performansları arasındaki ilişkiler bu çalışmanın temelini oluşturmaktadır. Bu ilişkiler, literatüre başvurarak ve üç deneysel çalışma yürütülerek araştırılmıştır. Yapılan çalışmalar, başkalarının varlığının kullanıcıların duygularını ve ürün kullanım performanslarını büyük ölçüde etkilediğini göstermiştir.

Anahtar kelimeler: kullanıcı deneyimi, ortak kullanıma açık ürünler, ortamda başkalarının varlığı, duygular, ürün kullanım performansı

To my most beloved ones:
my parents Ayze and Ahmet, and my twin sister Nazlı

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TABLE OF CONTENTS

LIST OF FIGURES

FIGURES

LIST OF TABLES

TABLES

CHAPTER 1

INTRODUCTION

1. 1 Problem definition

It is impossible to deny that we, our characteristics, our decisions in life, yet more our entire lives are shaped- or at least affected dramatically- by the presence of other people. Since we are not isolated, not just physically but also mentally, from other people, it is difficult to underestimate the effects of other people on our daily interactions. These interactions are not necessarily our interactions with other people; in fact, our interactions with the products surrounding us are under great consideration.

Our interactions with products have been covered, and are being covered even more comprehensively by the design literature in the last decade. In the design literature, there observed a shift of focus from the product to the user and to the entire experience users have during their interactions with a product (Desmet and Hekkert, 2007; Schifferstein and Hekkert, 2008), and many studies have been conducted about different aspects of these interactions and user experiences. It is understood that not just practical, but also hedonic experiences are important and pleasure in products appeared to provide all these benefits (Jordan, 1999; 2000).

User experience, the prominent term of the last decade, has been proceeded by a wide and diverse literature encompassing the term's emergence, different components of the experience, distinct frameworks introduced and various methods developed to evaluate the user experience. However, it is surprising that most of these studies have solely focused on the products that we own and use personally although these studies tend to generalize and embrace all kinds of products while attempting to explain the user experience (e.g. Hassenzahl, 2003). It is rare that the focus is a public product – a product which is used by public, in

front of public and is belonged to public. Surely, there are some studies which have involved some public products; yet, without the intention of focusing on 'public products'. In fact, they have been mostly used just as example cases for those studies with representing no distinction from any other products. These studies are revealed in the subsequent chapters.

Moreover, effects of the presence of other people have been frequently point of interest of the social psychology literature. It is identified that the presence of other people, even if this is a mere presence, does have an effect on individual's performances when they are conducting tasks (Zajonc, 1965). Different researches have incorporated different tasks while attempting to reveal the effects of the presence of other people and the reasons of this influence. It is important to note that, these tasks have not incorporated the use of the products specifically; in fact, the focus was on diverse motor and cognitive tasks (Strauss, 2002).

Actually, bethinking the social psychology literature, it is striking that interactive public products and so the interaction with them can be different from other consumer or personal products that we own. Interactive public products need special attention and should be evaluated from their own sake. They have a special context. They are shared with other people and they are used in front of the public. Furthermore, they are usually not familiar to the users since users do not possess, choose or customize them. Hence, not only the context, but also the product properties and interfaces can mostly be unfamiliar to the users of these products. Besides, the users cannot usually spare as much time as they use their own personal products. Considering this distinct interaction, the presence of other people can have a great impact on the public product-user interaction. The interaction with a public product when the user is alone would be different from the interaction when there is a crowd around the user. Also, this special context's impacts; i.e. the impacts of presence of other people, cannot be restricted to the task performances as seen in most of the social psychology studies, which are demonstrated in the following chapters. Users can also elicit certain emotions (hedonic experience) in relation to the presence or absence of other people, the importance of which is highlighted briefly above.

To clarify, the public products focus of interest in the scope of this study are the interactive ones; such as automatic cashiers, automated teller machines (ATMs),

information kiosks, ticket machines, food and drink vending machines, etc. These are just few of the public products that are encountered frequently in our daily lives, yet the examples can be broadened since many products and services are becoming more digitalized and interactive not surprisingly with the pace of the technology. As the image below (Figure 1.1) shows the change in domestic environment and technology, it is natural that a similar change occurs in the outer environment, in public products. Rapid improvements in technology, beginning by electricity and pursuing with information technology, have shaped the domestic context (Aldrich, 2003). Looking at the outside environment, it is also seen that the products have been also affected from both the technological developments and user needs. They are not just benches, lights, and so on, but interactive screens, transaction systems which are highly embedded in our current lives.

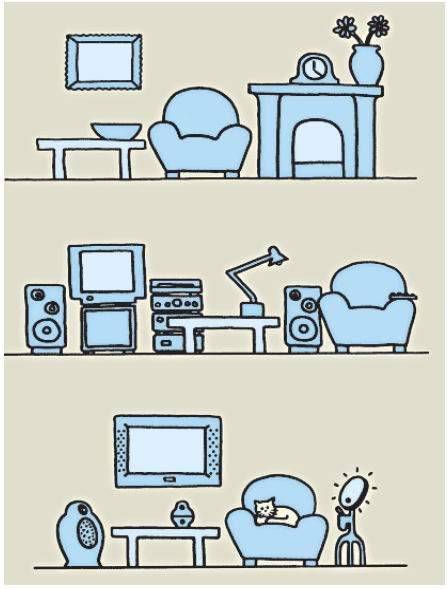

Figure 1.1 Change in technology and environments (Marzano, 1999)

In addition to being indispensable, the other reason for the interactive public products to be in focus is that they incorporate more and diverse aspects than the other products used by public by providing communication and action in two ways, from user to product and vice versa. The user makes a certain action to which the product or system reacts such as giving feedback, displaying information, performing service, and so on (Newman and Lamming, 1995). Also, for instance, since usability would be of greater importance in an ATM than a public bench, the effect of the social context could be higher; hence, no wonder that it is rational to concentrate on the interactive ones.

From this perspective, designers of the interactive public products need huge amount of information on user models and/or usage types. However, it is not wrong to say that the literature lacks a comprehensive understanding of the public product-user interaction which is significantly affected by the presence of other people around. Therefore, it is essential to focus on the presence of other people and the public product-user interaction interdependently in order to contribute to a good and satisfying user experience with these products.

1.2 Scope of the Study

This study aims to reveal insight about public product-user interaction with an emphasis on the effect of presence of other people (social context) on this interaction and to establish links between the social influence due to the presence of other people, feelings elicited during public product-user interaction, and corresponding task performance. As aforementioned, the social psychology studies have presented links between the task performances of individuals and the presence of other people. However, it is presumed hereby that the social context affects the feelings which as a result have an influence on the task performance during the user experience with the public products (Figure 1.2). Social psychology studies have also associated the performance changes with arousals but without emphasizing the specific feelings. So, as user experience literature emphasizes, both the hedonic and pragmatic issues, with a specific attention on feelings and task performances, are in consideration hereby. Moreover, the task performances which have been dealt with in social psychology literature till now are mostly about duration and accuracy (Triplett, 1898; Allport, 1920; Dashiell, 1930, 1935; Cottrell, 1972, Zajonc, 1965, 1980). Yet, user experience, and even usability, includes diverse aspects while evaluating the task performances. Thus, in the scope of this study, diverse aspects of task performances are discussed in the related sections.

Figure 1.2 Presumed social context-emotions-task performance model

So, in this study, the focus is on the social context, using the interactive public products when others exist, and its effects on public product-user interaction regarding the users' feelings and task performances. Hence, essential questions which are wanted to be explored with this study are indicated below.

Main Research Question:

- What are the effects of presence of other people on public product-user interaction?

Sub-Research Question:

- What are the relations between different social contextual factors, users' emotional experiences and task performances?

These questions were investigated by consulting to literatures of different disciplines, but mainly, social psychology and design literatures and by conducting three empirical studies. The research questions address different themes such as user experience, context, social influence and task performance. However, it is also crucial to concentrate on other studies about public products. So, in the subsequent chapters, how the public product-user interaction is affected from the social context, presence of other people around, will be identified and discussed considering different social contexts and corresponding feelings and task performances.

1.3 Structure of the Thesis

The thesis contains six chapters (Figure 1.3). Since the aim of this study is to understand the user-public product interaction in a broad sense; in other words the user experience in public products, and to intensify the attention on the effects of the presence of other people on this interaction, it is first necessary to comprehend what is meant by public products throughout the thesis. So, the thesis starts with an introduction and proceeds with a definition of public products and the examples of studies conducted about public products to reveal the related literature and to elucidate the lack of focus in literature on user experience with public products and the necessity of carrying out this study.

Subsequent to the literature about public products, literature on user experience takes stage. The meaning of the term, its history and frameworks about user

experience are explained. Then, three of the important aspects in user experience and in this thesis, feelings, context and task performance are touched upon. In the context part, a special attention is given to the social context and the presence of other people. In this part, the major studies and theories about social influence are covered. Finally in the literature review part, task performance is dealt with since the focus in user experience with public products in this study is the effects of the presence of other people on users' feelings and task performances.

The empirical studies conducted to investigate the research questions are explained in Chapter 4 and Chapter 5. Chapter 4 encompasses two preliminary studies to explore the user experience in public products generally and to understand the role of the social context in this experience. Links between different social contexts, users' feelings, and task performances are also revealed. Chapter 5 is about the main study which grounded on and intended to test the findings from the literature and two preliminary studies.

Finally, Chapter 6 reveals the conclusions of the research. In addition to the main findings of the research, recommendations for designers of the public products and researchers, and suggestions for further research are presented.

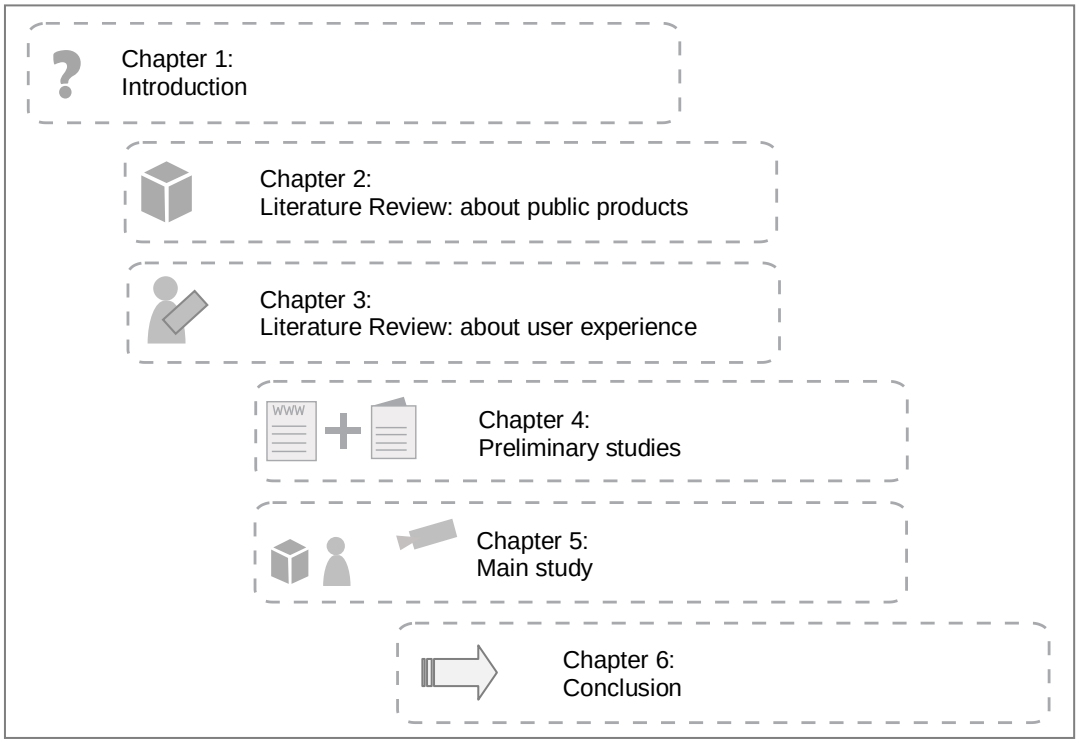

Figure 1.3 The structure of the thesis

CHAPTER 2

A GLANCE TO THE PUBLIC PRODUCTS

Before attempting to comprehend what user experience means and how user experience with public products shows up, specifically concerning the effects of the presence of other people, it is foremost essential to explore the literature about public products. So, this chapter commences with a definition of the public products, continues with the examples of studies conducted about the public products, and ultimately draws attention to the necessity of a study focusing particularly on the user experience with the public products.

2.1. Public Product Definitions

Our daily interactions with products do not merely involve the ones that we own. The products that are used by public have an important place since many of our transactions, information retrieval processes, or quick purchase actions are realized by the products or systems used by public.

As a matter of fact, the range of the products which involve public use is quite broad. Inherently, products like street furniture get involved into the domain.

The products or systems in question have been referred by different names. Rowley and Slack (1998) refer to the products and systems such as ATMs, catalogues in libraries, multimedia kiosks, and store guides as *public access information systems*. They highlighted the importance of the public use of database systems since the contexts in which people involve in these processes are getting more and more frequent. Yarlikas (2009), mentioned about the ATMs as being *public technology devices* which are situated and used in public spaces. Information systems for public use are also named as *public information systems* (Sundgren, 2005). However, internet based systems; i.e. web services, were also

included in many of those kinds of studies. So, in order to eliminate confusion, the products and systems in the scope of this study are referred as (*interactive) public products* since the public access of information systems such as electronic books, web-shopping, and so on, are wide off the mark.

2.2. Studies about Public Products

So far, public products are of subject of interest in many researches. Actually, much attempt has been made to point out and solve the problems regarding mainly usability in products like ATMs, information kiosks, and so on.

Rowley and Slack (1998) retrospected the Human-Computer Interaction (HCI) domain and implemented its principles in public access interfaces, as he named. Their study comprises the design of public access systems' interfaces; system components such as users, interaction types, environments, tasks (Table 2.1); design and evaluation of these systems. As can be seen, they incorporated the media accessible to the public use. In their study, the weight is given to the usability in interface design and attention is drawn to the diversity of users.

Table 2.1 Various public access information systems (Rowley and Slack, 1998, p. 12)

	User characteristics	Environment	Tasks	Technology
Public access kiosks	General public, **shoppers**	Shopping mall, centre, street. Public library, airport.	Collecting cash, Placing orders, tickets, etc.	Touch screen, muct be robust
CD_ROM	Depends on database - can include children, general public, library users, proffessional user and others	Library, airport, home, office	Retrieve information, download information and integrate information into other documents	Often multimedia, GUI, mouse
Internet	Internet surfers - preponderance of academics, students and males	Study/workplace, home	e-mail communication, shopping, file transfer	Desktop and portable PCs, with keyboard, screen and mouse
OPAC's (on-line public access catalogues)	Library users - profile depends on tyoe of library	In library In office/at home In other public venues	Narrowly defined ● identify book availability ● searching for information	Sometimes large screen, touch screen, special purpose keyboard but also accessed through standard office equipment. Remote and local access may use different workstations

Maguire (1999) demonstrated guidelines about user interface design by studying kiosk systems for public information. Many aspects such as place, accessibility, privacy, input and output, and so on, are touched upon. He emphasized the importance of designing public information systems with care since public involves various range of experience, ability, and confidence levels. He also emphasized that users usually prefer to use a system in public without being observed by others closely. This implies the effect of presence of other people on public product-user interaction clearly. Maguire (1997) also conducted a project on kiosk systems for tourist information, information on local government and employment opportunities. He found out that the level of privacy needed changes with the types of information being sought. Yarlikas (2009) investigated different ATMs to bring about a new ATM proposal. He examined the strengths of these ATMs and proposed them to implement into a new ATM. These strengths were mainly about usability and functionality of the products. Tractinsky et al. (2000) also dealt with ATMs to explore the correlation between aesthetics and usability perceptions of users. They utilized a computerized system serving as a surrogate for an ATM. What they concluded was that there is a strong correlation between users' aesthetic perceptions of the interface and usability perceptions of the system.

Similarly, there are other studies utilizing public products, but public products in these studies merely serve the function of exemplification. For instance, to explain error by design, Stanton and Baber (2002), and to explain two usability assessment techniques which are Concept-based Analysis for Surface and Structural Misfits (CASSM) and Cognitive Walkthrough, Connell, Blandford and Green (2004) used vending and ticket machines respectively. Also, there were so few studies which focused on cultural aspects while investigating the public products. To illustrate, Guenand, Ampilhac and Uehara (2006) studied food vending machines regarding cultural choices. Besides, there are studies about public products for disabilities, example of which is the investigation of Gill (2009) on self-service terminals.

Hassenzahl (2003) mentioned shortly about ATM as an example in his study about the user experience while he was explaining that the use of a product with certain product characters in a specific situation has specific emotional and behavioural outcomes. Though his study was focusing on the user experience,

and though there was an example from the public products, there was no ostensible attempt to delve into the user experience in public products. Certainly, these are not the all studies about public use products; nevertheless, many existing studies are alike in the sense that they do not concentrate on the user experience entirely. Most of the studies dealt with the usability problems and how these problems can be eliminated in these products. Acknowledging the significance of usability, adducing the above studies and referring to the importance of a comprehensive user experience, which is explained in the subsequent chapter, it is possible to say it is apparent that there is no focus in literature on public product-user interaction which is shaped dramatically by the people in the context. For the design literature, this is worthy to investigate since users can elicit feelings and their performances while using the public products can be affected highly due to both presence of other people and the products' properties. It can be also interesting to uncover whether certain product properties can intensify or diminish the effects of the social context in those experiences, or the social context can affect how users' interact with the products in question.

Before proceeding with the discourse above, user experience and its aspects related to this study are needed to be investigated. Hence, the next chapter seeks to bring concise insight into the user experience and its components relevant to the theme under inspection.

CHAPTER 3

BACK AGAIN TO USER EXPERIENCE

Hekkert and Schifferstein (2008) encapsulate the user experience as the awareness of the affective phenomenon which is the outcome of users' interactions with products; such as, the stimulation of senses, attribution of values and meanings to the products, and elicitation of emotions.

This explanation seems quite broad, but is remarkable considering the expression of different aspects involved in user-product interaction. This gives hint not only about the different aspects incorporated, but also diverse disciplines dealt with the term 'experience' and user-product interaction.

A large body of literature about user experience mainly includes the term's history, definitions, frameworks, components, and evaluation methods. Hence, in order to comprehend user experience thoroughly regarding the scope of this thesis, the following section introduces the history of the term shortly, and is followed by the user experience frameworks which have attempted to explain the nature of the term and its components.

3.1. A Brief Introduction to Term's Emergence and Evolution: A Journey from Ergonomics to Emotions

Looking back at the last century and the last decade in the design literature and other relevant disciplines, an obvious shift of focus in defining users' interactions with products is observed. Although, *ergonomics* was a prominent term of the 1940's, there started to be a dominance of *usability* in 1970's. ISO 9241-11 defined usability as:

> "The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use."

Nielsen (1993) related the emergence of usability to the time when computer vendors had to deal with lots of inconveniences and when 'user friendly' term – though not agreeing with the term's usage- for systems, and later, Human Computer Interaction (HCI) field were introduced. Carroll and Campbell (1989) explained the goal of this field as presenting insight about how the experiences, incentives, and actions of human restrain the computers' usability.

The aforementioned ISO 9241-11 definition of usability has been referred several times as being narrow and superficial term (Frøkjær, Hertzum and Hornbæk, 2000; Jordan 2000, Dillon, 2001; Blythe et al. 2003; Jeng, 2005; Kuijk et al. 2007).

Adler and Winograd (1992) pointed out a necessity of a new usability concept due to the deficiencies of the conventional usability approaches. Jordan (2000) also mentioned about the inadequacy of the conventional usability based approaches and their failure in viewing the products as tools to perform certain tasks. He emphasized the necessity of adopting a more holistic view in user-product interaction rather than just focusing on the cognitive and physical aspects of user. It is important to remember that people possess diverse goals, expectations, drives, needs, emotions, and so on, each of which has a great influence on user-product interaction. So, *pleasure* based views were considered as providing all the benefits; that is to say, pleasure in products seemed to provide not just practical benefits, but also, hedonic and emotional experiences are of great significance (Jordan, 1999; 2000). With the incorporation of emotions and pleasure, the focus shifted from preventing negative experiences to creating positive experiences (Hassenzahl & Tractinsky, 2006). In other words, conventional usability approach evolved into a more extensive approach: *user experience*.

Actually, affective experiences were not just the interest of the last decade. Affect had been studied in diverse disciplines after the sixties (Desmet and Hekkert, 2007). For instance, in the marketing discipline, Schmitt (1999) highlighted that it is not adequate enough to design products; thus, the intention should be

designing experiences. Dillon (2001) mentioned about the importance of going beyond the conventional usability approach and dealing with the actions, results and affect as fundamental determinants of user experience in HCI. Holbrook and Hirschman (1982) demonstrated a hedonic approach and highlighted its necessity in order to grasp the multiple faceted consumption experience thoroughly. Jordan (2000) claimed that in order to add value to design, the affective aspects in user experience should be addressed. Similarly, Norman (2003) discussed that affect and emotion have a major role in our daily decisions and experiences. So, the affective side of design is as important as, or even more crucial than, the practical aspects.

Aforementioned studies are just a drop in the bucket considering the wide range of researches and studies of experience in diverse disciplines. Yet, they are sufficient enough to epitomize this diversity and to infer that it is impossible to incorporate all different studies with the scope of this thesis.

3.2 A Glance to the User Experience Frameworks

After the emergence of the term, different user experience components and frameworks have been presented (Alben, 1996; Hassenzahl, 2003; Wright, McCarthy and Meekison, 2003; Forlizzi, Mutlu and DiSalvo, 2004, Desmet and Hekkert, 2007). All of these models are different as their focuses are on different aspects of interaction; nevertheless, they possess some identical aspects, too. Supplementing with various enhancements, the frameworks conceived to complement the practical side of the user experience (Hassenzahl, 2003; Blythe and Wright, 2006).

Considering the different focuses, many of these frameworks were grouped by Forlizzi and Battarbee (2004; Zimmerman, Koskinen and Forlizzi, 2009) into three categories as being product, user and interaction centred. Product-centred frameworks provide not only designers but also non-designers with information about the necessary considerations during the design and evaluation processes, which can be utilized directly in design practice. These frameworks usually serve the function of checklists as they are basically appeared as lists of measures to use in design and to achieve prosperous and pleasurable experience. User-centred frameworks intend to assist designers to comprehend users. The

frameworks in the third category, interaction-centred ones, try to focus both on the product and user, and especially on the relationship between them.

Indicating all these diverse focuses, Hekkert and Schifferstein (2008) presented the components of the user-product interaction, which is highly intertwined with the user experience, in a model (Figure 3.1)

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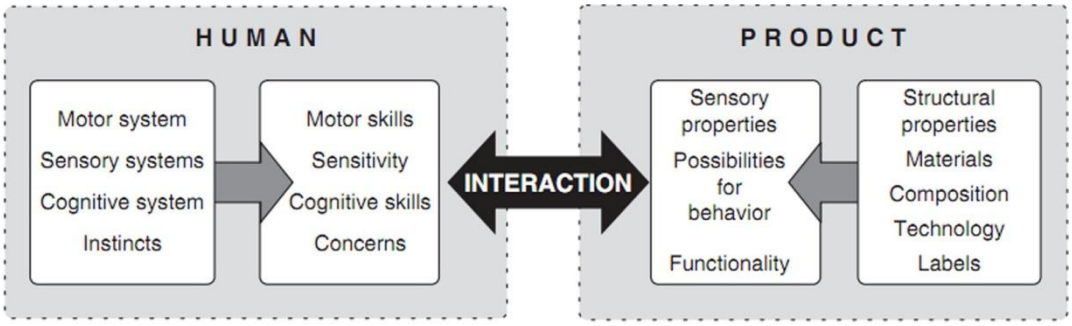


Figure 3.1 User-product interaction model (Hekkert and Schifferstein, 2008, p. 3)

Since these categorizations, frameworks and diverse components have been tackled and reviewed over and over again in different studies, in this study, they are not explained in detail. Yet, some common or important points which many of these frameworks have highlighted for a good user experience and which are within the scope of this thesis are of great deal henceforth. All these frameworks indicated that the user experience is a complex and a multidimensional phenomenon. They all concur that the experience is affected by the user's characteristics, the product's features, and the context. Many of these common aspects were also mentioned by Hassenzahl and Tractinsky (2006) as they summarized the user experience as the:

> "consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/ social setting, meaningfulness of the activity, voluntariness of use, etc.)."

Similarly, Desmet and Hekkert (2007) mentioned about the diverse manifestations encompassed in the product experience as the "subjective feelings, behavioural reactions, expressive reactions, and physiological reactions". The experience mentioned encompassed entire affective experiences encountered in user-

product interactions. However, it is not possible to confine these interactions to instrumental or non-instrumental physical acts; in fact, passive perception, yet more recalling or imagining the products, which can be summarized as interactions that are not physical, can be involved.

All of these approaches have the common goal of enhancing current models of product quality with hedonic aspects of usage.

Referring back both to the literature and one of the aims of this thesis, which is establishing links between social context, feelings, and task performance during the users' interactions with public products, it is seen that context, emotions, and usability are some of the major and prominent aspects in different frameworks, as well as in this study.

Accordingly and to comprehend the terms more clearly which are both the major components of the user experience and the research questions of this thesis, feelings, context, and task performance are looked over a bit more in detail.

3.2.1 Feelings

Feelings and emotions are the other commonly addressed components of the user experience. Actually, all user experience definitions and theories demonstrated above point out an affective phenomenon. Moods, feelings, emotions, pleasure, affect, all have been introduced as diverse affective phenomena (Demir and Desmet, 2008).

Emotions are beneficial since they shape people's positions in an environment by attracting them towards or repelling them from other people, situations, objects, and thoughts (Frijda, 1986). As aforementioned, approaches grounded on pleasure yield a holistic view in user experience complementing the practical benefits derived from a product (Jordan, 2000).

Relevantly, placing pleasure and affective experience in focus, several frameworks have been developed (Jordan, 2000; Desmet, 2002; Norman, 2004). Each of these frameworks has utilized different approaches to define the product emotions. Firstly, Jordan (2000) presented a framework of four pleasure types which are physio-pleasure, socio-pleasure, psycho-pleasure, and ideo-pleasure.

By focusing on this classification, he tried to explain the reasons why pleasure is experienced. Physio-pleasure is related to the pleasure brought about from sensory organs, whereas psycho-pleasure concerns the emotional and cognitive reactions of people. Socio-pleasure is grounded on the relationships with other people and society. Ideo-pleasure deals with the values of people. Secondly, Desmet's (2002) approach in explaining the emotions was appraisal based. Appraisal relates to the process of evaluating a situation regarding personal concerns (Lazarus, 1991). Desmet's model of product emotions (Figure 3.2) shows that products in relation to personal concerns give rise to emotions. Hence, it is not the mere product encounters, but the appraised concerns are the sources of emotion elicitation.

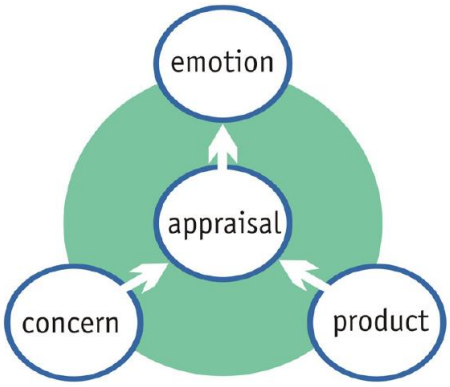


Figure 3.2 Basic model of product emotions
(Desmet, 2002; in Desmet and Hekkert, 2007)

Thirdly, Norman (2004) approached to the emotions with a neurobiological explanation. He classified different levels of processing information and explained how each level relates to the affective experience. These are visceral, behavioural, and reflective levels requiring different design styles. The visceral level is about the quick and automatic judgments, so emotions in this phase are usually simple and not conscious. Visceral design deals with the first reactions towards and appearances of the products in which the physical properties are of dominance. As the name implies, the behavioural level encompasses the skills and well-learned behaviours though still being sub-conscious. Behavioural design is grounded on expectation and involves the use phases. So, usability and even the pleasure of use are of great deal. The reflective level is the highest phase in cognitive processing. Self-awareness and consciousness involved in this level.

So, the corresponding design covers a broad domain. It is influenced from the culture, experiences, memories and society.

Actually, emotions can be both consequences of user-product interactions (Hassenzahl, 2003) and predecessors of product use (Norman, 2004).

Nevertheless, although utilized sometimes interchangeably, emotions and other affect related phenomena; such as feeling and moods can be differentiated from each other (Scherer, 2005). Emotions results from encountering with certain situations and events which are appraised pertaining personal concerns (Frijda, 1986; Lazarus, 1991). However, moods are not brought about by a specific stimulus, but by involvement of multiple interior and exterior, which are usually unidentifiable, reasons (Desmet and Hekkert, 2007). Feelings involve "the total pattern of cognitive appraisal as well as motivational and somatic response patterning that underlies the subjective experience of an emotional episode" (Scherer, 2005).

The term 'feeling' is utilized in the research questions of this study addressing such a broader term stated above, yet without intending to distinguish different affective phenomena.

3.2.2 Context: Elaboration on Social Context

Context, as also mentioned above, has been addressed numerous times in the literature as an important aspect of the user experience. In fact, it has been mentioned not only in the user experience studies but also in usability and HCI literature, as well, which is also mentioned in previous sections. Besides, it has been topic of interest of many disciplines such as sociology, psychology, and so on.

Chamorro-Koc (2007) stated that ignoring the product's context of use as a part of the user experience is one of the major problems eventuating in usability problems. Also, user experience is highly dependent on the user's comprehension about the product's use, which is grounded on his or her previous experiences of using it in a specific context of use. She claimed that diverse contexts bring about different interactions, which ends up with different comprehension and knowledge

of product use. I.e., users' understanding of a product use can be triggered by the product's contextual information.

What is meant by the product's use is the event taking place in a broader context involving social, experiential, cultural, and other contextual factors which have an impact upon how people relate to products (Hekkert and van Dijk, 2001). Similarly, Maguire (2001) stresses the diverse contexts' impacts, such as, physical, social, technical, and organizational, on the product's or system's use. So, context can be defined as all factors related to the user-product interaction.

Suchman (1987) drew attention to the human action which is informed by and situated in a specific context, culture, condition, experience, and so on. Driven by the Suchman's studies on 'situated action, many other studies have been conducted in HCI and design disciplines in which the user experience is in correlation with the context (Chamorro-Koc, 2007).

Pullman (2002) expressed that context provides meaning to the experience and it is the main aspect for the design of the activity. According to him, context is a physical environment and composition of products, rules and procedures for social interaction.

Dourish (2004) derived two distinct explanations of context: one from computer sciences and the other from social sciences. The first one points out the context as the world around the product which is independent from the content. Hereby, the concern is the material properties. The latter one defines a dynamic context where content and context are mutually affecting each other.

As related to my study, Chamorro-Koc (2007) established links between use, activity, task and situation. She described context as a dynamic entity with these relationships which take place during users' interactions with products, and which provide an understanding of a product to users. Nonetheless, she mainly focused on the differences between designers' understanding of context and users' understanding of context.

Social context, the emphasis in this study, has been covered in several other studies albeit addressing to diverse aspects. Obviously, the word itself connotes

people, relationships between them, and many other things related to the people and their relations. Yet, the inherent fuzziness and broadness of the term brings about different interpretations. The glossary of Stanford defines the social context as:

> "The environment of people that surrounds something's creation or intended audience. Social context reflects how the people around something use and interpret it. The social context influences how something is viewed."

Nevertheless, some other studies refer to the social context or social environment differently. For instance, Barnett and Casper (2001) asserted that the social environments of people comprise the instant physical settings, social relations, and cultural settings, in which definite groups of people interact and operate.

Forlizzi and Battarbee's (2004) interaction-centred approach dwells on the social context. They highlighted the significance of the user- product interactions and the corresponding experiences within the context of social interactions. Their framework aims to demonstrate user-product interactions and user experience dimensions (Figure 3.3).

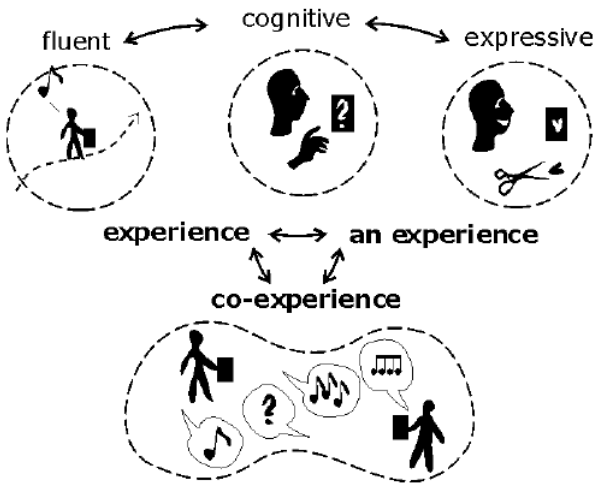


Figure 3.3 Forlizzi and Battarbee's interaction-centered framework of experience

According to the above demonstrated framework, fluent interactions are the automatic and well-known ones which do not require entire attentions. Cognitive interactions related to the products at hand. During this interaction product's

inability to correspond any similar history of use results in knowledge or confusion and failures. Later one, expressive interactions, assist the users to create a better fit and relationships between the products, or certain aspects of these products, and themselves. Apart from these interactions, three types of experience were defined: experience, an experience, and co-experience. The initial one, experience, is the continuous and conscious "self-talk" occurring during users' interactions with products and is about the constant assessment of the objectives regarding the products, people and context at a specific time. The second one, an experience, is shaped by numerous interactions and emotions, yet has a certain character in one's mind with a specific starting and finishing point, influencing changes in behaviour and emotions. The last one, co-experience, stresses social contexts. User experience occurs as they are generated together or shared by other people. Thus, meanings and emotions are created together by means of product use and social interactions. Actually, this last experience is more pertinent to what is being examined in this study than the other social context definitions since social situations and interactions, yet in more detail the presence of other people, are reiterated as having a great influence on co-experience. Nonetheless, the social context at issue is different from what is tackled throughout this study though acknowledging the influence of other people and social contexts. In fact, what is in question is the effect of the people around, presence of other people, on user experiences during interaction with public products.

As far as can be seen, surprisingly, there is no clear and exact definition of the social context though being touched upon in many studies in diverse disciplines. However, how it is referred in the scope of this study is regarding the immediate social surrounding of the users while they are interacting with certain products. Specifically, the presence of other people is in the focal point, which is frequently covered by social psychology literature. Hence, in the subsequent section, the literature about the presence of other people is covered.

3.2.2.1 The Presence of Other People

Social interactions, and so, social influence, are essential to social life (Atkinson, 1993). Social influence is described as the alterations in a person's ideas, emotions, and behaviours due to interaction with other people (Rashotte, 2007). In sociology and social psychology literatures there are abundance of studies and theories which have tried to comprehend and explicate the social influence. These

studies have focused on how attitudes, feelings and manners of people are affected from the presence, either physical or imagined, of others (Allport, 1954). As Guerin and Innes (1984) alluded, even the smallest social context, “one person with another”, has influence encompassing arousal levels, alertness, attentional processes, and social valuation. As a matter of fact, these studies have tried to understand the positive and negative consequences of the social influence.

One of the prominent terms is the *social facilitation* which is basically focusing on the effects of the other people’s presence on a person’s performance. In order to eliminate misunderstandings, it is wise to note that the word facilitation was pulled away from its real meaning over time encompassing both facilitation and impairment.

The term is pioneered by the Triplett’s (1898) studies in which he found out that the paces of the cyclists change during the presence of the other cyclists, *coactors*. He associated the increased performance to the competitive instinct occurred due to this presence of others. Additional researches by Triplett also revealed the facilitating effects of the presence of other people on people’s performance. Nevertheless, it was Allport (1924) who introduced the term social facilitation. His studies included different cases in which the participants were alone or together with other people and also conducting different tasks. What he revealed was again the facilitation of the performance in a group environment rather than being alone. Yet, he was particularly addressing the coaction. Later on, it was noticed that not only the coactors but also the *audiences* have facilitating impacts on the performance. The facilitating effects of the audience were observed in the performances of students doing multiplication problems (Dashiell, 1930).

Although there conducted a fair amount of studies and demonstrated many findings about the facilitating effects of the presence of the other people, Dashiell (1930) observed that more mistakes were also made in some multiplication tasks under the presence of coactors or audiences.

After these initial studies, a flood of research and theories have continued to be seen in the literature attempting to explain the effects of the presence of the other

people on individuals. These studies have been mainly classified according to different variables by different researchers. Yet, the most common classifications are under two headings: *activation theories* and *attention theories*. Activation theories emphasize the arousal and drive processes as a source of social facilitation; whereas, attention theories approach to the social facilitation reasoning the attentional processes. In order to have an insight on how and why people and their performances can be affected from the presence of other people, major theories are needed to be explained below. Also, there are other theories which are not possible to be examined under the former classification. Hence, those are shown under other theories section below.

3.2.2.2 Theories about the Presence of Other People

3.2.2.2.1 Activation Theories

Generalized Drive

It is explicitly seen above that contradictory findings started to be attained by different researchers about the effects of the presence of other people. These contradictions about both the facilitating and impairing effects of the presence of others were discussed by Zajonc (1965). He claimed that the mere presence of others can either enhance or weaken the individual's performance. He explained that if a task to be conducted is simple, easy, and repeated many times than the performance would probably be enhanced. Oppositely, if a task to be achieved is complex, difficult and novel to a person, then the performance would probably go inferior. Briefly, he claimed that the presence of others brings about the apt response of the individual's performance which is referred as *generalized drive hypothesis* (Figure 3.4).

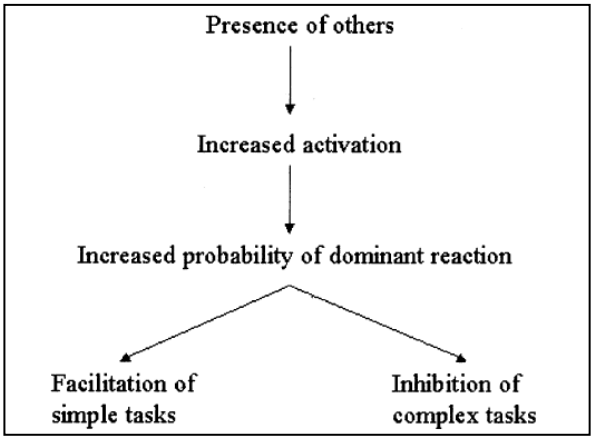


Figure 3.4 The Zajonc model (1965; in Strauss 2002)

Schmitt et al. (1986) found evidences validating the Zajonc's assertion. He conducted a study in which the participants realized comparatively easy and difficult tasks alone, in the mere presence of another person, or in the presence of an experimenter. The results of his study indicated that the mere presence of others is adequate to augment the person's prevailing arousal and to bring about social facilitation. Participants conducted the simple task more quickly and the difficult task more slowly in the mere presence of another person in comparison to being alone.

