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Designing a Technology Based Solution for Canteens

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Abstract

Purpose – The development of technologies have increased the use of different self-service technologies (SSTs) in regards with different services. However, one of the least studied is related to canteens. Thus the aim of this study is to develop and utilize a general methodology that creates successful SST solutions for canteen services and additionally propose prototypes of possible SSTs.

Design/methodology/approach – A conceptual model of factors affecting the success of SSTs is adopted and used in the creation of prototypes. The general methodology is comprised of various design methods and practices. The data is all primary and due to the qualitative nature of the study it is derived from observations, interviews and experience prototyping.

Findings – The successful creation of prototypes showed that the utilized methodology could be further implemented by managers and practitioners to develop SSTs. Additionally, the analysis outlined how the factors from the proposed model affect the success of SST, acknowledging the importance of the setting and the purpose of the SSTs..

Research limitations/implications – The study is predominantly formed on data from a single case-study, which limits the generalizability of the results. Additionally, the topic is researched only from a customer perspective rather than a holistic approach, the feasibility of which is limited by time and cost constraints.

Originality/value – The practical application of these findings can guide marketers in creating and implementing SSTs to their service delivery.

Contents

1. Introduction

In the last decade, the rapid advances in the capabilities of information technology together with the decreasing costs of implementation have made self-service technologies (SSTs) widely adopted in a variety of services. Self-service technology is a term that includes many types of implementations, but what they all have in common is that they give possibility for servicing customers without the direct involvement of employees (Meuter et al., 2000).It is possible to divide SSTs in two main realms, the first are the Self-service technologies that provide the possibility to perform a transaction; the second is formed of those technologies that provide information (Kallweit et al., 2014). Some examples of common Self-service technologies are ATMs, airlines ticketing websites and airports self-check-in kiosks and self-checkout in groceries shops (Eastlick et al., 2014; Orel & Kara, 2013).

Nowadays these technologies are so well established that customers do not see any other options to perform certain activities. Moreover, it is possible to say that with the advent of the digital era, SSTs changed industries and jobs forever. A really good example is the tourism industry, where the impact of self-service technologies was great on customers, employees, and business models in a positive way. Nowadays is not common anymore to go for a trip and book an airplane ticket or book a hotel room via a physical agency, people do everything themselves. This phenomenon is also observed in other sectors, such as Banking and retailing, even governments are implementing it to their customer servicing activities.

In the beginning, self-service technology have been seen only as a way for businesses to save many on employees (Atoji, 2016). Even though that this still might be partially the reason why businesses invest money and time in that technologies, at the moment SSTs are also considered as a way to improve services and therefore customer experience (Bitner, 2016). However, adopting SSTs does not always result in a positive outcome. Lack of human interaction, risks of service failure and employee antipathy are often mentioned as a downside of SSTs (Curran et al., 2003). Additionally, there are many elements and aspects that need to be considered in relation to implementing a SSTs in a specific service, in order to create a successful SST that delivers financial returns to the business and also impacts consumer satisfaction and retention.

In relation to this growing interest towards SSTs it was chosen as a research topic of this paper and since literature regarding its specific implication in canteens was not found, the research topic has been narrowed down to SSTs in canteen setting. However, the idea was to present a more different approach than the traditional quantitative studies found in relation to SSTs, thus a design approach was chosen, leading to the formulation of the research question - "How to create a successful self-service technology solutions for canteen environment". The idea is to present a process that could deliver a successful SST suitable for canteen services and additionally suggest prototypes of such SSTs, designed based on customer input and previous literature.

2. Literature Review

2.1. Self-Service Technologies overview

Self-Service Technologies (SSTs) are technological interfaces which allow customers to receive services independently, meaning without an involvement of direct service employee (Kotler, 2003). SSTs have been widely used nowadays and have successfully replaced many face-to-face service interactions with the main idea to make the service processes faster and more convenient with a minor possibility of an error, whilst at the same time saving costs to the service providers (Zeithaml et al., 2008). Some of the first examples of SSTs came with the introduction of ATM's in the bank industry and today they have evolved beyond the physical meaning of SST, now being incorporated in mobile applications and websites, processing a great variety of transactions, from self-pumping at gas stations to self-purchasing tickets on the Internet (Kotler, 2003). However, the focus of this paper is mainly regarding the physical presence of SST, such as the self-service kiosks, therefore little or no relevance will be made in regards to the non-physical varieties of SST.

Since the SST has been widely introduced nearly 3 decades ago, a lot of research has been done, mostly in the 90ties, with a major focus on Service quality attributes in relation to Self Service Technologies (SSTs) and consumer attitude towards this new (at that time) technology. Whilst consumer attitude is not that much of interest anymore, because of the wide application of SST nowadays worldwide, it is still interesting to look at quality attributes of SST and self-service as an experience. Some preliminary studies were mostly based on consumer decision-making research

and traditional service quality models (Cowles and Crosby (1990); Ledingham (1984); Langeard et al. (1981)) and were oriented towards two main issues - service quality and customers, and participation in technology-based service delivery. In general, all those initial studies found out that saving time and control were among the most important quality attributes of the self-service technologies.

2.2. Factors determining the success of Self-Service Technologies

Even though , there was a lot of research oriented towards SSTs, the main problem was that traditional service quality models were not precisely matching this new technology, since SSTs options represent a unique form of service delivery, thus some dimension of traditional service quality models may not be relevant.In this relation the work of Dabholkar (1996) uses a model that brings a good overview of the key characteristics of good self-service technology, which therefore drive customers to use the SST. In his research, he points out five attributes of service delivery which are vital for creating a good SST - Speed of Delivery, Ease of use, Reliability, Enjoyment and Control. The study was quite innovative back in the days as it was the first to apply consumer decision-making theory to services marketing and he found that customer expectations regarding these attributes were influencing the expected service quality and thus intention to use.

2.2.1. Speed

Speed of delivery is among the key attributes of the attribute-based model of Dabholkar, also a topic researched by Langeard et al. (1981), Ledingham (1984) and Maister's (1985), in all these studies both speed of service delivery and waiting time were considered to conclude that both are important and should be considered when designing a service which includes technology based solutions. Maister's (1985) also made another important point that occupied time feels shorter than unoccupied time which could provide a good theoretical basis for implementing self-service among different industries. Meuter et al. (2000) explains that speed of a self-service transaction is a vital factor that motivates customers to use SST, also noted in the work of Durkin (2004). In general the literature suggests that speed of delivery, including both waiting time and actual time taken to deliver the service , is crucial for service quality, the shorter, the better.

2.2.2. Ease of Use

Another attribute ofService Quality is **Ease of use**, which Langeard et al. (1981) in his qualitative research found out to be comprised by effort required to use a Technology based self-service and the complexity of the process of service delivery. Further studies by Davis et al. (1989) and Bagozzi (1990) also confirm these findings that effort and complexity are related to ease of use and thus to service quality. Williams et al. (1985) adds as well "personalness of automated service options" referring to responsiveness as another important factor. Dabholkar (1996) also mentions the fear of the "social risk ", which referrers to the idea that people might be afraid of looking foolish in front of others when they are not sure how to use the technology based service. In relation to these studies, two major points could be derived, that SSTs should be designed in such a way that they reduce effort required by customer to receive the service while at the same time it makes the whole process easy and comprehensive so that the effect of the "social risk" could be diminished. The process must be simply designed in such a way that everyone could use it without being a professional.

2.2.3. Reliability

Reliability is the third quality attribute mentioned by Dabholkar (1996) which refers to performance of the technology based self-service options and the accuracy of the outcome, also identified in the work of Parasuraman et al. (1988), Van gorder (1990), Davis et al. (1989), Bagozzi (1990) and Davis et al. (1992). The major issue here is to what extend a self-service that is technology based could be trusted, the point is that any chance of error should be minimized to zero and there should be no room for inaccuracy, since it could affect the quality of the service tremendously and a customer who once experience poor performance and inaccuracy might be hard to regain his trust again.

2.2.4. Enjoyment

A fourth attribute which is not so widely studies in the early days of the self-service technologies is **Enjoyment**, which happens to be of great importance according to Dabholkar(1996) in relation to valuation of self-service technology based options. Langeard et al. (1981) found in his qualitative

study that some customers like playing with machines and therefore interacting with technology based self-service is perceived as a game and is fun, which Davis et al. (1992) describes as crucial for using such products. Another point is made by Holbrook and Hirschman (1982) who suggest that the novelty aspect is another issue which encourages customers to try new services. In the work of Dabholkar, enjoyment is measured according to a four-item scale, which includes 4 words - enjoyable, fun, entertaining and interesting; as the last two were added to capture the novelty aspect, previously missing in the work of Davis et al. (1992).

In the work of Collier &Sherrell (2009), where enjoyment is mostly referred to exploration interest it is also pointed out that novelty could boost customers' interest and willingness to use SST. Further study by Collier and Barnes (2010) also suggests "fun" to be an important attribute when designing an SST to improve experience, although their study is focusing on customer delight in a hedonistic setting, this knowledge could be generalized and put in use when considering the design of a self-service options.But regardless of the ways enjoyment is measured or defined, the main conclusion is that the fun factor and novelty could provoke interest and willingness to use technology based self-service options, that is why it is important to address this points when designing such services.

