



Shopping Profiles of Supermarket Customers

How the Composition of Needs Effects the Decision to Use Assistance Robot

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Abstract. The results from the study show that it is the combination of the needs of an individual that determines WHETHER and HOW the product is used in the supermarket context. Because if the product is great, people with the need for connectedness & sense of community (high subjective prioritization) would be more likely to refrain from using the device (tablet while shopping) because it has an isolating effect on them to maintain contact with the people around, knowing that there are features on the tablet that would help you shop. Users with high subjective prioritization of needs such as stimulation and or competence, are more inclined to be stimulated by offers and recipes and keep track of the supermarket through the device and thus are more likely to enjoy using it and exploring the menu navigation.

We have created the profiles of the customers on this basis in order to work precisely with the customer needs. Thus, the target group of users can be better enclosed in the aforementioned context, and the aspect of acceptance of the application is increased by the profiles and its understanding of customer needs.

Keywords: positive user experience · psychological needs · hci

1 Introduction

All the listed workshops [1], exercises, studies, and experiments [2] were developed within a project called “I-RobEka”. In the increasingly aging society, scientists and experts studied robotic shopping assistance for supermarkets from 2017–2021. The goal is to develop autonomous and mobile shopping assistance with a human-robot interaction that contributes to the solution of dynamic and complex situations in the supermarket. In this context, interaction concepts are to be developed, designed, and tested, which are adaptable to the situation. The interactions of the inputs and outputs for the users happen via the mobile end device (tablet), which is located on the robot.

In addition to the results (which we write about in the poster) of the tested digital prototype in the context of shopping assistance, we were able to establish profiles of

the clientele that we believe are important for the HCI community to consider when developing shopping applications.

2 Description of Study

As could be expected, we found that a developed application based on the needs we found out (we also present these in the paper) was happily used and received positive feedback for it. However, the interesting thing was that as soon as the priority of the needs changed, we are talking, for example, about autonomy, the willingness of the clientele to use a shopping assistance is rather low, which we did not expect. These results lead us to present different profiles in the poster based on the study.

2.1 Baseline

Before the demo application could be designed according to the psy. Needs of the customers, an extensive experimental setting was carried out with the help of the students. In the context of the Human-Computer Interaction lecture, the students had the task to apply the contents from the lecture based on their own group project (I-RobEka). With the addition of working into the design process with the psychological needs. In the three years 2019, 2021, and 2022, a total of 229 students successfully participated in the exercise and surveyed more than 540 customers about their shopping behaviors and experiences. Figure 1 below shows the generalized and prioritized needs that came out. We do not plead for completeness, as the qualitative study is limited to only 30 subjects, but there are some clues to further expand the profiles and apply them in research in general.

The results were quantitatively proven psychological needs that are important for the shopping experience [3]. From this publication, it emerged that the needs for comfort, stimulation, competence, autonomy, and security in order, proved to be the most important general needs from the 13 fundamental needs according to Desmet [4], in the shopping scenario. In this context, needs such as community, impact, recognition, fitness, and beauty were also important but not as crucial as the needs mentioned above. Based on the identified needs, a demo application was developed and tested in the supermarket in the study.

2.2 Study Procedure

A total of 31 supermarket customers participated in the qualitative study. Audio recordings as well as screencast recordings of a total of 14 h and 31 min were evaluated. The demo prototype was built in a Wizard-of-Ozz approach. We built a prototype framework, which was operated remotely by the other study participant. That is, there were interaction functions for the customer, such as product search, and item scanning. And there were “system” functions that went back to the customer in the background as feedback.

First, we attached the tablet to the shopping cart. During the shopping process, we asked questions about the process. Second, we conducted an interview about the

Comfort	Having an easy, simple, relaxing life, rather than experiencing strain, difficulty or overstimulation.	<ul style="list-style-type: none"> - Peace of mind - Convenience - Simplicity - Overview and structure
Stimulation	Being mentally and physically stimulated by novel, varied, and relevant impulses and stimuli, rather than feeling bored, indifferent or apathetic.	<ul style="list-style-type: none"> - Novelty - Variation - Play - Bodily pleasure
Competence	Having control over your environment and being able to exercise your skills to master challenges, rather than feeling that you are incompetent or ineffective.	<ul style="list-style-type: none"> - Knowledge and understanding - Challenge - Environmental control - Skill progression
Autonomy	Being the cause of your actions and feeling that you can do things your own way, rather than feeling as though external conditions and other people determine your actions.	<ul style="list-style-type: none"> - Freedom of decision - Individuality - Creative expression - Self-reliance
Security	Feeling that your conditions and environment keep you safe from harm and threats, rather than feeling that the world is dangerous, risky or a place of uncertainty.	<ul style="list-style-type: none"> - Physical safety - Financial security - Social stability - Conservation

Fig. 1. Excerpt about the main generalized needs found in the supermarket shopping scenario [4]

functions of the tablet. We did not have a strict schedule for this but wanted to talk about the tablet functions as naturally as possible. Many participants registered in advance by email to take part in the study, and some we asked spontaneously on-site. Since the group of respondents was randomly selected, the age range was between 20–70 years. Study participants included couples, single people, and mothers. The guideline consisted of the following question areas (Fig. 2):

- Questions about the use of a recipe function in the market
- Shopping with or without a shopping list
- Online payment or at the checkout
- Self-searching, using a tablet function, or asking employees
- Viewing offers
- Suggest alternatives to products
- Create a quick route through the market
- Filter by eating habits

Finally, questionnaires were filled out about the tablet and its interaction with AttrakDiff, PANEM, and participants were rewarded with a shopping voucher for 20 euros. The shopping process took 20–40 min to complete.