Alertness and Monitoring

Later, Zajonc (1980) revised his previous theory asserting that when other people are present, an individual cannot know how they will act. This leads to alertness in that person and corresponding preparedness for the unanticipated situation. Thus, the increase in alertness gives rise to facilitation in task performances. Taking the Zajonc's (1980) *alertness hypothesis* into account, Guerin and Innes (1982) proposed the *monitoring hypothesis*. According to this hypothesis, the unfamiliarity of the person who monitors an individual or the unfamiliarity of the situation leads to uncertainty and arousal increase in the individual.

Evaluation Apprehension

Also, according to some researches (Dashiell, 1930; Henchy and Glass, 1968), social facilitation effects have a close link to contention and feeling of being evaluated. According to the *evaluation apprehension approach* of Henchy and Glass (1968), the concern about being evaluated is the reason of the increase in activation and arousal. Meanwhile, Cottrell et al. (1968) propounded a similar approach regarding evaluation; however, claiming that a learned drive brings about an alteration in behaviour. Cottrell (1972) also acclaimed that drive levels cannot increase just because of the mere presence of others, so social facilitation may not be observed necessarily. According to him, the concerns of people about how others evaluate them can increase the drive levels resulting in task performance facilitation or impairment.

Challenge and Threat

Blascovich et al. (1999) embraced a similar approach as Zajonc (1965) concerning the simplicity and internalization of the tasks and the task performance However, he consulted to the cardiovascular processes to explain this influence. If

a person is conducting an easy and well-learned task, this results in a regular cardio-vascular process as observed usually when there is a challenge. Nevertheless, if a person is performing a difficult task, the cardio-vascular response resembles to the response when the person is under a threatening situation, which leads to an inferior performance.

3.2.2.2.2 Attention Theories

Distraction-Conflict

Social facilitation is also related to allocated attention and distraction due to the presence of others (Sanders and Baron, 1975). Sanders et al. (1978) presented that there occurs an arousal in the presence of other people, but because of the conflict in the attention. Again like Zajonc (1965), they established relationships between easy tasks- increased performance and difficult tasks-impaired performances. Despite the reason of the changes is an arousal, this theory is usually investigated under attention theories since the reason of the arousal is related to the attentional processes.

Overload in the cognition can be also observed if there are people present when a person is performing a task (Baron, 1986). The overwhelming information coming both from the task being conducted and the people around causes distraction, and correspondingly, decrease in performance in complex tasks.

3.2.2.2.3 Other Theories

Social comparison and *self presentation* theories have also been introduced accounting for the social facilitation. Baumeister (1982) asserted that when there are people present, people are motivated by a desire to please them and to construct a certain public image. Bond (1982) acclaimed that when the performed tasks are difficult, the will for the favourable self presentation results in being ashamed, stressed, and so, in inferior performances. However, on easy tasks, more attention can be given, leading to better performances.

Latané (1981) revealed that the number, strength and immediacy of the effects increase the social impact on an individual (Figure 3.5). In other words, the amount of the other people present, their relevance and prominence would promote the social facilitation effects. In addition, he mentioned that when the

number, immediacy and strength of an impact are distributed over several targets, the social impact on an individual would decrease (Figure 3.6).

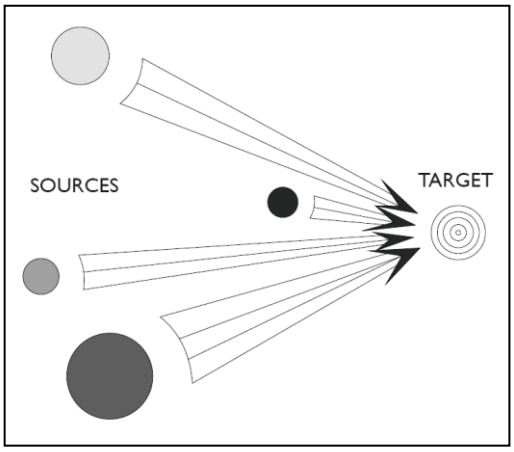


Figure 3.5 Multiplication of impact I=*f*(SIN) (Latané, 1981)

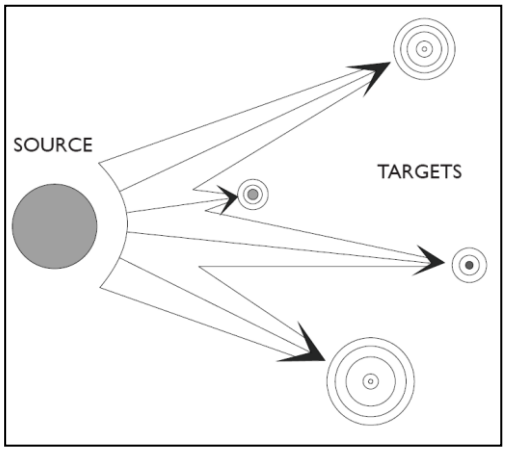


Figure 3.6 Division of impact I=*f*(SIN) (Latané, 1981)

Apart from the aforementioned studies, there are also a number of researches considering the affects of social context and group influence on individual's consumption behaviours, choices and decision making. Ratner and Kahn (2001) studied the influence of private versus public consumption on individual's variety seeking behaviours. They showed that when a person is evaluated by others- yet this evaluation should be on hedonic aspects and not utilitarian- he or she changes consumption behaviours. The reasons are various such as desire to be seem as an interesting person, to impress others, to follow the group pattern, etc. Bearden and Etzel (1982), investigated the group influence on product and brand purchase decisions. They found out differences between privately and publicly consumed products and luxuries.

There are also many other theories, studies and categorizations about the presence of the other people examples of which are *deindividuation* and *bystander intervention*. Deindividuation concept was grounded on LeBon's studies and tackled by many other researchers (Festinger et al., 1972; Zimbardo, 1979; Diener, 1979, 1980). The term refers to a feeling emerged due to specific situations in groups when the individuals get rid of their identities and disappears anonymously in the group. Therefore, there observed decreased constraints concerning impulsive behaviour or other mob behaviours. Moreover, Bystander effect is another social psychological phenomenon related to the situations in

which individuals are passive to act and help during emergency due to the presence of other people (Latané and Darley, 1970). There are many reasons for not attempting to help in emergency cases some of which are the possible dangers, possibilities of misunderstanding, and allocated responsibility. Though not relating to the task performances directly, these theories also show that when other people are present, individuals tends to act differently than they are alone. Even in most cases individuals do not want to leap out among other people.

Studies showing the facilitating and impairing effects of presence of other people on task performances and feelings of individuals depending on various factors are of the main point of interest. Even if after this brief review, it can be easily asserted that the user experience with public products can be highly affected from the presence of other people around, either in a positive or negative way. The effects can be on diverse dimensions on the user experience as put forward at the beginning of the thesis; such as the feelings and task performances. The feelings and context have been covered concisely. So, in the next section, the meaning of the task performance is presented more comprehensively, considering the objective of this study.

3.2.3 Task Performance and Usability

In the literature of social psychology, diverse tasks have been conducted to evaluate the impact of the presence of other people. These tasks have been ranging from the multiplication problems (Dashiell, 1930), cycling (Triplett, 1898), to changing clothes (Markus, 1978). There has been no specific focus on the task performances while users are interacting with products. In those studies the performances have been evaluated by the speed and the accurateness of conducting the tasks, no other measures of task performance and usability have been under investigation. However, while interacting with the products, users' task performances and the usability of the products are in strong correlation. Hence, the usability measures are in point of interest hereafter in order to explain the users' task performances during their interactions with products.

Usability covers different measures such as effectiveness, efficiency, and satisfaction (ISO 9241-11). Actually, different definitions of usability and so different measures of it are also available in the literature (Seffah et al.,2006) but the above measures are the mostly accepted ones.

Effectiveness refers to the correctness of the tasks and finishing them. Thus, error frequency is dealt under this measure. Efficiency deals with the relationship between correctness and completeness of the goals, and the sources used while achieving these goals. Therefore, the time spent to learning and finishing the tasks are of great consideration. Finally, satisfaction is related to the comfort and attitudes of the users while conducting certain tasks and achieving their goals .

Seffah et al. (2006) gathered many of diverse measures of usability (Table 3.7).

Table 3.7 Various usability measures

Constantine & Lockwood (1999)	ISO 9241-11 (1998)	Schneiderman (1992)	Nielsen (1993)	Preece et al. (1994)	Shackel (1991)
Efficiency in use	Efficiency	Speed of performance	Efficiency of use	Throughput	Effectiveness (Speed)
Learnability		Time to learn	Learnability (Ease of learning)	Learnability (Ease of learning)	Learnability (Time to learn)
Rememberability		Retention over time	Memorability		Learnability (Retention)
Reliability in use		Rate of errors by users	Errors/safety	Throughput	Effectiveness (Errors)
User satisfaction	Satisfaction (Comfort and acceptability of use)	Subjective satisfaction	Satisfaction	Attitude	Attitude

Effectiveness, efficiency and satisfaction are the main considerations in this study while evaluating the relationship between the presence of other people, feelings, and task performances. After having looked all these concepts concisely, the next chapter presents the empirical studies conducted to answer the research questions.

3.3 Towards User Experience in Public Products

It is revealed that user experience is a broad term encompassing diverse aspects. User, product and context are the main components in user-product interaction, yet being complemented by the characteristics of each component and relationships between them.

The contribution to be done with research is regarding the restricted focus on public products. As explained previously, researches conducted about these products are mainly about the usability of these products, or about aesthetics in few cases. With this study, the relationships between social context, users' feelings, and task performances are wanted to be uncovered (Figure 3.8). Moreover, how the design can be informed by these relationships are of concern, as well. In the following two chapters, the preliminary studies and the main study conducted to shed light on the effects of the presence of other people on public product users' feelings and task performances and correspondingly to reveal directions to inform design are demonstrated.

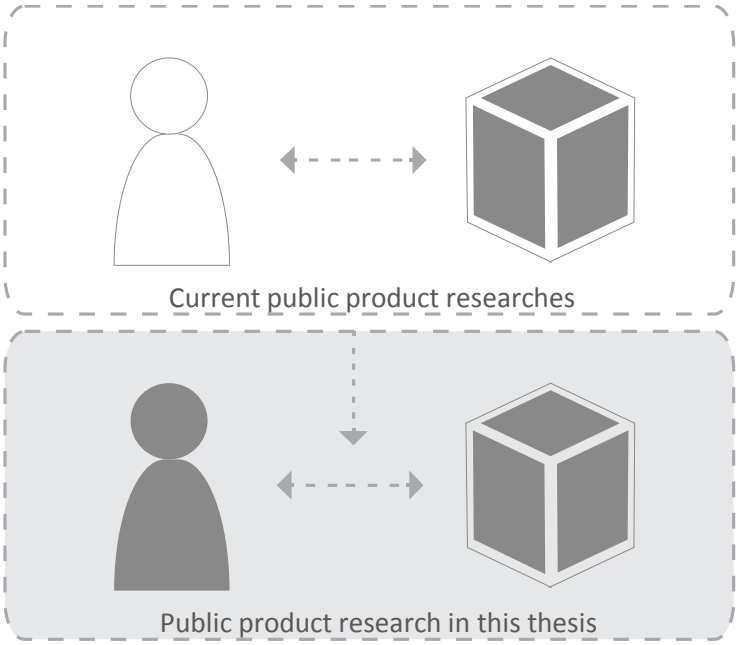


Figure 3.8 Current public product researches and public product research in this thesis (focuses are highlighted)

CHAPTER 4

PRELIMINARY STUDIES

As presented in the previous chapters, there are abundance of studies on user experience and also many studies on social influence. The user experience literature says that user experience is affected significantly from the context. The social psychology literature also states that the performances of people are influenced from the other people, even from the mere presence of others, which can be referred as social context. No wonder, these two statements are overlapping considering the fact that user experience cannot be isolated from the context, and typically from the presence of the other people. Especially, the influence of the context would be higher in the user experience with public products due to the previously mentioned factors; such as, using the products in front of other people, sharing the use of the products with other people, and not owning them. So, considering the literature of user experience and social psychology, it was pre-assumed that user experience with public products is affected from the presence of other people. Another presumption was that the presence of other people while interacting with a public product leads to certain feelings which therewithal affect the use and/or usability of the public product.

This was a crucial inference from the literature since there have been no studies about the interaction with products with a focus on the social context and the presence of other people. Hence, it was first necessary to realize whether the social psychology literature can be traced in users' experiences with public products. Then, it was important to understand the effects of the presence of other people during the user experience with public products, especially on the feelings and task performances. Considering both the feelings and task performances is also crucial since both pragmatic and hedonic experiences are important as noted before in the literature review.

In order to examine the research questions of the thesis and test the presumed model, two preliminary studies were conducted. The specific research questions raised in these studies were as follows.

- What kind of experiences users have while interacting with diverse public products and what is the place of the social context in those experiences?
- What kinds of relations exist between different social contexts, users feelings and task performances while the users are interacting with different public products?

Although addressing the similar questions, these two studies varied in their styles, depths, and freshness of the experiences questioned, which are explained in detail below. Also, none of these studies were the reason nor the cause of the other one. They were conducted simultaneously to gather as much qualitative data and many aspects as possible about the effects of the social context on user experience with public products which would (in)validate the presumptions, and also, which would assist to shape the main study to be conducted after the preliminary studies.

4. 1 Questionnaire

4.1.1 Method

With the intention of revealing the importance and the impact of the social context in public product-user interaction, an online questionnaire was devised (Appendix A). The link of the questionnaire was distributed via social media, but with being selective and restrictive meanwhile. For instance, a considerable attention was paid in order not to involve the same participants in both preliminary studies. By doing as such, the probability of involving similar responses in both studies and of making the participants familiar to the research subject are eliminated.

Participants were asked to fill in the questionnaire after a brief introduction about the aim and content of the study and after a short demographics question. What public products mean and the scope of public products in the study- interactive ones- were also clarified by few examples. In the first part, the frequency of use

and the main concerns of using or not using 8 public products were enquired. This part demonstrates the different concerns in different public products such as security, social pressure, product design, technical problems; nevertheless, this part mainly serves the function of stimulating the participants to remember their interactions with public products and desirably the role of social context in these interactions.

In the second part, participants were requested to remember their two very bad experiences and two very pleasant experiences with the interactive public products. The questions in this part were:

- What was the product?
- When did it happen?
- Were you alone?
- What happened?
- What were your main concerns/considerations?
- How did you feel?

A mood chart which was developed by Vastenburg et al. (2011) was presented for the last question in the second part (to be used optionally) to facilitate the recalling and naming of the feelings during the experiences (Figure 4.1). The selection of a certain mood or emotion set was crucial not just to facilitate the recalling and also to standardize the responses and to eliminate the drawbacks such as language problems. A mood set rather than an emotion set was utilized since moods, as discussed in the user experience chapter, are not brought about by a certain stimulus, but by the incorporation of diverse, usually unidentifiable, factors (Desmet and Hekkert, 2007). Similarly, in the case of user-public product interaction, many different stimuli are involved thinking about the absence or presence of people around, product properties, personal concerns, characteristics, and so on.

In the selected mood chart there were four positive and four negative moods which were demonstrated by a character in addition to the name of the moods. Also, the names of the moods were represented by two significantly closer words to facilitate comprehension in case a participant does not know the meaning a certain word. Apart from these, there was a ‘neutral’ mood in the chart and also

an ‘other’ option if a participant had a different feeling besides the ones provided in the chart.

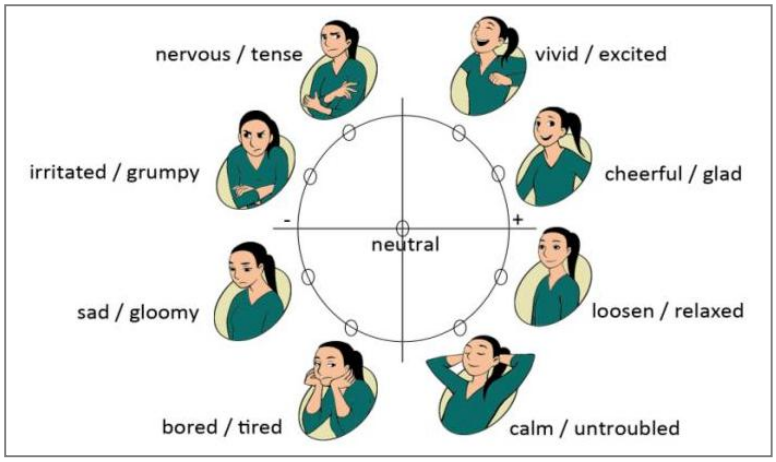


Figure 4.1 Mood chart

In the final part of the questionnaire, participants’ suggestions to improve the user experience with interactive public products were investigated.

In brief, this study focused mainly on the general experiences and the past experiences of the participants. The social context and its effects were not questioned explicitly. First, the experiences that the users of the public products had, and then, the situation of the social context among the recalled experiences were tried to be understood. The experiences to be recalled were not questioned in detail since the difficulty of recalling past experiences was under consideration. Yet, keywords and indications that would demonstrate the links between the social context, emotions and task performance were tried to be derived by the questions listed above.

4.1.2 Sample

The study was conducted with 40 participants (29 Female, 11 Male) according to availability sampling. The ages of the participants in the sample were ranging between 23 and 47. Also, the participants’ nationalities were different. There were 13 Turkish, 7 Dutch, 5 Iranian, 4, Italian, 2 German, 2 Bulgarian, 1, Hungarian, 1 Spanish, 1 Latvian, 1 Greek, 1 Chinese, 1 Russian/Swedish, and 1 Colombian participants. This diverse distribution in the sample concerning the nationalities was remarkable since backgrounds and cultures of the people also affect the user experience, especially in their emotional experiences. By constituting a sample

composed of participants from different nationalities, the risk of finding evidences related or specific to a certain group/nationality and then making generalization according to those evidences would be eliminated. Moreover, it was aimed to gather as much and diverse data as possible about the social context and its importance and effects for the user experience.

4.1.3 Analysis and Results

Firstly, all responses were gathered and categorized according to the types of the questions. Secondly, all parts of the data which were related to the social context were highlighted to better comprehend the relationships related to the social context. Then, the responses to the second part (bad and pleasant experiences) were reduced to keyword levels under five headings to analyse the factors affecting the user-public product interaction and to establish relationships between the feelings elicited due to the social context and their consequences in user-public product interaction. These five keyword categories were: task definitions, factors, types of the social context, feelings, and effects of the social context.

While the user experience in public products was tried to be uncovered, it was seen that the feelings change according to diverse factors such as the social context, usability, technical problems, and so on. However, these feelings are also depended on the qualities of the activities performed which are mentioned as task definitions.

Hence, after documenting and grouping the data, the relationships were started to be uncovered by detecting the causes of the feelings in general and then by narrowing down on the social context among other causes. The effects of the social context on the feelings and the feelings' effects on the task performances were analysed in relation to the task definitions.

In total, 101 experiences were collected from the participants. Nonetheless, 10 of these experiences were not included in the analysis since they were beyond the scope of the study either because the public products that the participants mentioned did not fit in the focus of the study and the experiences were not clear enough to be analysed.

In 23 out of these 91 experiences (25%) social context and the presence/absence of other people were the main factors of the feelings, either positive or negative, that the participants had (Figure 4.2).

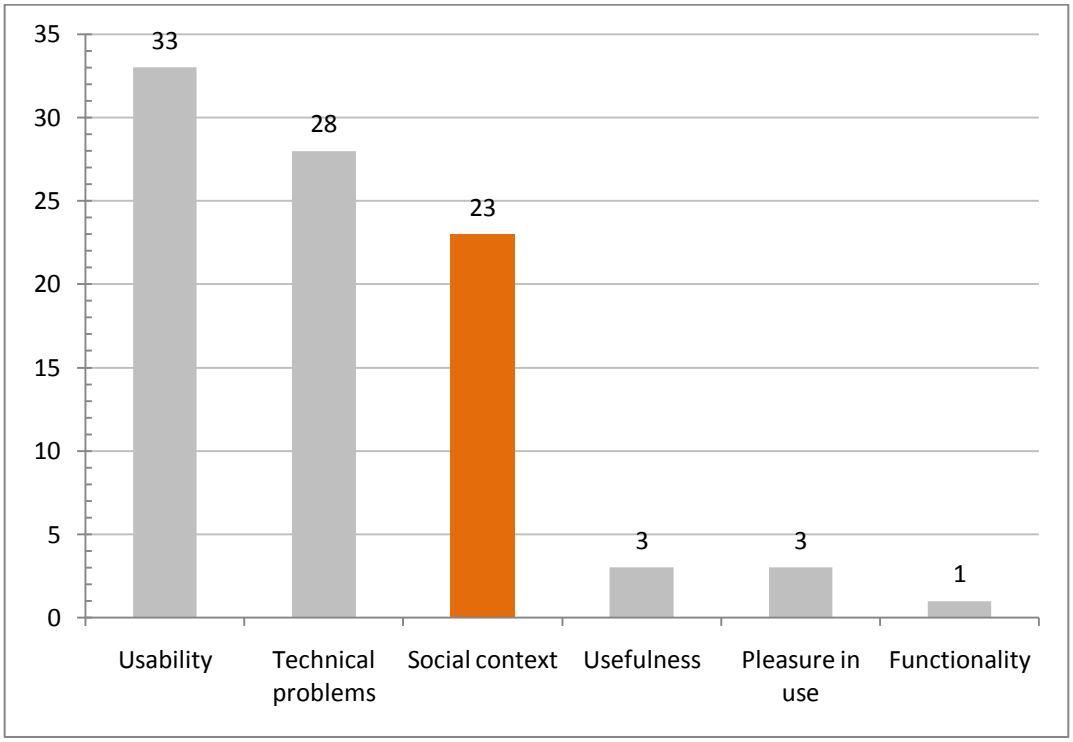


Figure 4.2 Factors eliciting feelings while interacting with public products

The other factors affecting the user experience in the collected experiences besides the social context were usability of the public products, technical problems that the participants encountered, usefulness of the products, pleasure in use, and functionality of the products. What these factors encompass is explained below (see Figure 4.2).

- Usability was the mostly remarked factor (33/91). It encompasses the fundamental aspects related to the comprehension and use of the products; such as, ease of use, clarity of information, clarity and conformity of feedback, and so on, are tackled under usability.

- Technical problems were also prominent in the experiences gathered (28/91). Technical problems cover the circumstances when a public product malfunctioned. For instance, when a public product stopped working, when a food, card, or ticket got stuck inside a public product,

when a coffee machine gave coffee without glass, technical problems were the main factors affecting the experiences.

- Social context, the main factor to be examined in the study, was also mentioned plenty of times (23/91). In those experiences, the presence of people in the queue or just around and also the presence or absence of a companying person brought about diverse feelings, which affect the feelings and use of the public products. It was necessary to note that, social context factors sometimes appear together with and felt greater due to the other factors such as usability and technical problems. For instance, if the menu of a public product was too complex and the product was difficult to use, negative feelings were easier to be elicited due to the people in the queue and around.

- Usefulness factor was asserted few times as the cause of the certain feelings (3/91). Apart from the main functions of the public products, few other functions were mentioned to enhance the experience. To illustrate, an information kiosk which was used for searching a certain place in a map printed the route; i.e., that information kiosk provided a facility besides its main function, providing information. These circumstances were gathered under usefulness factor.

- Pleasure in use was also stated (3/91). The situations in which the participants touch upon the monotony or fun were categorized under pleasure of use.

- Functionality was expressed once (1/91) regarding the rest of the money. When a public product did not give the rest of the money, though performing its main function, it caused certain feelings.

After looking at the big picture about the main factors affecting the user-public product interaction, the social context is investigated thoroughly. As previously stated, it was seen that the feelings could change according to the activities and tasks performed in addition to the factors above. Therefore, the occurrence rate of the social context effects and other factors were investigated in diverse task

definitions. It was aimed to find out whether the feelings elicited due to the social context has also links to the types of the tasks being conducted.

The task definitions refer to the group in which the types of the tasks carried out in the recalled experiences were mentioned. This categorization was important since there were wide range of public products and concerns incorporated. Hence, the tasks were simplified and clarified by referring to them according to the quality of the task conducted. Main task definitions were: simple task, money related task, time limited task, and unfamiliar task.

- Simple task refers to the user-public product interaction in which the users dealt with the task itself and there are no additional concerns and factors such as time pressure or money concern. When a participant just wanted to take a cup of coffee or wanted to check information from an information kiosk, these experiences are explained as simple task. However, there are also some other tasks conducted through the ATMs and ticket machines which were also discussed under this task definition. Although the ATMs involve money and security issues and the ticket machines usually incorporate the time factor, few participants just consider the operation of these products and the completion of the tasks detached from the money and time issues. Thus, these experiences were also categorized under the 'simple task' category, as well.

- Money related task comprises the tasks in which the monetary issues and so the security due to dealing with money is important. Mostly, the tasks in which the participants needed to use credit cards and big amounts of cash are involved in this category; such as, using an ATM or buying a ticket from the train ticket machine by a credit card.

- Time limited task included the tasks in which the time is an important concern for the participants. If a participant performed a task under time pressure such as using a ticket machine while trying to catch a train, trying to withdraw a money from an ATM while being late for an appointment, and so on, were counted in the 'time limited task' category.

- Unfamiliar task involves the use of the public products for the first time. So, when a participant mentioned that s/he had used a public product for the first time and s/he had certain feelings due to this first usage, those experiences are grouped under the ‘unfamiliar task’ category.

The distribution of the social context related concerns and problems that caused certain feelings in relation to the task definitions were demonstrated in Figure 4.3.

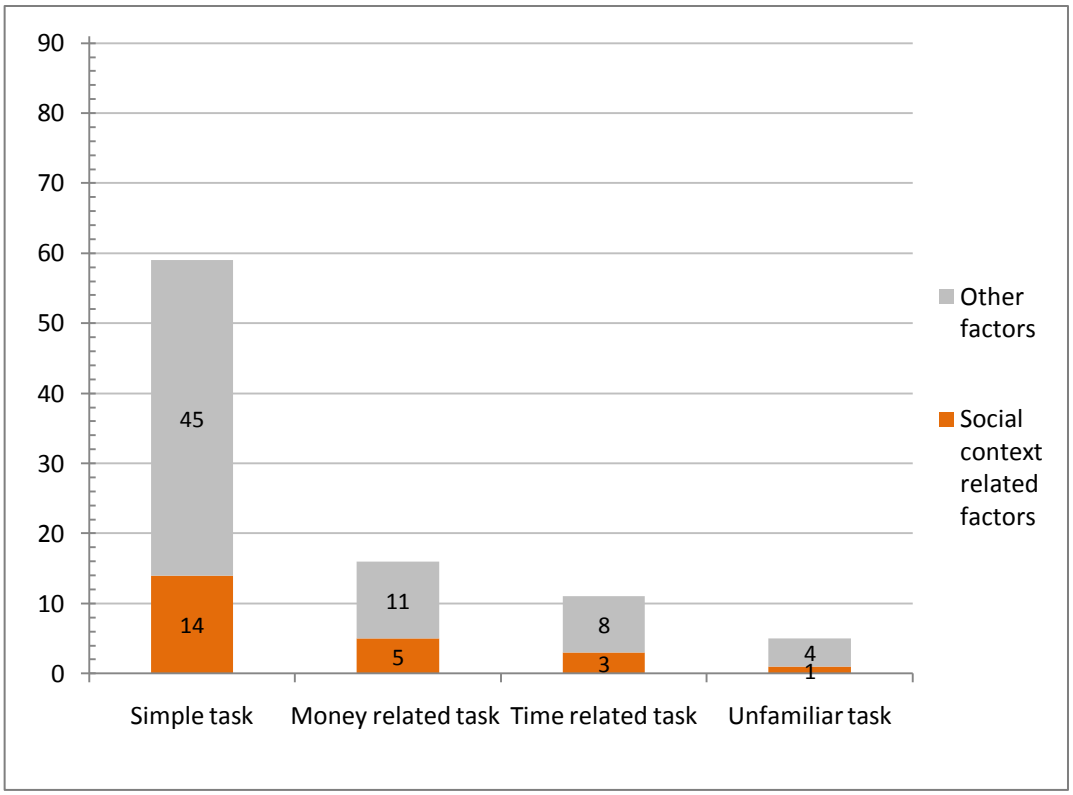


Figure 4.3 Social context among different task definitions

The factors named as ‘other factors’ involve the aforementioned ones; such as, usability, technical problems, usefulness, pleasure in use, and functionality. After seeing the place and importance of the social context in the big picture, these factors in relation to each task definition were investigated in depth to better understand the differences in concerns in diverse tasks. Figure 4.4 demonstrates all the factors in the diverse tasks (Also, see Appendix B).

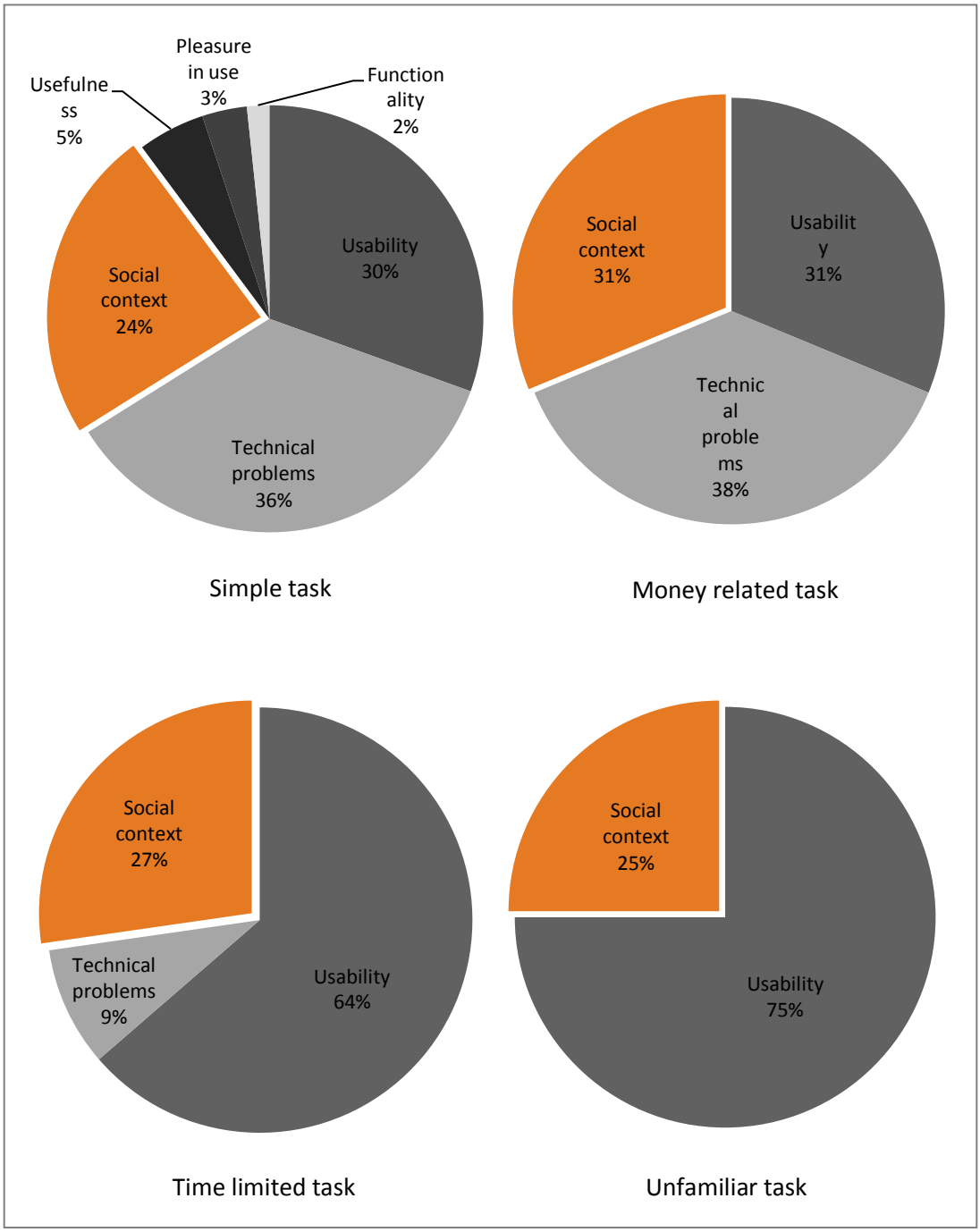


Figure 4.4 Main factors and concerns in all task definitions

Simple task involves all the factors which were found out. Mainly, usability, technical problems and social context were in the foreground. Usefulness, pleasure in use and functionality were also apparent, as well. However, not all of the factors are present in the other task categories. Money related and time limited tasks incorporate similar concerns though their percentages are different. It is seen that the social context is more important in the money related and time

limited tasks. In the unfamiliar tasks there were just two factors which are the usability and the social context.

Apart from the factors, feelings were also identified for each task definitions. Different feelings were elicited at the same time in many tasks; hence, the feelings were not grouped, but the ones elicited during each task were mentioned below.

In simple task category there were 14 social context related factors out of 59 factors (see Figure 4.3 and 4.4). All these factors brought about negative feelings. It was seen that the participants' task performances were influenced by the elicited feelings. These relations' general view is as in Figure 4.5. The numbers stand for the amount of the participants. Then in Figure 4.6 and 4.7, the relations were shown in detail, numbers representing the assertion time since one participant could mention few emotions at a time and task performances could be affected diversely at the same time. To clarify, the number of the feelings and task performances sometimes exceed the number of the experiences since many of them appeared together (in one participant).

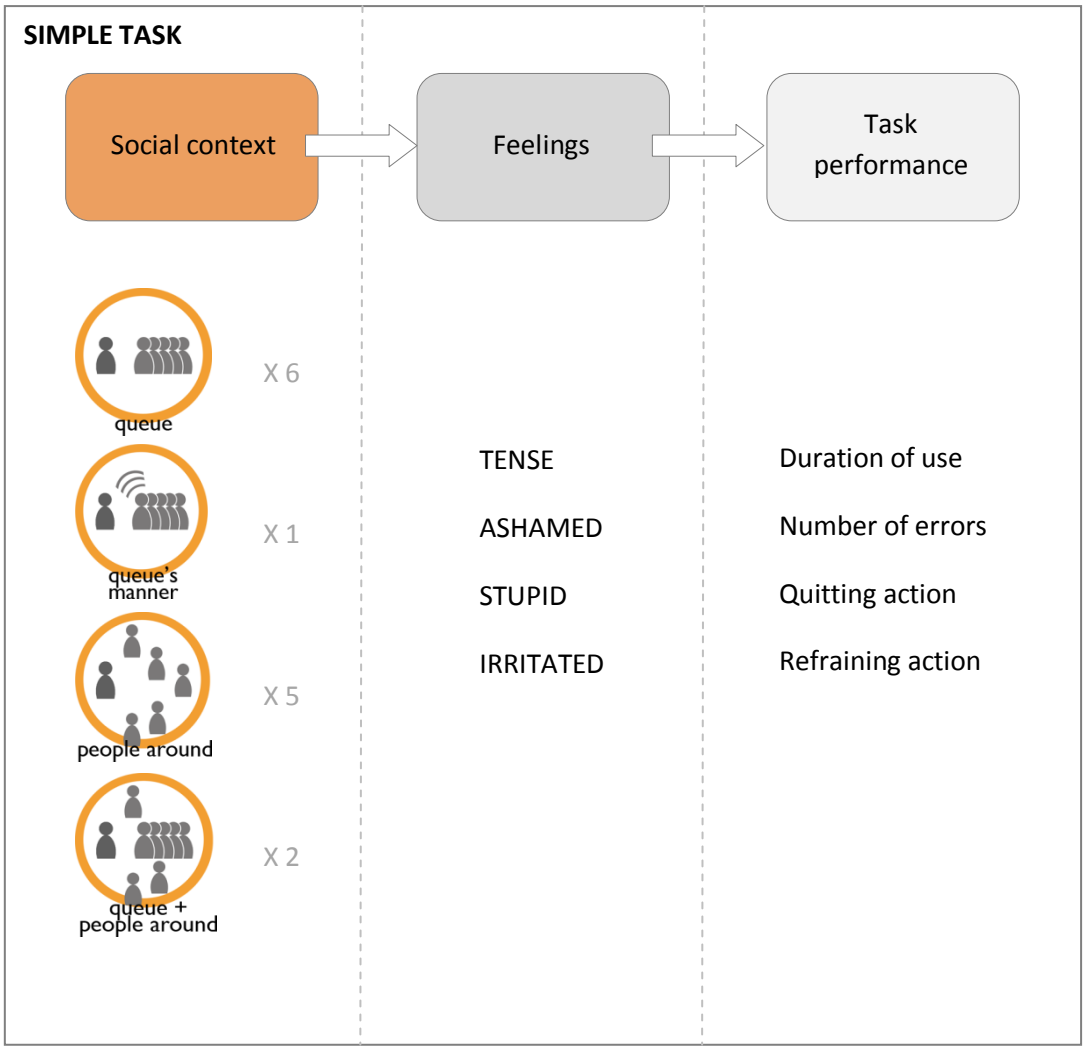


Figure 4.5 Social context – feelings – task performance relationship in simple tasks

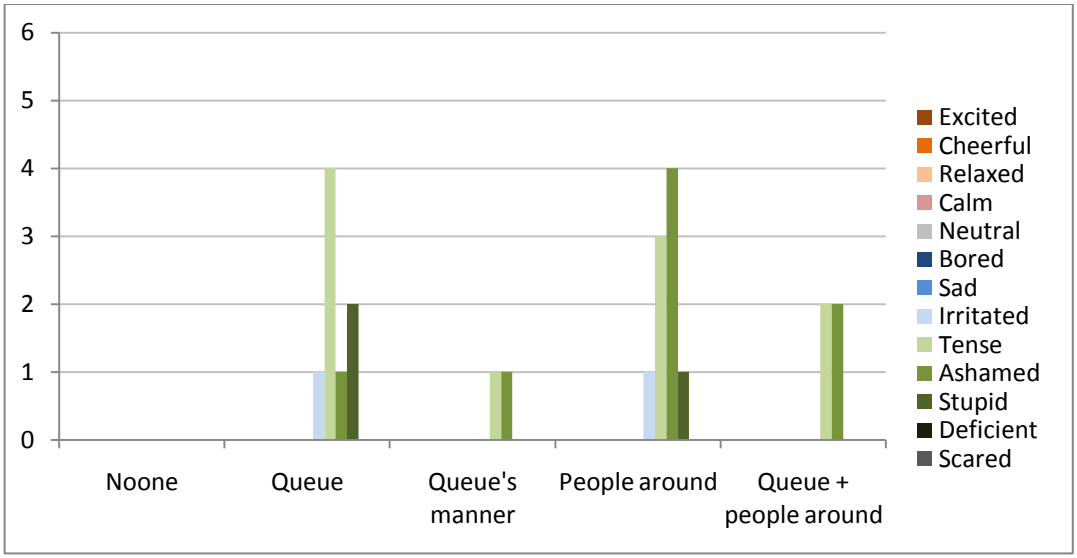


Figure 4.6 Simple task: Feelings elicited in diverse social contexts

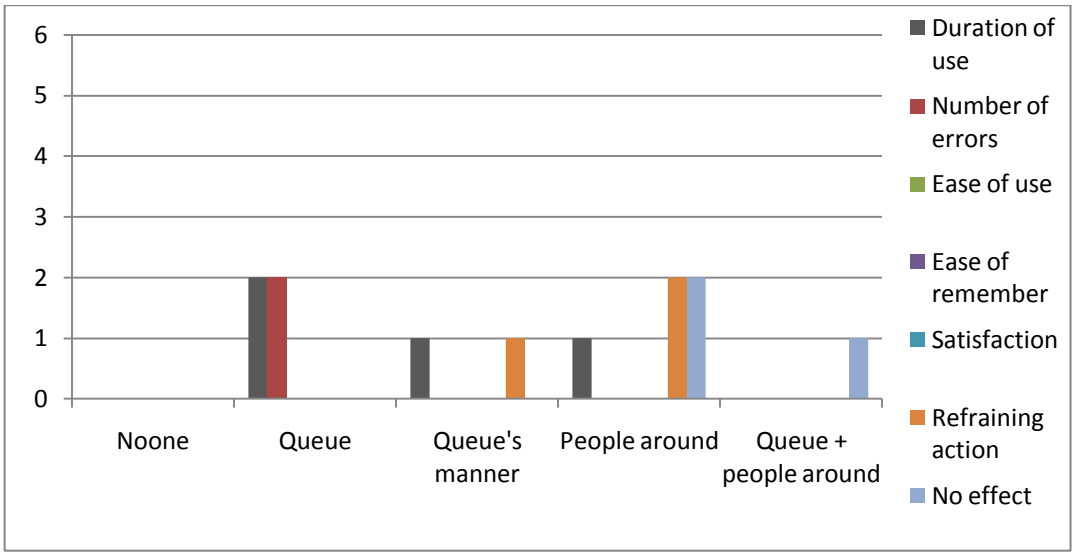


Figure 4.7 Simple task: Tasks performances affected by the feelings elicited in diverse social contexts

It can be seen from Figure 4.6 and 4.7 that 4 different social contexts were mentioned in the simple task category. Prominent feelings observed were being irritated, tense, ashamed, and stupid. In all different social contexts there were participants feeling tense and ashamed. Participants expounded the reasons of feeling ashamed by referring to the noticeability of the information from the products be it the information on the screen or sound feedback from the products. Nevertheless, one participant liked the visibility of the information- process time- by the others because he felt tense due to the queue and thought that others could understand he was not the one using the machine but the machine itself is slow. Owing to the negative feelings as such, participants tried to use the products faster, did more errors, quitted their actions or refrained from the actions that they wanted to do. Yet, although negative feelings were elicited, no change in task performance was mentioned for some cases.