2.2.5. Control

The last but not least feature of service delivery mentioned by Dabholkar (1996) is **Control**, which Langeard (1981) and Hui (1987) describe as the amount of the amount of control that a customer feels has over the process or outcome. It is believed that self-service options in general make people feel more in control thus choosing such option is favored (Guiry (1992), Bateson (1985) and Bowen (1986)). "Control is viewed as a characteristic directly associated with the use of the technology-based self-service option, independent of situational influences" (Dabholkar, 1996, pp. 39), and that is why control is seen as very important aspect of the service quality. However, it is often hard to measure this dimension, as people might find it complicated to articulate this factor. Another important point here is that when talking about control, it does not mean only actual control but also perceived control which self-services often referred to (Dabholkar, 1996). In his work he find out that different people feel in control depending on their preferences, for example

if they do not feel confident in using a SST and would rather use a traditional servicing way they would always describe SST as they have less control, thus it is important to make the SST as comprehensive and easy to use as possible so people could be confident and using it. Even though control could be dependent on the general attitude of the individual towards different service options, it stays an important factor for determining service quality.

A recent study by Collier &Sherrell (2009) confirms the importance of control and explains that it depends to a large extend on the information provided to customers about how the SST operates and what are the benefits of using it. According to the their study this is the step that many firms fail and thus reduces customers' interest and attitude towards the SST. Initial support from employees could be the solution to this problem, which would also boost trust in the company and speed up the transaction process, according to Collier &Sherrell (2009). They also mention the importance of employees preparation to assist customers during a self-service transaction and especially when they experience failures.

Furthermore, a comprehensive process that allows customers to easily track their steps or start over is vital for making customers feeling in control, a feature that is mostly related to **functionality** and should be addressed when designing SST (Collier &Sherrell, 2009). Collier also adds that functionality sometimes might result in increased complexity, which contradicts to the overall idea of the construct of "Ease of Use" to make everything simple and convenient, but he points out that as long as it is logical and gives customers' a feeling of increased control, this complexity is favorable.

2.2.6. Employee involvement

The above 5 attributes derived from other service quality models could be also complemented by the "**Need for interaction with service employee**" and "**Attitude towards using SST/ prior experience**" as suggested by Dabholkar (1995). In his work he developed a second construct in addition to the 5 attribute based model, where he points out that these two factors contribute to the service quality evaluation and intention to use the SST. Two decades after his research, attitude towards using SST is still relevant despite the eminent technological progress, many people are still reluctant to use technology based services and their attitude should be considered.

On the other hand the need to interact with employees would always appear as an important phenomenon, since people have different attitude towards using technologies (Cowles, 1989; Cowles and Crosby, 1990; Forman and Sriram, 1991).

A more recent work by Cho and Fiorito (2010) also supports the importance of employees in the use of SST and more specifically **employee readiness**, since their assistance is still an integral part for kiosk success or other forms of SST. They study was based on a company that has introduced kiosks in their stores and initially has failed, pointing out employee training as one of the reasons. In the study an important point was made, that well prepared employees encourage customers to use kiosks and assist them whenever necessary whilst using the kiosks, thus customers are more satisfied with the SST and also the management could prevent service failures caused by customers who have difficulties operating with the system. The findings are supported by Anitsal and Paige (2008), who found that employee support in the presence of technology based self service is crucial and has a positive correlation with the perceived quality of the service.

2.2.7. Promotion

Another factor, external to the features of SST is highlighted in the work of Cho and Fiorito (2010),suggesting that **promotion** plays a vital role in the perception that people have towards a certain SST. In the case that they researched, it was pointed out that the company, which implemented SSKs in its stores had been aggressively promoting the introduction of kiosks to their customers, featuring that in their advertisements and catalogs, also throughout the stores, making regular announcements. But what was crucial, is that the company tried to put emphasize on the benefits the new technology brings to customers, which in fact turned to be a right strategy and encouraged a large number of customers to try the SSKs.

2.2.8. Additional influencing factors

In addition to the above factors, Collier &Sherrell (2009) adds **convenience**, which they define as "Convenience in a self-service perspective can be defined as the perceived time and effort required in finding and facilitating the use of a self-service technology. " (pp. 492). They were the first to investigate how convenience affects customers' decisions to use SST and made a valid

point that it strongly influences customers decision whether to use a specific SST. In addition a study by Ahn et al. (2007) also found out that convenience of a technology will increase customers' willingness for exploration, which goes back to the enjoyment.

Efficiency is very important to customers who use SST as noted in the work of Collier and Barnes, 2010. However, in many studies researching the topic of self-service, only the utilitarian aspects of a service experience were issued, meaning that bill payment kiosks, ticket machines ,ATMs and other forms of SST were designed with the sole idea of being simple and efficient, but very little research has been done on the hedonicself-service context, which goes back to the enjoyment attribute. For instance, Barnes et al. (2010) found that customers who are delighted have increased their commitment, loyalty and word of mouth, compared to customers who were just satisfied. Additionally, Finn (2012) suggests that the effect on behavioral intention to use SST is stronger when customers are delighted and points out that there is a difference between customer delight and satisfaction, although both are connected.

Furthermore, Collier and Barnes (2010) also researched the influence of task uncertainty and servicescapeon customers. They found that task uncertainty influences both perceived control and time pressure. When task uncertainty increases, customers' level of perceived control decreases and time pressure increases, which again goes back to the ease of use and employee support. Galbraith (1977) defines task uncertainty as "the difference between the amount of information required to perform a task and the amount of information already possessed by a customer" (pp.987). Shockley, Roth, and Fredendall's (2011) conducted a retail study which concluded that a poor self-service design increased task uncertainty and customers needed more information to control the service process without the need of employee participation. These findings highlight the importance of a good self-service technology design.

2.2.9. Servicescape

Servicescape, on the other hand is also an important influencer that either facilitates the whole process or creates further boundaries, increasing task uncertainty and overall experience from the service Collier and Barnes (2010). Servicescape could be defined as the physical environment that surrounds the service, such as furniture, sings and their arrangement but also music and scent

(Kotler 1973; Bitner1992). The servicescape is important for customer evaluation of a product or a service. In fact customers evaluates services on appearance and external impression. In other words the physical environment of a service will have an effect on the customer opinion since customers are highly influenced by tangibles things (Levitt, 1981). In consideration of these is it possible to say that servicescape and subsequently self-service kiosk influence customer perception and evaluation of the canteens which has a high number of intangibles parts, typical for hospitality industry (Lin, 2004).In hotels as in canteens and particularly in canteens where the self-service is predominant is possible to say that customers have more interaction with the physical amenities than with the service employees, making the servicescape dominant in the customers' evaluation of the service and the overall organization (Linn, 2004).

When talking about the service setting is important to consider the shift that happened in business in the last few years. Here many researchers argue that the service economy moved to the concept of "experience economy", also other similar concepts such as "attention economy" and "entertainment economy", but all having similar ideas. (Davenport and Beck 2002; Wolf 1999; Pine and Gilmore 1998, 1999). In general, these studies pointed out that many services became commodities and so to differentiate the offer and achieve competitive advantage companies had to focus more on the experience factor of the service. As already discussed one of the factors that mostly influence the experience is the servicescape (Bitner, 1992). Moreover, experience means making interaction between the customer and the service pleasurable. (Pullman and Gross, 2003). All these means that attention to the physical amenities and in particular with the one that creates interactions with customs, like self-service kiosk, have to be considered important, when creating a great experience.

Furthermore, the **servicescape** can be very important in helping customer that engage with self-services because, the physical aids substitute the employees and their assistance. The importance of a good layout is critical when customers are proceeding in some task that puts them under time and peer pressure, for example in rush hours in places where there is a self-service check out, this situation could be influenced either positively or negatively depending on the layout (Bitner, 1992). In his work, Bitner (1992) also points out the holistic customers' perception regarding the environment, meaning that customers do not consider separately all the three factors that

compose the service environment when forming their experience evaluation. The three attributes, according to Bitner are "ambient conditions", "spatial layout" and "functionality" - sings, symbol, and artefacts.In relation to this, SSTs, such as SSKs could be considered "arefacts" and cannot be considered in isolation but with regards to the other two factors of the servicescape. In the case of SSKs and canteens, they are usually at the end of the customer journey, defined as the purchase moment, meaning that SSKs are the last critical touch point, making them essential in the formation of the overall customer experience (Peter, Donnelly Jr., Pratesi 2006), which therefore puts emphasize on their good design.

2.2.10. Interface

In terms of SSKs, Rowley (1995) suggested that the **interface design** one of the essential elements that facilitates the use of kiosks in retailing. According to him a great interface needs to be evaluated in terms of its functional capabilities from a user perspective, since this functional features determine the efficient and effective work completion of the processes conducted on the kiosk. Researching this subject, Cho and Florito (2010) concluded that the interface should be designed in a simple way but with useful layout, so that customers could stay focused on what they want. A user-friendly design should be appealing to a variety of customers, including people with very basic knowledge and experience in technology, such as older people for example.