3 Profiles

We found that the above needs are valuable for creating an assistant application in the supermarket, but during testing, the actual more detailed usage scenarios emerged.



Fig. 2. To simplify handling, the tablet was attached to the shopping basket, as there was no release for testing the robot yet.

After the study, we noticed that the needs can be mapped in individual combinations and thus a better statement can be made about who would use a shopping assistant and why, and on the basis of which needs the customers to decide not to use it if necessary. We have examined individual statements according to experience categories and classified them according to the definition of Desmet [4].

Need for comfort, all respondents from the study placed a high value on the. This was not up for discussion. All of them aspired to more Comfort, in that the application accommodates the information, such as an overview of time and money, and product location. Of course, under the fundamental 13 needs, more is meant than just a quick route or a product search function. But if we take out the single statements and analyze them, e.g. by valence method [5], it makes the needs accessible and touchable for everyone. We can work with it and learn more about the needs.

Profile Autonomy-Competence

Customers who have particularly pronounced needs in the direction of autonomy and competence. They are self-determining and consciously choose what they want to buy when they look at offers. They are not distracted by advertising, suggestions of recipes, and offers and do not look very closely at the price. They still like to give their data and would rather buy anonymously and quickly. If given the opportunity, these customers would rather have home delivery than go shopping themselves. Shop for products they already know. Have a plan in mind and would prefer to search for products themselves rather than ask something or someone. A shopping assistant would hinder rather than assist them in the pace of shopping. Statements have fallen, such as “Only when I have time and desire, I stroll in the market”, “I do not want to get information from the tablet, I want to look at myself when I need it”, and “I know what I need and buy already known products”. Are rather opponents to the need for stimulation (Table 1).

Profile Competence-Stimulation

For customers with a pronounced need for competence and stimulation it is important to

Table 1. Profile description for Autonomy-Competence

Attributes	Description
General	name, age, gender, place of living, technology usage behavior, wishes, motivation
Needs	Autonomy, Competence
Shopping Behavior	<ul style="list-style-type: none"> - self-determining - consciously choose what they want - not distracted - not look at price - buy anonymously and quickly - prefer home delivery - shop products they already know - searching by themselves

plan everything in advance, thereby can be supported by intelligent decision processes for example; “If I know how much the purchase costs in time, by the default of the shopping list, then I can decide whether I still manage to buy before the work or rather after the work.”. He looks closely at how long the wait is at the lines. Takes a rather pragmatic approach. Likes to face challenges and during the study explores through the application. He is curious and likes to have the application display important information, such as certain recalls, or quickly browse through offers directly in the store. The user would interact with the tablet on the spot. The cost overview for the purchase lets him decide whether he can pay for the purchase in cash or with a card. He would also disclose data about himself if it supported the planning of the purchase even better (Table 2).

Table 2. Profile description for Competence-Stimulation

Attributes	Description
General	name, age, gender, place of living, technology usage behavior, wishes, motivation
Needs	Competence, Stimulation
Shopping Behavior	<ul style="list-style-type: none"> - plan everything in advance - makes decisions based on time - pragmatic approach - explore application - likes to face challenges - likes display important information - cost overview

Profile Competence-Security

People with proficiency Competence and Security make sure that they buy products

that they already know. As a strategy for finding products, they take their time and look for them. Have their recipes in mind and do not want to try novelties only on the recommendation of others. They trust in the signet and judgments about the quality of the products from others not to check again what ingredients are included. They also plan ahead. Walk only the shelves they already know. Stimulation is not important, only if they happen to discover something. Overview of the store and shelf labeling helps them shop a lot. Statements such as “It’s on sale, but do I need it?” or “Looking for recipes in the store is too stressful for me, I don’t know what I want to eat in a few days” are representative of this user group (Table 3).

Table 3. Profile description for Competence-Security

Attributes	Description
General	name, age, gender, place of living, technology usage behavior, wishes, motivation
Needs	Competence, Security
Shopping Behavior	<ul style="list-style-type: none"> - buy products they already know - take time and search for products - recipes in mind - not try novelties - trust in signet and judgements from others - plan ahead - overview of the store

4 Conclusion

Since we conducted the study in a project “I-RobEka” about robotic shopping assistance in supermarkets, these results make their contribution to all assistance systems and assistance applications. The knowledge about the profiles of people structured according to the priority of their needs, from the information of our study, opens new perspectives to see the end users with broader view. Even the preparatory studies, pretests or user interviews can be formulated much more precisely and other, many better questions can be asked, focusing on the core of the projects. In the further course of the projects, the presented profiles will support the process of keeping the focus until the end. We do not plead for completeness, as the qualitative study is limited to only 30 subjects, but there are some clues to further expand the profiles and apply them in research in general.

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