In money related task category there were 5 social context related factors out of 16 factors (see Figure 4.3 and 4.4). Participants elicited negative feelings due to these factors which again affected the task performances (Figure 4.8). The detailed investigation of these relationships can be seen in Figure 4.9 and 4.10 respectively focusing on the feelings in diverse social contexts and task performances in these social contexts.

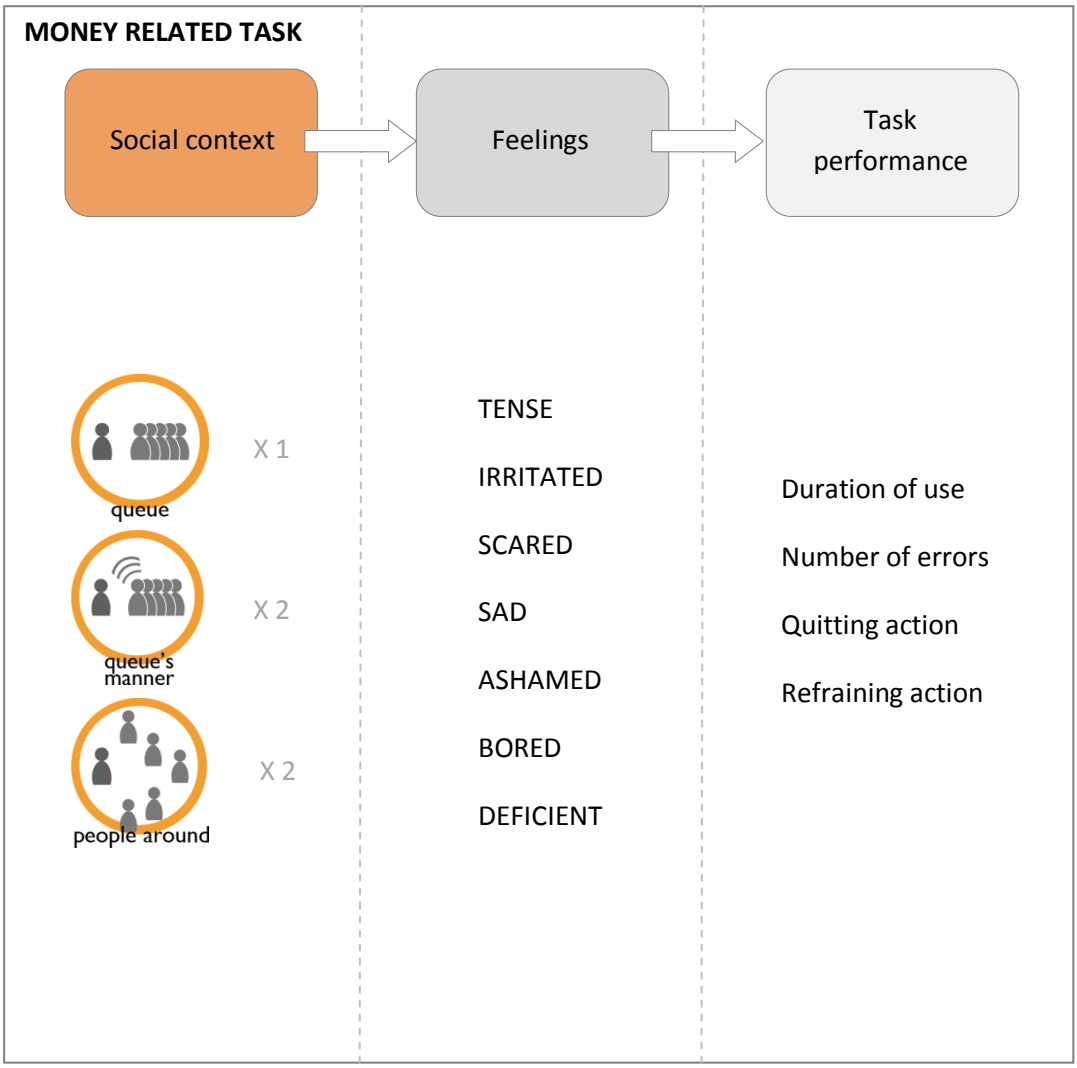


Figure 4.8 Social context – feelings – task performance relationship in money related tasks

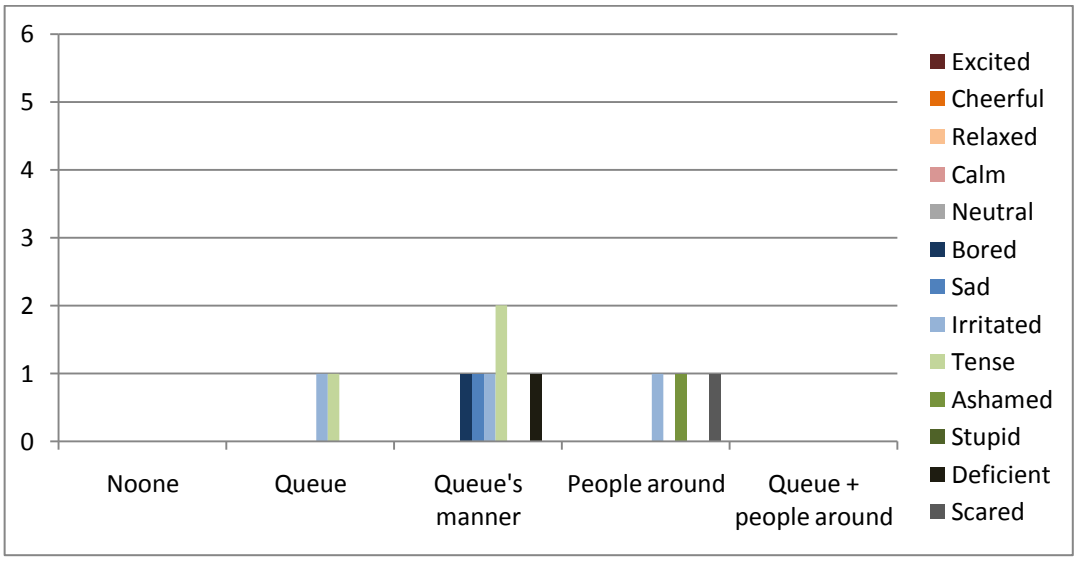


Figure 4.9 Money related task: Feelings elicited in diverse social contexts

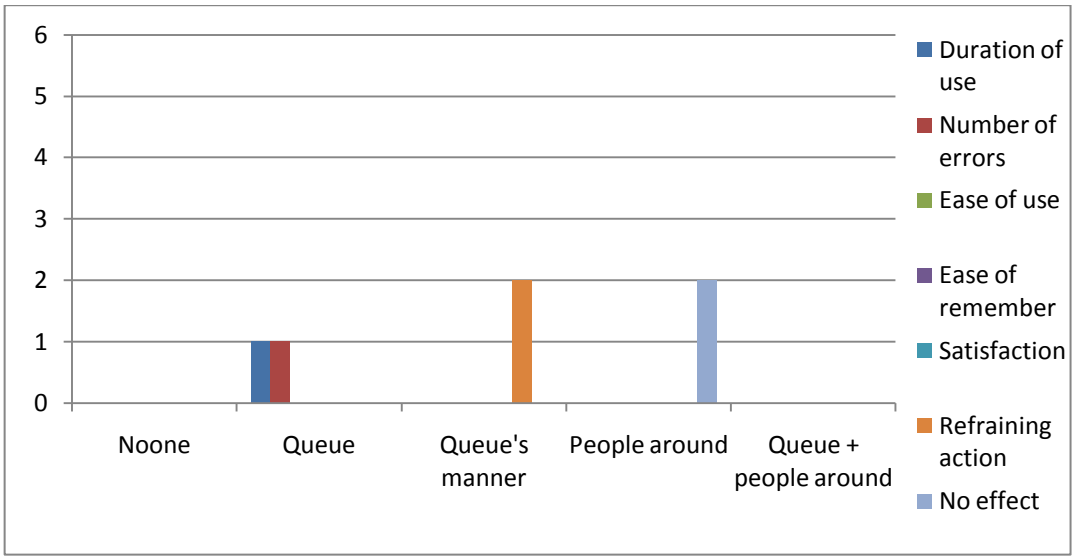


Figure 4.10 Money related task: Tasks performances affected by the feelings elicited in diverse social contexts

3 types of social contexts were mentioned for the money related tasks. It can be seen that in these tasks, negative feelings encountered when there was a queue and when there were just people around. Also, angry, impatient, and complaining people in the queue caused negative feelings. In all different contexts mentioned, there were people who felt irritated. Also, they felt tense, ashamed, deficient, bored, and sad. They highlighted the importance of a private area and one participant emphasized the necessity of having an overview on the environment. However, in one experience the participant scared since there were so few people in the train station at very early in the morning even though there was no effect on the task performance. Similar consequences were observed; such as, the change in duration of use and number of errors, or refraining action.

In time related task category there were 3 social context related factors out of 11 factors (see Figure 4.3 and 4.4). Participants either felt tense or irritated because of the queue and also the complaints from the people in the queue. However, they did not mention any effect of these feelings on usage of the products (Figure 4.11, 4.12 and 4.13).

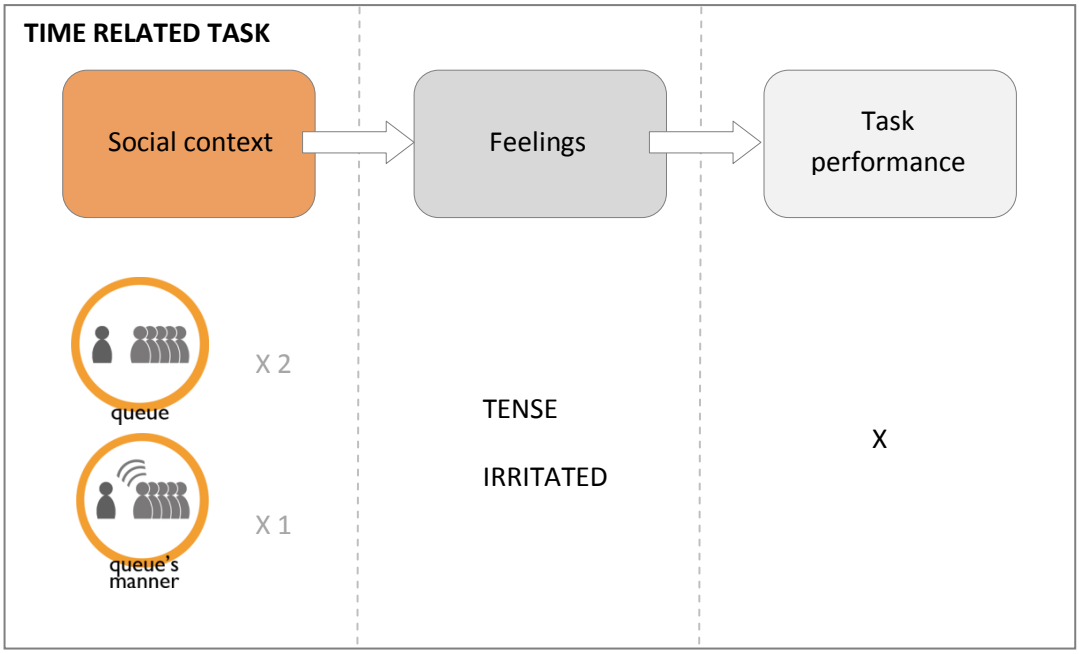


Figure 4.11 Social context – feelings – task performance relationship in time limited tasks

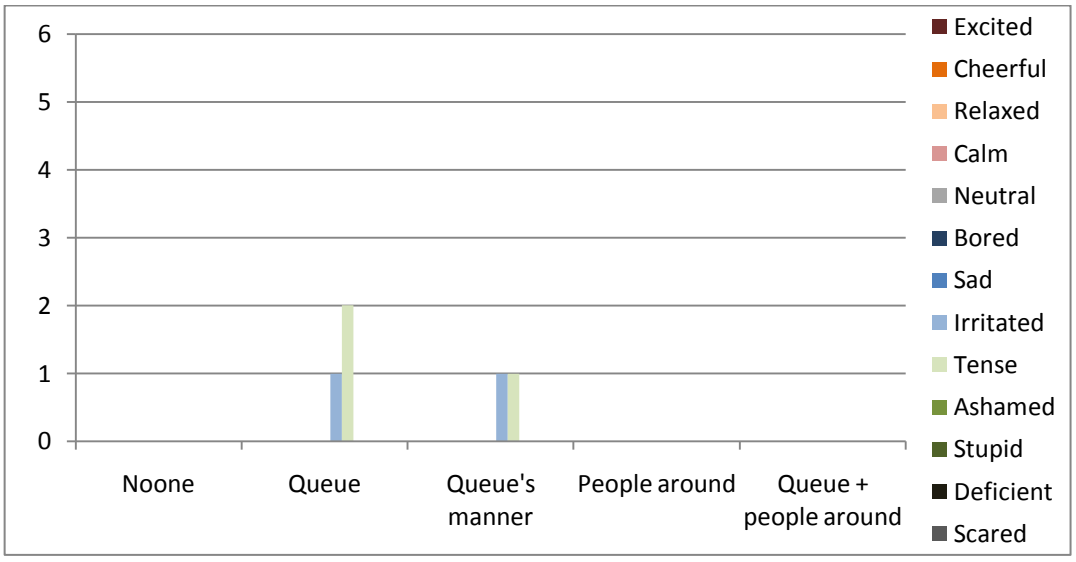


Figure 4.12 Time limited task: Feelings elicited in diverse social contexts

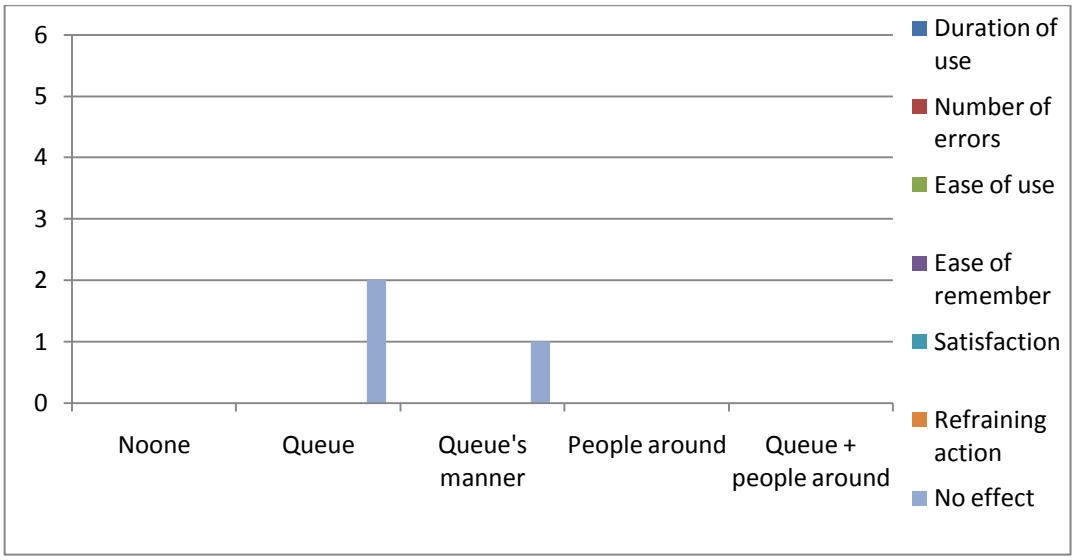


Figure 4.13 Time limited task: Tasks performances affected by the feelings elicited in diverse social contexts

Within the unfamiliar task category 1 social context related factor was retrieved among 5 factors (see Figure 4.3 and 4.4). The social context mentioned was when there was a queue behind the participant. Although the conducted task was unfamiliar the participant mentioned that he felt relaxed since the queue was not too long and he had a chance to show off that he was talented. Again, there was no change in the use of the product due to the social context and corresponding feeling (Figure 4.14, 14.15, and 4.16).

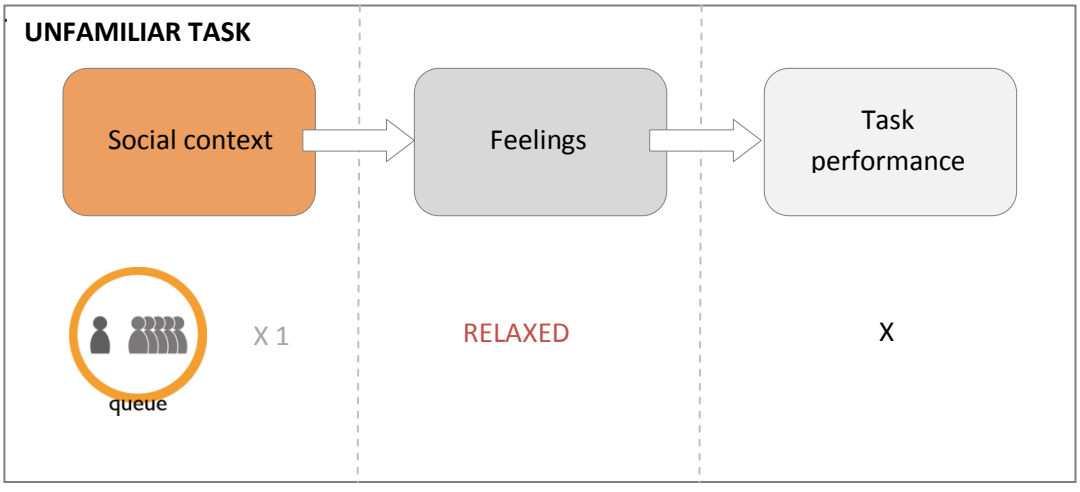


Figure 4.14 Social context – feelings – task performance relationship in unfamiliar tasks

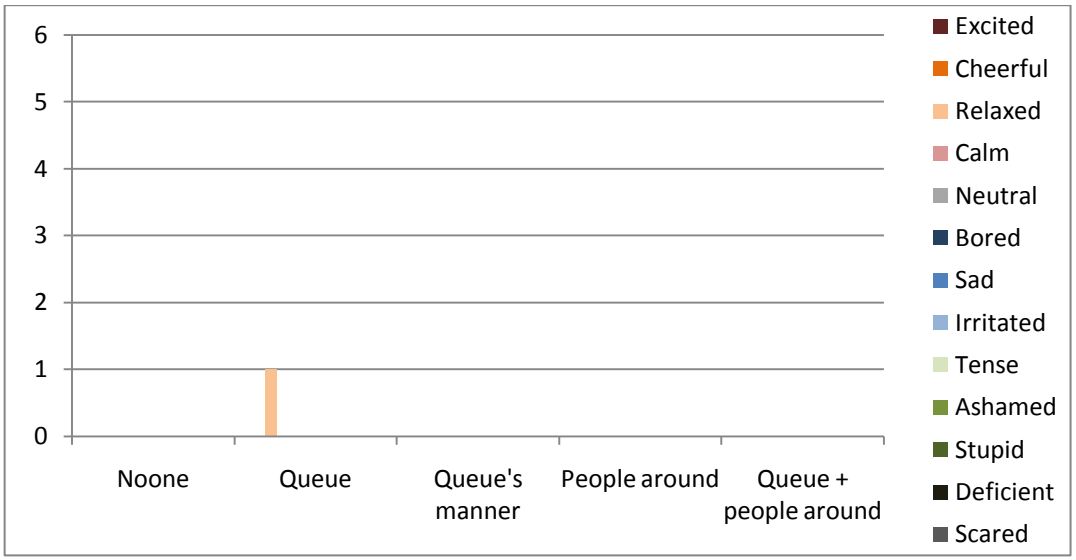


Figure 4.15 Unfamiliar task: Feelings elicited in diverse social contexts

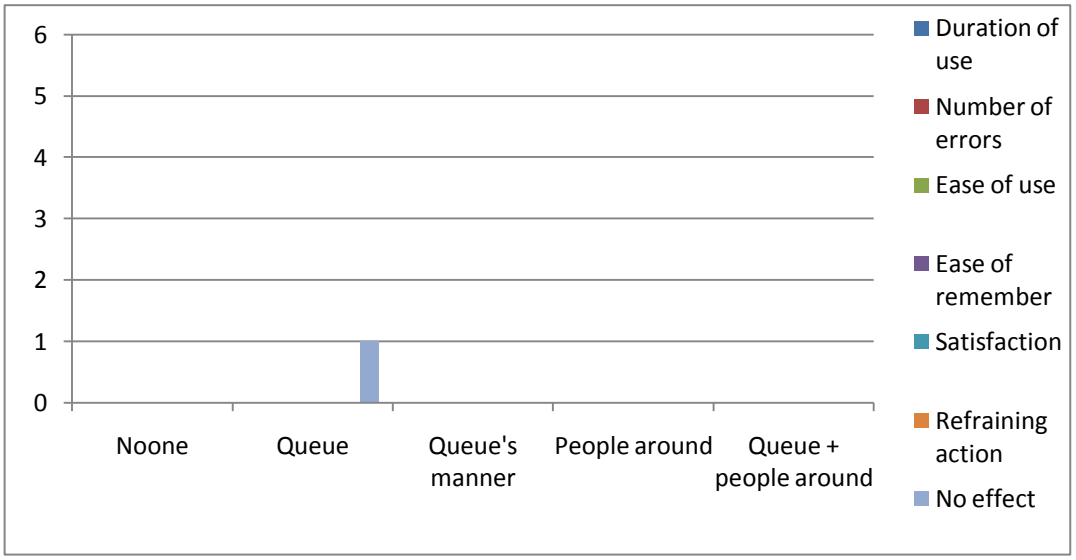


Figure 4.16 Unfamiliar task: Tasks performances affected by the feelings elicited in diverse social contexts

4.1.4 Discussion

As can be seen from Figure 4.2, social context is one of the important factors which affect the user experience in public products. No wonder that usability and technical problems are the most apparent factors; nevertheless, it's interesting that the social context was mentioned almost as much as them. In this study, the participants had to recall their past experiences with public products and the effects of the social context were not asked to them directly. Even if the concerns and problems related to the tangible factors such as usability, technical problems and usefulness could be remembered much more easily compared to the more

implicit ones such as the social context, the recalling of the social context within those experiences implies that the effects of the social context and the presence/absence of other people would be more frequent and greater during our interactions with public products in our daily lives.

According to the Figure 4.4, usability and social context were present in all of the task definitions. It can be inferred that though all of the factors have a role in user experience, usability and social context are the ones affecting all types of tasks and activities whether a person is doing a simple action with a public product, dealing with a money while using a public product, and so on. Also, according to the data retrieved, **social context's affects felt higher respectively in money related tasks, time limited tasks, unfamiliar tasks, and simple tasks**. One drawback to note hereby is that, the amount of the experiences related to the different task categories were not the same, so, the percentage could differ in a bigger sample in which all the task categories have same amount of experiences. But, still the results are valuable considering the fact that the aim of the study was not to show the social context in different tasks categories but to understand its effects in our interactions with public products focusing on the feeling and task performances. The data found and introduced related to the diverse task categories and concerns could shed light to further studies related to the different types of public products.

When focused more deeply in social context, it is seen that queue while interacting with a certain public product, people around apart from the queue, and manners of the people (angry, impatient, complaining, rushing, and so on) in the queue caused certain feelings in the user of that public product. **Generally, the presence of other people in any form caused negative feelings which make the user to try to use the product faster. Hence, the number of the errors increased.** Also, in those cases, users tended to quit their tasks or refrain from an action that they wanted to do. Nonetheless, **there are also few cases in which the presence of other people yields positive feelings. Especially when a place feels insecure due to the location and time, users want to see other people in queue or around.** Besides, if a user feel confident, s/he tends to feel positive no matter there is a queue or people around. Another important aspect to note is that being alone or accompanying by someone can influence the experience, as well. One of the participants mentioned that he felt sad, ashamed

and stupid due to the queue, but he added that he would not feel so if he had not been alone. Moreover, people doing the same task could reduce the negative effects of the presence of other people around in some cases. According to one participant, since there were other people doing the same task at the same time (using the next machine), he felt more relaxed. This could be related to the social impact theory (Latané, 1981). As explained in the literature review, he revealed that the number, strength and immediacy of the effects increase the social impact on an individual. In other words, the amount of the other people present, their relevance and prominence would promote the social facilitation effects. In addition, he mentioned that when the number, immediacy and strength of an impact are distributed over several targets, the social impact on an individual would decrease. So, we can interpret the presence of other people in the next machine doing the same task as the attention from the people in the queue or around were divided on several users. That's why the participant could feel more relaxed in this situation.

In summary, there are lots of things to be considered when dealing with the social context and especially with its links to the feelings and task performance. However, **one of the main reasons that the users are affected from the social context was the lack of privacy**. When, the information on the screen of a public product was visible to the other people or when a sound feedback was heard by the other people, users mostly elicited negative feelings. **Just in few cases participants preferred the visibility of information by others to decrease the pressure.** If a problem occurs due to the machine, the visibility of it eliminates the chance of other people associating it to the mistake from the user. Yet, this is especially valid for the simple tasks, distinguishing the simple tasks from the other tasks involving security and time issues. Thus, considering all, great attention should be paid to the design of the public product to eliminate or at least reduce the negative effects of the social context on feelings and on task performance. This is really important since finishing a task in public products could be much more crucial compared to the other products considering the fact that these products are used when they are really needed and necessary; such as using an ATM when being in need of money, buying a ticket when trying to catch a train, and so on.

The number of the specific experiences related to the different types of the social context was sufficient to reply the research questions. The social context's influence on public product-user interaction was seen and diverse links were found between the social context, feelings, and task performance. However, the variations in the social context, and so, the links, were shown by few quantitative data, although the aim was to collect as much qualitative data as possible. Hence, the second study focused explicitly on the social context and its effects on public product-user interaction.

4.2 Booklet

4.2.1 Method

As aforementioned, both preliminary studies were conducted addressing the similar questions. The second preliminary study also intended to demonstrate the importance and the effect of the presence of other people on public product-user interaction. However, this time, the social context and the relations between the social context, emotions, and task performance were examined by focusing on the types of the social context in detail and different stages of the experience. To realize this detailed examination fresh experiences were needed to be collected. Hence, a booklet was devised (Appendix C).

Booklets were handed out and the participants were informed to fill in the booklet as soon as using the public products. Although a brief introduction was made while handing out the booklets, the booklets also incorporated an introduction about the aim and the content of the study. Contact information was provided at the end of the introduction to enable participants to contact whenever they finish the booklets or whenever they have questions.

One booklet involved 7 experiences to be filled in immediately after a participant used a certain public product. So, each experience referred to one interaction with public products. Participants were instructed to give back the booklets either when they finish the 7 experiences or when 2 weeks were passed. They were contacted several times via their mobile phones or e-mail addresses during the process in order to remind filling in the booklets and returning them back.

Each experience was divided into two parts regarding the waiting time and usage time (pre-use and post-use stages). Before proceeding with these parts, the type of the product that the participant used was asked at the beginning. The first part of the experience, which is related to the waiting time, dealt with the amount of the people in the queue before the participant and the feelings elicited during this stage. The questions were:

- How many people were in the queue before you?
- How did you feel while waiting to use the product?
- What are the reasons for feeling like that?

The same mood chart, which was mentioned in the first preliminary study (Vastenburg et al., 2011), was presented for the second question together with an 'other' option.

In the second part of the experience, initially, similar questions were asked and the same mood chart was given. However, the focus was on the 'use' phase rather than the 'pre-use'. These questions were:

- How many people were in the queue behind you?
- How did you feel while using the product?
- What are the reasons for feeling like that?

Then, in the last part of each experience, social context was elaborated. Questions regarding the main concerns using the public product, the effect of presence of other people during the experience, and the suggestions related both to the social context and product properties were asked. The questions can be seen below.

- What were your main concerns while using the product?
- Did the presence/absence of other people effect your use of the product considering the below aspects? (The aspects were: duration of use, ease of use, ease of remember, number of errors, satisfaction.)
- Do you have any suggestions to improve your experience when using this product (considering both the social context and the product properties)?

With the questions about the feelings, it was aimed to derive the feelings elicited to the social context, whereas with the ones about the presence of other people, the effects of these feelings on the task performances were aimed to found out. The choices provided in the options for the later one was selected from the usability and task performance literature which were also mentioned in the literature review part.

All of these questions were repeated in each of the seven experiences. The experiences did not necessarily compose of experiences with different public products, similar product could repeat if the participant used so.

In brief, contrary to the previous study, fresh experiences were retrieved from the participants. Also, the social context and its effects were questioned explicitly and in detail focusing on both the feelings and task performances. It was aimed to find similar relationships as found in the previous study with the online questionnaire. To add on it, the fresh experiences would help participants to mention the amount of the people in the queue or around, which in turn was beneficial to understand whether there is also a difference if different amounts of people are present in the queue. Also, the situations in which there are no queues were aimed to be investigated to comprehend the effects of the social context thoroughly. Furthermore, more detailed data was aimed to be collected considering the task performance.

4.2.2 Sample

The booklets were handed out to 14 participants (7 Female, 7 Male) according to availability sampling. The ages of the participants were ranging between 23 and 31. The participants were from different nationalities. There were 2 Dutch, 2 Turkish, 2 Italian, 2 Mexican, 2 Korean, 1 German, 1 Argentinean, 1 Colombian, and 1 Chinese participants. Owing to constituting a sample from diverse nationalities and ages, the risk of finding evidences specific to a certain group was prevented.

4.2.3 Analysis and Results

As explained in the online questionnaire study, almost similar method was followed for the analysis of the booklet study. It was important to have results in the same format to be able to compare and discuss the findings.

So, initially, all responses were transcribed. Secondly, the parts of the gathered experiences which were related to the social context were highlighted to see the relationships related to the social context. After, the responses were re-typed in keyword forms under the five headings: task definitions, factors, types of the social context, feelings, and effects of the social context.

The effects of the social context was started to be analysed by focusing on the big picture first, and then focusing on the social context in each task definitions. What these terms meant and what they included are not explained hereby since they were already mentioned in the online questionnaire's analysis. Nevertheless, as different from the analysis of the online questionnaire, the other factors affecting the each task definition was not analysed in depth. Rather, in depth analysis was made for the diverse social contexts and task performances.

In this study, 80 experiences were collected from the participants. 13 of those were excluded from the analysis due to the incompatibility of the products and situations for the study and ambiguity of the experiences mentioned by the participants. All task definitions designated before were apparent in the study. The amount of the social context mentioned as affecting the feelings or the task performances or the both, either negatively or positively, was examined for each task definition (Figure 4.17). In 66% of the experiences (44/67) social context appeared to be a fundamental factor.

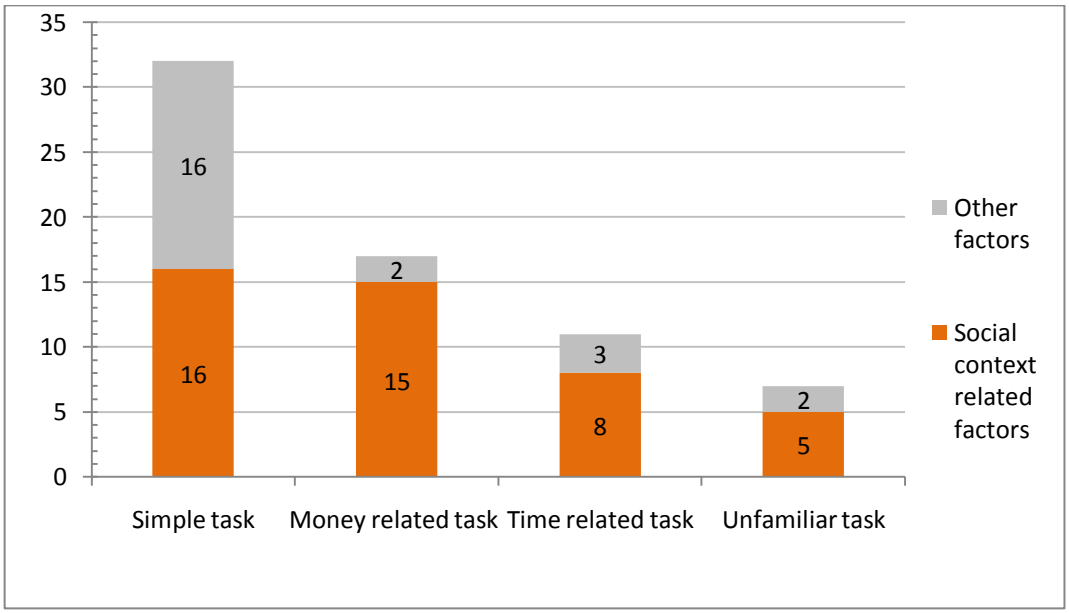


Figure 4.17 Social context among different task definitions

Although this time the other factors were not analysed in detail, the other factors in this study involved merely usability and technical problems. In some cases the participants mentioned about their general concerns rather than the ones specific to the experience in account. These concerns and factors were not included in the analysis. After excluding these factors, actually, there was just one experience about the technical problems while a participant was doing a time limited task. So, apart from this single technical problem factor in the time limited task, all 'other factors' were related to the usability of the public products. It is also noteworthy to mention that, again, social context concerns usually appear together with the other factors. However, the factors mentioned together with the social context were not counted for the analysis since the social contexts were the main reasons for the feelings and corresponding task performances, the other factors just increase the effect of the feelings. Also, due to the product properties such as lack of privacy (screen position or loud sound feedback) participants had negative emotions and so affected from the social context.

Figure 4.18 demonstrates the overview of the social contexts, feelings, and task performances mentioned in the simple task category. Then, Figure 4.19 and 4.20 elaborate on the feelings elicited due to the social contexts while doing a simple task with the public products and the feelings' effect on task performance respectively.