Figure 1 - Drivers of success regarding SSTs

The above figure summarizes the main points of the literature review regarding successful Self-Service Technologies (SSTs). The idea is that the success depends mostly on the quality, which could be evaluated by the 5 attribute model introduced by Dabholkar - Speed, Ease of Use, Control, Reliability and Enjoyment. At the same time the successful SSTs should also take in consideration additional factors, that are derived from various literature regarding SST, such as Employee participation; Promotion; Interface Design; Servicescape; Convenience; Functionality and Efficiency. Together all these give a holistic view of the SSTs and their successful implementation, which therefore becomes the theoretical foundation of this research and helps the authors organize their data and therefore analyze it.

2.3. Interface Design Heuristics

Since the interface design place a vital role in the success of the SSTs and will be a large part of this paper, because the prototype creation would be predominantly interface oriented, it is therefore necessary to present relevant research regarding that field, which will therefore guide the authors in the prototype creation. Therefore this section has the purpose to present an overview of important principles used in design of successful user-interfaces.

A study that originates back in the 1998 by Maguire have presented a solid summary of principles and guidelines regarding the design of public kiosks, including research from dimensions, viewing angle, how to engage use, how to organize the menus and how to design the colors, icons and graphics. However, many of these are not relevant for the purpose of this study, so mostly principles that facilitate the ease of use and control attributes (described in the previous section) will be issued in this part of the literature review, which therefore guided the authors of this paper in the designing process of the prototypes.

In the work of Constantine and Lockwood (1999) a wide research was conducted regarding Usage-Centered Design and found out that too much information creates additional noise which can take away the user from its initial task. Thus visual elements that are unnecessary should be avoided in a good interface design. This is of great importance especially for public spaces, which are usually very busy and people are in a hurry, so the whole process must be quick and convenient, without creating possibilities for distraction that could slow the procedure.

Another principle that should be followed when designing a user-interface is outlined in the work of Norman (1998), who developed an action cycle, which suggests that appropriate visibility of controls in the given interface should be present, together with system feedback, which allows customers to identify the right actions required and evaluate at what stage of the process they are. Furthermore, this is also relate to the need of sufficient contrast and brightness, which is especially important for people with reduced eye vision, since a well know fact is that the light sensitivity decreases with age (Maguire, 1998). Additionally, it is an element that ensures that people would easily identify the visual elements on the interface, despite of the various forms of color blindness (Sandnes et al., 2010).

In the work of Smith et al. (1995) is pointed out that a kiosk designer could combine graphical representations, color and sound all together instead of limiting the design only to text. Furthermore, Sandnes et al. (2010) suggests that a message which is combination of the above means is more likely to be properly understood, whilst a single channel communication is more likely to be wrong understood by the user. She also points out that multiple channels communication could benefit different types of users, for example a user who cannot read the text, could understand the proposed meaning from graphical representation, others could benefit from the audio communication, if for example they have visual problems.

Before starting the process, an instruction video presented both textually and graphically could be also crucial for the success of the kiosk, since there is a great variety of users with different backgrounds and skill-levels (Sandnes et al. (2010) and Maguire (1998)). It also gives the opportunity to be observed by bystanders who are doubtful or scared to use the kiosk, especially in the case where the first page is full of options and information, it could be perceived as an indicator for a high-complexity process which requires some sort of expertise and thus discourage people from using it. The video should be preferably played automatically so that no action is required from the user, but also good if there is a possibility to go back to this video in any moment of the process (Sandnes et al. (2010)).

Further research also says that a good interface should "provide clear affordance, making the actions visible" Sandnes, et al. (2010). Norman (1998) explains that visibility is crucial for the user so that he/she can observe and understand what can be done. In particular, clear icons and illustrations a lot to communicate an action on additional channel. In many cases, the initial screen (the start page)is not well designed and does not consider the need to visual signaling what has to be done (lack of affordance). A good design that solves this could be just a clear and visible button "start", just something that makes it clear for the user to initiate the process. Lack of affordance could appear at any step of the process, whilst using the electronic interface, so every step should be considered in such a way that the action is visible, e.g. having a button, which represent a form of action and making it clear that it has to be pushed or scrolled or if it is something else, it must be comprehensive for the user.

Now going back to the first principle that additional "noise" from visual or other elements should be diminished, it is also important to focus on this principle from a temporal dimension, not only on the spatial dimension. It means that any unnecessary steps should be avoided as it only slows down the customers and creates more room for error (Sandnes et al. (2010) and Maguire (1998)). This is essential particularly for public kiosks, where customers are often in a hurry, and any complication or delays should be avoided.

An earlier work of Sandnes (2008) researchers the topic of selection trough cycling over items, which is typical in consumer electronics, such as digital alarm clock, where the user cycles over the different possibilities until he/she sees the required option. It could be considered as an additional function that is an exchange of time. This kind of interaction could be used when there is no sufficient real estate or if costs are too high to implement a more sophisticated and convenient solutions. But in the case of touch screen kiosks, it could be seen as unnecessary slow downs, meaning that for such cases direct solutions are preferable, since they could exploit the full capacity available in terms of real-estate (physical capabilities).

Another highly valuable, but often neglected principle is related to the language of the interface. Quite often designers and managers are lacking the proficiency or training to provide a good quality translations, which take into account not only language but also culture, since understanding of foreign culture provides the context for communication and must be perceived precisely, so that not misinterpretations occur (Jian et al., 2008). Jian also points out that the root of this problem is often related to the fact that a design team usually has the same or similar background, so they could easily miss a problem that occurs, due to their insensitivity. Thus it is important to seek for advice from experts on language and culture when designing a public self-service kiosk and especially in international or foreign environment (Sandnes et al., 2010).

Going back to the temporal dimension of a interface design, another valid point is made in the work of Huang et al.(2006). It is a simple principle that is widely accepted and implemented nowadays but it is important to mention it, it says that the design should be made in way that users should rely on recall and not on memory as it was in the past, when command line user-interfaces were applied. This is principle is the base of today's windowing systems. A graphical interface allows users to understand what they can do based on their perceptions of the different

elements they see, such as icons for example (Lai and Huang, 2008). In the other case of command line interfaces, the users has to rely on their memory, since they have to remember the commands, which is harder than relying on recall. Recognizing is much easier for people and that is why this principle is widely implemented in design nowadays.

In terms of navigation in and operation of the interface most textbooks on HCI claim that it any action should be reversible by "undo" function or "back" button (Norman, 1998). In relation to kiosks it means that at any stage of the process the user should be able to go back to a previous view, so a good design should think of back buttons (Sandnes et al., 2010). Other types of options or buttons are also useful, such as confirm and next buttons but should be carefully considered and avoided if they are not absolutely necessary, for example in a case where the dialogue involves multiple stages. Moreover, Sandnes (2010) suggests that information should be requested sequentially instead of simultaneously. This principle comes from the "wizard interaction style" which is suitable for situations where the user is a beginner and the system is probably used only one time. This capability enables users to perceive easily the purpose of each view and reduces the chance of something being forgotten or disregarded.

Another well-known heuristic in user interface design is that a navigational aids should be present (Gwizdka and Spence, 2007). This helps users as a guidance that informs them at what stage there are, how they got there and what and why they should do next. This is vital especially for busy environments and stressful situations, when for example the user is not familiar with the system or the virtual environment is non-native, since it could boost the confidence of the user and encourage him during the use of the specific system.

Sandnes et al. (2010) also suggests that web or desktop paradigms cannot be always used in designing user interfaces for kiosks, or at least not without some changes and adaptations. The main reasons is that in the case of desktops, the users are not experiencing the same type of pressure and stress, since the environment is different from when they are in public. One very important point that they make is that for kiosks accuracy and details should be avoided if are not needed, for example a specification of time does not require minute and second accuracy if the transaction relies on the customer selection just from a few distinct times or choosing a specific time to book a room in CBS's libraries, when there are only a few discrete times.

Final but important principle is that the system should be developed in way that it does not leave room for scammers or accidental cheating (Gwizdka and Spence, 2007). This widely adopted principles originates from Norman's (1998) proposals for preventing errors by restricting illegal options. This heuristic is very relevant for systems that include complex services and products and chance of error is higher. Also when updates to the systems are made it is important to leave sufficient time for testing before implementation, since this is the most often case when an initially well designed interface becomes vulnerable to scammers.

Table 1 - **Summary of the design interface principles regarding public kiosks**

Summary of the design interface principles regarding public kiosks	
Constantine and Lockwood (1999)	*Avoid unnecessary visual elements.*
Norman (1998) and Maguire (1998)	*Make text and elements visible with sufficient contrast*
Smith et al. (1995), Sandnes, et al. (2010).	*Communicate on multiple channels –minimize the need for reading*
Sandnes, et al. (2010).	*Show instructional videos on the start page*
Sandnes, et al. (2010), Norman (1998)	*Provide clear affordances – make actions visible.*
Sandnes, et al. (2010)	*Avoid unnecessary steps.*
Sandnes (2008)	*Prefer direct selection over selection by cycling through items.*
Jian et al. (2008)	*Solicit the advice of experts on language and culture.*
Huang and Sandnes (2006), Huang et al. (2006) and Lai and Huang (2008)	*Rely on recall not memory*

Norman (1998), Maguire (1998) and Sandnes, et al. (2010)	*Use confirm and next buttons sparingly – provide back buttons (undo).*
Sandnes, et al. (2010)	*Avoid unnecessary accuracy and detail.*
Norman (1998) and Maguire (1998)	*Do not allow illegal choices.*
Sandnes, et al. (2010)	*Request information sequentially, not simultaneously*
Gwizdka and Spence (2007)	*Reveal all the needed steps from the start.*

Source: Sandnes, et al. (2010).