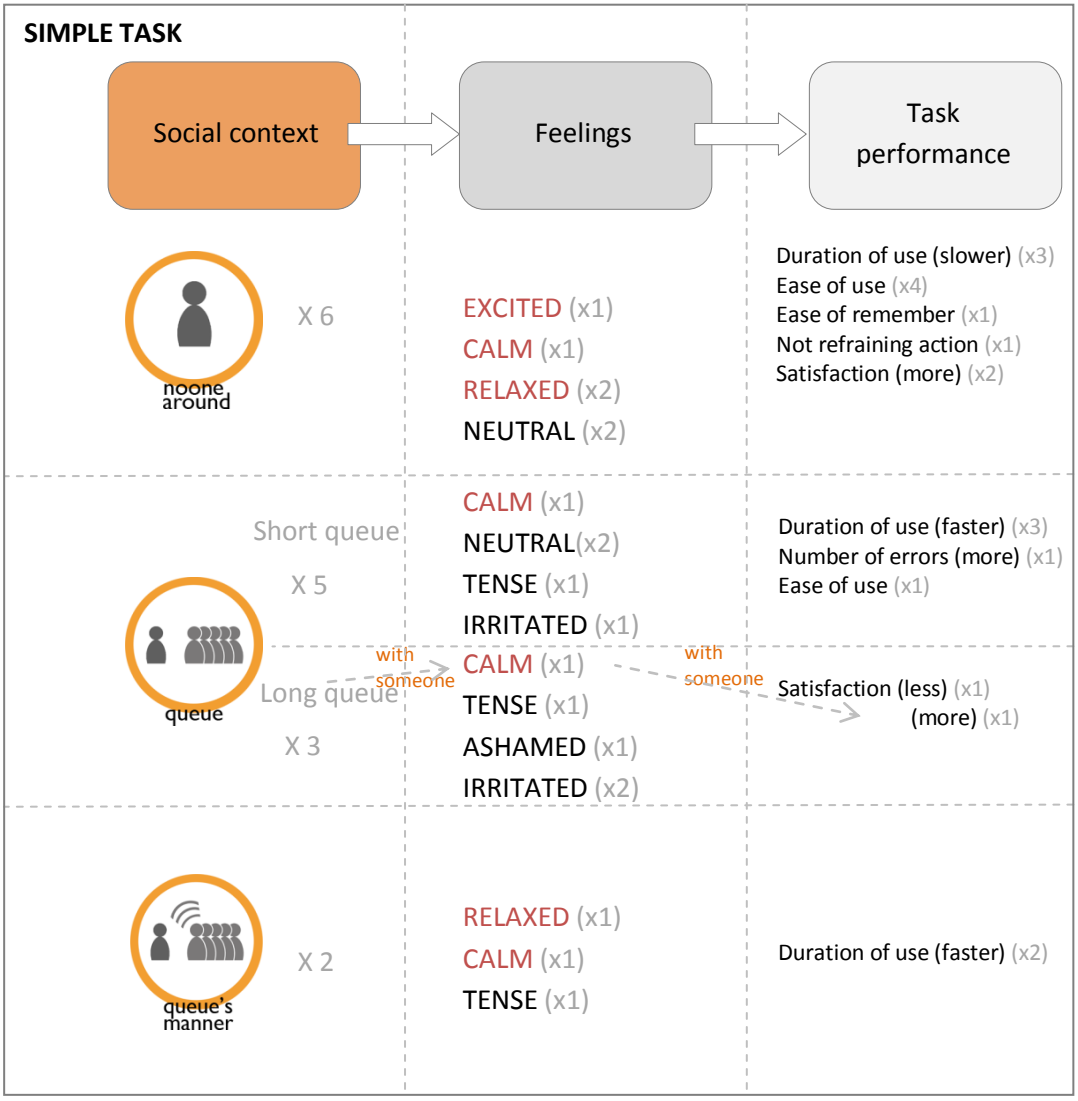


Figure 4.18 Social context – feelings – task performance relationship in simple tasks

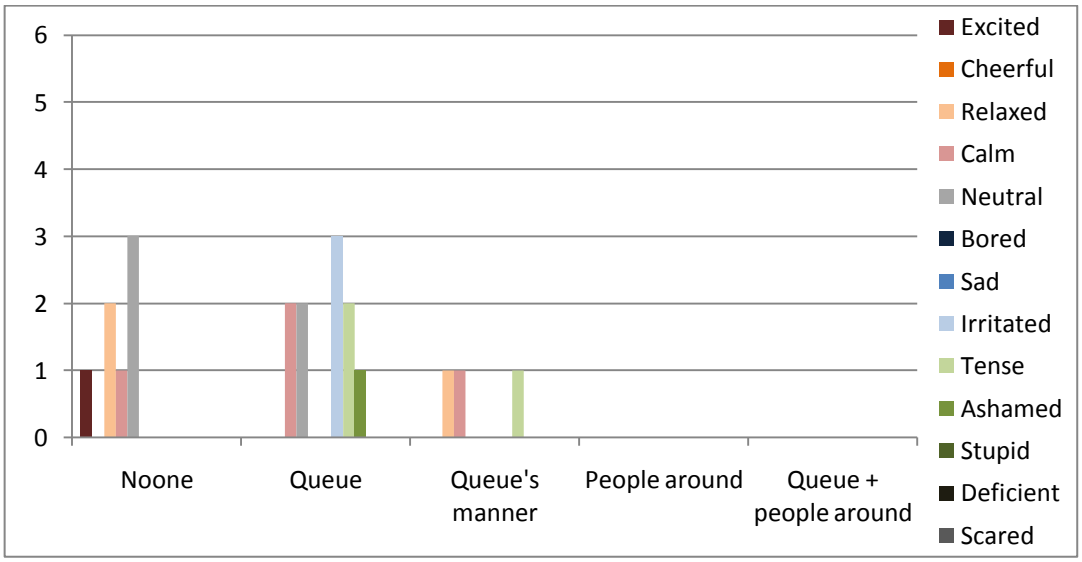


Figure 4.19 Simple task: Feelings elicited in diverse social contexts

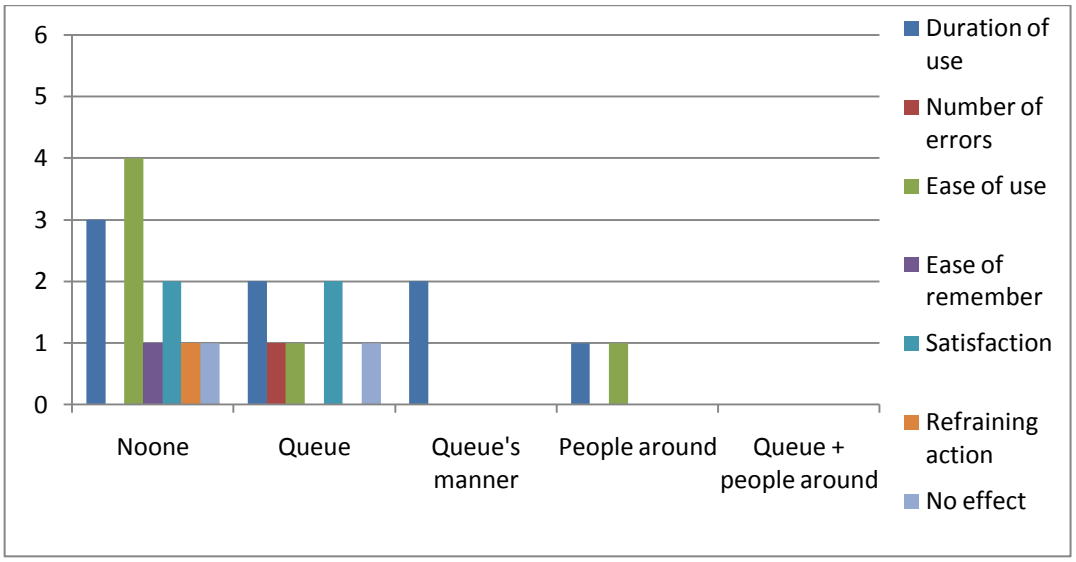


Figure 4.20 Simple task: Tasks performances affected by the feelings elicited in diverse social contexts

In simple tasks, it is seen that when there is no one around, the participants elicited positive feelings or just felt neutral, which affect the task performance positively considering the ease of use, ease of remember, satisfaction. Also, participants tended to use the products more slowly. However, when there are people in the queue and also when the people in the queue were nervous and hurrying, the participants usually had negative feelings. When there is no one around participants usually felt neutral, calm, or relaxed. One participant mentioned that if there had been other people, he would have stopped using the product and tried another one. In few of the cases, participants did not affect negatively from the presence of other people felt relaxed and/or calm. Even one participant declared to feel calm when there were many people in the queue; yet, added that this was due to being with a company. Moreover, in one experience with a short queue (with 1 person), the participant said that he did more errors not just because of the person waiting for him, but because of his accompanying friend. He clarified by adding that he felt distracted and did more errors.

While doing money related tasks, security issues involved. So, there encountered also different feelings from the previously mentioned ones; such as feeling scared and insecure. Figure 4.21, 4.22, and 4.23 demonstrate all the feelings elicited in money related tasks and their consequences. Feeling (in)secure was translated as scared - participants also resorted the terms insecure and scared alternately - in the later graphs to gather them under a common term.

Figure 4.21 Social context – feelings – task performance relationship in money related tasks

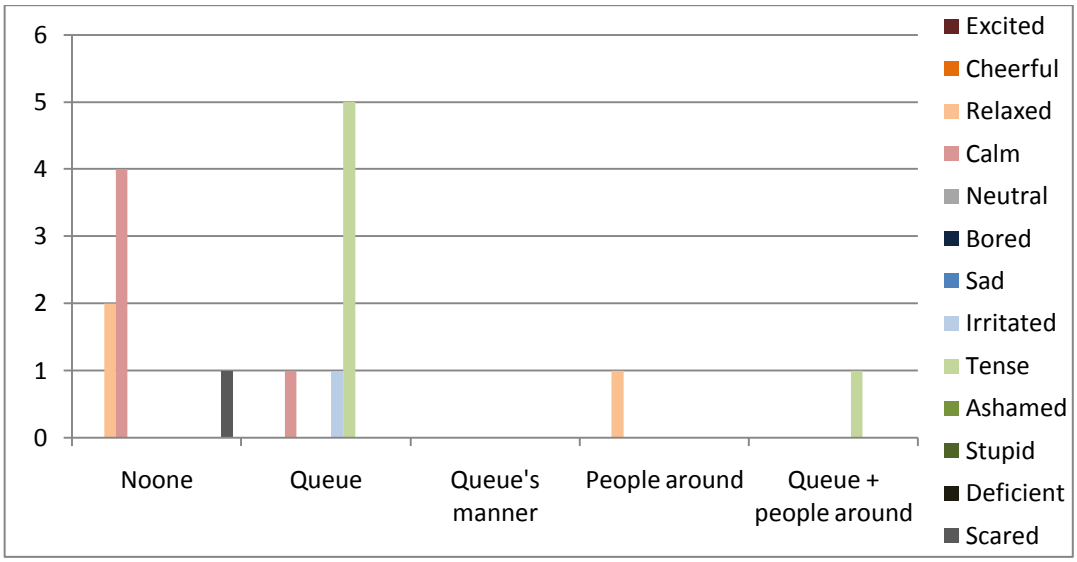


Figure 4.22 Money related task: Feelings elicited in diverse social contexts

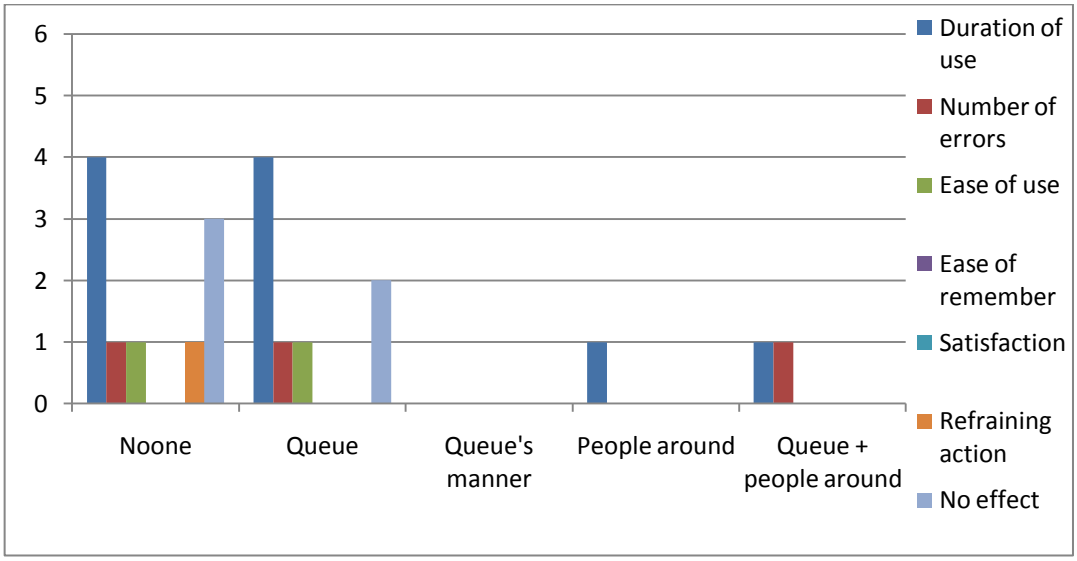


Figure 4.23 Money related task: Tasks performances affected by the feelings elicited in diverse social contexts

In money related tasks, the participants elicited many positive feelings when there is no one around. These feelings also influenced the task performance positively considering the ease of use and number of errors. Also, they could use the products more slowly and do the tasks without refraining. However, one participant felt insecure, and so scared, on contrary to the other positive feelings and one secure feeling. It was mentioned that if a task involve money and security issues, being alone in an environment felt insecure. Also, one participant mentioned that she got scared since the ATM she was using was in a little room and there came another person so she could not have escaped if something

happened. Feelings elicited in the presence of other people were usually negative. These feelings had impact on the duration of use, number of errors and ease of use. Keeping other people wait and not wanting to be seen by other were the main motives for faster action. Just two of the participants mentioned that they felt relaxed and calm; yet, both of their durations of use were affected. Even if feeling more positive, they used the products faster.

Few experiences were mentioned regarding the time limited tasks. The social context, feeling, and task performance relationship can be seen in Figures 4.24, 4.25, and 4.26; the former one being the general view and the other ones demonstrating in detail.

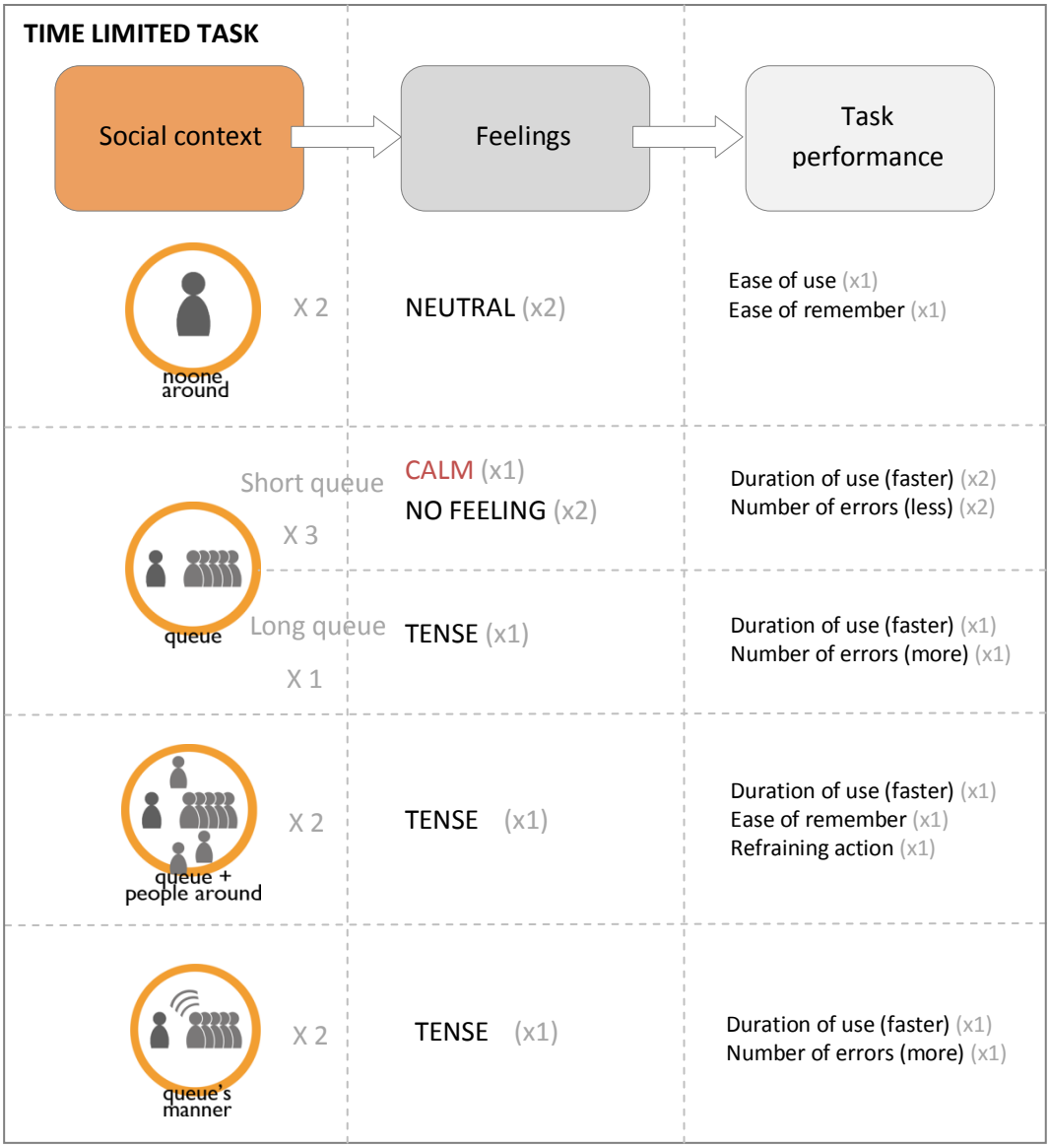


Figure 4.24 Social context – feelings – task performance relationship in time limited tasks

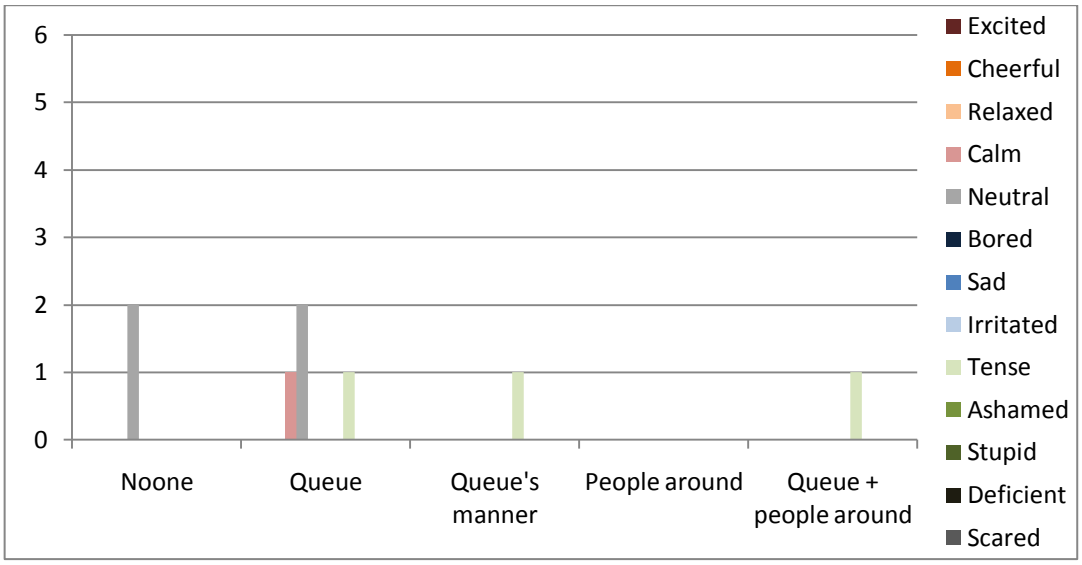


Figure 4.25 Time limited task: Feelings elicited in diverse social contexts

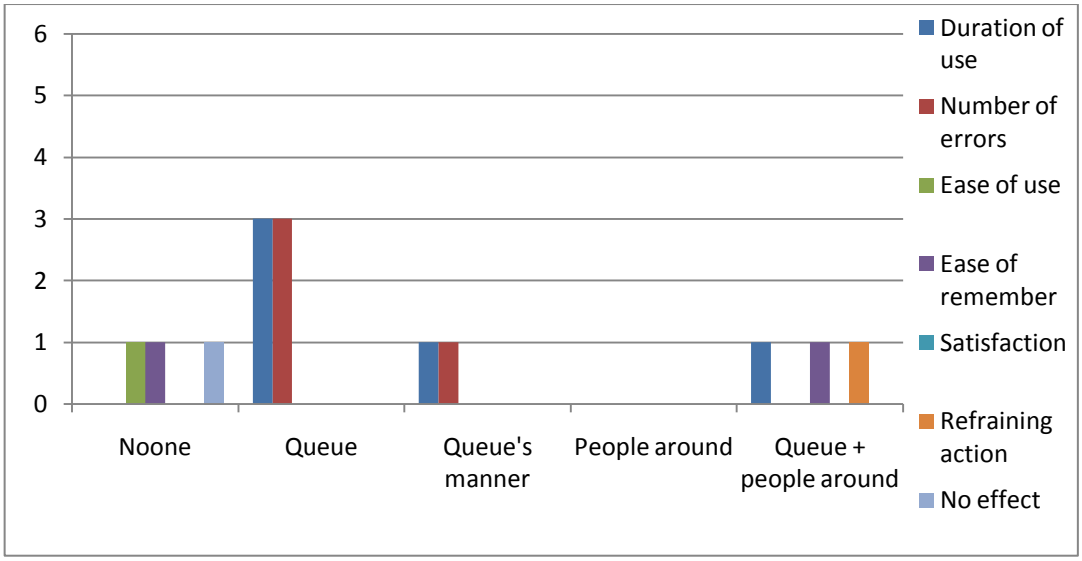


Figure 4.26 Time limited task: Tasks performances affected by the feelings elicited in diverse social contexts

Most of the participants felt tense in the time limited tasks if other people were present, which affect the duration of use, number of errors made, and rarely, the ease of use. Participants tried to use the products faster and did more errors. Ease of use deceased, too. Just one participant felt calm when there was a short queue behind. Also, in one experience, a participant said that he made fewer errors if there was someone behind since he should not fail and he tried to focus more. In the absence of other people, the participants had no feelings or felt neutral, and this influenced the ease of use and remember positively.

There were few experiences with the unfamiliar products and tasks. There was one experience for each of the social context type. These experiences were examined in detail in Figures 4.27, 4.28, and 4.29.

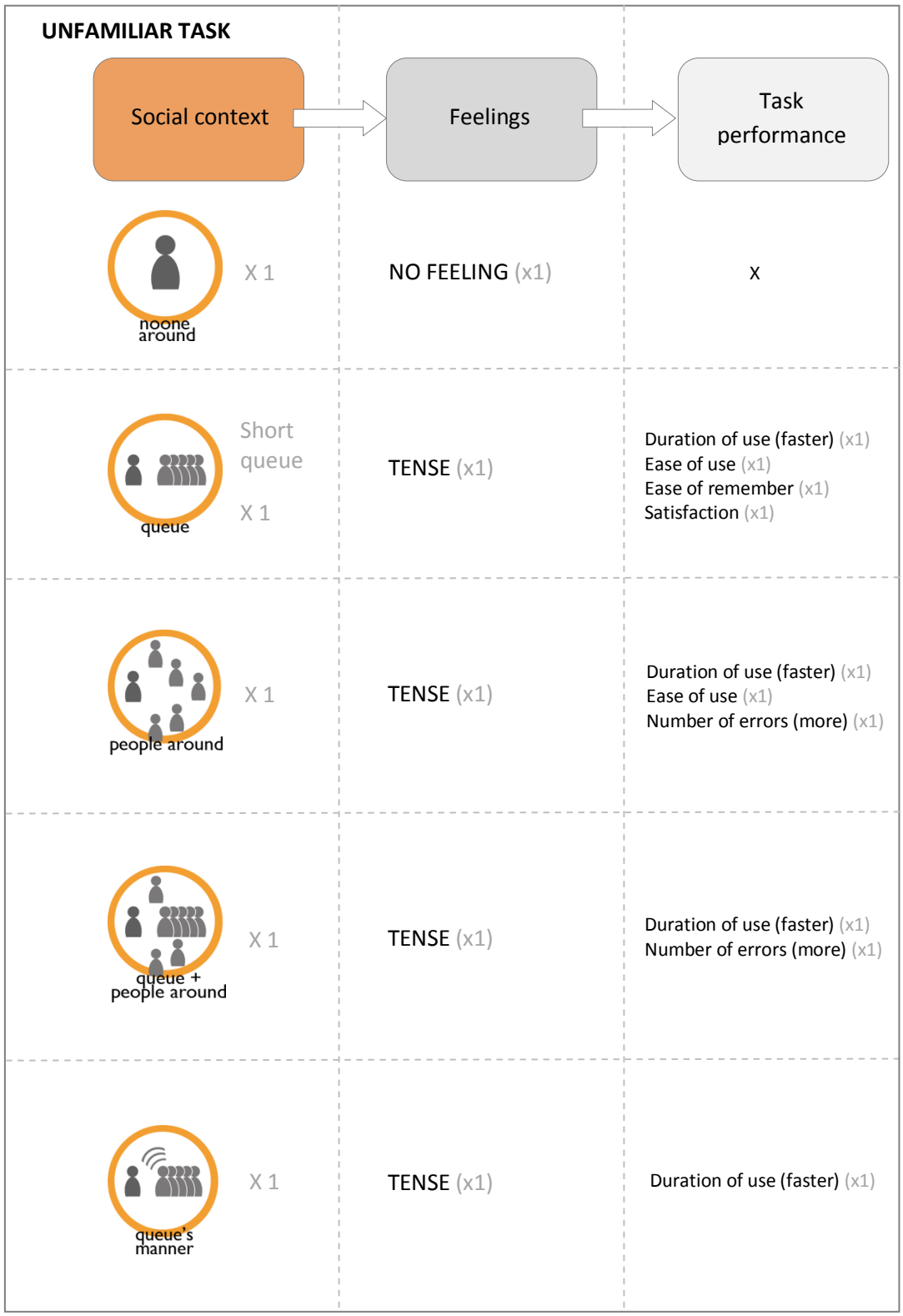


Figure 4.27 Social context – feelings – task performance relationship in unfamiliar tasks

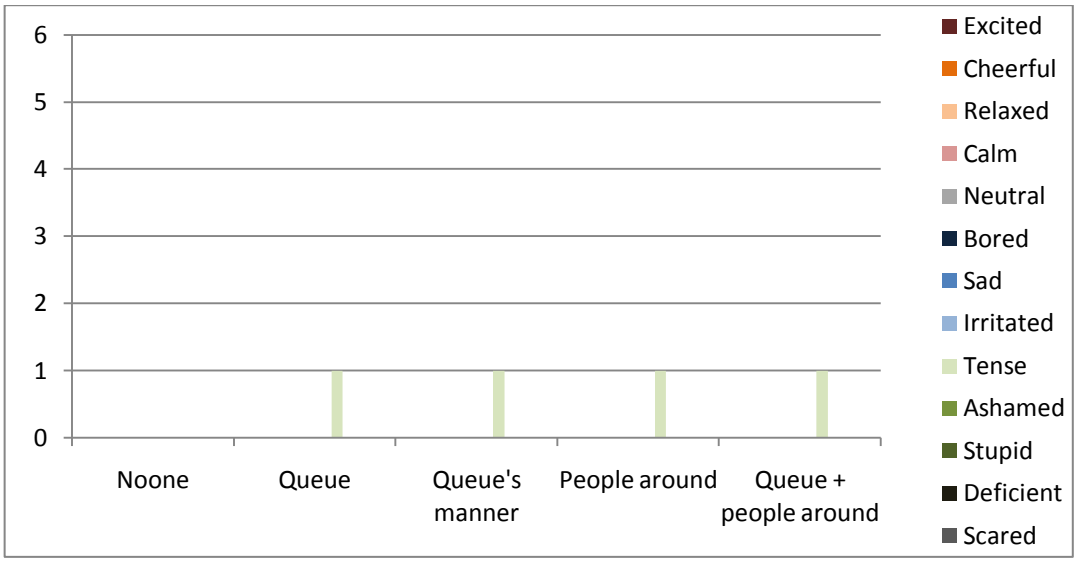


Figure 4.28 Unfamiliar task: Feelings elicited in diverse social contexts

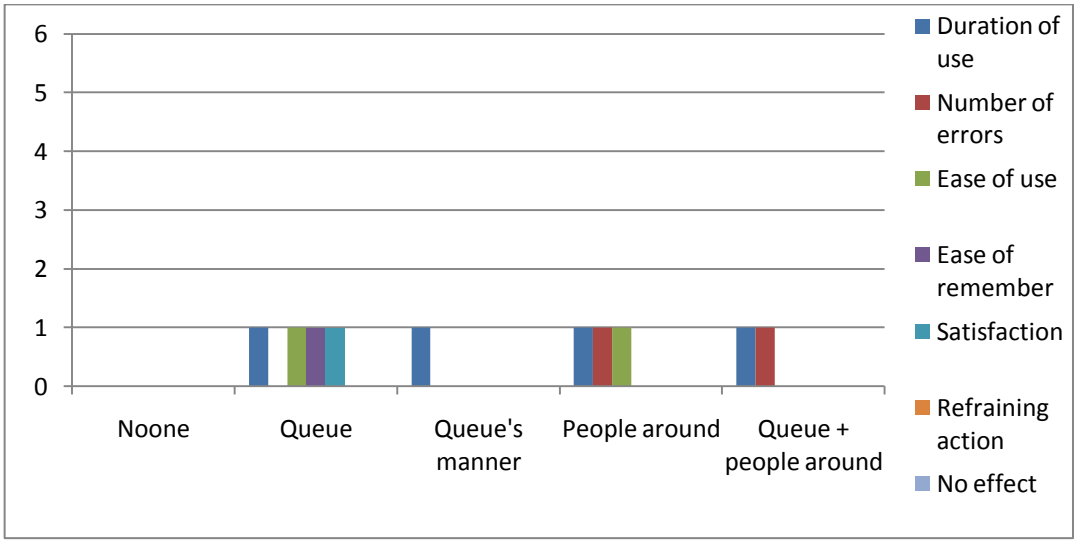


Figure 4.29 Unfamiliar task: Tasks performances affected by the feelings elicited in diverse social contexts

As can be seen in the figures about the unfamiliar tasks, in all of the situations where there were people around and in the queue, participants felt tense. Thus, they tried to use the products faster and did more errors. Moreover, it was more difficult to use and remember. Satisfaction was affected, as well. When there was no one around, one participant had no feeling and there was no change in his task performance. Nonetheless, one participant added that having people around to consult or to ask help could sometimes be better if the task is unfamiliar.

4.2.4 Discussion

In this study, parallel evidences were found with the online questionnaire. As can be seen from Figure 4.17, **social context had a great influence in all different task types** which were defined in the initial preliminary study. Different from the online questionnaire, participants of this study mentioned their fresh experiences. So, they could mention about the amount of the people in the context of the experience and their feelings regarding the diverse use stages. Although feelings were collected regarding the pre-use stage, they were not incorporated in the analysis. However, it was necessary to make this differentiation in the booklets given to the participants because participants could mix their feelings about pre-use and use stages while mentioning about their experiences and also retrieving precise and accurate data about the social context's influence on feelings was crucial.

Moreover, according to the Figure 4.17 (considering the percentages), **social context's affects were higher respectively in money related tasks, time limited tasks, unfamiliar tasks, and simple tasks**. This order was also same in the online questionnaire study (see Figure 4.3 and 4.4). Unlike the preliminary study, there were fewer factors mentioned in the experiences. Usability and social context were the main considerations. The reason of this could be the fact that in the online questionnaire past experiences were asked, so, the answers could return in more variety. On the contrary, fresh experiences were investigated in the booklet study with predefined concerns. Also, it is not frequent to encounter with the technical problems all the time and with diverse types of products incorporating different aspects, as well. Thus, in the recalled experiences it is more likely to retrieve divergent aspects.

Furthermore**, the links between the social context, feelings, and task performances were quite similar to the initial preliminary study.** The presence of the queue, people around apart from the queue, and manners of the people (angry, impatient, complaining, rushing, and so on) in the queue caused mainly negative feelings in the user of that public product. These feelings made participants to use the products faster, do more errors, have more difficulty in use and remember and less satisfaction. Also, they quitted their actions or refrained from the actions that they wanted to perform. However, having a company reduced the negative feelings of the presence of other people in one experience.

Nevertheless, again, especially when a place feels insecure due to the location and time, users felt secure if there were people in the queue or around.

All figures related to the different task types imply that participants could also feel positive if there is a short queue. It can be inferred that though a queue either short or long usually bring about negative feelings, short queue is more prone to yield positive feelings, as well. Also, it is seen in those figures that, not all of the emotions caused with a change in the task performances, or vice versa, not all changes in the task performances were caused by the emotions. In few cases although the participants felt neutral or had no feeling, a change in the task performance regarding the social context; such as using the products faster, were observed.

In conclusion, there are abundance of links between different social contexts, feelings, and task performances. Yet, the most apparent thing that can be said is that the presence of other people causes negative feelings and impairs task performances. When there is no people around, users are more likely to feel neutral and positive; hence, resulting in facilitation in task performances. In the money related tasks the positive effects caused due to the absence of other people decrease. Especially, money related tasks yields bit diverse results since security is way more important than the other tasks. So, no matter that the effects of the social context could alter slightly. Moreover, some cases are found to reduce the negative effects of the presence of other people on feelings and task performances. When there is company, users can feel the social pressure less.

It is also important to add that feelings can be observed both due to the social context and the properties of the public products and related concerns related to these products. In other words, a person can elicit certain feelings because of the people around and this affects how she or he interacts with the product. Also, the product properties can cause certain feelings which intensify or diminish the affection from the presence of the other people (Figure 4.30).

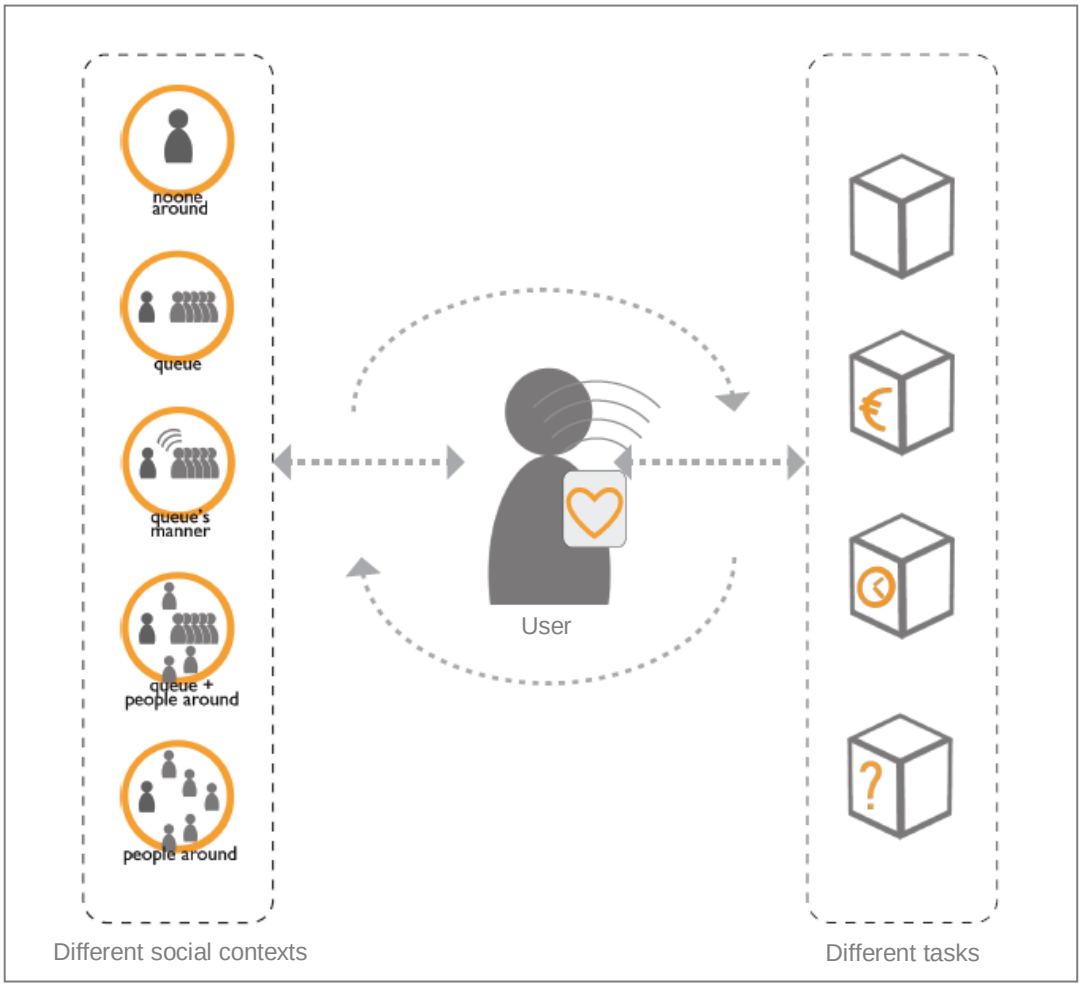


Figure 4.30 Public product-user interaction

Furthermore, the results point out some essentialities regarding design interventions that can be considered to eliminate, or at least reduce, the negative effects of the social context. Particularly, in the money related tasks security, and thus, privacy is of great importance. The product's screen, feedback possession, feedback conformity (visual or sound), its location or isolation, and so on, gain urgency. It was seen that while the information from the money related public product should be invisible to the other people, the visibility of it is preferred in some simple task related products, especially when there is a problem due to the product's operation. Usually, users do not want their mistakes to be understood by the others, so, if incorporated, sound feedback should not be too loud or the information on the screen should not be seen by the others.

Though having different methods, depths and contents, the result of the two preliminary studies validate each other concerning the importance of the social

context and the relationships between the social context, feelings and task performances. This second preliminary study also adds on the first one by looking at the changes in the task performances due to the social context and the corresponding feelings.

This chapter has revealed the findings from the preliminary studies which also shaped the main study. In the next chapter, this main study is demonstrated which aimed to test the self reports gained from the participants in the preliminary studies in real situations. Furthermore, it also intends to elaborate on the product public properties which can have a great influence on the way users are affected from the social context.

CHAPTER 5

MAIN STUDY

After the preliminary studies, another study was conducted. The results of the preliminary studies constituted the input to be used in this main study, which is explained in the following sections.

5. 1 Method

Aiming at exploring the effects of the social context on user experience with public products and its relation with the public product design in more detail, and examining how these findings correspond with the ones retrieved from the preliminary studies, a main study was conducted. The specific research questions of this study were as follows.

- How the user experience with public products, more specifically the feelings and task performances of the users, change if there was no one around, if there was people around in a scattered way, and if there is a queue behind the user?
- Are there differences between how the users perceive the effects of the social context and the actual influence of the social context?

This study basically incorporated the *use of a preselected public product*, a coffee machine in the Industrial Design Engineering faculty of TUDelft, within simulated (controlled) social contexts, and the *confrontation of the participants with their experiences* through their video recordings. The types of the above mentioned simulated social contexts were decided according to the results of the preliminary studies which were:

- absence of people
- presence of other people in a queue
- presence of other people around

Few of the challenges involved in the main study were the selection of the public product and the tasks to be given to the participants. A coffee machine was selected since it is one of the most prevalently used public products in our daily lives. However, in order to standardize the concerns for each of the participants, specific tasks were incorporated. The coffee machine utilized in the study was mainly used by the faculty staff, so students were not familiar to it. Also, by giving the specific tasks, the difficulty and the familiarity of the tasks were tried to be standardized for each participant as much as possible.

Before conducting the main study, a pilot test was run with three participants. Each of the participants was involved in one of the three social contexts mentioned above. It was not required to modify too many things in the set-up after the pilot test. Few changes were made in the question formats. After revising the set-up (Appendix D), the main study was conducted.

The first part of the study was about using the product. Initially, participants were informed that they were going to be video-recorded. So, their consents were taken. No hint was given to the participants about the social context. This was of great significance in order not to direct the participants and retrieve inaccurate results. Following an introduction, participants were given a two-sided task card which involved different tasks in each side (Figure 5.1). After, participants were asked to buy a cup of coffee from the selected coffee machine doing both tasks. However, it is said that they can pass to the second task only after they conducted the first task. In one task, participants were asked to buy a certain type of coffee, the reason of which was explained above, but in the other task they were asked to buy a coffee according to their preferences. The reason of involving preferences in the second task was to be able to understand whether the absence or presence of other people would have an effect on duration of thinking and selection, as well. Task 1 and 2 were given to half of the participants in different orders.

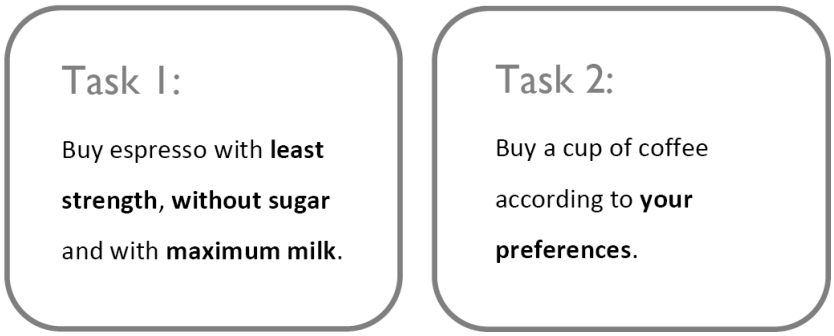


Figure 5.1 Task cards used in the main study

The second part of the study was related to the self-confrontation. Participants were taken to a separate place to watch their video records. This self confrontation session involved watching the video-records, filling in a questionnaire, and a semi-structured interview.