The above table summarizes the main principles that were discovered in the literature review and which later on became the guidelines for the creation of the prototypes, together with the analysis of the initial data gathering.

2.4. Design process and methods

"You cannot hold a design in your hand. It is not a thing. It is a process. A system. A way of thinking." Gill, 2003.

Figure 1 - Structure of the design literature review
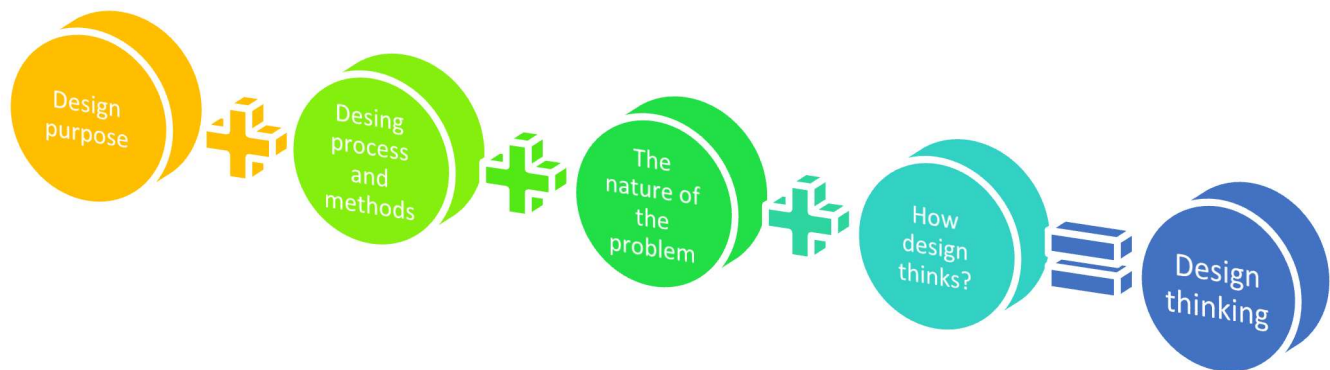
In this chapter of the literature review different aspects of "design" studies will be covered. The first sections will be dedicated to "What is design?" and will cover topics such as "design goals", "design process", "design methods" and conclude with "how designers think". Finally the design section will talk about what is "Design Thinking", how it can be used and what are its drawbacks. This journey in "design" studies is aimed to create a guide for the conduct of this research and also to familiarize the reader with the methods, processes and ideas that were considered before initiating this particular project. Design indeed is complex subject and has many variation and studies, so the sections that will follow will be organized starting from the more visible part of it to the more philosophical and abstract part (as illustrated in Figure 1). The aim is to get to a holistic knowledge of what is design and understand what "Design Thinking" is, since it is the foundation of this study.

2.4.1. History and overview

Design is a term that appears quite often when talking about technology and particularly about self-service technologies. Good design is often mentioned as a critical factor when implementing a technology based self-service. But what is design? In everyday life this term is mentioned for many

different activities and more often than not for things and product. It is indeed common to say "I bought a designer chair" or again "that website has a good design". But why a chair and a website use the same term to identify something that has a particular form? One reasons might be because design is strictly linked with doing. Another reason for that might lay in the connection between engineering architecture and design. This relation is highlighted in some of the first studies about design, Alexander in 1971 talked about design and engineering, Simon in 1973 used architectures as an example for design practitioners, later on Hubka in 1982 mentions some of them in his book "Principles of engineering design". A reason for this early link between these three subjects might be that engineers and architects were the first to practice design which later slowly became also popular in others fields. Notably disciplines such as "research design" or "service design" started to apply this concepts and conduct. Shostack was the first who mentioned "Service design" but it was officially introduced as discipline in 1991 by Prof.Dr. Michael Erlhoff, an example of how design has been introduced in something that before was considered exclusively managerial field (Moritz, 2005). This started the notion that design process could be used not only by scientists and practitioners but also from managers, applying design processes to improve existing or create new products and services that could boost further their business conduct.

2.4.2. Design purpose.

Starting from the concept expressed by Gill (2003), where design cannot be described as one simple thing it has to be considered into its different aspects. In this sense, the goals of design could be seen as the intentions that pushes designers to get to the final outcome, but this outcome could vary according to the different fields. In fact the outcome changes when considering its field, such as interior design, web-design, service design or others, then it seems that it design could be very complex. However, there are aspects that do not change, such as the goals of design.

According to Alexander (1971) design is meant to create a fit between the context and its form. He arrived at this idea during the study of design process of creating form. In this study, he makes examples of industrial design and tries to explain that to create a hover for instance, a designer has to take into account many requirements and find what fits best among them. From Simon's

points of view design helps to solve problems, and in particular problems where absolute solution cannot be computed mathematically, in other worlds design is something that helps finding satisfying solutions to complex problems (Simon, 1969). This notion is also supported by Alexander (1971), who explains that the best fit is not aiming for the perfect solution but the best possible solution given the available knowledge. A more recent study by Hatchuel and Weil (2009) supports the notion given by Alexander and Simon but adds further that the goal of design is also to create new knowledge and concepts, due to the exploration made in finding the best possible solution which solves the given problem and fits the context and the form required. It could be just concluded that "design" is a process that aims to solve problems and creates new knowledge with attention to the given form and the context.

2.4.3. Design Process

The design process describes what and how designers carry out their jobs. Some scholars think that desing process should be chaotic and creative, which means that design cannot be identified and taught because it is an art. In other words the design process according to this point of view is innate (Evbuomwan, N.F.O., Sivaloganathan, S. & Jebb, A. 1996). This point seems to lose its foundation because of some research which found that designers need to use technical expertise applied to the design process as well as training (Lawson, 1997). Another view of the design process is that it should be structured and organized, because of the many actions that a designer has to carry out during the process and also due to the high level of uncertainty naturally involved in the design nature. Therefore the design process is seen as logical and involves a more strict evaluation (Archer, L. B. 1984). Another suggestion is that designers do not need imposition of design, meaning that the design process is not a strict guideline that has to be followed step by step. This point of view has roots in the nature of the designers who already have guidelines from customers and who need to be free to be creative. From all this it could be concluded that design process is complex and open to many different answers, probably because of the nature of both the design problem and the solution (Atsrim, Felix, Joseph Ignatius TeyeBuertey, and KwasiBoateng 2015).

2.4.3.1. Characteristics of the process

Some researches tried to define the most important characteristics of design. For example, Lawson (2006), believes that "selection" and "identification" of the limitations are fundamental for the design process, because it creates the "formal environment" in which the designer can create basic guidelines which therefore will help to the "creation process". Similarly, Cross and Dorst (2001) found a positive correlation between creativity and the definition of the design problem. In other words the study showed that the more a designer spends in knowing the problem, the more creative the solution will be.

In Brown's point of view, the design process is experimental, and this is probably because of the uncertainty of the design process which requiresexperimention with different types of solutions in order to get to the best one. This experimentation can be seen mostly in the testing activity (Brown 2008). The design process in Cross's perspective is an exploration and it develops further in doing it (Kimbell 2009). This can be reasoned by his positivistic point of view regarding designs, indeed his vision of design seems closer to Schön's perspective. This exploration and developing in doing of the design process is also present in others studies, specifically in "Creativity in the design process: co-evolution of problem–solution" by Cross and Dorst. In this study the two researchers found out that in the design process there is co-evolution of problem and solution because the more designers study to find a solution the more they learn about the problem and the more creative they become. This explains Cross's point of view regarding the nature of design process as previously stated (2006). Cross and Dorst's finding about the design process and its influence by the relation between creativity and problem exploration can also be related to the Lawson (2006) idea that the design process never ends. In fact the design is meant to be a process that keeps discovering the problem and refining or creating new and better solutions. These points are summarised in the table below.

Table 2 -Summary of the literature regarding the design process

Summary of the literature regarding the design process	
Author	Findings

Lawson, 2006	• Limitations and boudries are important for the "creative process". • The design process is continous.
Cross and Dorst, 2001	• The more time is spend on the problem, the more creative the process is. • Co-evolution of the problem and the process is present.
Brown, 2008 and Cross, 2006	1.3.3 The process is experimental

2.4.3.2. Frameworks

Even though that "design" has a specific set of processes and activities that are typically applied, they could vary depending on the authors perspective. Some academics describe them in a more general way, others in a more detailed perspective, but what seems to be common in the definition of the design process is that there are few general steps which are outlined in the Figure below. "Pre-research" is done initialy to understand and define the problem. After that a secondary research is done to understand and highlight the characteristics of the problem, which threfore leads to the next step of the process - solution generation. The next step is aimed at testing the proposed solution and gather feedback. Once the test is completed it is followed either by implementation of the solution or just presentation of the findings. However, this final step does not mean that the process is eneded, because after that the learning process procceeds further. This is only a basic illustration, which to a large extend covers also the methodology of this paper and there are also other view, for example Lawson (2006) explains that this process does not always happen sequentially. In fact the process in Figure 2 is only guiding.

Looking at some other theories about the design process it can be seen that is not specifically defined and the process in different models could vary (Table 2 below). The first theory about the design process described from RIBA (1980) presents four stages: assimilation - menaning tha gathering and ordering of accurate information that is not specifically about the problem; general study - this is a research phase where designers analyses the nature of the problem and try to solve it; development and refinement - in this stage aa solution found in the previous phase is verified; communication - this last phase described by the RIBA is related to the communication of the solutions to the stakeholders. This view is probably the broadest of the design process, and very simmilar to the models proposed by Darke (1978) and Cross (2006)

As observed in the above table (table 2) it is possible to see that different authors remained broad in their conceptualization of the design process. On the other hand, there are others, who tried to describe the design process in a more detailed way, in particular Markus (1969) and Marver (1970), wich was noticed in the work of Lawson(2006). As a matter of fact, they believed that to have a more comprehensive picture of the design process, it is required to understand the decision order and the anatomy of every specific phases of the design process. Which specifically is separated into the following steps: Define, Research, Ideate Prototype, Select, Implement, Learn. Looking at these steps it is possible to see that the process is much more defined ant articulated (Ambrose and Harris 2009). Further academics and practitioners are taking this detailing to a even higher level, look at the work of Richard Buchannan (1997) and Mok and Yamashita (2003).

2.4.3.3. Activities

Design activities, are what designers perform in the design process. As suggested by Schön (1983), the design activities and the design process are a continues flow of action and thinking. He observed that designers think whilst they are doing, a process that he calls "reflection in action". According to him, this is something that belongs to practical disciplines and creates that massy knowledge that is typical of design activities. Designers probably subconsciously practice the "reflection in action" all the time, when for example they sketch possible solutions or they implement them in prototypes. This allows designers to explore and think about the possible outcomes at the moment they see it on paper or they test it in real life. Together with "reflection in action" designers carried three main activities which are outlined in figure number 2.

The first activity - visioning, can be also translated into "thinking in a creative manner", it could be also perceived as the spark that makes the other two activities possible. The second one is aimed at making the invisible visible, by drawing, sketching or other means to represent the ideas developed in the first stage. The last activity is proving, which can be conducted in a variety of ways, one way might be experience prototyping, an activity that in reality is used in the design process to measure and evaluate the ideas that have been developed in the design process (Zeisel, 1984), a method that is also adopted in this study and will be explained further in some of the next sections.

Figure 3 - The three main activities of the design process

Visioning

Make the invisible visible

Proving
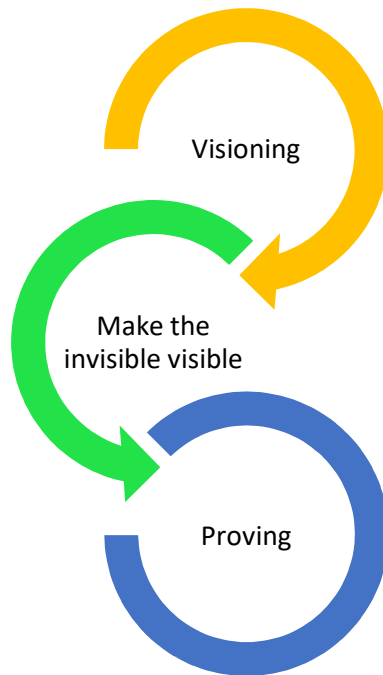
Source: (Zeisel, 1984).

In relation to the first activity of the design process there are different ways that could be taken to identify the problem that needs to be solved. An example is presented by Alexander (1971) who came up with the idea of "functional decomposition", which is a way to identify the problem's main aspect by decomposing it into its micro elements. The way presented by Alexander helps designers to clearly define and limit the issues that require attention, but it bears the risk of going too further, since it is not clear when the designers should stop this decompositions. In reality, reaching the basic units of a problem might not always bring advantage, since it might originate from something on a higher level. Hubka (2015) suggests that experienced designers should know when to stop but it still bears a risk of going too in-depth without an actual reason. However, the main purpose of this activity is valid in any circumstances, which is to select and identify the boundaries. This process though is not static, according to Braha (2003) designers actively find correspondence between functions and designs parameters.

The identification of boundaries and applying guidelines is something that notably helps designers to find the correct solution applicable to the problem. However, find and applying boundaries is

not biased free, because of the so called "fixation" which is a common problem in the so called "problem definition" moment, when designers first learn about how the problem is defined in terms of the boundaries. The problem with this is that it could limit the output of the design process and designers could easily miss better solutions. Some researchers found that this "fixation" of the design solution is observed mostly in cases where the in the problem definition process one or more suggestions are made that could be seen as boundaries (Cross 2001, Rowe 1987). That is why this process should be carefully considered and this "fixation" should be avoided, which was also taken in consideration in the design process in this paper.

To conclude this section, it is possible to say that design process is not so much about the solution but more about the right "problem formulation" and about the identification and application of boundaries and guidelines, which influences the overall process dramatically and therefore the outcome. However, the process is also influenced by the "Nature of the problem", which will be issued in a further section, that will explain different way to approach and solve design problems. But first an overview of different design methods is presented in the next section, which is also the ground for our methodological choices.

2.4.4. Design Methods overview

The need to identify design methods can be track back to 1920s with De Stijl, Theo van Doesbu, and later, Le Corbusier. This first wave was looking to have a method that was more objective and rational, typical for the scientific approach that could be applied in the creation of new objects. Later in the 60s the idea to apply a scientific approach to design came back as a trend in the academic field, with the so called "design methods movement". This movement had even stronger ideas about the creation of a scientific design process. One of the most important contributors of this period was H.Simon with "The science of artificial" . Simon believed that a scientific design processes and methods can be helpful in solving ill-structured problems. In the 70's though even some early contributors of the "design method movement" like Alexander rejected the idea that having a strong scientific process and methodology was useful in design. Another critique comes from Schön, who criticize the idea of design since, because he believes in the ill-structure nature of the design and of the design problems. Moreover he believes that there is some sort of unique "touch" that the design practitioner can bring to the process (Cross 2006).

Despite the criticism, the main aim of Simon was to create a common ground so that a dialog would be possible among art, science and technology and in a more holistic way of thinking all the stakeholders that are involved in the creation process (Cross, 2006). A problem recognized also by J. Kolko which in his "Abductive Thinking and Sensemaking: The Drivers of Design Synthesis" highlights the problem that designers usually face in communicating with clients (Kolko 2010). A third point of view can be identified with Banathy, who suggests that design is neither scientific, nor artistic, but can be see a third way of knowing with distinct method from the humanities and the sciences(1996). All these three view points are briefly summarized in Table 4.

Table 3- Summary of the main points of view

Summary of the main points of view		
Point of view	**Authors**	**Believes**
Scientific	Simon, Alexander, Hanver, Rittel, Webber, Dorst, Dijkhuis Hatchuel, Lawson, Archer, L. B.	Design requires scientific methods
Artistic	Schön, Buchanan, Alexander, Evbuomwan, N.F.O., Sivaloganathan, S. & Jebb, A.	Design is an artistic discipline that do not require scientific boundaries
Separate from the above	Cross, Kimbell, Banathy, Boland and Collopy, Garud	Design is a discipline that has its own methods and ways to produce knowledge.

It is important to have an overview of the different ways the methods have been approached so far in order to get a more general perspective of the topic. Design methods have four main different types of schools of thinking: Scientific Design; Design Science; Science of Design; and

Design as a Discipline, which is the most recent perspective;. Cross gives a really good overview in his "Designerly Ways of Knowing: Design Discipline Versus Design Science.", where at the end he comes up with this new way of view to the design methods - Design as a Discipline. To sum up what is presented in his paper a brief overview is given.

- Scientific Design - refers to modern, industrialized design--as a distinct from pre-industrial, craft-oriented design-based on scientific knowledge but utilizing a mix of both intuitive and non-nutritive design methods. Scientific Design is probably not a controversial concept, but merely a reflection of the reality of the modern design practice.

- Design Science - refers to an explicitly organized, rational, and wholly systematic approach to design; not just the utilization of scientific knowledge of artefacts, but design in some sense as a scientific activity itself.

- Science of design - refers to that body of work which attempts to improve the understanding of design through "scientific" (i.e., systematic, reliable) methods of investigation. An important note should be made that "science of design" is not the same as a "design science."

- Design as a discipline. - it believes that design have its own ways of thinking, knowing and acting. As a result design has already its own methods and practices that works to gather new knowledge and there is no need to implement methods and practices from others subjects. (Cross, 2006, pp. 51- 55).

- There is also a similar approach to the one propose by Cross, called Design as a practice, developed by Kimbel (2006), which is discussed in the last section of the literature review in relation to "design thinking".