Before watching the video, participants were given the questionnaire and asked to fill in the first part of the questionnaire. In this part of the questionnaire, they were required to answer demographics questions and to rank how familiar they were to each task (Figure 5.2). Although the intention was standardizing the familiarity of the specific task for each participant, their experience levels can be different due to their frequency of use concerning the other types of coffee machines. Then, video-records were shown, about which they were questioned concurrently. For instance, when a participant was checking his or her surrounding, the reasons were asked to understand whether it had links to the social context.

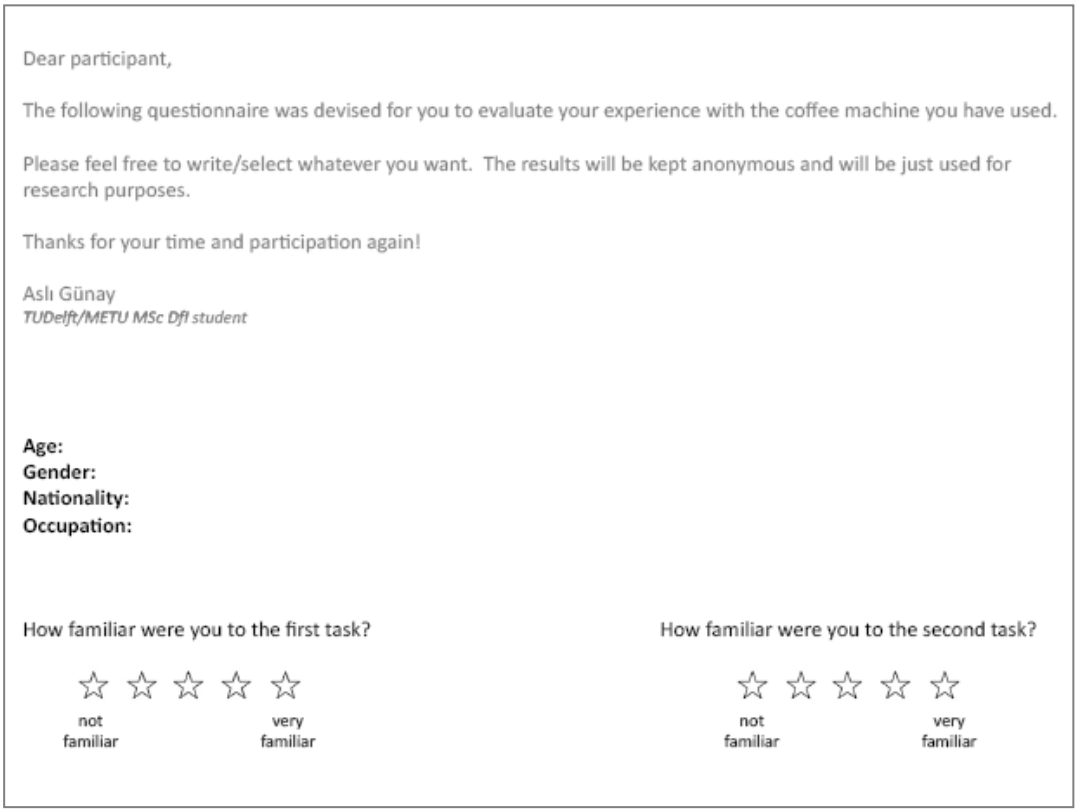
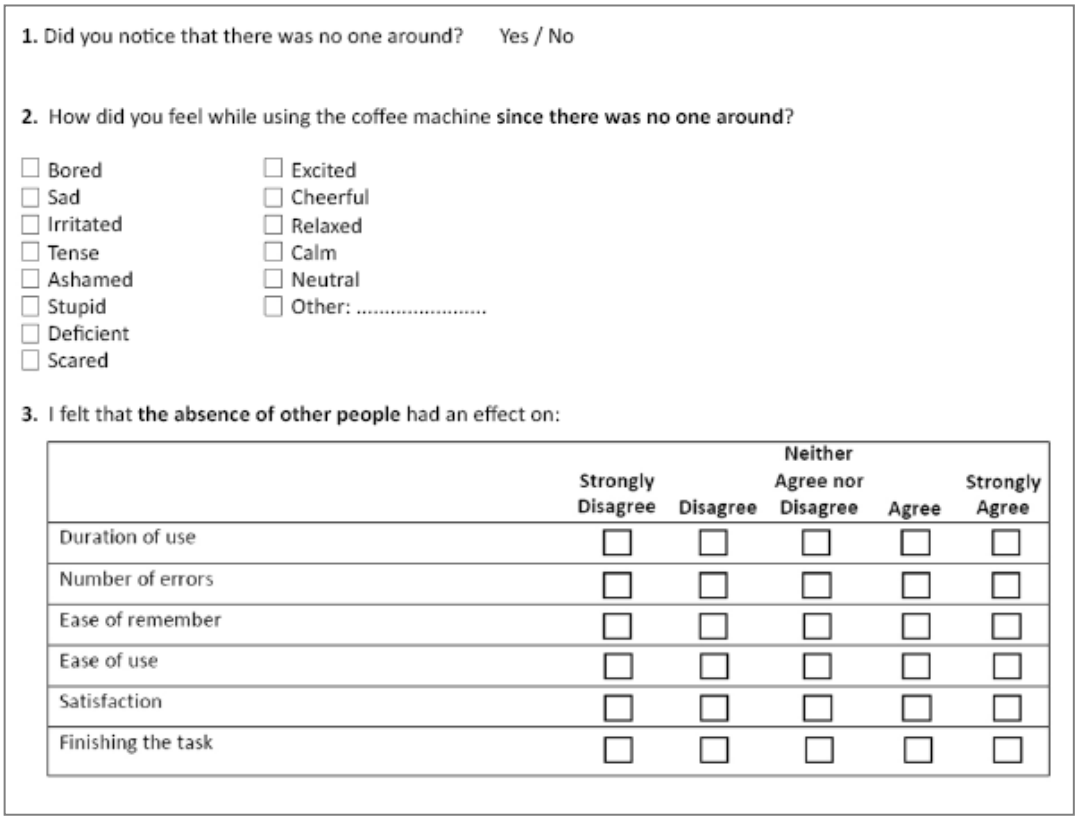


Figure 5.2 First part of the questionnaire

In the final part of the questionnaire, there were questions merely about the social context (Figure 5.3). The feelings and task performances of the participant were investigated in relation to the social context while they were using the coffee machine. Hence, there were three types of questionnaires, for each context (Appendix E).Firstly, in order to comprehend if the participants were aware of the social context, they were asked whether they had noticed it. Then, how they felt due to the social context was asked. In this main study, the mood chart which had been utilized in the preliminary studies was not demonstrated. Yet, feelings which had been gathered as a result from the preliminary studies were used in order to be able to compare and discuss the results of all studies. Also, as aforementioned, task performances were wanted to be examined in detail; hence, different task performance measures were presented to the participants. Participants had to rank to which extent they agreed to the each task performance change due to the presence or absence of the other people (Figure 5.3).



1. Did you notice that there was no one around? Yes / No

2. How did you feel while using the coffee machine **since there was no one around**?

☐ Bored	☐ Excited
☐ Sad	☐ Cheerful
☐ Irritated	☐ Relaxed
☐ Tense	☐ Calm
☐ Ashamed	☐ Neutral
☐ Stupid	☐ Other: .....
☐ Deficient	
☐ Scared	

3. I felt that **the absence of other people** had an effect on:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Duration of use	☐	☐	☐	☐	☐
Number of errors	☐	☐	☐	☐	☐
Ease of remember	☐	☐	☐	☐	☐
Ease of use	☐	☐	☐	☐	☐
Satisfaction	☐	☐	☐	☐	☐
Finishing the task	☐	☐	☐	☐	☐

Figure 5.3 Second part of the questionnaire

Finally, when the participants finished filling in the questionnaires, questions related to their answers were posed. Besides, there were questions addressing the design of the public products. Some of these questions were:

- Can you explain a bit more in detail why you felt as such (considering the presence/absence of the people)?
- Would you feel the same if there were (not any) people?
- According to you which product properties increased or decreased the effects of the social context and how they can be improved?

The interview parts were audio-recorded. All the session, including both the use and post-use sessions, lasted between 10 and 15 minutes.

To summarize, this study endeavoured to establish relationships between three social contexts, users' feelings and task performances, in addition to the product properties playing role in these relationships. The study is important not just to delve into these relationships more, but also to see the similarities and differences

between the self reports of the experiences in the preliminary studies and the actual experiences observed in the last study.

5.2 Sample

The main study was conducted with 90 participants (42 Female, 48 Male) utilizing availability sampling. 30 participants were involved in each of the three social context types. The ages of the participants were between 18 and 35. There were 63 MSc students (60 industrial design, 2 architecture, 1 mechanical engineering), 20 BSc students (17 industrial design, 3 aerospace engineering), 4 PhD students (3 industrial design, 1 chemical engineering), 1 architect, 1 chemical engineer, 1 industrial designer. Moreover, the participants were from diverse nationalities. Again, by composing a sample with different nationalities, the probability of finding evidences related to particular culture or nationality was prevented.

5.3 Analysis and Results

In this study, there were different types of data to be handled. It was aimed to test the validity of the preliminary study results within a simulated environment. For this, the sample for each condition was kept equal with 30 participants as mentioned before, paving way for a quantitative analysis. Furthermore, it was also necessary to do a qualitative analysis for revealing the product properties involving in the user experience with public products. Therefore, both qualitative and quantitative analyses were performed.

First of all, transcriptions of all video/audio recordings and questionnaires were done and collected in a single document. While doing transcriptions, great attention was paid to the categorization of the data related to different aspects such as user demographics, actual use conditions (retrieved from the video recordings), perceived use conditions (retrieved from the questionnaires), feelings, and so on. Then, according to the different objectives of the study, relevant data were taken out and dealt with separately which are explained in the next sections.

5.3.1 Quantitative Analysis and Results

According to the aim of this main study, the most important data to delve into were the feelings and actual task performances. Briefly, the relationships on which it was aimed to shed light were:

- Different *social contexts'* effects on *actual task performances* (durations and number of errors)
- Different *social contexts* 'effects on *perceived task performances* (durations, number of errors, ease of use, ease of remember, satisfaction, and finishing task)
- Differences between the *actual task performances* and *perceived task performances* (durations and number of errors)
- Different *social contexts'* effects on *feelings*
- *Feelings'* role in *task performances*

In order to explore the above relationships, SPSS (MANOVA) was utilized. Fundamentally, using Pillai's trace, there was a significant effect of different social context conditions on task performances and feelings, V=0.72, F(24,136)=3.16, p< .05.

For the actual duration of use and number of errors, each task (specific and preferred) and total results were handled separately, as well. Significances found in actual number of errors and feelings. There were no significant effects on actual duration of use and perceived task performances. Nonetheless, tendencies and patterns were found which could be beneficial to understand the entire relationships. All these findings are shown in the subsequent figures. In the Figures 5.4 - 5.16, condition 1, 2, and 3 stands respectively for conditions when there was no one, when there were scattered people around, and when there was queue. Also, y-axes refer to the estimated marginal means.

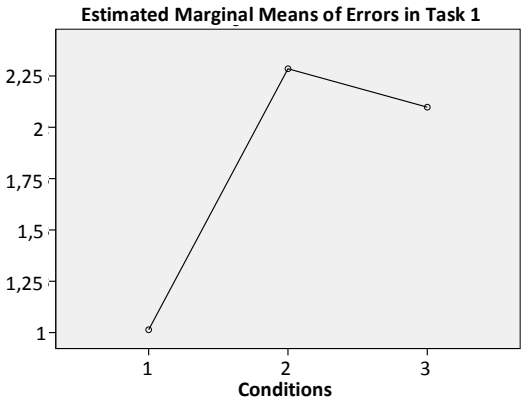


Figure 5.4 Task 1 errors in different social contexts

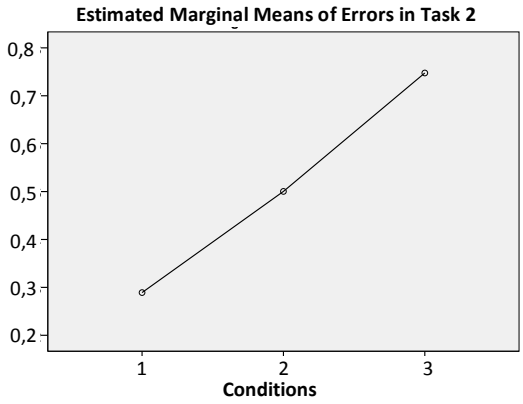


Figure 5.5 Task 2 errors in different social contexts

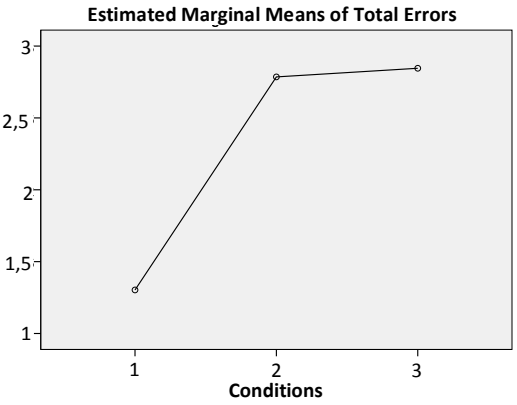


Figure 5.6 Total errors in different social contexts

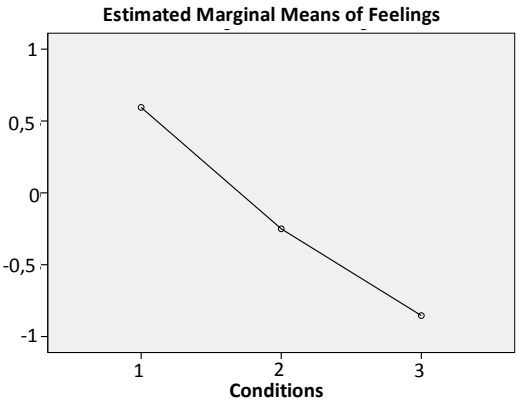


Figure 5.7 Feelings in different social contexts

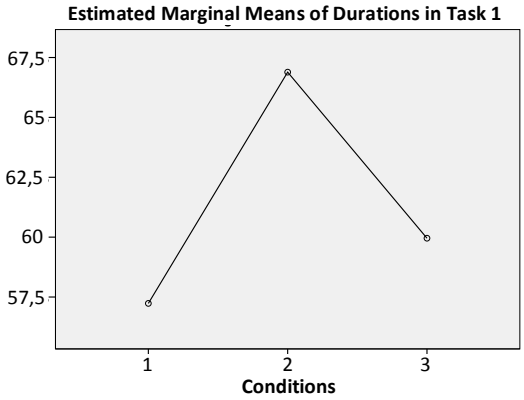


Figure 5.8 Task 1 durations in different social contexts

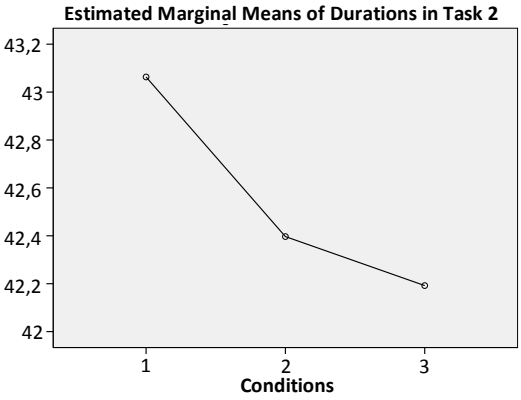


Figure 5.9 Task 2 durations in different social contexts

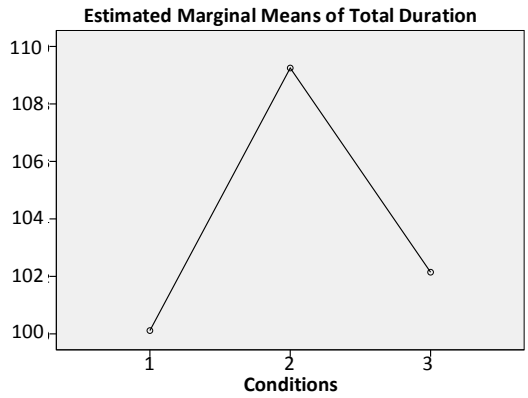


Figure 5.10 Total durations in different social contexts

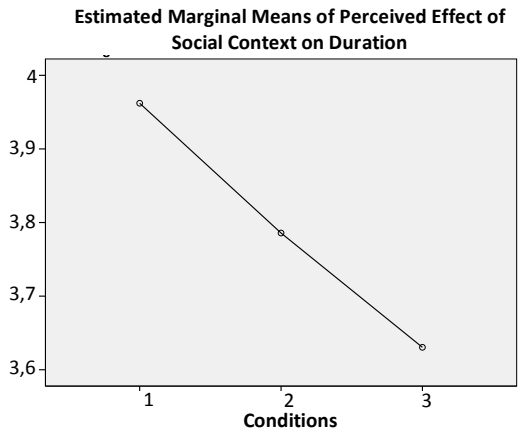


Figure 5.11 Perceived effects of different social contexts on duration of use

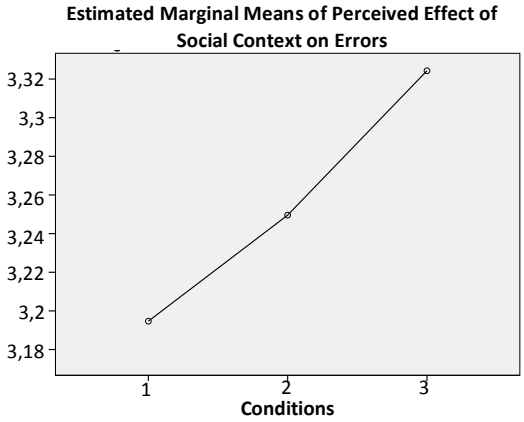


Figure 5.12 Perceived effects of different social contexts on number of errors

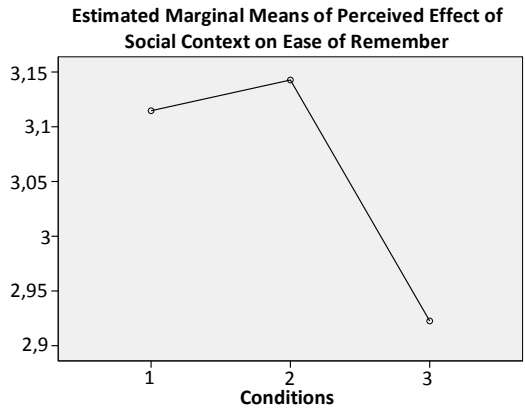


Figure 5.13 Perceived effects of different social contexts on ease of remember

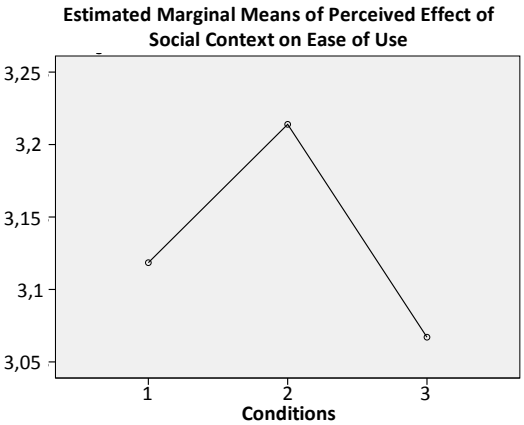


Figure 5.14 Perceived effects of different social contexts on ease of use

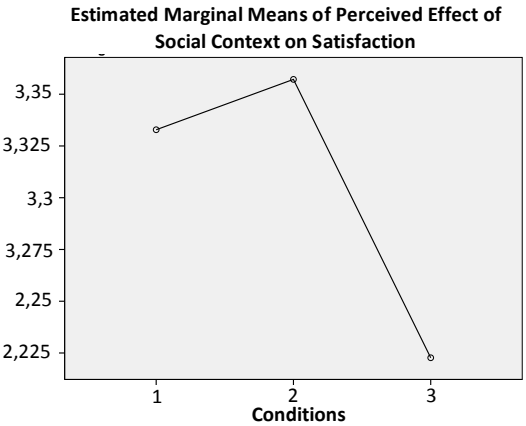


Figure 5.15 Perceived effects of different social contexts on satisfaction

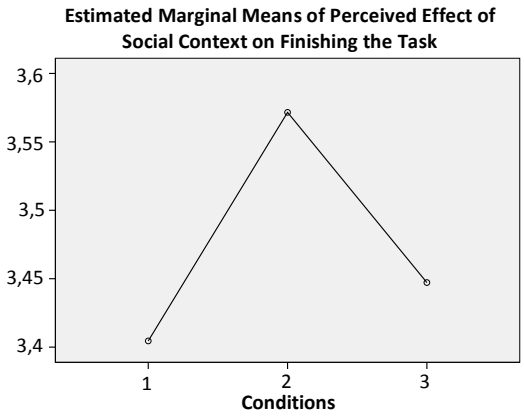


Figure 5.16 Perceived effects of different social contexts on finishing tasks

Firstly, data in which significances were found are explained in detail below.

There was a significant effect of social context on the number of errors done while conducting the specific task (Task 1). Figure 5.4 demonstrates the variations between these errors according to different social contexts. It is seen that participants did less errors when there was no one compared to the conditions when people were present. Paying attention to the means of errors, which are the numbers presented in the y-axis of the graph, the number of errors when there were people scattered around and when there were people in the queue appear to be similar. However, there observed a descending trend between these last two conditions.

In the task during which the participants had decided what to buy (Task 2), significances were found for the number of errors, as well (see Figure 5.5). As seen in Figure 5.5, the means of errors when participants conducted more familiar tasks were approximate in various conditions, though the trend was slightly ascending.

After investigating the errors for each task, total number of errors was also examined (Figure 5.6). It is seen as general view that more errors were done respectively when there was a queue, when there were scattered people around, and when there was no one. The differences between the conditions when there were people (scattered and queue) were close; however, the difference between the conditions when there were people and when there was no people were greater.

As aforementioned, significances were also found for feelings (Figure 5.7). In Figure 5.7, '-1' stands for the negative feelings, '1' for the positive feelings, and '0' for being neutral. When there was no one, positive feelings were elicited, whilst with the presence of other people feelings started to be negative. It can be seen that when the people were scattered around, the participants felt more neutral, but more negative feelings were elicited when there was a queue. The distributions of specific feelings according to different social contexts are shown below.

Participants felt mainly relaxed (11/30), calm (9/30), and neutral (7/30) when they were alone (Figure 5.17). However, few of the participants elicited negative feelings despite being alone. These participants stated that they felt tense (2/30) because anytime there would be people around. Also, the participant who felt stupid explained that he was not aware of being alone.

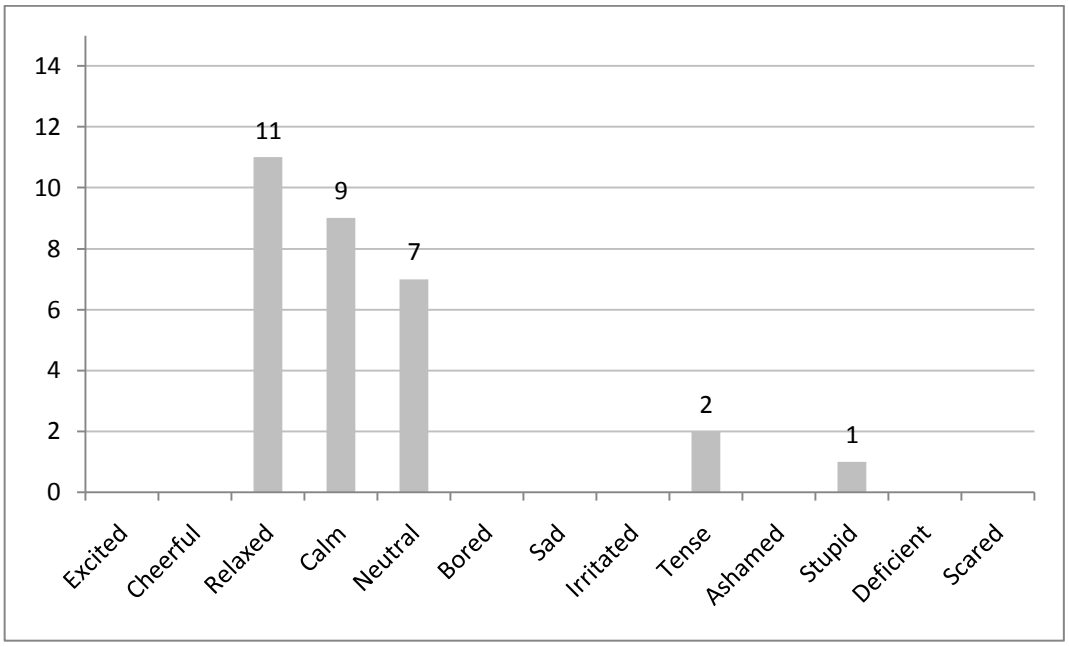


Figure 5.17 Feelings elicited when there was no one

Participants elicited diverse feelings when there were people around (Figure 5.18). Majority of the participants either felt tense (8/30) or relaxed (7/30). The other feelings were diverse.

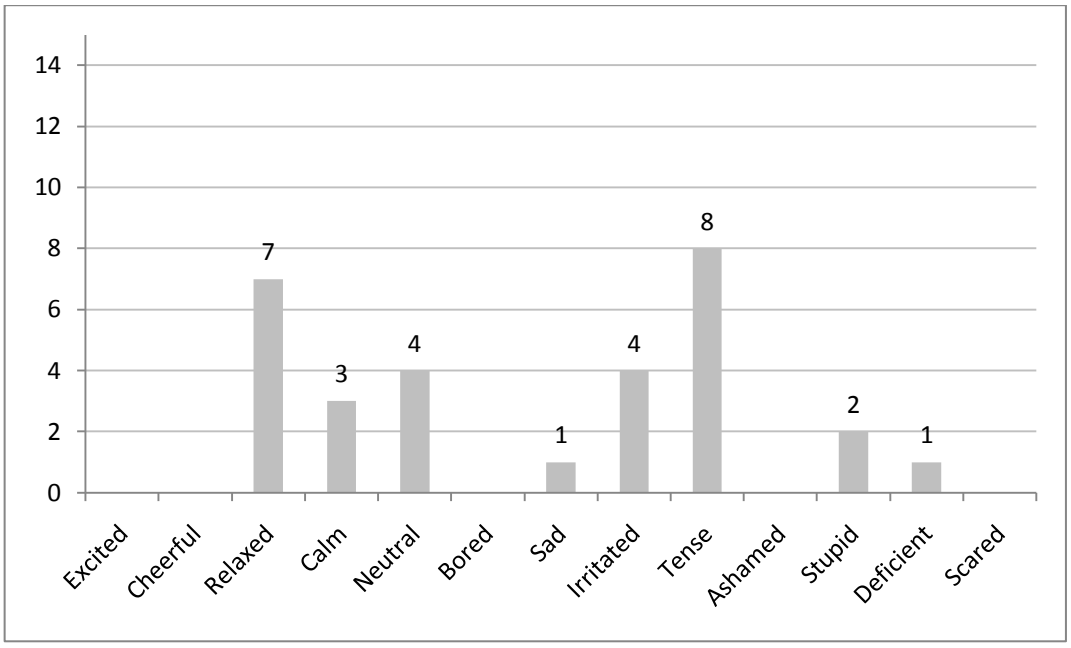


Figure 5.18 Feelings elicited when there were people around

Participants generally felt tense (13/30) when there was a queue behind them (Figure 5.19). There were many other negative feelings such as feeling stupid, ashamed, irritated, deficient, and bored. Few of the participants felt neutral (3/30). However, there was merely one participant who felt positive.

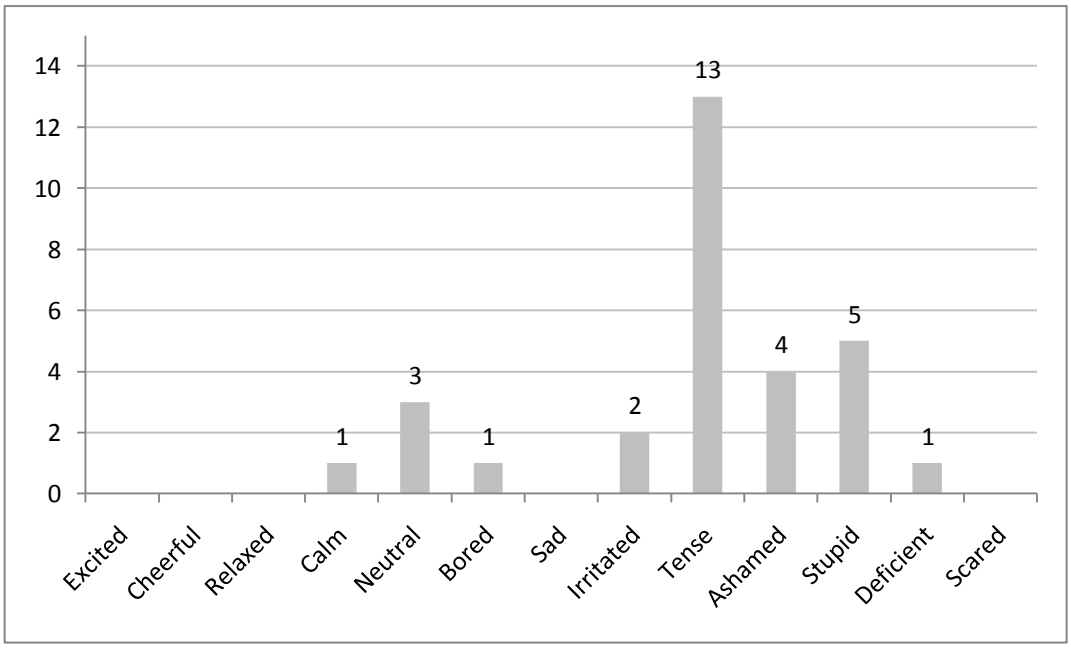


Figure 5.19 Feelings elicited when there was a queue

In addition to the data in which significances were found, it was important to dwell on the other data to investigate the trends and better comprehend the influence of the social context.

Figures 5.8, 5.9, and 5.10 demonstrate the trends for actual durations in specific task, preferred task, and the total duration. There were outliers affecting the means of durations. Hence, the outliers that had z-scores higher than 2,50 (or less than -2,50) were removed.

Participants finished the unfamiliar task (see Figure 5.8) when there was no one around and when there was a queue in approximate durations, though the duration was longer in the latter. The longest duration was observed when there were people around in a scattered way.

As can be seen in Figure 5.9, the durations when participants bought a coffee according to their preferences were almost similar. However, there was a descending trend in the duration looking at the conditions when there was no one, when there were scattered people around, and when there was queue respectively.

The trend in the total duration resembles to the trend of the duration when participants conducted the specific task (Figure 5.10). The total durations when there was no one around and when there was a queue were approximate, again the latter being slightly longer. When people were scattered around, the longest durations of use were observed.

After looking at the actual task performances and feelings, how users had interpreted the social contexts' effects on their task performances was examined. As explained previously, participants ranked how much they agreed on the effects of the social context on different task performance measures (see Figure 5.3). Figures 5.11 – 5.16 demonstrate these perceived effects of the social context on different task performance measures (1: Strongly Disagree, 2: Disagree, 3: Neither Agree nor Disagree, 4: Agree, 5: Strongly Agree). It is important to highlight that the ranking scale did not address negative or positive influence, but indicates whether there was an effect or not. However, whether the influence was in a positive or negative way was inquired in the semi-structured interviews.

According to the Figure 5.11 participants generally agreed that social context affected their duration of use. They added that when they were alone, they tended to use the product slowly, whereas they tried to use it fast when there were people, especially as a queue.

Figure 5.12 shows that participants almost neither agreed nor disagreed that social context affected how many errors they did, yet the trend was inclining towards agreeing that there was an effect. Participants thought that the presence of other people in queue influenced the accuracy of use more than the condition when there were just people around. The least effect on number of errors was felt when there was no one. However, it is important to pay attention that the means of number of errors in each condition were still too close to each other. Furthermore, participants mentioned that they did more errors respectively when there were people in queue, when there were people around in a scattered way, and when there was no one.

Participants again neither agreed nor disagreed that there was an effect of the social context on ease of remembering while interacting with the product (see Figure 5.13). Nevertheless, tough the intentions was more on agreeing when there was no one and especially when there were people scattered around, the trend was more on disagreeing when there were people in queue.

For the ease of use (Figure 5.14), participants again neither agreed nor disagreed that there was an effect of the social context. However, the general trend was still pointing the slight effect of the social context. These participants basically claimed that the effect was more positive when there was no one; i.e. it was easier to use the product when they were alone. Nonetheless, they thought that the presence of other people affected the ease of use more negatively. According to the Figure 5.14, the highest effects were perceived by the participants when there were scattered people around.

Figure 5.15 reveals that little effect of the social context on satisfaction was perceived. All the participants who had agreed that the social context had an influence on their satisfaction mentioned that the influence was in a positive way when they were alone, but in a negative way when other people were present.

According to the Figure 5.16 participants slightly agreed that the social context had an impact on finishing the tasks. The effects were more obvious to the participants when there were scattered people around.

5.3.1.1 Discussion

This analysis shows apparently that **the social context affected both task performances and feelings in public product-user interaction.** As presumed and as found out after the preliminary studies, participants elicited negative feelings when there were people present; and inferior task performances, regarding the number of errors, were observed. However, unlike expected, no significant effects were found concerning the duration of use.

Basic relationships for each social context (not considering significances) are demonstrated in Figures 5.20, 5.21, and 5.22. The relationships in these figures based on the means and relative magnitudes of the found values. Mainly, task 1 is considered since there observed slighter effects of the social context on task 2. However, even these slighter effects are discussed afterwards.

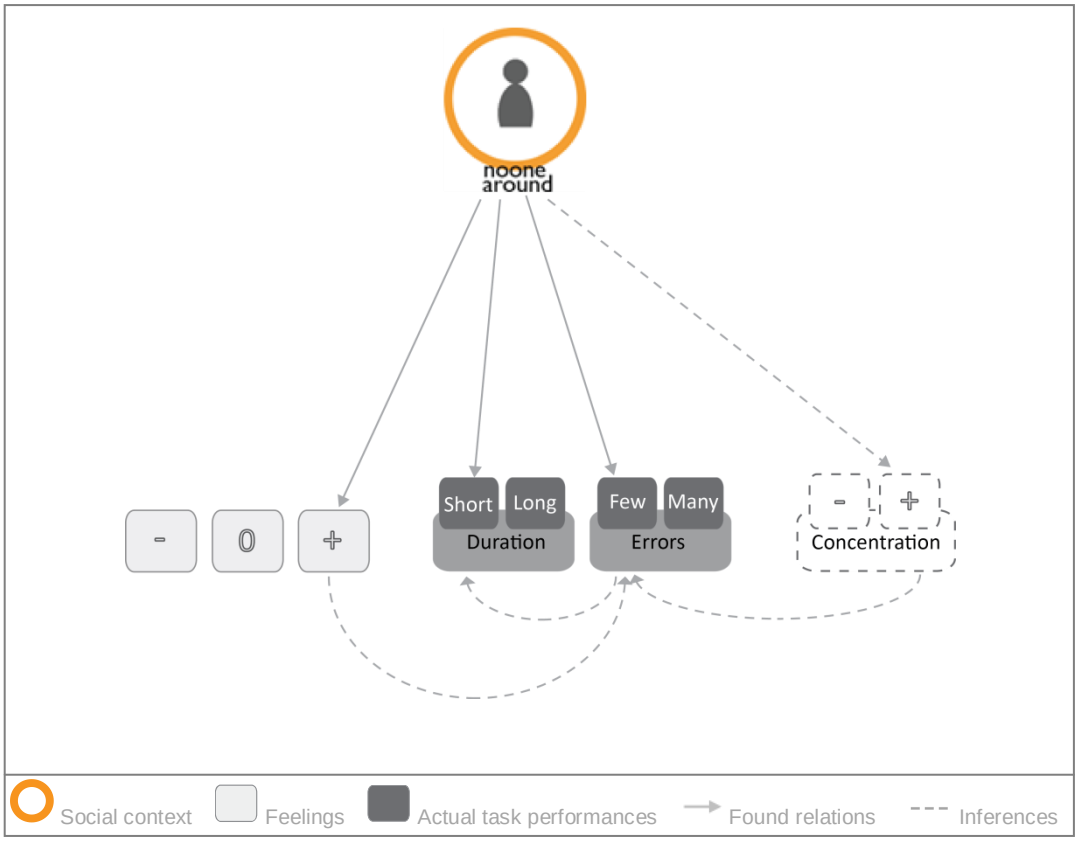


Figure 5.20 Basic relationships when there is no one

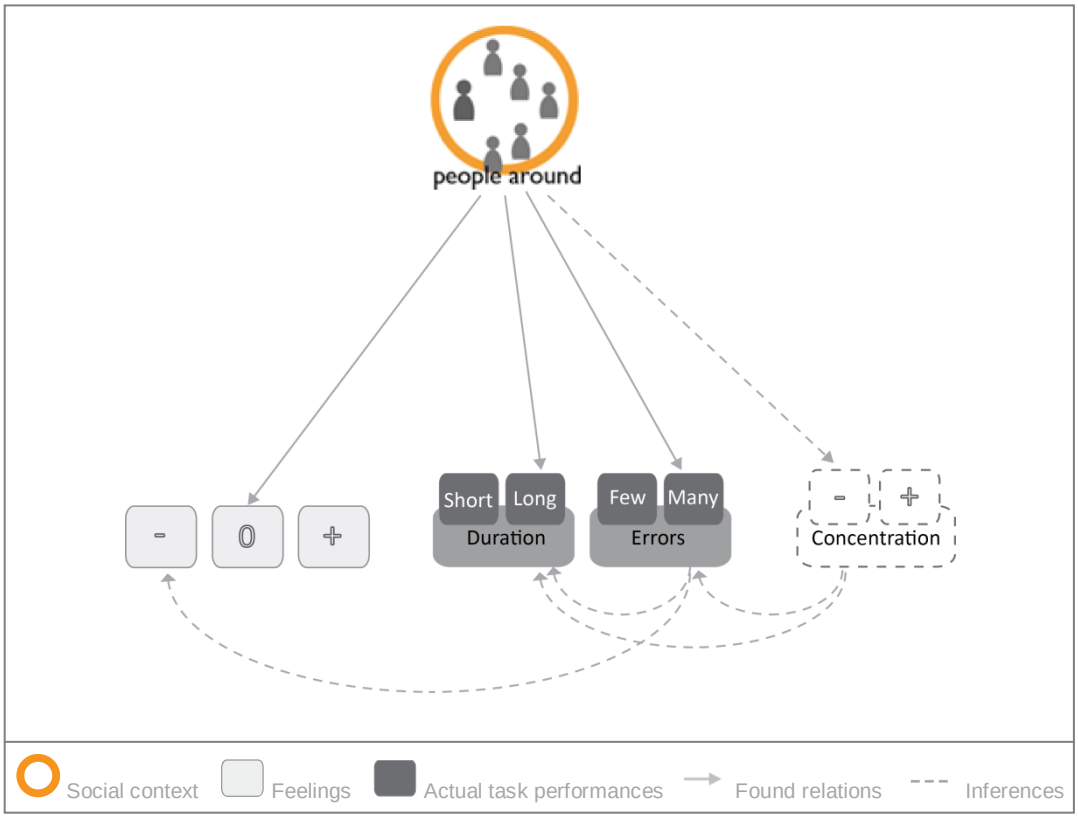


Figure 5.21 Basic relationships when there are people around

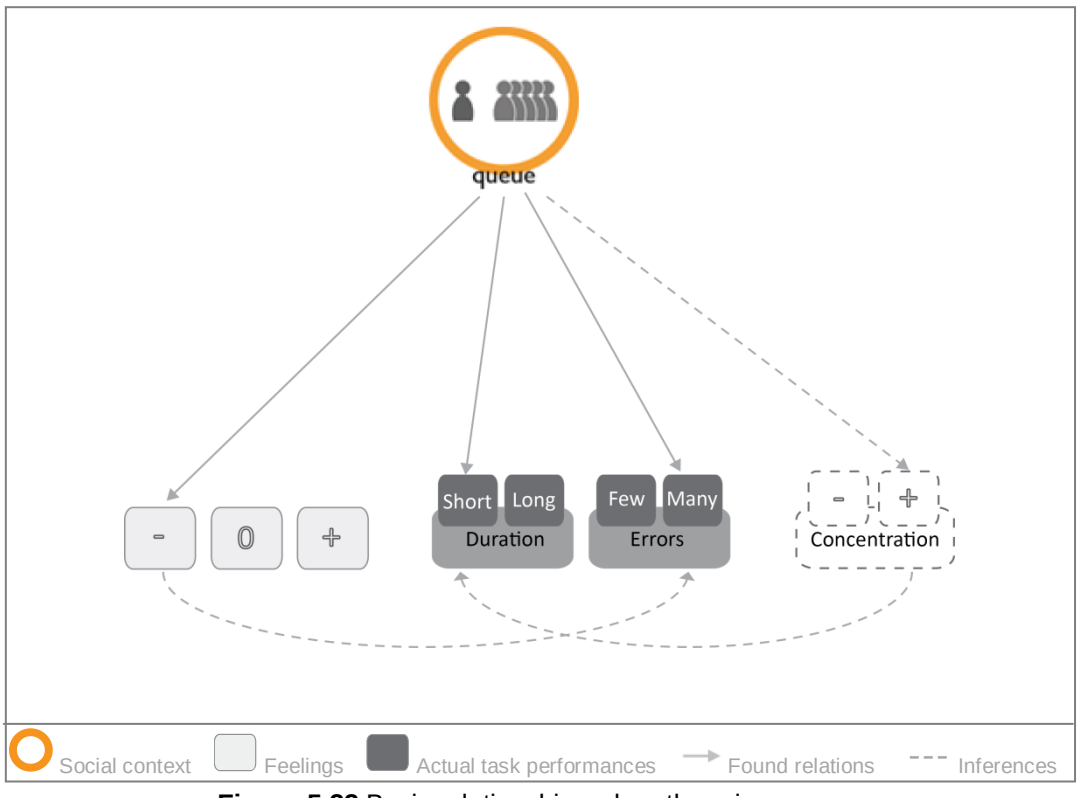


Figure 5.22 Basic relationships when there is a queue

Feelings

As presumed and as parallel to the findings of the preliminary studies, **negative feelings were elicited when there were people in a queue and positive feelings when there was no one around. When there were just people around, diverse feelings were elicited, but with a mean inclining towards neutral.** However, it can be said that **feelings might not the only factors affecting the task performances** (Figures 5.20, 5.21, and 5.22).