2.4.5. "How designers think"

In order to understand the way this project was issued and carried it is also important to have a look on "how designers think" and "design thinking", which is related to the mental process used by designers to design objects, services or systems, as distinct from the end result of elegant and useful products. Design thinking results from the nature of design work: a project based work flow

around "wicked" problems (Martin and Dunne 2009). The section starts with a presentation of the types of reasoning used in this mental process by the designers.

2.4.5.1. Modes of reasoning

To solve problems designers can count on many types of ways of thinking. This multiple ways of reasoning gives the possibility to design practitioners to choose the best way according to the point in time where they found themselves in the project. Following this idea, Martin and Dunne believes that designers use inductive, deductive, and abductive reasoning. To explain, inductive reasoning is used by designers to generalize from specific instances, on the other hand deductive reasoning involves supposition from logical premises. Furthermore abductive as defined by Charles Pierce (1905; cited in Hoffmann, 1995) is "the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new idea." How all this methods of reasoning work is well presented in the figure below. In fact as described by Martine and Dunne "A designer uses abduction to generate an idea or a number of ideas, deduction to follow these ideas to their logical consequences and predict their outcomes, testing of the ideas in practice, and induction to generalize from the results. This learning in turn helps generate new ideas and the process can be depicted as a cycle…"(Martin and Dunne 2009).

Figure 4 - The Cycle of Design Thinking
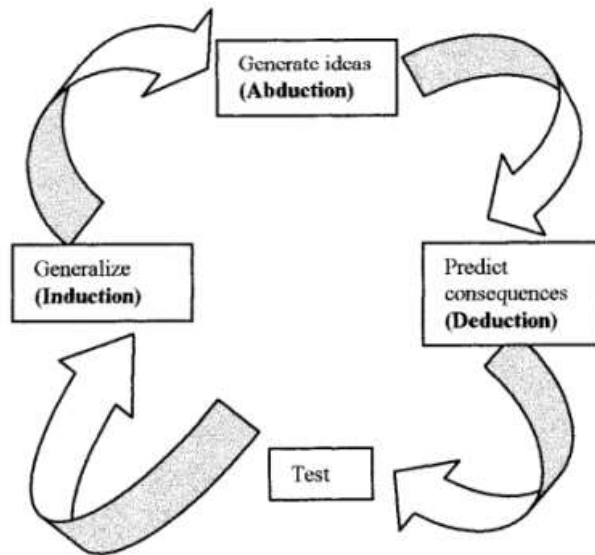
FIGURE 1
The Cycle of Design Thinking

Source: Martin and Dunne, 2009

2.4.5.2.   Reasoning Process

2.4.5.2.1.   Analysis and synthesis

Analysis and synthesis can be seen as a mental process that designers carry out all around the process. As presented in the figure below, the mental process can be visualized as the arrows that move from one step to the other. In fact the analysis can be defined as the moment in which designers take the whole and fragment it (Alexander 1964; Ritchey 1991). The analysis happens when designers examine the results of one of the design processes seen in the "Process" section. Once done this designers have the ability to create a synthesis of the things that have been discovered. Synthesis can be seen as the procedure combining divided set of information and bringing it together to create a new understanding. This mental process gives designers the

possibilities to wrap up and move on to the next step with a new set of thoughts (Ritchey 1991). In other words designer use synthesis to create new knowledge. Through the organization and filtering of the knowledge gathered from analysis. In this process the abductive reasoning is used (Kolko 2010).

Figure 5: The synthesis process
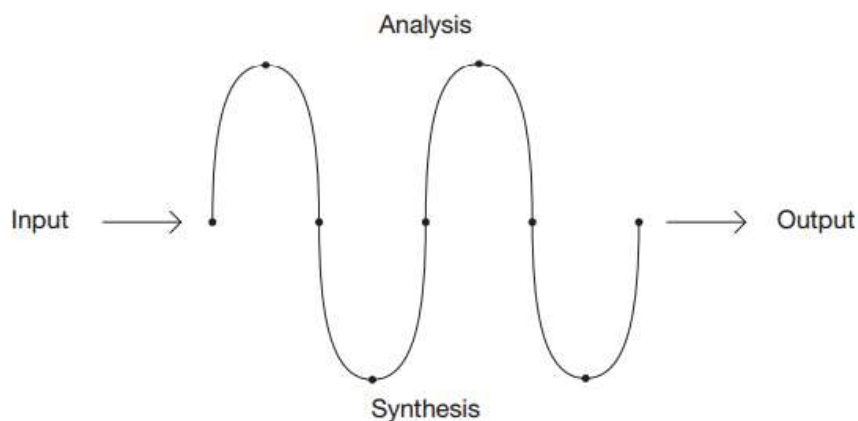
Source: Dubberly, 2005.

2.4.5.2.2.   Divergent thinking versus convergent thinking

Analysing a Problem as well as its solution can be seen as a divergent or convergent mental process. In other words the divergent and convergent thinking happens before and after the synthesis process. To explain the figure below is applied, imagine that at each intersection designers conduct a synthesis process. What brings them there is the divergent and convergent thinking. The first can be seen as the process of braking down the information of the concept from which the designer started to produce a new bite of information that is far (diverge) from the initial. At this point the designer starts to collect the different pieces and bring them together in a new way until he/she can synthesise a new concept. (Banathy, 1996; Cross. 1984; Alexander, 1964)

2.4.6. "Design Thinking" origin

So far this literature review travelled in the design realm answering many question that will lead the authors of this paper to their methodology creation in order to answer the Research Question - **"How to create a successful self-service technology solutions for canteen environment"**, which was also developed in the design process**.** To do so seems that design will help giving a way to understand the problems, a way to tackle it and a specific method. At the beginning of this chapter the literature review also introduced to the reader the topic of "how designers think", so that the reader can have a complete overview of design's practices, methods, ways of reasoning and the way in which design identifies and interacts with problems. All this and the design tools, that will be introduced later have been described by many authors devoted to the "Design Thinking". The term in some ways originates from the reflective school developed by Schön, which believes that design have to interact with messy and difficult situations (ill-structured problems or wicked problems) (Cross, 2006). In fact, before Schön, researchers and practitioners just wanted to understand which were the procedures (actions) that designers encompass in their work, so that they could define patterns and decode methods , just like Simon, Alexander and Hatchuel did. Within this tradition some research started to apply science to design methods. Meanwhile others following Schön, started to research more the designer behaviour and the way of thinking. To summarise - the research about design moved from studying "how to get to the final product" (Alexander 1971) to "problem solving" with Simon, Hatchuel and Weil so that later to understand "how designers think" with the introduction of the term "design thinking". Within this tradition Buchanan was the first to shift the design theory form the craft and industrial tradition to a more general idea that started the "Design thinking" literature. Moreover, Buchanan helped to shift the "Design Thinking" as a cognitive matter to a methodology for design that involves the social aspects (Kimbell 2009). This pushed design towards the application of "Design Thinking" to nearly everything (Kimbell 2009). After Buchanan many used the term "Design Thinking" to include methods, tools and practices, which therefore created a sort of misunderstanding of what "Design Thinking" exactly represents.

This misunderstanding is the main argument in a series of articles that Kimbell published to criticize the term "Design Thinking". Kimbell in fact tries to introduce two new terminologies.

Design as a practice and Design in practice. The first one is a way to describe design by taking in consideration the artefacts that professionals use. In Kimbell's words "*Design-as-practice mobilizes a way of thinking about the work of designing that acknowledges that design practices are habitual, possibly rule-governed, often shared, routinized, conscious or unconscious, and that they are embodied and situated. Design-as-practice cannot conceive of designing (the verb) without the artefacts that are created and used by the bodies and minds of people doing design*" (Kimbel, 2009, pp. 12). This view is most probably influenced by the Latoure vison where artefact and society cannot be understood separately (Latoure, 2005). This new way of defining "design thinking" is more complete since it acknowledges the work done by professional, but opening up to others interested in using design, such as managers. Design in practice, on the other hand represents the incomplete nature of the process the thus the outcome of design (Garud et al 2008). It is simply related to the idea that the work of design is not over even after the final product is completed and end-user is engaged with the artefact (Kimbell, 2009).

This two concepts expressed by Kimbell re-define and refine the concepts behind "Design Thinking" opening the doors to the tools, practices and process used by designers to other areas of studies, such as the managerial ones. In a way Kimbell tries to specify the concept of design thinking to help others non-design professionals to understand that not only the way of thinking is important but also the practices and tools that can be used in other areas to give a new and different point of view (Kimbell 2009).

 "Design thinking" is a term that originated from a long research tradition about design. Starting with Alexander and Simon, who both tried to describe and understand design. This understanding of design continued with Buchanan (1992); Jones (1992); Buchanan and Margolin (1995),which tried to describe successful practices of design. From there the analysis moved towards more and more abstract aspect of design. From Schön's (1983) and his "reflection in action" researchers tried to describe the thought's and the mental processes that design practitioners use to reframe and solve problems that cannot be defined before, just like in Simon's point of view (Kimbell, 2009). It is possible to notice that the research in design slowly moved from "focusing on the form", with Alexander. After that they went to "how design solves problems" with Simon and they finally moved to"how design thinks" with Buchanan's 1992, Rowe 1987 or Cross 2006 which of course started thanks to Schön's (1983) contribution. This shift of design form its craft and

industrial production to a more general and abstract made the term Design Thinking really popular because of the increase use of the theories, found by the authors mentioned before, to many different areas of studies (Kimbell 2009).

2.4.7. The use of "Design Thinking"

Design thinking can be useful in a variety of ways to managers and the managerial area of study. According to Martin and Dunne, "design thinking" can bring value to managers by establishing different ways of analysis(Dunne & Martin 2006; Martin 2009). Moreover design thinking combines the three reasoning methods - abductive, deductive and inductive, which can help to amplify set of skills and ways to achieve new business solutions (Martin 2009). Managers nowadays focus on reliability while on the other hand designers focus on validity. Managerial ways and design ways of doing and approach data can bring a positive balance. In fact as Martin point out today business and managerial focus on reliability can bring a lot of security but also inability to react to changes (Martin 2005).

Furthermore, "Design Thinking" is important for management and business for its ability to create value for customers and create innovative products and services Hatchuel (2001), due to the design nature, which needs to enlarge basic concepts, thanks to its capability to study the problem during the process. In this way design thinking gives space to the creation of new spaces where research can be made thus to create or explore new and different solutions. To do so design need to create learning tools that will be helpful in the realm where the problem cannot be framed before.(Hatchuel 2001, Boland and Collopy 2004 Dorst 2006).

Two other authors that believed in the importance to implement "Design Thinking" in management are Boland and Collopy (2004). In their paper they found a so called "design attitude" that contrasts a "decision making" which is a common attitude of the managerial world. The "design attitude" as described by Boland and Collopy is: "By design attitude, we mean a thorough, ongoing expectation that each project is a new opportunity to create something remarkable, and to do it in a way that has never been done before." On the other hand they believe that "decision-making" tools and techniques are grate in the moment the problems are well-defined and under these circumstances Boland and Collopy believe that the two have to be

used together. To explain "design attitude" is important to solve problems and find alternatives and create new solutions, at the same moment "design attitude" does not help making decisions so it is important for managers use both and complement the weakness of each other (Boland and Collopy, 2004; Kimbell 2009).

The term "design thinking" describes all the mental processes that designers use and share when they confront with a problem in other words, it seems to describe how designers proceed. But as seen in previous sections design practitioners have many different ways to tackle a problem and to confront the design process or and to what they have to achieve their goals. What really brings together designers are the practises, meaning the use of way of thinking and tools.

All this knowledge about design have helped the authors of this paper to create the methodology for this project. By adopting similar way of thinking the authors were able to come up with solutions that have been tested and consequently further knowledge generated, which could be therefore the basis for further design process and managerial implications.

3. Methodology

3.1. Research Philosophy

This section will be focused on Ontological and Epistemological considerations that set the direction of this research design, including basic overview of the related literature and its implication in relation to the thesis and philosophy choice.

Accodring to Arbnor's and Bjerke's (2009) the ontology relates to the basic assumptions that determine someone's research design, it is a philosophical construct that issues the essential questions regarding "being" and "the nature of reality" (Ladyman, 2007) and along with human nature develops the basics of a study by elaborating its believes (Kuada, 2011). It explains how the world is perceived by the author of the study, as an external reality not influenced by relevant participants or the individual creates its own reality by taking an internal role - objectivism versus subjectivism.

In relation to the thesis a twist combining objectivism and subjectivism will be observed throughout the thesis, since all social phenomena have many sides and interpretations, such combination is not so untypical for the academic researchers, hence they even have a term - "situationalists" (Rossman and Wilson, 1985). The idea is that such combination allows researchers to get a deeper insight into the researched problem. According to Rossman and Wilson (1985) social actors can be seen as both subjective and objective entity thus reality and social phenomena can be seen from both stances. Additionally this paradigm believes that in this way the researcher's truth is believed to be reliable and tangible.

In the master thesis context, this combination approach allows the researchers to issue the problem statement from a two different perspectives simultaneously . From subjectivist point of view, it could be assumed that the authors of the thesis create new knowledge, by exploring a very specific problem and presenting new empirical evidences regarding SST. At the same time, from objectivistic standpoint the researchers will also observe the problem externally, since not everything in the research design is solely created by them (discussing and using already established research concepts).

Epistemology differs from Ontology but together they contemplate the authors point of view on research design. This philosophy refers to the believes of the researchers and what is considered as truth, which therefore determines how knowledge is created (Ladyman, 2007; Kuada, 2011). There are two main approaches on epistemological level - positivism, which relates to the objectivistic approach, and constructivism - the subjectivist approach.

The positivistic approach explains the reality by focusing on regularities and causal relations between its compounding elements (Kuada, 2011). It enables external social actors to investigate a particular problem statement and later on to get "the truth" about its peculiar social reality. Therefore, the proponents of the positivistic approach advocate that any investigator within a particular social reality can be an objective (external) observer and ultimately their research can be seen trustworthy in that manner. On the contrary, the anti-positivist approach argues that researchers have to participate and operate "from the inside" in order to obtain reliable knowledge for the topic of interest. The proponents of this methodological concept believe that in

its essence the social world and reality are relativistic (socially constructed) and that is why they can be understand only by emphasizing an internal point of view.

In the case of this research the philosophy has mostly been influenced by the fact that design processes and methods derived from disciplines as design thinking and service design have been chosen as means to carry out the research. On one side there is "design science" , "scientific design" and "science of design" that have a positivist doctrine (Cross 2006). On the other hand the "Design thinking" is mostly related to the constructivist approach (Cross 2006; Kimbell 2009). In fact this paper is kind of twist between the two approaches, positivistic because it relates to social reality (Remenyi et al. 1998), also because the ideas and hypothesis that were developed through the research process were not solely derive from primary data but also relevant literature and previous research on the problem. Furthermore, general laws and principles were identified in this research (customer problems with SSKs in this case) which have been synthesized from a complex set of data and have been tested further. Some of the methods used are also typical for the positivistic approach, such as the in-depth interviews and the use of primary data (Saunders, 2007). In terms of the constructivism it comes from the authors' believe that the scientific and absolute reality is not accepted as pure truth. The authors of this paper are supporting Latour's idea that reality is a social construct influenced by all objects that are in the reality (Latour, 2005).

Figure 4 - Research philosophy choice

Research philosophy	Why?
Positivism	- work is about social reality (source of reliable data collection) - identification of general laws and test them
Constructivism	- scientific and absolute reality is not believed - reality is a social construct, influenced by the object that is in the reality

3.2. Research Strategy

Figure 6 - Strategy and Purpose
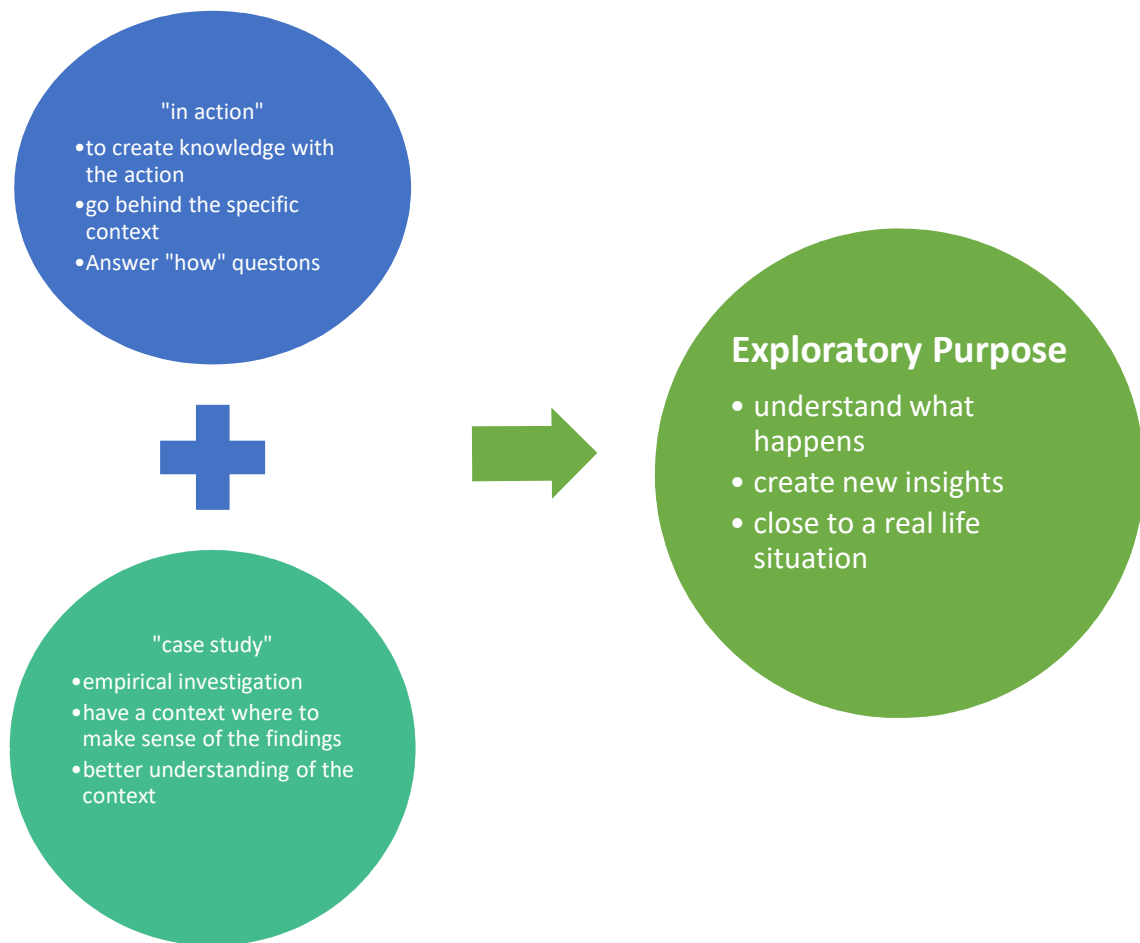
The purpose of this research is exploratory (Figure 2) because the aim is to understand what happens in relation to Self-Service Technologies (SST) in canteens, then come up with some ideas in relation to our research question which is **"How to create a successful self-service technology solutions for canteen environment"** and after testing these ideas trough experience prototyping, create new insights for managers and designers that are considering implementing SST in canteens. Moreover, the nature of this research gives the possibility to better understand the