Number of errors

While participants were conducting specific tasks, which can be interpreted hereby as unfamiliar tasks, the fewest errors were observed when the participant was alone. This can be interpreted in two different ways. Firstly, owing to eliciting comparatively more **positive feelings** than the conditions when there were other people, fewer errors were done. Secondly, participants might be able to **concentrate more** on the task since no one was around (see Figure 5.20). These two interpretations might have a close link, too.

However, surprisingly, **fewer errors were done when there was a queue than when there were people around in a scattered way**. This was not expected addressing the feelings elicited. It was presumed that if more negative feelings were elicited, then inferior task performances would be brought about. This time, although the most negative feelings were observed when there was a queue, slightly fewer errors were done compared to the condition when there were people around in a scattered way, as above mentioned. Thus, it can be inferred that because of the waiting people, participants would try to focus more on the task and try to finish it more quickly and accurately. Moreover, the people around in a scattered way could distract the participants more since, in the queue, people were behind the people in a neat way. However, when it was in the scattered way, they were more in the sight of the participants and in more dynamic way, which can distract the participants (see Figure 5.21). Therefore, **both the feelings and the concentration** (either because of not being distracted by other people or because of the pressure of other people) **would account for the trends of errors in diverse conditions while conducting the unfamiliar task**.

Furthermore, participants conducted the second task, during which they bought a coffee according to their preferences, almost in similar durations in different social

contexts. This implies that **the effects of the social context on number of errors while conducting a familiar task is less than the situations while conducting an unfamiliar task.** This finding is corresponding to the majority of the literature presented previously which claimed that worse performances are observed if the tasks are unfamiliar. However, unlike this majority of the literature, no specific facilitation effects were found in the familiar tasks.

Dwelling on the total number of errors, the big picture can be interpreted (see Figure 5.6). Participants did more errors respectively when there were people, no matter how, than when there was no one.

Duration of use

As just seen above, duration of use appeared to have a link to the number of errors and feelings. Although, some links were revealed, now, putting the duration of use in centre, the relationships will be discussed.

Though not retrieving significant results for the duration of use, certain inclinations and patterns were encountered. In unfamiliar tasks, **participants used the product fastest when they were alone** (Figure 5.8). This is reasonable bearing in mind the number of errors done in this condition (see Figure 5.4). **Comparing the durations of use during the presence of other people, it is seen that participants finished their tasks quicker when there is a queue**. This might have a link to the number of errors, as well. Resembling patterns are seen looking at the number of errors and durations in the unfamiliar task (see Figures 5.4 and 5.8). Nonetheless, the trend of duration in the familiar task was not resembling to the number of errors done while conducting this task (see Figures 5.5 and 5.9). It can be inferred that **although being familiar to the task, because of pressure from the other people (again in order to use the product as fast and as accurate as possible), participants used the product fast**, but with more self-confidence and less concentration due to the familiarity, which brought about more errors. Furthermore, it is seen comparing the Figure 5.8 and 5.9 that **participants finished the familiar tasks in a shorter time than the unfamiliar tasks**. This was also expected referring to the familiarity. But also, it was seen that participants conducted shorter actions in familiar tasks where they bought coffee according to their preferences, i.e. they bought coffee in a way which

required the fewest steps. This can imply that due to the presence of other people, they wanted to finish the task soon and bought coffee in a shortest way.

In brief, the differences between the duration trends in unfamiliar and familiar tasks can be elucidated addressing to the diverse aspects and variables incorporated in the study, such as self-confidence levels of participants due to the familiarity/ unfamiliarity of the tasks, concentration due to the familiarity/ unfamiliarity of the tasks, the amount of the people around, and how they were situated.

Perceived effects

Moreover, **participants thought that there was a small effect of the social contexts on different task performance aspects.** However, as above demonstrated, it is observed from their experiences that the accuracy of use had a close link to the social contexts. Also, there was an effect, though not significant, on durations, too. Apart from these, according to the participants, there was no really effect of the social context on their ease of use, ease of remember, satisfaction, and finishing the task. Nevertheless, considering the differences in perceived and actual durations of use and number of errors in this study, and also resorting to the results of the preliminary studies, in which there observed an effect on diverse task performance measures, it can be inferred that **participants could have been even much more affected than what they reported**. This might be because of difficulty of noticing and conveying these more implicit and latent experiences. Also, task performances such as ease of use, ease of remember, and satisfaction cannot be easily observed as duration and errors.
In addition to the above discussed relationships, diverse product properties were also of great importance in being affected from the social context. These properties are explained in the following section.

5.3.2 Qualitative Analysis and Results

For the qualitative analysis, the responses of the participants in the interviews were consulted. After transcribing the data, statements concerning the product properties having important role in being affected from the social context have been highlighted. Then, these statements were reduced to keyword levels. There were three keyword levels: main public product related features affecting social context influence, required properties, and suggestions.

With this analysis, it was aimed to explore the main public product features which gave rise to, or at least played a role in, being influenced from the social context. Also, what participants expected from these features to decrease the negative effects of the social context was of great significance. So, the first keyword level, which is mentioned above, involved the public product features and other features related to the public products. The second keyword level incorporated the required properties related to these different features. In other words, desired properties for the previously mentioned product related aspects were covered. Finally, the last keyword level included the suggestions of the participants about these public product features to reduce the negative effects of the social context.

In total, 91 keywords were retrieved about the public product related features (Figure 5.23). There were participants who mentioned about several features at a time and also some others who didn't mention about any properties.

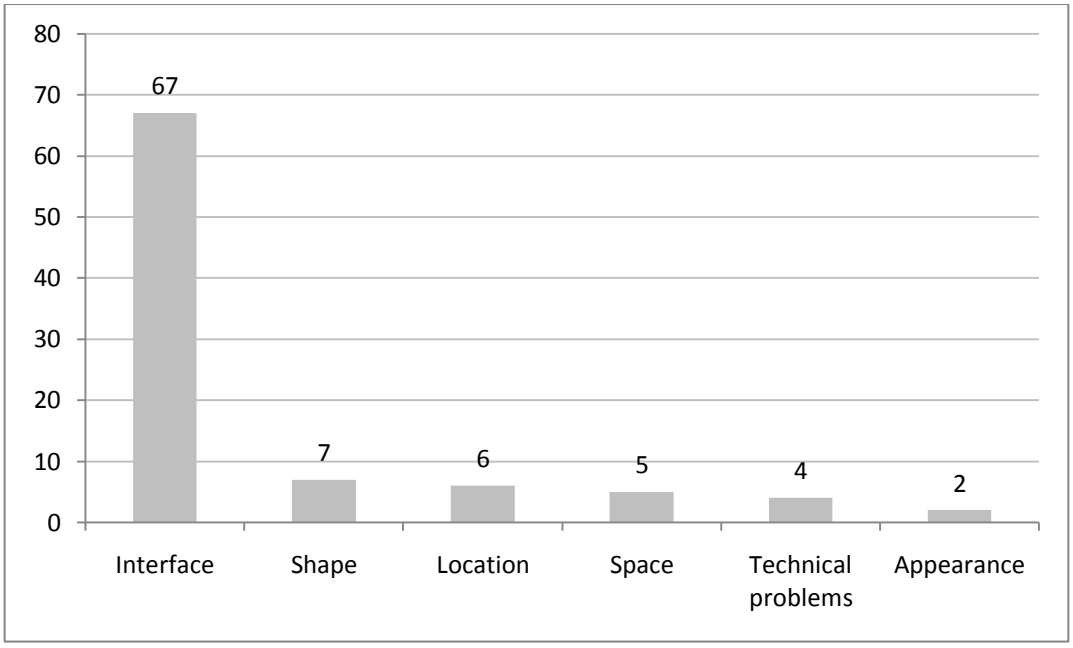


Figure 5.23 Different public product related features having role in social context influence

The features found were about the interface, shape, location, space, technical problems, and appearance of the public product. The scope of each is explained below.

- Interface was the mostly addressed feature (67/91). Different parts of public product interface had been touched upon by the participants and were gathered under this category, majority of which were related to the control panel (33/67) and feedback (24/67). Display (8/67) and instructions (4/67) were other mentioned interface parts.

- Shape of the coffee machine was mentioned several times as playing role in being affected from the social context (7/91). When participants referred to the form or closeness of the product, the statements were included in this category.

- Location was the other aspect which participants stated several times, as well (6/91). Though not related to the public product design directly, the place in which the public product is located is a public product related aspect.

- Space was asserted few times (5/91). Situations when the participants mentioned about the distance between themselves and others, and about the proximity of other people are discussed herein.

- Technical problems were also stated (4/91). As the name explains clearly, problems or errors not related to the user, but to the product itself, also affected how the participants were influenced from the social context.

- Appearance was indicated twice as a feature which is significant for social context influence and which has to be improved (2/91). These participants mainly placed importance to how product looked and what kind of visuals it has to have.

After looking at the product related features, it was necessary to comprehend why these features are important and how the problems with them can be improved. Hence, what had been required from these features due to the social context was examined in relation to the suggestions that the participants had made. This was of great importance since the keywords extracted for the suggestions serve the function of explaining the required properties more in detail in addition to providing

solutions. Firstly, Figure 5.24 shows the requirements and their relationships with the aforementioned product features. Then, Figure 5.25 demonstrates the frequency of each requirement considering all product related features. It is important to express that sometimes more than one required property were correlated to a certain product feature. Thus, the numbers in the figure stand for the number of statement of the related keyword.

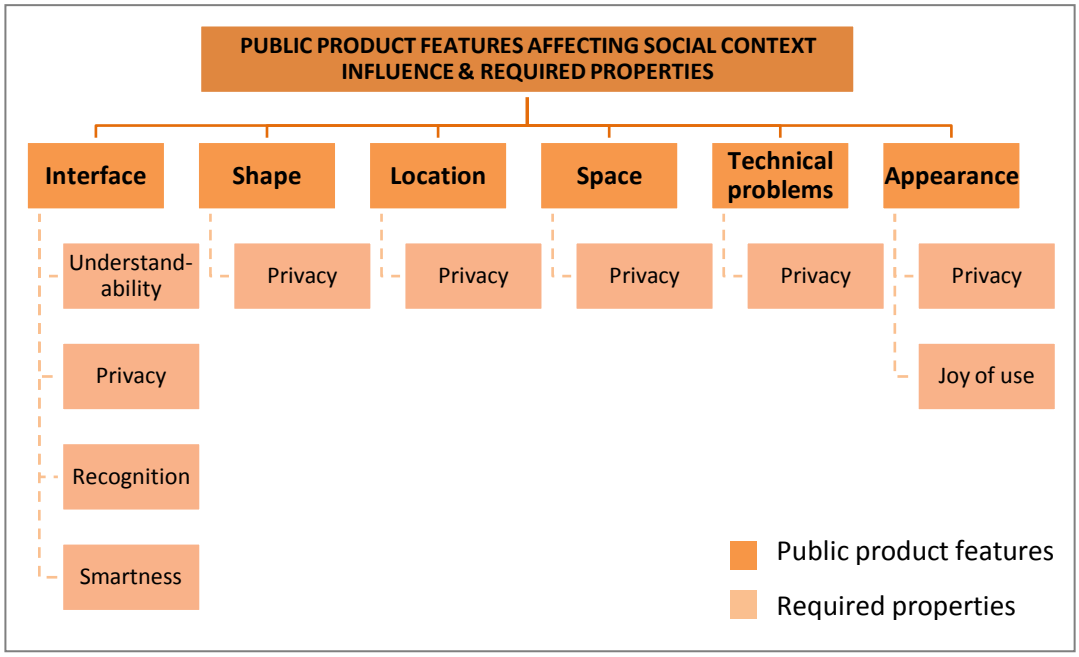


Figure 5.24 Public product features and the requirements of participants from these features

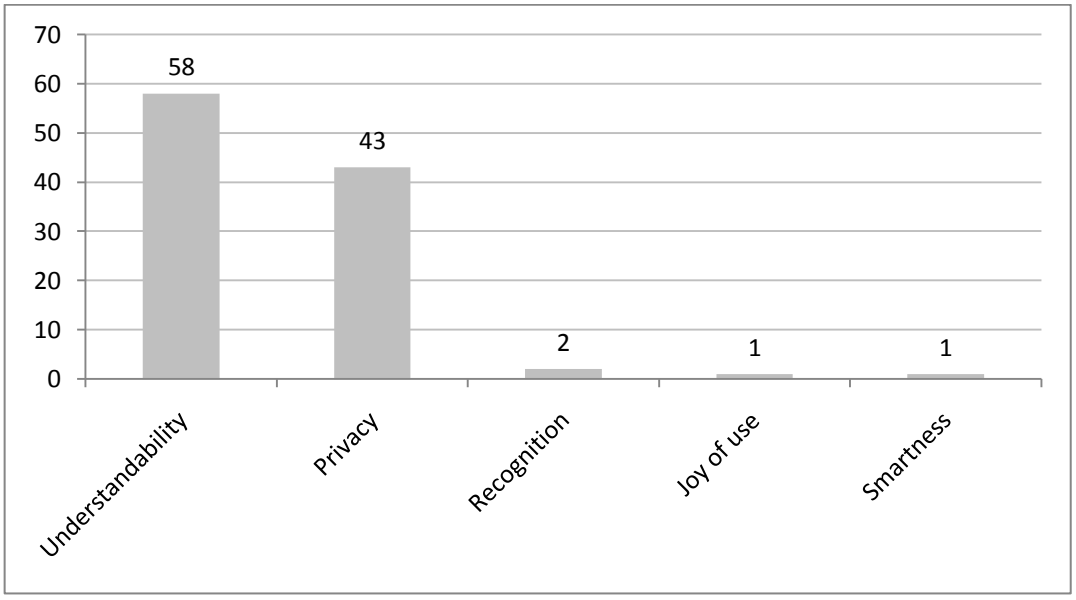


Figure 5.25 Required properties

Understandability, privacy, recognition, joy of use, and smartness were demanded mainly to reduce the negative effects of the social context. The meaning and content of each are clarified below.

- Understandability was the most prominently desired property (58/105). It comprises the situations in which the participants want to comprehend the information from the product quickly and easily. It appeared merely about the ***interface*** (See Figure 5.24). In order to attain understandability, various suggestions were made (Figure 5.26). 70 keywords were gathered for the understandability suggestions.

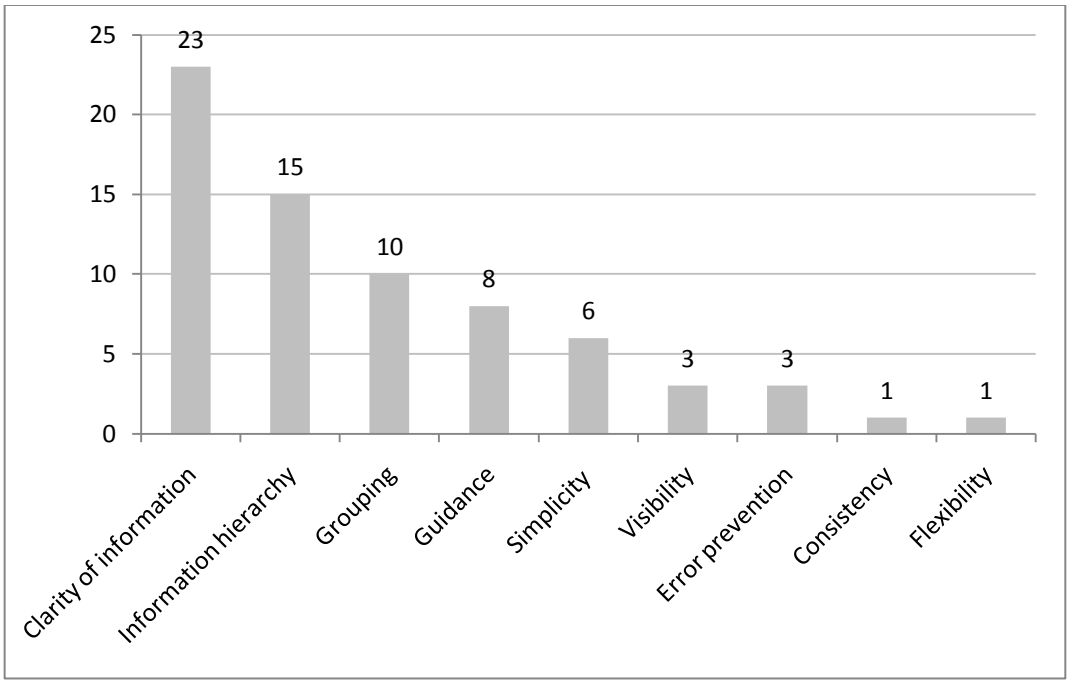


Figure 5.26 Suggestions for understandability

Most of the participants mentioned generally that *clarity of information* was important (23/70). As the name implies, the information given should be clear and easy to understand. Participants claimed that feedback, information on the control panel, display and instructions should be clear. Hereby, few participants touched upon visual and sound feedbacks. To illustrate, one participant mentioned that sound feedback facilitates comprehension in products, but he would not prefer it considering the other people. Also, it was stated twice that the initial sound, which came upon inserting the card to the machine, gave wrong feedback and it was difficult to understand the reason of it. They

thought that the card was broken or there was no credit in it, though neither was the case. Furthermore, to eliminate the drawbacks of the sound feedback, visual feedbacks (images and animations) were suggested.

Information hierarchy was also suggested several times to achieve understandability (15/70). When participants mentioned that important places in the interface should be highlighted or when they wanted to see the order of the actions to be done, they are investigated under this category.

Grouping was another suggestion for the interface (10/70) to better understand it and to be affected less negatively from the social context. This category involves the suggestions about categorizing and mapping the products, in this case coffee types, and adjustments. Hence, grouping mainly relates to the control panel in the interface.

Participants demanded *guidance* few times (8/70) to be able to comprehend and use the product quickly, which would eventually reduce the chances of being influenced negatively from the social context, as well. The suggestions when the participants asked for step-by-step information were incorporated.

Simplicity was indicated few times, too (6/70). When participants complained about complexity of the interface and lots of information they had to deal with, which also had an impact on social context influence, these suggestions were tackled hereby.

Visibility was another solution for achieving understandability (3/70). Participants wanted to see the display, control panel or other parts of the interface quickly and easily. Statements when the participants referred to the heights and sizes of the interface parts as facilitating or preventing visibility were involved under this category.

Another suggestion was *error prevention* (3/70). These participants indicated that a confirmation button was crucial, so that they could

understand the product and their actions more easily. Otherwise, they would do more errors or buy an undesirable thing due to the social context.

Consistency (1/69) and *flexibilility* (1/70) were the other solutions covered under understandability. Consistency was about the coherent information and interface. Flexibility was related to being able to do the actions in diverse orders.

- Privacy was the second mostly remarked required property (43/105). It encapsulates information privacy and usage privacy. Besides, it is related to visibility and personal space, too. Privacy was observed in all product related features (see Figure 5.24). In total, there were 42 suggestions for privacy (Figure 5.27).

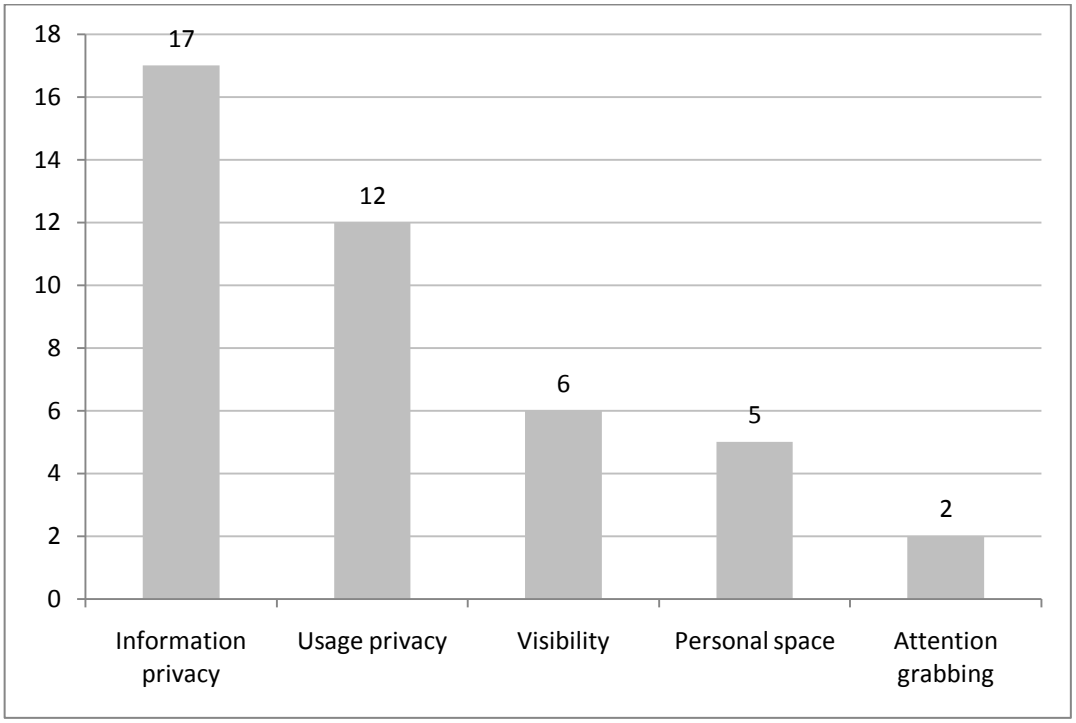


Figure 5.27 Suggestions for privacy

Information privacy was stated mainly (17/42). It covers the statements when the participants did not want other people to see the information from the product. Information privacy was mostly related to the ***interface*** whether it was a feedback from the product or information on the display.

Usage privacy was also prominent (11/42). Different from the information privacy, participants did not want their actions to be seen by other people. That is to say, privacy of the interaction between the product and participants were of consideration. Thus, ***location*** and ***shape*** of the products were the addressed product related features.

Visibility was suggested by some participants (6/42) though the name might seem contradictory to the privacy. In those cases participants wanted other people to see certain information on the product such as the remaining time and process or the errors not caused by the participant, but because of the product itself. Also, they wanted other people to see certain information on the upper part of the product, such as basic instructions or the product choices in the machine, so that the attention of the other people could be directed to these parts rather than on the user. Hence, ***interface*** and ***technical problems*** were in question hereby. It is important to remind that visibility also appeared related to understandability as aforementioned. Yet, the differences stemmed from how they were related to the product features and desired properties.

Personal space was suggested also for achieving privacy in the product related feature ***space*** (5/42). Suggestions about a line separating the participants from the queue or statements about how the participants felt uncomfortable due to the proximity of other people were included.

Attention grabbing was expressed twice as a solution for providing privacy (2/42). One of them was about the ***interface*** and the other was about the ***appearance*** of the product. It was expressed that there could be good images on the product or interface so that other people can concentrate on these rather than the users.

- Recognition was expressed twice as a required property (2/105). Both of them were related to the ***interface*** (See Figure 5.24). Recognition encompasses diminishing the memory of the user's by providing apparent actions and choices. Thus, when the participants suggested

that there should be lights or similar things on the interface to make them concentrate more on the task they were conducting, these statements were discussed under recognition category.

- Joy of use (1/105) and smartness (1/105) were the other properties and each was mentioned once. Joy of use was related to the ***appearance*** of the product, whereas smartness appeared under the ***interface*** feature. It was expected that the product should be more pleasing and less serious, so that it would lessen the negative feelings elicited due to the social context. So, *pleasing appeal* was the suggestion. This situation was about joy of use. Also, it was suggested that the product could remember the settings and preferences of the users, diminishing the pressure on the user. This was categorized under smartness property and discussed as *personalization*.

So far in this section, general analysis, related to the presence of other people, of the public product related features and what was demanded from these features have been performed. All of these were retrieved from the interviews, i.e. from the self reports of the participants. Yet, it was also of great significance to look at the actual experiences as well as the self reports. Hence, afterwards, the aforementioned transcription was classified according to severity. Acknowledging the importance of the self reports, it was thought that inspecting the self reports referring back to the real experiences of the participants would add more value by including the actual task performances. Therefore, the statements, and so the related keywords, were coded as severe or not severe to inform design about the public product related features and required properties. Task performances, feelings and data about public product design were taken into account together. To remind, there were two tasks in the study. So, to understand severity, i.e. the strongest influence of the presence of other people on actual experiences, the number of finished tasks and feelings were considered. When the participants were not able to finish one or more tasks correctly and besides elicited negative emotions, these experiences were classified as severe. In other words, when there were problems both in hedonic and pragmatic experiences, the severest problems were observed. By delving into the severe ones, the most important public product related features regarding the social context were tried to be detected.

35 out of 90 experiences appeared as severe taking into account both the actual experiences and self reports (Figure 5.28). As mentioned above, participants could not finish one or the both tasks and had negative feelings herein. Yet, almost all of the unfinished tasks were merely unfamiliar (specific) tasks (31/35). In few of them participants could not finish only the familiar (preferred) tasks (2/35). In the rest, both tasks were not completed (3/35).

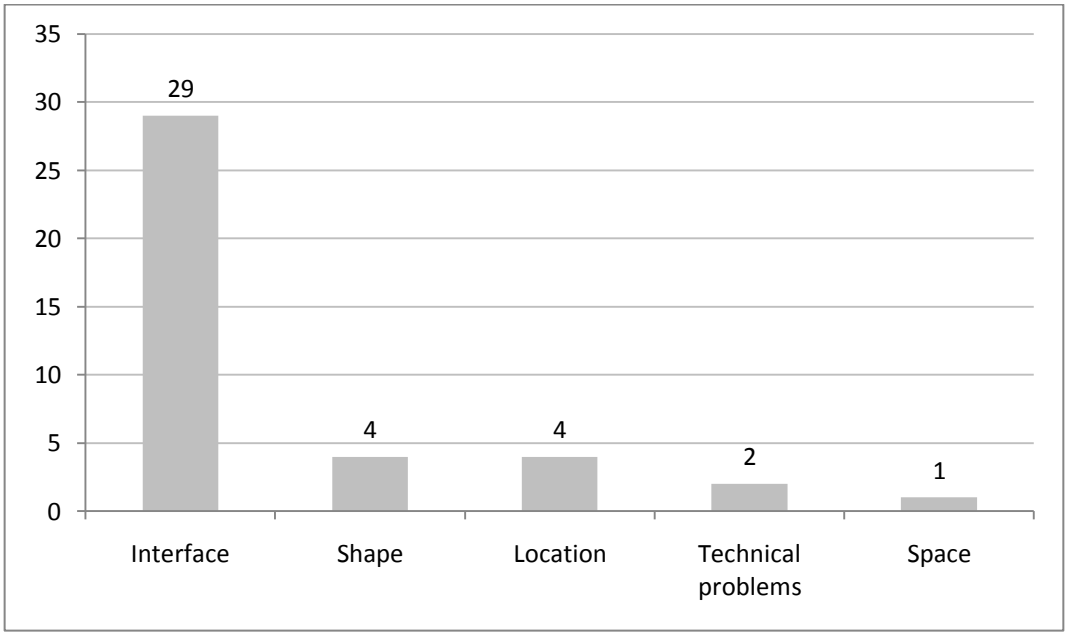


Figure 5.28 Different public product related features having role in social context influence according to severity

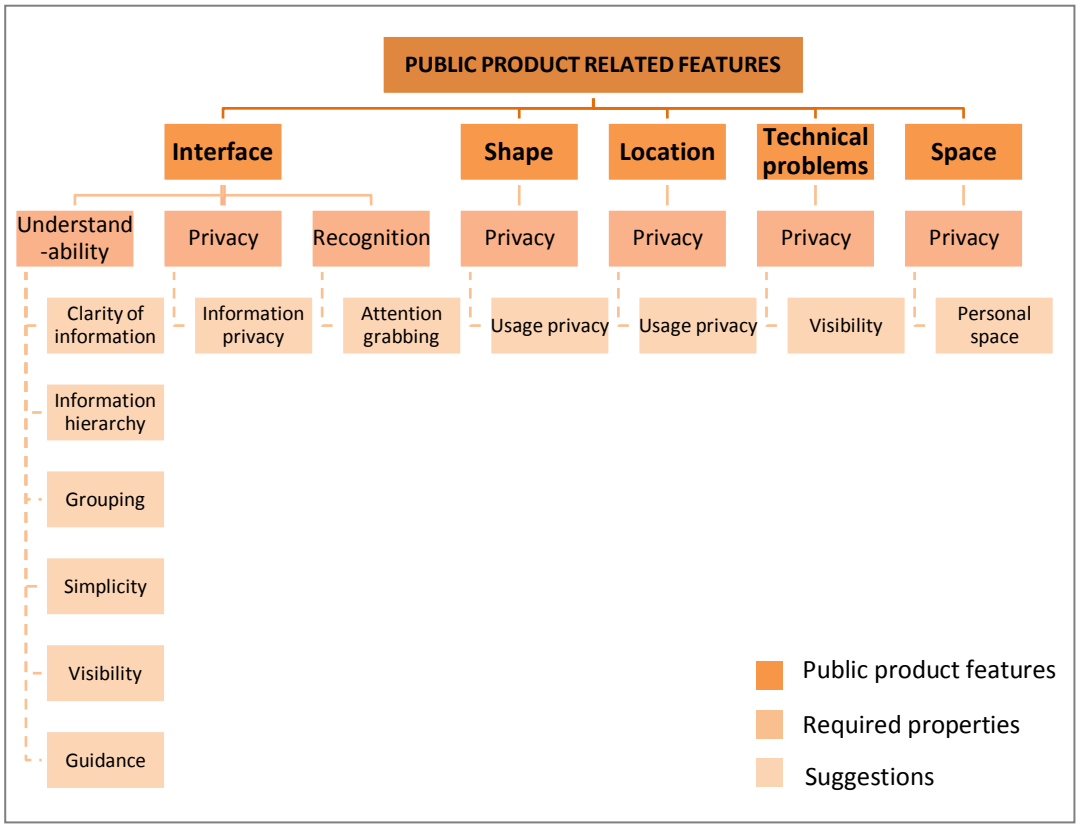


Figure 5.29 Public product features and the requirements of participants from these features considering severity

It can be seen from Figure 5.28 that ***interface*** stands out among the other features. Apart from this, ***shape***, ***location***, ***technical problems***, and ***space*** were important influencing both the task performances and feelings of the participants negatively due to the presence of other people. Moreover, addressing back to all the previously found features, appearance was not included (see Figure 5.24). The meanings and scopes of these terms are explained previously, so they were not mentioned hereby. Nevertheless, for the severe experiences, specific examples for suggestions to inform design are provided.

Considering severity, 46 required properties were found. These are shown in Figure 5.30 below.

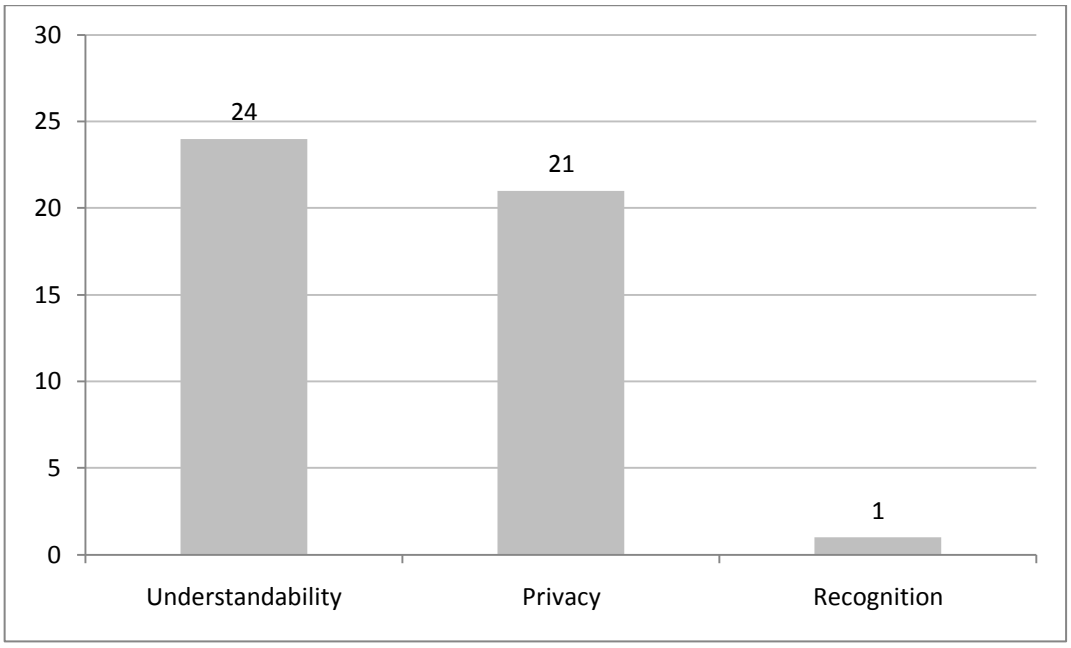


Figure 5.30 Required properties for facilitating task performances and for preventing negative feelings

It is seen that understandability (24/46) and privacy (21/46) are the most, and almost equally, severe requirements considering the presence of other people's effects on concluding the tasks and feelings. Thus, although the previously presented features, required properties, and suggestions give hints and ideas about the design of public products taking into consideration the presence of other people, the most crucial criterion are retrieved from the latter and mere focus on inferior task performances and negative feelings.

When the participants elicited negative feelings and were not able to finish the tasks due to the social context, they fundamentally associated this to the understandability (24/46). They highlighted that social context and understandability were interlinked. They elicited negative feelings due to the social context, and so, had difficulty to understand the products, which consequently resulted in not being able to finish the tasks correctly. Also, they did not understand the product and since there were other people around or in the queue, they elicited negative feelings, too. The number of the suggestions for the experiences classified as severe was 29. They were all related to the ***interface***. These suggestions were about *clarity of information* (10/29), *information hierarchy* (9/29), *simplicity* (4/29), *guidance* (3/29), *grouping* (2/29), and *visibility* (1/29). Participants who mentioned about clarity of information suggested that there

would be visual feedback showing the process. More specific example can be given for information hierarchy. Participants mentioned that important parts could be coded by different colours and lights, and the necessary part would light up. Yet, simplicity was demanded especially for the coffee options and other adjustments. Moreover, for guidance, an animation by which it would be possible to see the each step, such as adding sugar, adjusting milk, or selecting coffee types was suggested. For selecting coffee types and adjustments, grouping and mapping were mentioned. Participants wanted to see related coffee types together and to understand which adjustments were belonged to the related coffee types. Finally, interface had to be visible to the participants. They wanted to see the display in the eye-height. Also, size and amount of the interfaces were addressed. Accordingly, the size was preferred to be big enough to be seen by the participants.

Privacy was almost as much important as understandability (21/46). For privacy 17 suggestions were made. Both *information privacy* (8/17) and *usage privacy* (7/17) were crucial. In order to have information specific and private to the users, suggestions were made for the ***interface***. Moreover, to obtain usage privacy, ***shape*** and ***location*** were addressed. ***Space*** was also mentioned and providing *personal space* was suggested. Firstly, according to the participants, information privacy would be achieved by paying attention to the display size and angle, feedback type and appeal, visibility of the necessary parts only by the participants, but also visibility of the other attention grabbing parts by the other people. Secondly, participants mentioned that shape of the product would be closer from side or the location of it would be less visible for usage privacy. However, the parts of the product with which the participant were not interacting, or the visuals, remaining time would be visible by others in order for attention grabbing on the related parts and not on the users. Also, for relieving the pressure from the social context, personal space would be created.

Recognition appeared once as severe (1/46). The participant again referred to the attention grabbing, but this time to be able to focus more on the task rather than the social context. It was suggested that lights would be incorporated in the interface to attract attention of the users.

5.3.2.1 Discussion

First of all, the results of this study certify the findings of the initial studies that the **presence of other people has a great effect on user experience with public products**. The effects were observed again on task performances and feelings. Nonetheless, not all the tasks in the initial studies were incorporated in this study, but the big pictures are mainly corresponding. It is important not to forget that not all the different social contexts and task types were encompassed in the last study. Hence, differences in the results are conjecturable to a certain extent. Also, different from the preliminary studies, the participants of the main study were given certain tasks and they were not merely reporting their previous experiences. Therefore, some results from the preliminary studies were naturally not acquired, such as refraining from actions.

As can be seen from Figure 5.25 (and also from Figure 5.30), **understandability and privacy were the most important and severe concerns** in this study, when participants were conducting simple or unfamiliar tasks according to the descriptions of the preliminary studies. It can be discussed that understandability clearly addresses usability and no wonder that understandability always matched with the interface of the product. Nevertheless, these findings, albeit addressing the usability, stemmed from the effects of the presence of other people. Furthermore, privacy is naturally related to the presence of other people. As different from the preliminary studies, privacy was frequently observed even in simple and unfamiliar tasks. It can be discussed that participants also felt time pressure partially as a result of presence of other people. According to the data retrieved, privacy in interaction is of great significance due to the concerns about being observed and evaluated by the other people. This can be discussed bearing the evaluation apprehension theories (Dashiell, 1930; Henchy and Glass, 1968), which were explained previously, in mind. The possibility of making mistakes and being seen by the others yielded certain feelings, which in turn affected the task performances. However, it is seen that privacy in interaction is of great significance regarding the information brought about due to the users' actions. Yet, privacy is not preferable concerning the complications caused by the products. In brief, **privacy is sought for the actions and results caused by the users, but not for the results caused by the product itself**. This had been encountered in the preliminary studies for diverse tasks, too.

The relationships found between social contexts, feelings and task performances also corresponded to the ones in the preliminary studies. When people were present, more negative feelings and inferior task performances were observed compared to the situation when no one was present.

However, looking at both to the quantitative and qualitative analyses in the main study, **differences were observed between how participants interacted with the product and what they reported**. Participants were more influenced from the social context than how they evaluated this influence. Figure 5.12 shows that participants thought there had been no effect of the social context on their task performances regarding number of errors. However, Figure 5.6 demonstrates that the social context did affect their experiences. The main comparison can be made between the duration of the tasks and amount of the errors. However, other task performances which had been tried to be found out, such as ease of use, ease of remember, and satisfaction, were difficult to be observed and measured just by looking at the actual tasks. Hence, the self reports were the main resources to be consulted. The drawback emerged hereby is being dependent on the self reports for the lastly mentioned task performance measures, though differences were observed between the actual and perceived task duration and errors. According to Figures 5.13, 5.14, and 5.15, just slight inclinations and patterns were found for ease of use, ease of remember, and satisfaction. But, it can be inferred referring back to the aforementioned differences and results of the preliminary study that the effects of the social context would be greater on different task performance measures, yet could be more latent for certain ones.

In brief, feelings, familiarity to the task, concentration, distraction, context awareness, and product properties all had an impact on the user experiences with public products. By benefiting especially from the results of this study, as well as the previous researches, important inferences and recommendations can be made for design literature, designers and researchers, which are represented in the subsequent chapter.

CHAPTER 6

CONCLUSIONS

The preceding chapters presented the studies conducted to respond the research questions. These studies and the entire research process were exploratory; hence, the results were of great significance both concerning design and research implications. Main findings of each study to inform design were already demonstrated in detail, yet it is necessary to name the most fruitful and severe ones in a more concise way. Also, it is necessary to convey the research experiences. Moreover, several other research questions were prompted while conducting literature review and three empirical studies. These questions are significant for prospective researches.

So, this chapter firstly presents a brief review of the findings regarding the research questions. Then, taking into account the results of the entire study and the exploratory process, recommendations for the designers of the public products and researchers are made. Finally, several suggestions are presented for prospective researches.

6.1 Reflecting back on the Research Questions and Main Findings

User experience is a broad concept encompassing various aspects as revealed in the literature research. This study highlights the importance of considering the user experience focusing on the interactive public products.

Public products have specific contexts as discussed in the introduction chapter. The three studies conducted reveals that the presence or absence of other people affects the user-public product interaction greatly, and that relationships between diverse social contexts, feelings, and task performances exist.

The absence of other people usually presents a comfortable platform to the users since they do not feel any pressure or distraction from other people. Therefore, users feel usually neutral or positive which results in fewer errors. Though the users feel more comfortable to take their time while interacting with public products (while thinking, navigating, investigating the public products), their interaction times can be less than the experiences when other people are present, the reason of which is the fewer errors done than when being alone.

When other people are present, the feelings and task performances of the users change. When there are people around in a scattered way, users usually feel neutral or elicit negative feelings. Even though the feelings are neutral, there is an increase in the number of errors done in unfamiliar tasks compared to the experience when there is a queue behind the users. The elicited feelings due to the possibly of being observed and evaluated by others, and the changes in the concentration due to the presence of others are the basic factors affecting the accuracy and duration of use.

Depending on the social context, presence of other people is sometimes required. In the locations and situations when safety is a problem, the presence of other people is relieving, unless these people are not interfering in the personal space and privacy during the user's interaction with the public product. Moreover, the presence of other people is beneficial when socialization is considered. Nevertheless, still the interaction between the other people and the user should be limited to a certain extent.

In short, understanding and considering the users concerns about the presence of other people is substantial while designing the public products. As can be understood from all the previously mentioned research findings that it is difficult to make generalizations about the effects of the presence of other people due to all different tasks and personal characteristics, but it is possible to comprehend certain aspects and relationships in user experience with public products. It can be concluded that though the presence of other people is desired in few cases as explained above, there is hardly a facilitating effect of the presence of other people on users' task performances. Generally, the presence of other people results in negative feelings and inferior task performances. However, if the user is familiar to the product and tasks, the negative effects of the social context

diminishes, but usually still exists. It is significant to note again that feelings, though playing an important role, are not always the mere reasons of being affected from the social context. Feelings are highly interlinked with different phases of the experience; hence, it might be sometimes difficult to distinguish the mere reasons and moments of the elicited feelings.

6.2 Recommendations for Designers

The research conducted revealed several directions and recommendations to be taken into account for better user experiences with public products. Not all of these recommendations were design related, such as the location of the public products. However, they also implied important aspects which can be manipulated by the design of these products. The essential points from all studies are gathered and summarized below to inform design.

Refinements and improvements are highly related to usability, but this study differs from other existing studies that even the usability suggestions hereby are the result of being influenced from diverse social contexts.

It can be said that main challenge facing the designers of the public products are providing easy and clear, thus quick, but also comfortable interactions to the users in order to eliminate, or at least minimize, the negative effects of the social context. The comfort is highly pertaining to the privacy of information and usage.

The presence of other people can be both preferable and undesirable depending on the characteristics of the public products, conducted tasks, and related concerns.

- Privacy and usability should be given equal importance while designing public products.
- The clarity of information is of great importance to accelerate the comprehension and usage of the public products, and to eliminate errors and other problems during the interaction. Hence, the chances of doing mistakes and eliciting negative feelings due to being seen by other people while doing these mistakes would be eliminated or reduced.

- The visibility of information is important both from the user's and the other people's perspectives. The information from the public product should be understood by the user immediately. However, the scope of the information provided to the user should be visible to the other people to a certain extent. The information about the technical problems should be visible to the other people in order to eliminate the thoughts that these problems are caused by the user.
- General information about the public products such as the product types in vending machines, basic instructions, and so on could be visible to the people waiting in the queue. For instance, these types of information can be written on the top part of the machine in a visible way, so that other people can concentrate on this information rather than the user. Hence, the pressure on the user can be relieved to a certain extent, and also, the people in the queue can learn the main steps of and the products in the public product beforehand. So, in their turn, they could also understand and use the product more easily, resulting in being less negatively affected from the social context.
- In order to provide quick and easy understanding, feedback types gain importance. In some products sound feedbacks are being implemented and they usually do facilitate understanding. However, they do not necessarily bring about positive user experiences since they usually annoy the users considering the presence of other people. If it is vital to use sound feedbacks, they should not be too loud to be heard by the other people. Also, more pleasing sounds should be selected in order not to convey information to the other people around as if the user has done so serious mistake.
- The orientation, size and angle of the screen in public products are of great importance. The display should not be seen by other people even if there are no money issues.
- Both the interaction and the appearance of the public products should be pleasing. It is natural that pleasure in use brings about positive user experiences; however, this might be even more important to eliminate or reduce the negative effects of the social context, too. To epitomize, if a public product does not seem so serious, mechanic, and so on, the users of this machine could also take it less serious to use it wrong. It is acknowledged that the accuracy of use especially in public products

is of great significance since they usually serve the function of doing transactions and buying necessary things; yet, if a user makes a mistake, the negative effects of this mistake on the user experience concerning the social context could at least be reduced. The user could elicit fewer negative feelings and do fewer prospective errors during that interaction.

6.3 Recommendations for Researchers

Before attempting to make recommendations for researchers, aspects that influenced the choice of the methodologies used in the research are explained below. After explaining the limitations and corresponding decisions, recommendations are presented.

There were several limitations and challenges in the study. Few of them were due to the practical issues and few others were brought about as a result of the methodologies incorporated.

Firstly, as a result of the research subject and questions, so many different variables and relationships were wanted to be explored in the study. Secondly, all these variables involved various characteristics which made it difficult to employ a single methodology. Some variables were obvious and observable, but some were more latent as touched upon in the previous chapters. For instance, duration of use and number of errors were about actual behaviours. Nonetheless, feelings and task performance measures like satisfaction were implicit and were not easily observable. There were certain studies in the literature about the effects of the task performances. Yet, they were restricted to certain cognitive and motor tasks, as explained in the initial chapters, and the actual behaviours were the main aspects to be measured. There was no such a research and example about the effects of the social context on both feelings and task performances, and so, how all these different variables and relationships among them could be measured at a time. Furthermore, time and language were the practical constraints affecting the selection of the methodologies to a certain extent.

Bearing these limitations in mind, and as explained previously, an online questionnaire study, a booklet study, and a study in a simulated environment were conducted. Each study had advantages and disadvantages.

The first two methodologies employed for assessing the fundamental aspects in user-public product interaction were grounded on the self reports of the participants. Considering the time limitation and the aim of acquiring as many aspects and relationships as possible, the online questionnaire made it possible to reach many and various type of people in a short time. However, the participants had to report their previous experiences, which might have been different from what they actually experienced, since the information gathered from such studies were restricted to what participants remember and to what extent they want to share their experiences. Furthermore, the influence of the social context was intrinsically more difficult to notice, understand, remember, and convey than reporting the problems about usability. In the online questionnaire, general past experiences were questioned; and the necessary information about the social context was extracted among all experiences. Also, though it was necessary to ask the general experiences to retrieve as much and diverse information as possible, this imposed several drawbacks regarding the analysis process. To illustrate, the results were categorized, but the number of participants for each category was not similar, which make it difficult to compare the results quantitatively and make generalizations for all cases.

The drawback of remembering the past experiences was eliminated by conducting the booklet study. The booklet study was fruitful and more to the point by questioning the effects of the social context explicitly. Moreover, participants had to fill in the booklet with seven experiences and within a certain period; thus, richer and diverse experiences about the effects of the social context were retrieved. However, this study also depended on the self reports of the participants, although the experiences were fresh this time. Other drawbacks were about the availability of various participants and language. Since this study's duration was longer for each participant, and since the participants had to fill in booklets in a foreign language, it was difficult to reach participants with so diverse occupations and ages. That's why, in order to compensate the drawbacks of the each study, the online questionnaire and the booklet study were conducted concurrently.

So, it can be said that conducting these two qualitative studies at the initial stage was reasonable regarding the limitations and the benefits of the each study. Nevertheless, if there had not been any obstructions encountered due to different

public product types; such as privacy, and also due to conducting the study in English, and therefore being dependent on more restricted sample, the methodologies could have been different. For instance, observation in addition to interview or context mapping study could have been done at the beginning rather than the selected methodologies.

The final study took place in a real environment with simulated social contexts and the experiences observed directly rather than consulting only to the self reports of the participants. This was one of the strongest points of the methodology. The most accurate results about duration of use and number of errors were retrieved by observing the experiences of the participants directly. Also, confronting the participants with their own videos was beneficial. When participants watched their own video recordings, they recalled many important points they had forgotten or they noticed the things which had affected them subconsciously. Nevertheless, the researcher was recording the videos due to running the study on her own (even though trying to be as less intervening and distractive as possible); hence, there might be certain effects of the presence of the researcher on the participants. So, if it had been possible, there would have been a research team, in which each team member had been responsible for different tasks. The camera recording the participants could have been controlled remotely by one team member, eliminating the risk of affecting the participants. Then, the other researcher could have been responsible for the self-confrontation session. Moreover, in order to achieve sufficient amount of information for quantitative analysis, number of the participants, target group, and type of the public product to be selected were of great importance. 90 participants were involved since there were three social context conditions. This amount was quite sufficient for the quantitative analysis. The selection of the coffee machine in the university eliminated the privacy and availability problems. However, if it had been possible, it could have been also interesting to conduct similar studies with different public product types, especially which provide more navigation through the interface. Thus, different public products, different concerns, and different public product properties could have been investigated and compared.

Furthermore, lots of aspects to be investigated were incorporated in the main study, as well. Hence, few other complications were faced. Several of these were expected from the beginning of the study, but were still involved since they were

thought to be crucial. Lots of information were found regarding two diverse tasks and about the actual effects of diverse social contexts on durations of use, number of errors, finishing the tasks; perceived effects of diverse social contexts on durations of use, number of errors, finishing the tasks; perceived effects of diverse social contexts on ease of use, ease of remember, satisfaction; effects of diverse social contexts on feelings; and product properties playing role in being affected from diverse social contexts. Also, relationships were established between all these findings. Nonetheless, some relationships were not investigated precisely due to the aforementioned limitations. To illustrate, though very rich data were found about feelings, the feelings were not classified according to the order of occurrence. In other words, which feelings preceded the task performances and which feelings were the results of the task performances were not distinguished in detail. Moreover, involving two different tasks resulted in few disadvantages. The reasons of involving two different tasks were explained in the related study. However, it is explored that incorporating more than one task, in addition to the aforementioned various aspects, yielded ambiguity in certain parts of the analysis.

Apart from these, great attention was given to the measurement of the feelings. The selected mood chart was beneficial since it incorporated names of the moods with related visuals. Participants easily comprehend the meanings of each mood. This was important since the empirical studies were not in the native languages of the participants. Thus, possible misunderstandings were eliminated greatly. Nevertheless, the mood chart did not encompass many other commonly encountered feelings such as anger, shame, and so on. But, providing an ‘other’ option reduced the complications.

Based on all these experiences, certain recommendations can be made for researchers who attempt to obtain both hedonic and pragmatic information at a time. Some of the recommendations may not be novel; nonetheless, they are all grounded on this exploratory research. These recommendations are stated below as follows.

- Especially if the research topic is novel and extensive, if there are ambiguities in the research topic and questions, and if there are no practical limitations like time pressure, qualitative studies at the initial

phase would be beneficial to define the significant aspects, keywords, or relationships in the study, and would help to clarify the directions for the next steps.

- If necessary, more than one empirical study can be conducted; however, involving many studies to explore certain research topic can cause complications both in practice, analysis, and conveying the results.
- Qualitative studies can be fruitful when richer insights are necessary to be obtained; yet, it is important to remind that studies which depend highly on participants' self reports can be biased and may not be always accurate. On the other hand, quantitative studies can be helpful to reveal general results; however, they might not provide in-depth understanding to the researchers. Hence, bearing the requirements and limitations of different studies in mind, utilization of both would yield stronger and richer results.
- In order to achieve the most accurate and sufficient results to draw conclusions and make generalizations, the number of the participants in the sample should be big enough. Self-confrontation tests, which intrinsically encompass the observations of the actual experiences of the participants and their self reports, with a big sample group would bear the most fruitful results by providing in-depth and accurate findings.
- If more than one empirical study is to be employed, it would be better to use parallel measurement tools for feelings, usability, and so on. By doing as such, the findings could be comparable. Otherwise, it would be difficult to compare and discuss the results, and to draw precise conclusions.
- If there are different variables to be tested in a study (such as perceived and actual experiences), their scales should be similar, as well. Again, unless there are similar scales, it would be difficult to compare the results.
- If applicable, measurement tools from the literature could be used rather than involving novel and untested ones. Incorporating untested tools for providing information about novel research themes would bring about problems.

- The tasks that the participants are to conduct should be clearly defined. Also, preferably, single task should be involved in the research, especially when there are more variables to investigate apart from this task.

6.4 Further Research

Throughout this study, several new research directions related to the main thesis questions have appeared.

First of all, a study with different public products with specific characteristics, such as ATMs, train ticket machines, snack dispensers, and information kiosks, can be conducted. In this thesis, all these public products were touched upon generally and also general trends within different public product interactions were revealed. However, feelings and task performances for each product category can be examined and compared regarding the absence and presence of other people. This would bring about more specific results about differences between different tasks and concerns.

Secondly, another study can dwell more on the feelings to classify which feelings are elicited due to the social context and effect the task performances, and which feelings are elicited as a result of the task performances related to the social context. To clarify, the former can be epitomized by feeling tense or scared due to the presence of other people and doing errors accordingly. The latter one can be exemplified by feeling ashamed and stupid due to doing errors in front of other people. Even though all above mentioned feelings are caused due to presence of other people, the hierarchy in occurrence time is different. This can be investigated to provide better understanding and richer information to inform design of the public products.

Moreover, a study can be carried out to understand how the effects of the social context change considering different user groups. To illustrate, elderly people would be incorporated who might be affected more from the social context.

Other studies can be conducted with public products in order to understand the effects of the presence of other people on how users perceive the aesthetics of the public products and assign meanings to them. These can provide certain

design opportunities and directions, and also help to constitute a broader understanding of the effects of the presence of other people on user experience with public products.

Finally, though deviating little bit from this thesis topic, a study about the products which are usually used in front of other people can be carried out. Whether, and how, the presence of other people influence user experience with these products can be investigated. Again, links can be established between users' feelings and task performances.

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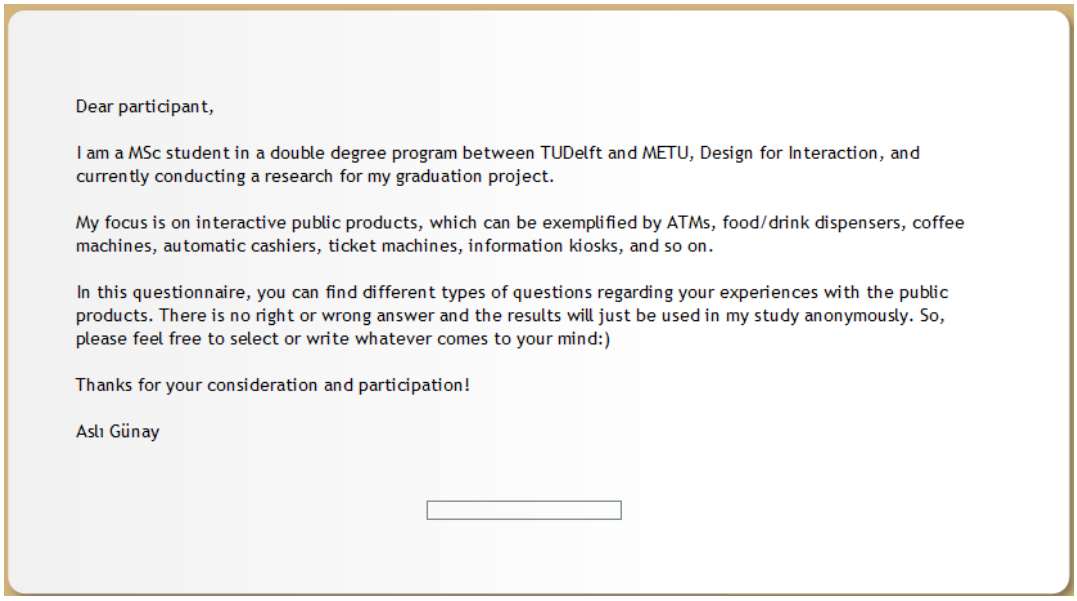
APPENDIX A

ONLINE QUESTIONNAIRE


Dear participant,

I am a MSc student in a double degree program between TUDelft and METU, Design for Interaction, and currently conducting a research for my graduation project.

My focus is on interactive public products, which can be exemplified by ATMs, food/drink dispensers, coffee machines, automatic cashiers, ticket machines, information kiosks, and so on.

In this questionnaire, you can find different types of questions regarding your experiences with the public products. There is no right or wrong answer and the results will just be used in my study anonymously. So, please feel free to select or write whatever comes to your mind:)

Thanks for your consideration and participation!

Aslı Günay

Figure A.1 Online questionnaire Page 1: Introduction


Your...

Age

Gender

Nationality

Figure A.2 Online questionnaire Page 2: Demographics

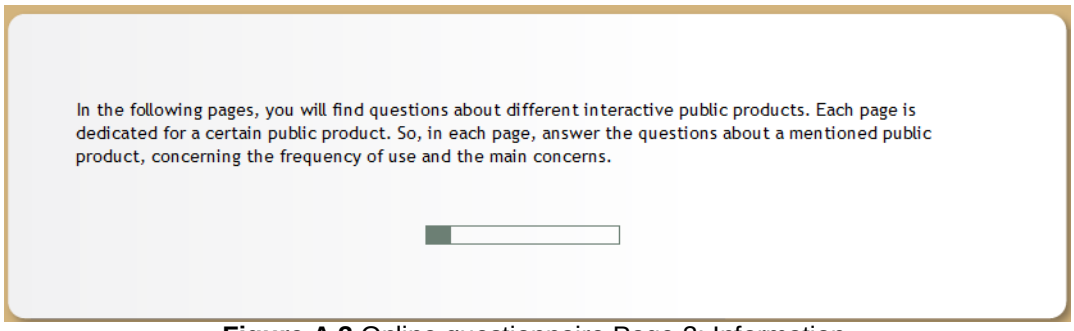


Figure A.3 Online questionnaire Page 3: Information

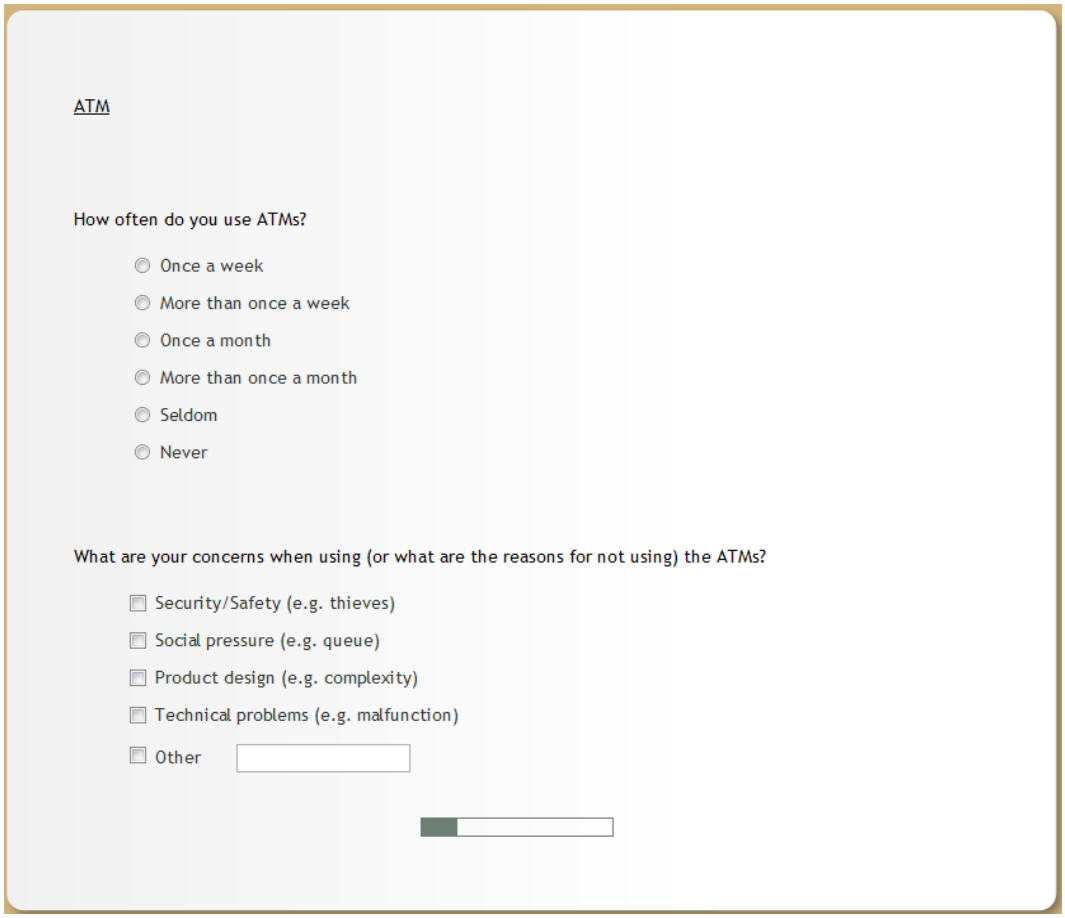


Figure A.4 Online questionnaire Page 4: Questions about ATMs

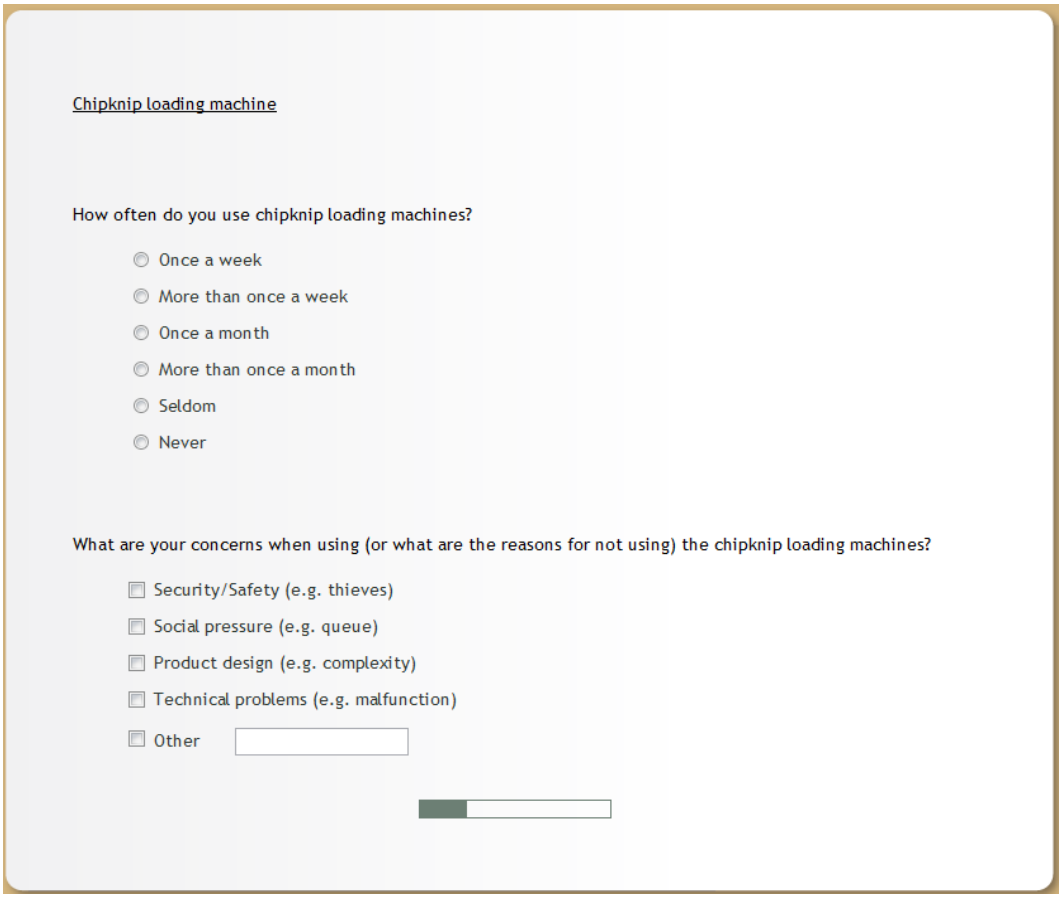


Figure A.5 Online questionnaire Page 5: Questions about chipknip machines

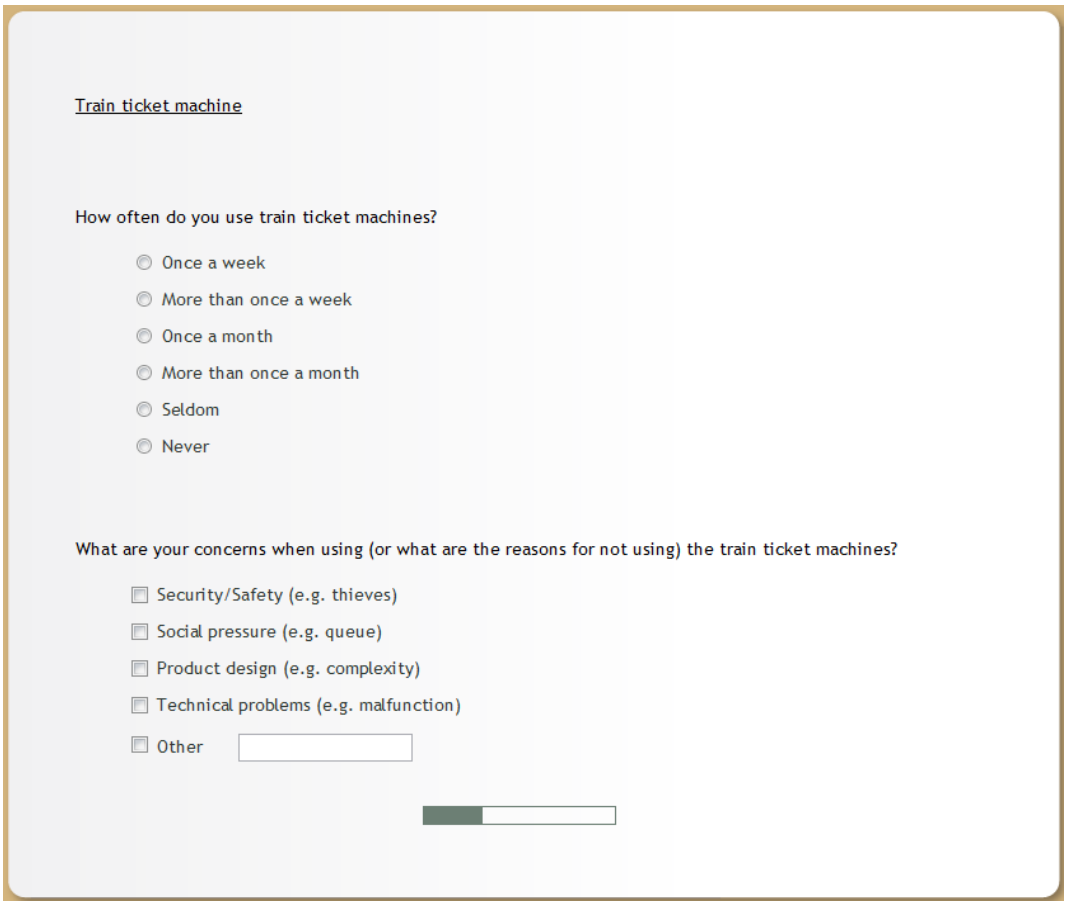


Figure A.6 Online questionnaire Page 6: Questions about train ticket machines

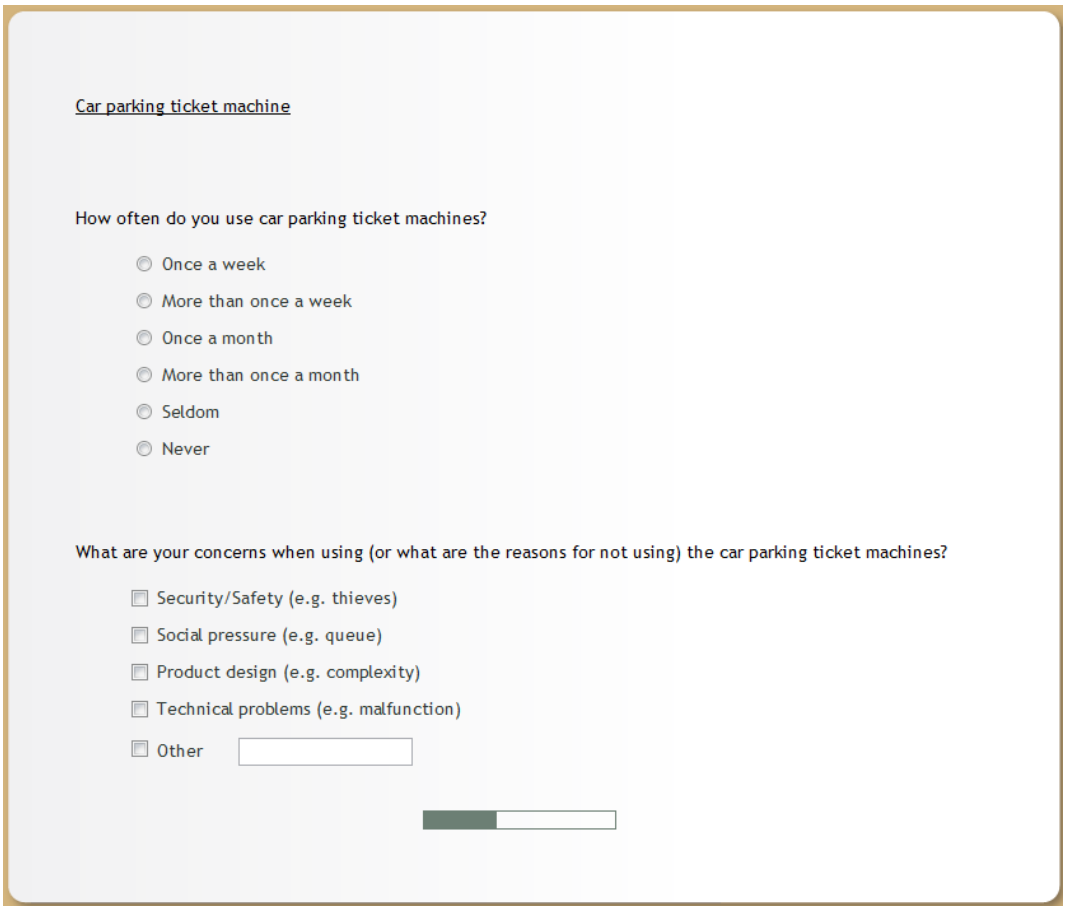


Figure A.7 Online questionnaire Page 7: Questions about car parking machines

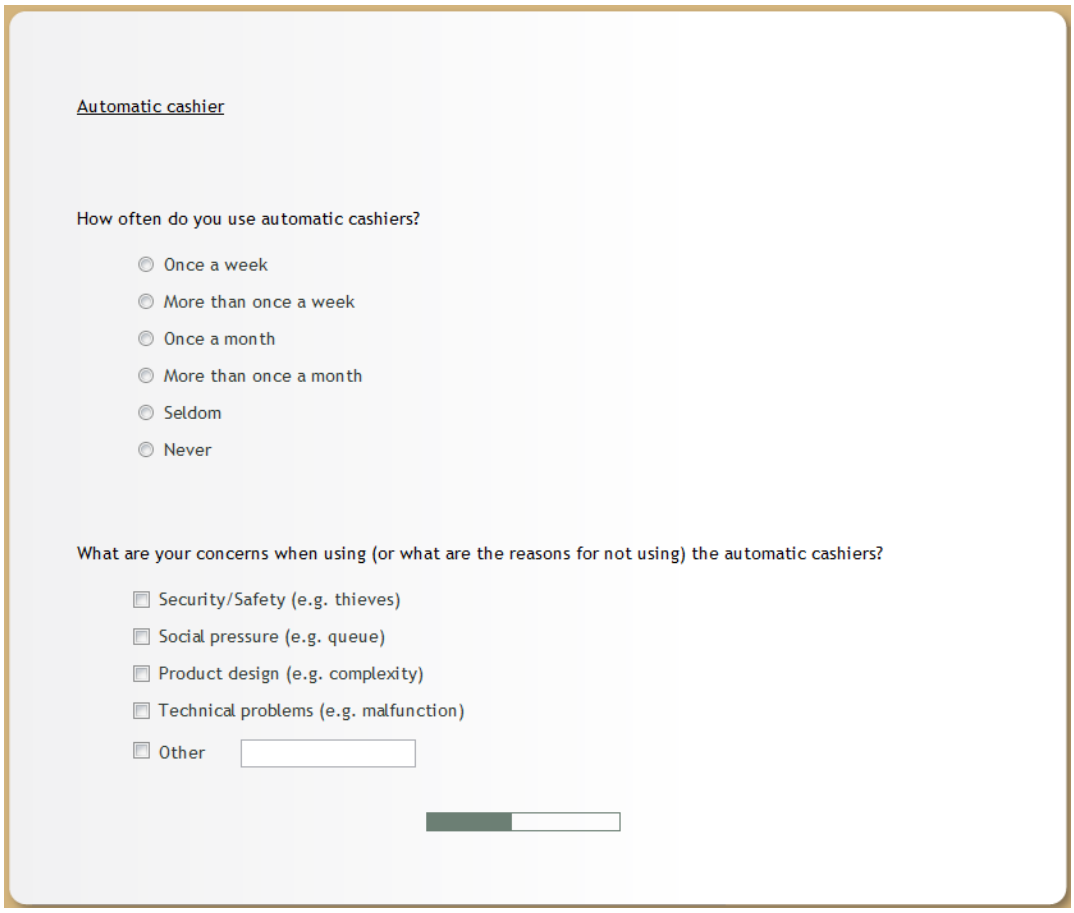


Figure A.8 Online questionnaire Page 8: Questions about automatic cashiers)

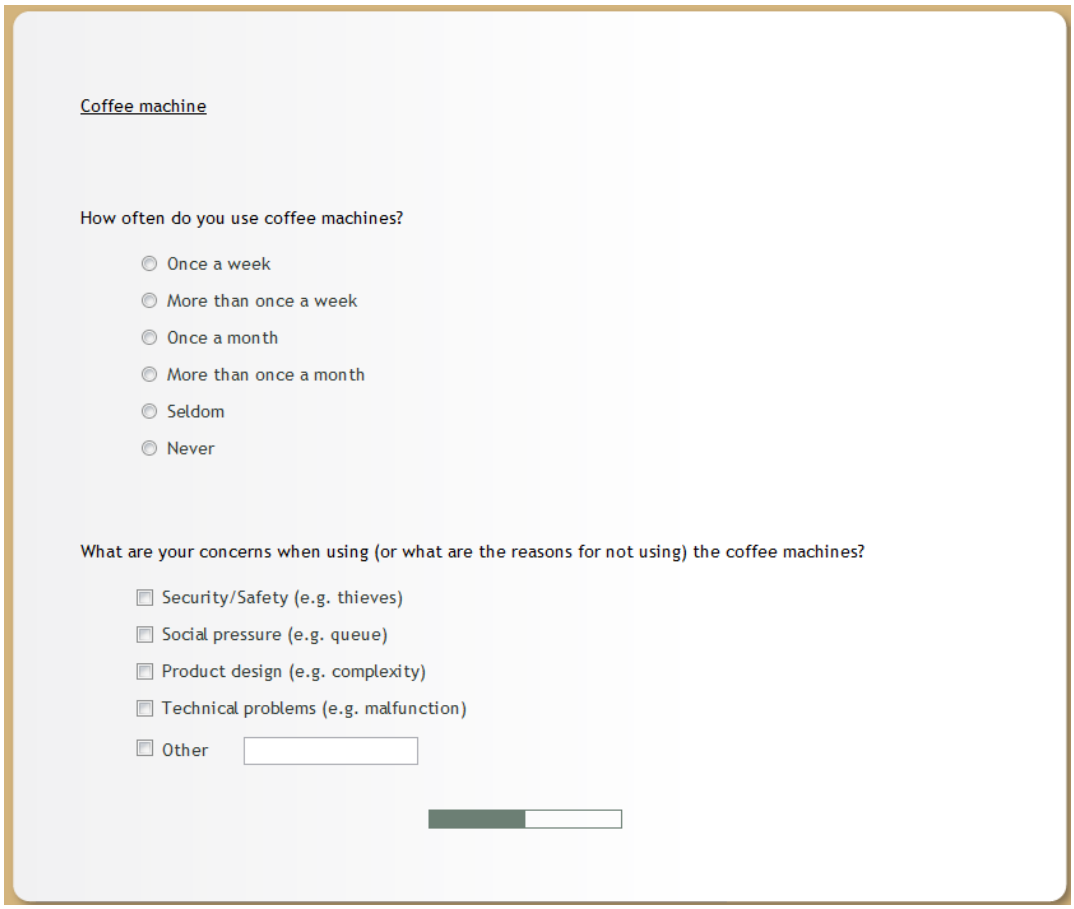


Figure A.9 Online questionnaire Page 9: Questions about coffee machines

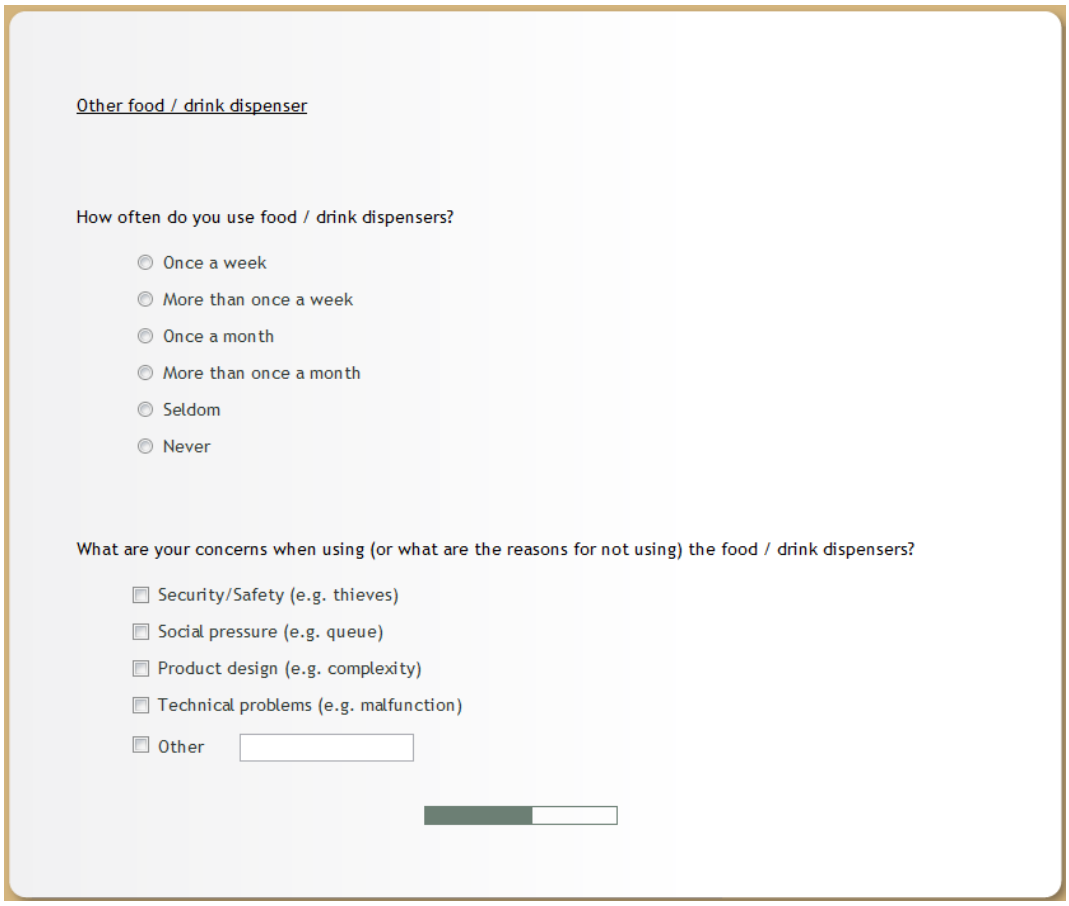


Figure A.10 Online questionnaire Page 10: Questions about food/drink dispensers

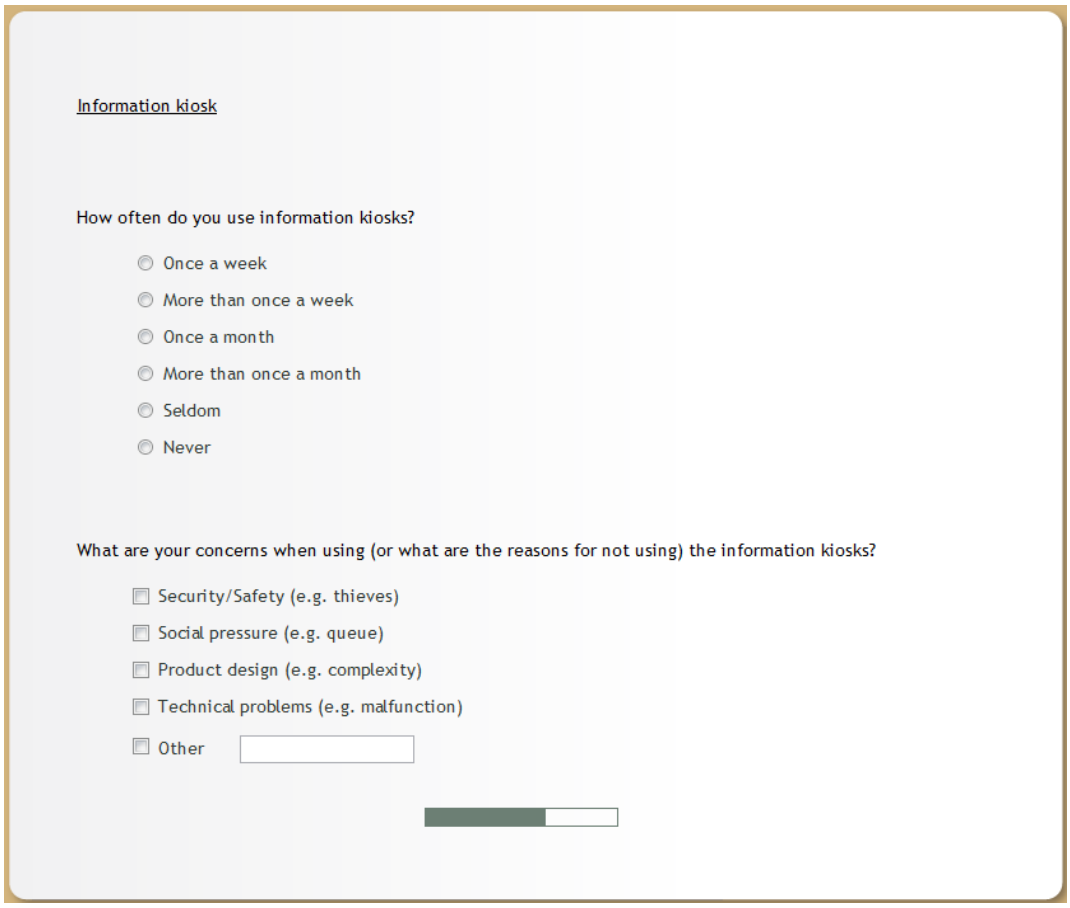


Figure A.11 Online questionnaire Page 11: Questions about information kiosks

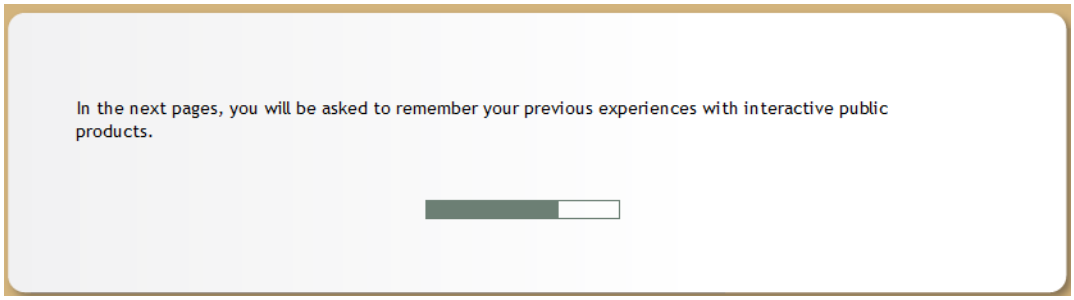


Figure A.12 Online questionnaire Page 12: Information

Now, recall two very **BAD** experiences with any interactive public product and answer the questions regarding these two experiences.

EXPERIENCE 1

What was the product?

When did it happen?

Were you alone?

What happened?

What were your main concerns?

How did you feel? (You can use the mood chart below to select your feelings and also add other feelings)

Mood chart

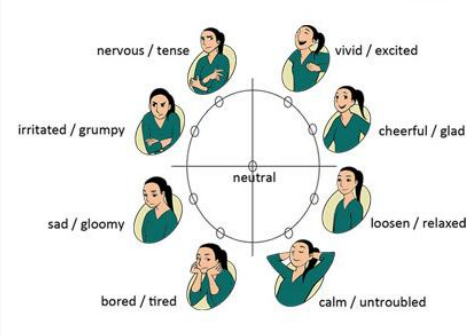


Figure A.13 Online questionnaire Page 13: Questions about bad experiences

EXPERIENCE 2

What was the product?

When did it happen?

Were you alone?

What happened?

What were your main concerns?

How did you feel? (You can use the mood chart below to select your feelings and also add other feelings)

Mood chart

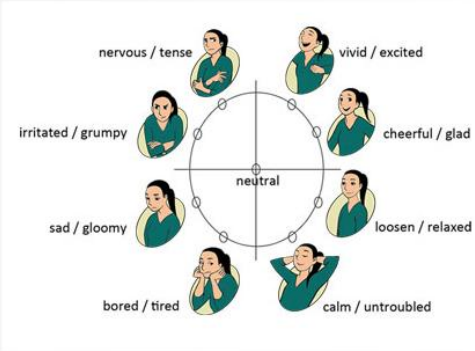


Figure A.13 (continued) Online questionnaire Page 13: Questions about bad experiences

Now, recall two very **PLEASANT** experiences with any of these products and answer the questions regarding these two experiences.

EXPERIENCE 1

What was the product?

When did it happen?

Were you alone?

What happened?

What were your main considerations?

How did you feel? (You can use the mood chart below to select your feelings and also add other feelings)

Mood chart

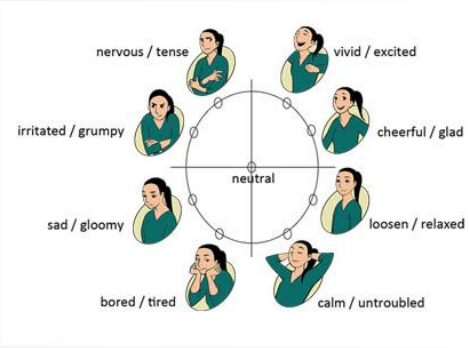


Figure A.14 Online questionnaire Page 14: Questions about pleasant experiences

EXPERIENCE 2

What was the product?

When did it happen?

Were you alone?

What happened?

What were your main considerations?

How did you feel? (You can use the mood chart below to select your feelings and also add other feelings)

Mood chart

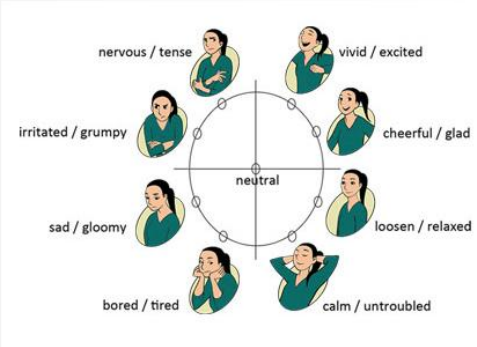


Figure A.14 (continued) Online questionnaire Page 14: Questions about pleasant experiences

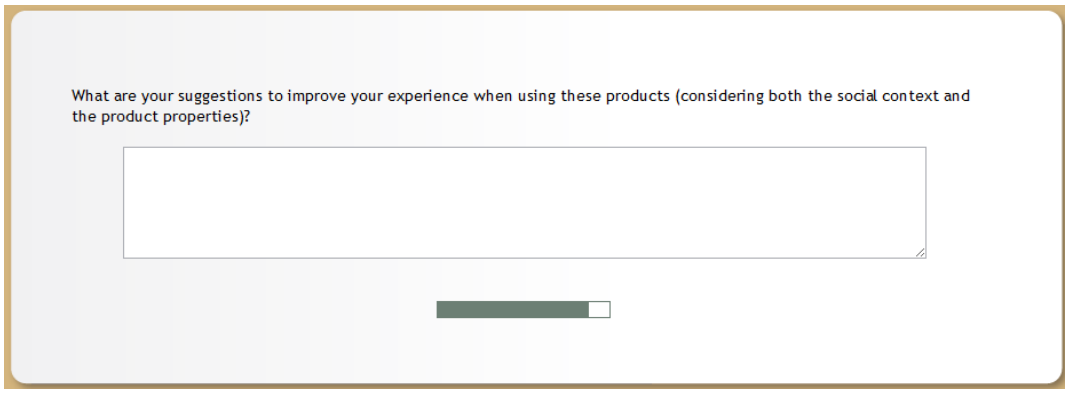


Figure A.15 Online questionnaire Page 15: Questions about suggestions

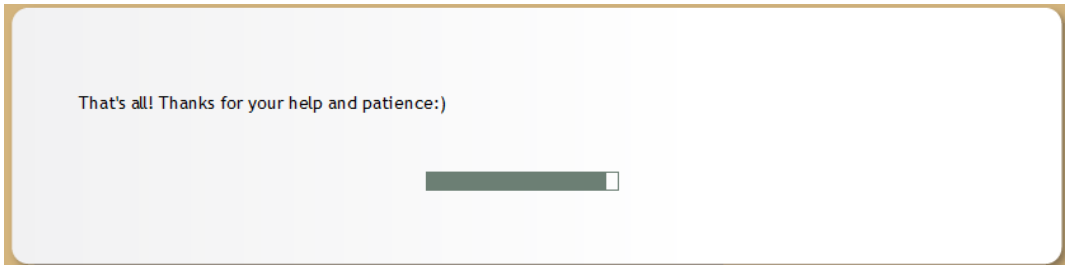


Figure A.16 Online questionnaire final page

APPENDIX B

ENTIRE FACTORS INCORPORATED IN DIFFERENT TASK DEFINITIONS IN ONLINE QUESTIONNAIRE

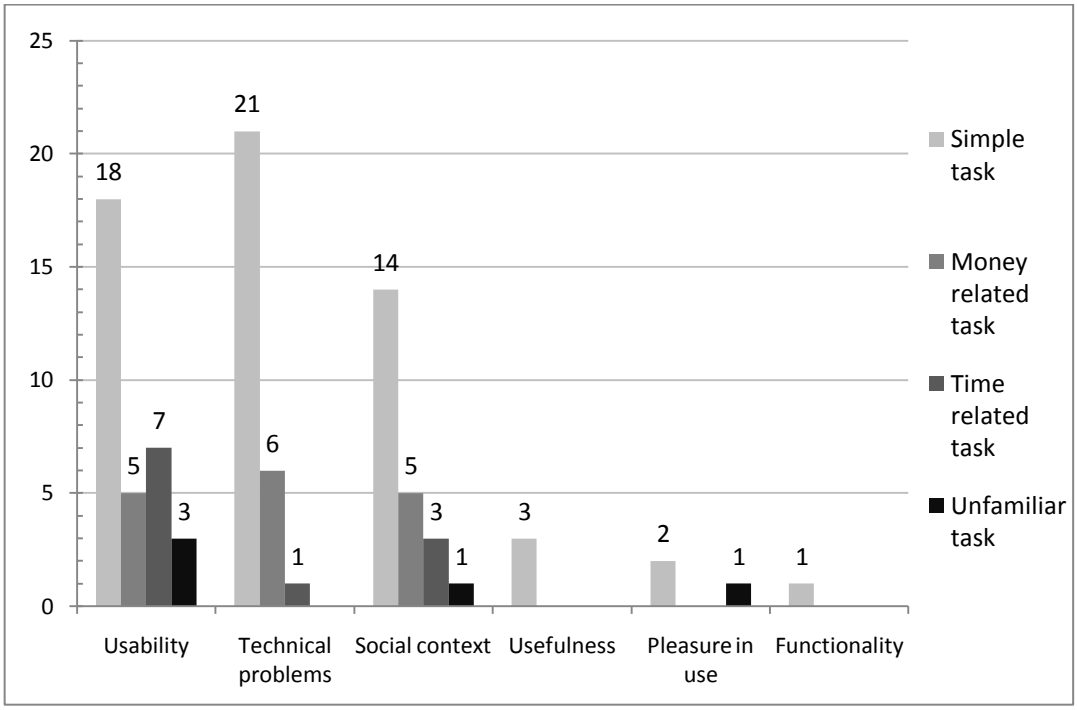


Figure B.1 Factors involved in different public product task definitions

APPENDIX C

BOOKLET STUDY (SHOWING ONE EXPERIENCE)

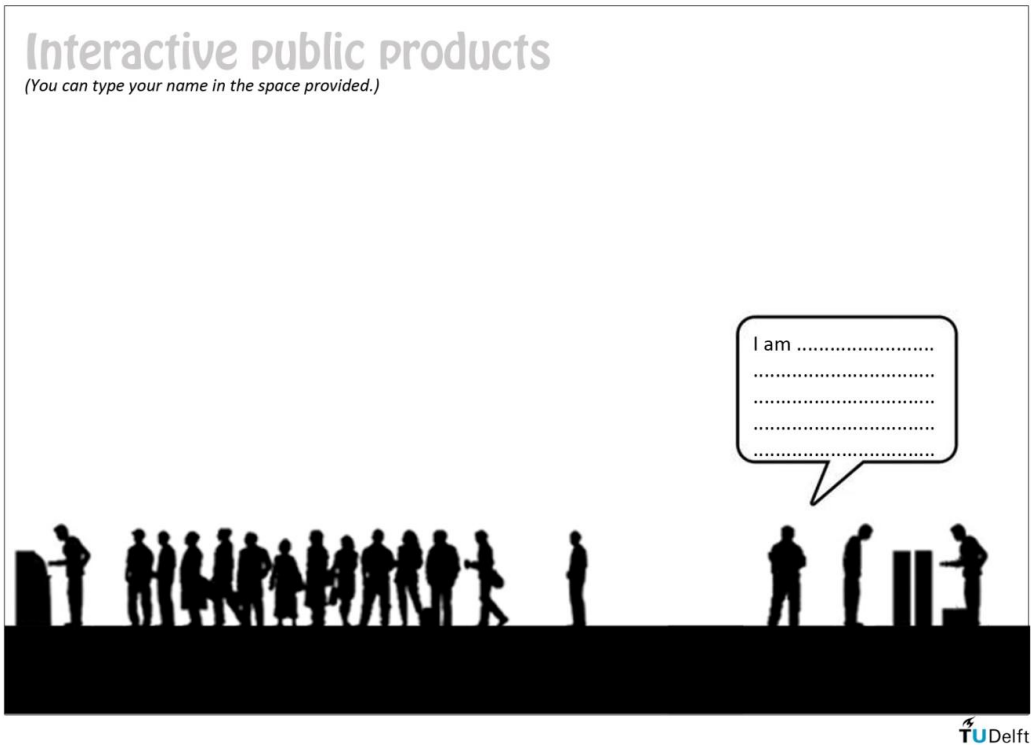


Figure C.1 Booklet Page 1

Introduction

Dear participant,

*I am a MSc student from TU Delft, faculty of Industrial Design Engineering. Currently, I am conducting a research for my graduation project, the focus of which is interactive public products. These products can be exemplified by **ATMs, coffee machines, other food/drink dispensers, automatic cashiers, ticket machines, information kiosks,** and so on.*

This booklet is devised in order to better comprehend the user experience with interactive public products. So, your personal experiences are of great significance for my study.

*The booklet is composed of several tasks regarding your experiences with these interactive public products. Please fill in each 'experience' **after you use a certain interactive public product**. The booklet will be collected after 7 'experiences' are completed.*

There is no right or wrong answer and the results will just be used in my study anonymously. So, please feel free to write whatever comes to your mind and also to select more than one choice when possible.

For any further questions please don't hesitate to contact me,
via e-mail: yngilsa@gmail.com
via phone: 0616669349

Thanks for your consideration and participation!
Best wishes:)
Aslı Günay

TUDelft

Figure C.2 Booklet Page 2

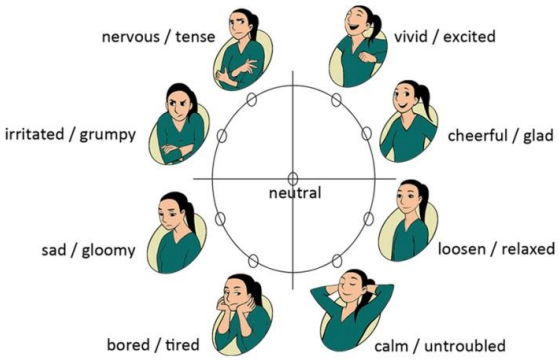
Experience 1

What was the product you used?.....

Before using the product:

How many people were in the queue **before** you?.....

How did you feel **while waiting** to use the product? *(Please mark the feeling which best suits you. Feel free to choose more than one option. You can also write other feelings or coments in the option provided as 'other'.)*



Other: .....

What are the reasons for feeling like that? .....

.....

.....

.....

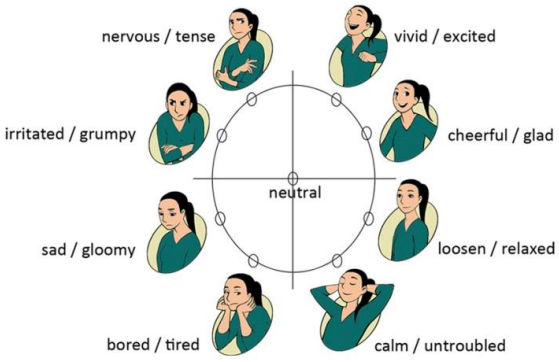
TUDelft

Figure C.3 Booklet Page 3

While using the product:

How many people were in the queue **behind** you?.....

How did you feel **while using** the product? *(Please mark the feeling which best suits you. Feel free to choose more than one option. You can also write other feelings in the option provided as 'other'.)*



Other: .....

What are the reasons for feeling like that? .....

.....

.....

.....

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Figure C.4 Booklet Page 4

While using the product:

What were your concerns while using the product? *(Please select the option which best suits you. Feel free to choose more than one option. You can also write other concerns in the option provided as 'other'. Also, provide brief explanations of the concerns.)*

- ☐ Security/Safety (e.g. thieves): .....
- ☐ Social context (e.g. queue, unfamiliarity): .....
- ☐ Product design (e.g. complexity, unclarity): .....
- ☐ Technical problems (e.g. malfunction): .....
- ☐ Other: .....

Did the presence of other people effect your use of the product considering the below aspects? *(Please select the option which best suits you. Feel free to choose more than one option. You can also write other aspects in the option provided as 'other'. Also, provide brief explanations of the aspects.)*

- ☐ Duration of use: .....
- ☐ Ease of use: .....
- ☐ Ease of remember: .....
- ☐ Number of errors: .....
- ☐ Satisfaction: .....
- ☐ Other: .....

Do you have any suggestions to improve your experience when using th's product (considering both the social context and the product properties)?.....

.....

.....

.....

.....

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Figure C.5 Booklet Page 5

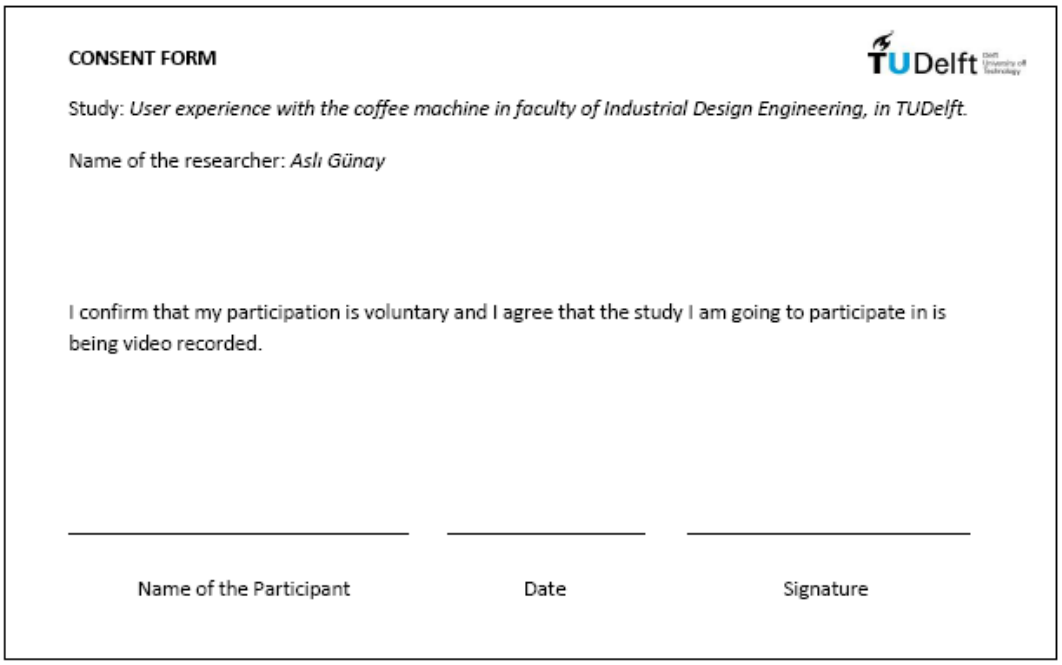
APPENDIX D

MAIN STUDY SET-UP

Using the coffee machine

Hello, I am a DfI master student and currently conducting a user test with the coffee machines. The user test involves using the coffee machine, a free coffee, and a small interview afterwards. I would be glad if you may participate in my study.

Thanks for your participation. First, I will ask you to buy a coffee from this coffee machine. Would you permit to be video recorded while using the machine? These recordings will be just use for research purposes and will not be used or shown anywhere else. *[If the participant wants s/he can sign the consent form (Figure 1). But, otherwise, it will not be given in order not to intimidate the participants.]*



CONSENT FORM

TU Delft

Study: *User experience with the coffee machine in faculty of Industrial Design Engineering, in TUDelft.*

Name of the researcher: *Aslı Günay*

I confirm that my participation is voluntary and I agree that the study I am going to participate in is being video recorded.

Name of the Participant | Date | Signature

Figure D.1 Consent form

Now, while using the coffee machine, I want you to do certain tasks. Please, look at the task cards and after reading buy a coffee according to the mentioned way (Figure 2).

[In one task, the participant will be asked to buy a certain type of coffee, but in the other task s/he will be asked to buy a coffee according to his/her preferences. The reason of this is to be able to understand whether the absence/presence of other people has an effect on duration of thinking and selection, as well. Task 1 and 2 will be given to the half of the participants in different orders.)

Figure D.2 Tasks

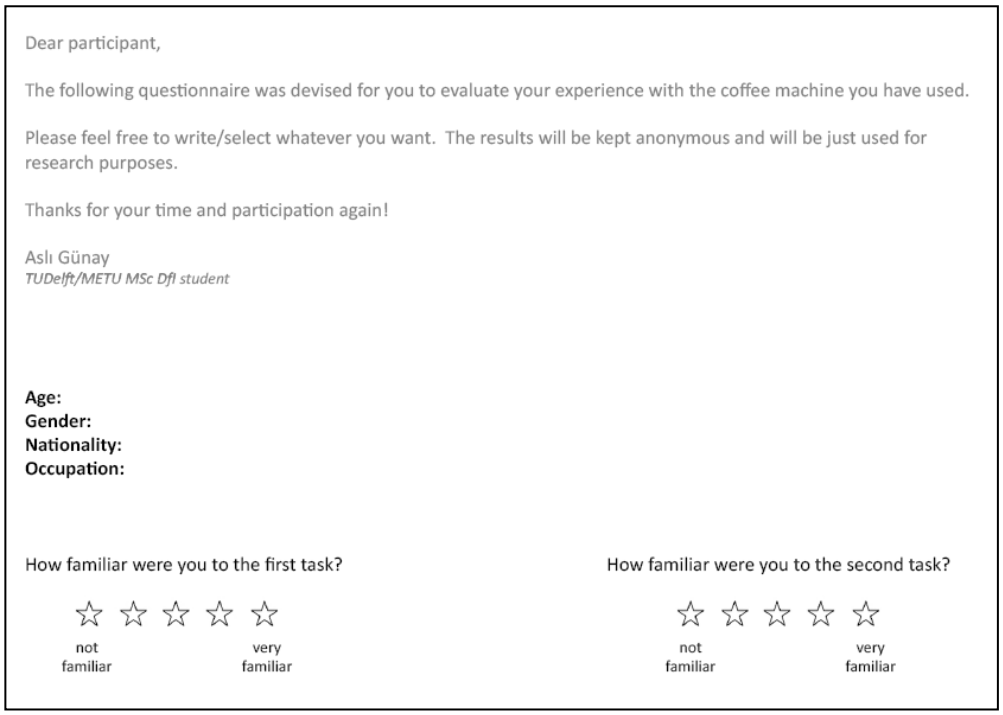
[While the participant is using the machine, one of the social context types will be simulated by the actors. In order to make a queue, there will be 2-3 actors behind the participant. For the simulation of the people around, there will be actors which are close to the participant less than 2 meters.]

This was all about using the machine. Now, I will do a short interview with you about your experience.

Interview (Self-confrontation)

Now, you are going to watch the video of your experience with the coffee machine you used. I want you to watch it and think loudly while doing that. In the meanwhile I will give you a short questionnaire (Figure 3) to rate your experience more easily and quickly.

[Before continuing with the video, the participant will be asked to fill in the initial page of the questionnaire.]



Dear participant,

The following questionnaire was devised for you to evaluate your experience with the coffee machine you have used.

Please feel free to write/select whatever you want. The results will be kept anonymous and will be just used for research purposes.

Thanks for your time and participation again!

Aslı Günay
TUDelft/METU MSc Dfl student

Age:
Gender:
Nationality:
Occupation:

How familiar were you to the first task?

☆ ☆ ☆ ☆ ☆

not familiar — very familiar

How familiar were you to the second task?

☆ ☆ ☆ ☆ ☆

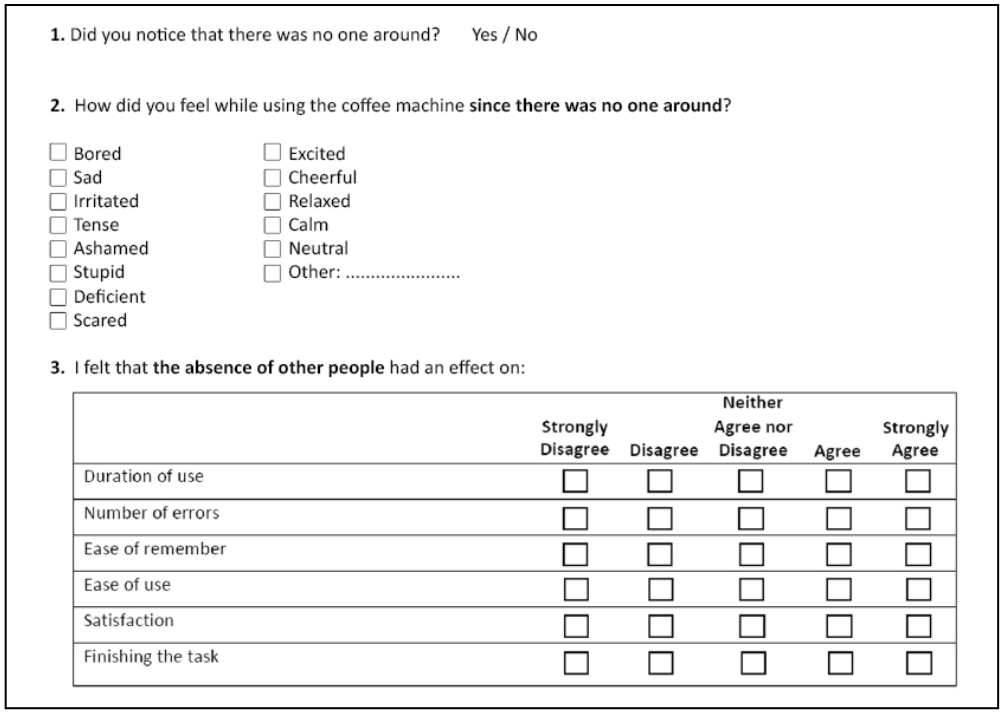
not familiar — very familiar

Figure D.3 Questionnaire (Page 1)

While watching the video:

- Have you noticed that there was nobody around?
- You were not able to set the sugar, etc., at the first trial. Can you explain the reasons?

[After watching the video, the participant will be asked to turn the page and fill in the other questions (Figure 4 .]



1. Did you notice that there was no one around? Yes / No

2. How did you feel while using the coffee machine **since there was no one around**?

- ☐ Bored
- ☐ Sad
- ☐ Irritated
- ☐ Tense
- ☐ Ashamed
- ☐ Stupid
- ☐ Deficient
- ☐ Scared
- ☐ Excited
- ☐ Cheerful
- ☐ Relaxed
- ☐ Calm
- ☐ Neutral
- ☐ Other: .....

3. I felt that **the absence of other people** had an effect on:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Duration of use	☐	☐	☐	☐	☐
Number of errors	☐	☐	☐	☐	☐
Ease of remember	☐	☐	☐	☐	☐
Ease of use	☐	☐	☐	☐	☐
Satisfaction	☐	☐	☐	☐	☐
Finishing the task	☐	☐	☐	☐	☐

Figure D.4 Questionnaire (Page 2)

[During the self-confrontation test, there will be three different types of questionnaires depending on the social context in which the interaction was performed.]

- You selected that you felt.....? Can you explain it a bit more?
- Would you feel the same if there were (not any) people?
- According to you which product properties increased or decreased the effects of the social context and how they can be improved?

That was all. Thanks for your time and participation again.

APPENDIX E

THREE DIFFERENT QUESTIONNAIRES IN THE MAIN STUDY

Dear participant,

The following questionnaire was devised for you to evaluate your experience with the coffee machine you have used.

Please feel free to write/select whatever you want. The results will be kept anonymous and will be just used for research purposes.

Thanks for your time and participation again!

Aslı Günay
TUDelft/METU MSc DfI student

Age:
Gender:
Nationality:
Occupation:

How familiar were you to the first task?

☆ ☆ ☆ ☆ ☆

not familiar — very familiar

How familiar were you to the second task?

☆ ☆ ☆ ☆ ☆

not familiar — very familiar

1. Did you notice that there was no one around? Yes / No

2. How did you feel while using the coffee machine **since there was no one around**?

- ☐ Bored
- ☐ Sad
- ☐ Irritated
- ☐ Tense
- ☐ Ashamed
- ☐ Stupid
- ☐ Deficient
- ☐ Scared
- ☐ Excited
- ☐ Cheerful
- ☐ Relaxed
- ☐ Calm
- ☐ Neutral
- ☐ Other: .....

3. I felt that **the absence of other people** had an effect on:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Duration of use	☐	☐	☐	☐	☐
Number of errors	☐	☐	☐	☐	☐
Ease of remember	☐	☐	☐	☐	☐
Ease of use	☐	☐	☐	☐	☐
Satisfaction	☐	☐	☐	☐	☐
Finishing the task	☐	☐	☐	☐	☐

Figure E.1 Questionnaire 1 (When there is no one)

Dear participant,

The following questionnaire was devised for you to evaluate your experience with the coffee machine you have used.

Please feel free to write/select whatever you want. The results will be kept anonymous and will be just used for research purposes.

Thanks for your time and participation again!

Aslı Günay
TUDelft/METU MSc DfI student

Age:
Gender:
Nationality:
Occupation:

How familiar were you to the first task?

☆ ☆ ☆ ☆ ☆

not familiar — very familiar

How familiar were you to the second task?

☆ ☆ ☆ ☆ ☆

not familiar — very familiar

---

1. Did you notice that there were people around you? Yes / No

2. How did you feel while using the coffee machine **since there were people around you?**

- ☐ Bored
- ☐ Sad
- ☐ Irritated
- ☐ Tense
- ☐ Ashamed
- ☐ Stupid
- ☐ Deficient
- ☐ Scared
- ☐ Excited
- ☐ Cheerful
- ☐ Relaxed
- ☐ Calm
- ☐ Neutral
- ☐ Other: .....

3. I felt that **the presence of other people around** had an effect on:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Duration of use	☐	☐	☐	☐	☐
Number of errors	☐	☐	☐	☐	☐
Ease of remember	☐	☐	☐	☐	☐
Ease of use	☐	☐	☐	☐	☐
Satisfaction	☐	☐	☐	☐	☐
Finishing the task	☐	☐	☐	☐	☐

Figure E.2 Questionnaire 2 (When there are people around)

Dear participant,

The following questionnaire was devised for you to evaluate your experience with the coffee machine you have used.

Please feel free to write/select whatever you want. The results will be kept anonymous and will be just used for research purposes.

Thanks for your time and participation again!

Aslı Günay
TUDelft/METU MSc DfI student

Age:
Gender:
Nationality:
Occupation:

How familiar were you to the first task?

☆ ☆ ☆ ☆ ☆

not familiar — very familiar

How familiar were you to the second task?

☆ ☆ ☆ ☆ ☆

not familiar — very familiar

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1. Did you notice that there were people waiting in the queue behind you? Yes / No

2. How did you feel while using the coffee machine **since there were people in the queue?**

- ☐ Bored
- ☐ Sad
- ☐ Irritated
- ☐ Tense
- ☐ Ashamed
- ☐ Stupid
- ☐ Deficient
- ☐ Scared
- ☐ Excited
- ☐ Cheerful
- ☐ Relaxed
- ☐ Calm
- ☐ Neutral
- ☐ Other: .....

3. I felt that **the presence of other people in the queue** had an effect on:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Duration of use	☐	☐	☐	☐	☐
Number of errors	☐	☐	☐	☐	☐
Ease of remember	☐	☐	☐	☐	☐
Ease of use	☐	☐	☐	☐	☐
Satisfaction	☐	☐	☐	☐	☐
Finishing the task	☐	☐	☐	☐	☐

Figure E.3 Questionnaire 3 (When there are people in a queue)