problems that designers and managers face when they implement a new SST. Furthermore, the research is based on a case study, so that the project results could be as close as possible to a real life situation and additionally to get more field for exploration. A company that is looking in implementing a new SST or to improve existing SSK using design methods, would probably address similar processes as the ones in this research.

This research decided to use an "in action" and a "case study" strategy (Figure 2) because of the lack of knowledge regarding the specific topic. To explain, the "in action" research strategy have been implemented to create knowledge with by doing something rather than study the action of others. This fits perfectly with the constructivist philosophy that is preliminary in this research, also influenced by Schön's research about "reflection in action" (Coghlan and Brannick, 2005; Schön, 1983). Another reason why this "in action" strategy have been implemented is because the idea regarding the knowledge generated from this research is to go behind the specific context in which the study was undertaken (Huxham, 1996). Moreover, this type of strategy fits the "How" research question typology (Saunders, 2007).

3.3. Case-studies

Two case studies were selected for the purpose of this research, firstly because the main RQ have been formulated as a "How" question, multiple case study seemed the most appropriate way to conduct the research (Saunders et al., 2003; Yin, 2009). Moreover multiple-case analysis provide more valid results compared to the analysis of a single one (Yin, 2009). Secondly, because of the possibility of empirical investigation which this type of research provides(Robson, 2002). Moreover this gave the researchers the possibility to have a context where to make sense of the findings (Yin 2003). But also thanks to the case study strategy, this research was able to create and give a better understanding of the context in which the research happened (Morris and Wood, 1991). This strategy normally includes interviews, observation, documentary analysis and questionnaires (Saunders2007), which is also the case in this project.

The two case-studies are based on CBS's Canteens and Fazer's Canteens , a case where self-service technology was implemented and the second case is the one where no SST is introduced yet but there are plans for future implementation of self-service kiosks. Initially the idea for the project

was to represent in some extent the process and the experience that managers or designers would go through when implementing a new SST or improving existing SSK in canteens using design methods. Thus, one of Fazer's canteens have been selected as a case that has not implemented SST yet but has such plans. Additionally, the choice was supported by the fact that one of the researchers works at that place and gives the researchers easier access to the specific setting at any point, plus additional information from the management of Fazer, which is a huge company owning more than 1200 canteens around the Nordic countries (Fazer, 2016). On the other hand, the best way to get knowledge and insights but mostly to understand the problems that customers could face is to look somewhere that SST was already implemented and even better if that somewhere is another canteen setting, that is why the second case study is based on CBS's canteens, where SSKs were recently introduced and therefore a field for research is widen. This way of researching gives the opportunity to generate knowledge and ideas that could be beneficial to any canteen setting.

3.4. Literature Choices

In order to define and address the research question - **"How to create a successful self-service technology solutions for canteen environment"**, a wide range of literature have been reviewed form "Design" and "Self-Service Technology" (SST). Both Design and SST have been the subject of many academic and organizational studies, which made literature easy to obtain. However, it also increased the need for choosing sources deliberately, and often the choice of authors were based on the importance and influence that paper had in the field.

This research takes advantage of the two different literature branches. Articles, books and website have been consulted about all what concern design, from which are the goals of design to the methods/tools. This helped the research to guide the process and create a unique methodology that allows to address the given Research Question. It helped researchers to find the most suitable tools and practices that designers use to solve problems and get insights. On the other hand also literature about SST and on User Interface (UI) have been reviewed, which established the basics to understand the topic of SST and address the right questions in the interviews conducted, also classifying the problems and designing solutions. The main literature which became a foundation

for the study is Dabholkar's 5 attribute model and a list of principles regarding designing public kiosk - Sandes (2010). In terms of Design methods, Ellis (2010) provided a framework for the research that has been embroiled from an extensive literature review. Regarding the tools and practices of design, Cross and Kimbell (2006) helped to guide the literature to more specific one, in mores specific instance, Sketching and drawing Cross 2006; Lawson 2006. Prototyping objects, experience prototyping by Kelley (2001) and Fulton and Suri 2000. Brainstorming - Sutton and Hargadon 1996 and Kelley 2001.

3.5. Data collection

Due to the exploratory goal and the qualitative character of the study all data is primary, gathered through observations, semi-structured (in depth) interviews and experience prototyping. Observation were carried out at the beginning of the process to understand and evaluate the problems that customers face when using SSK. Initial observation were carried out in different SSK settings, not only canteens. The observation of the different types of interfaces and customers' behaviors gave the initial idea that SSK experience need to be improved. The initial observation took place in train and metro station, canteens and supermarkets all of them around the Copenhagen area. Later on the observation focused specifically on the canteen setting and CBS canteens were used as a case study, together with Fazer's canteens, used to find similarities in both settings. Furthermore, the approach on the observation in this phase was set really free and in fact the questions made during the intercepted interviews were not specific on some particular aspect of the self-service such as "speed", but were open questions with the aim of getting to know what customers wanted to share about the experience. The different type of self-service observed where randomly selected by the authors among their everyday life activities, in fact some are groceries shops, cafeterias, train stations, canteens and others.

 Semi-structured interviews were used to verify the problems highlighted during the observations and explore further the situation, e.g. problems, suggestions, feelings. A specimen of the questions asked during these interviews are presented in Appendix 1. The Interviews ensured that the observation results were valid. Moreover they give extra insights and highlight new problems that customers were facing. However, interviews do entail a personal encounter, which can create

biases since the articulation and the knowledge of the interviewer can affect the informants willingness for unrestricted dialog. Furthermore, the interviewee might not be willing to critique and outline the problems or did not remember the experience precisely, therefore, in order to prevent this, the interviewer avoided giving its personal opinion during the interview and the every interview was done in the canteen setting, just after the customer finished with its purchase. Despite these drawbacks, the semi-structured interview was best suited for the task at hand. Interviews have been carried in CBS canteens.

The questions were developed on the basis of the studied literature and the identification of problem areas, some questions varied from interviewee to interviewee (see interview guides in Appendix 1). Each interview took between 15-30 minutes. In total, 31 people were interviewed in this initial semi-structured interviews, predominantly students but also a few teachers and CBS employees, their age varied from 19 to 53, both females and males. The various population gave the researchers more insights and different perspectives, which enriched the initial data gathering. In addition, the managers of the two selected case-studies, Fazer and CBS were interviewed by e-mail with a brief and structured questioner in order to obtain their managerial perspective regarding Self-Service Technologies in the Canteens (interview guides presented in Appendix 2).

The experience prototype took place at university setting. Even though space and resources were limited, the best stage possible was created, which is crucial to have better insights, even though Experience Prototyping only creates an approximate and partial simulations, it brought to the research subjective richness (Fulton and Suri 2000). The time of each experience differed by each person involved, but on average it took around 2 hours together with the questions asked after each test. To balance and enrich the insights from the experience prototype, some in-depth interviews were carried out straight out after the test of each prototype. That gives the possibility to go through the data in a more structured way to what just happened to the participant, and also gives a sort of guide that was useful in the analysis of the videos from the experience prototype. In total, 19 participants did the experience prototype coming from different backgrounds - students in service management, employees in IT companies, hotel managers and others. Although, each participant had a different background, all of them were involved in either the service sector or technology sector, making it closer to the topic of this paper and giving the researcher richer and critical information. In addition, 6 of the participants had not been involved

in situations with SST in canteens, meaning that they did not have prior knowledge of kiosks in canteens, thus their answers and tests were very interesting and valuable, since it was their first experience with SST in such kind of setting. On the other hand, the other 13 participants have used CBS's canteen Kiosks, which allowed them to make comparisons and evaluate our prototypes in a comparative way, giving this research more reliability and variety in terms of data generation.

3.6. Research Methodology

Figure 7 - Overview of the processes
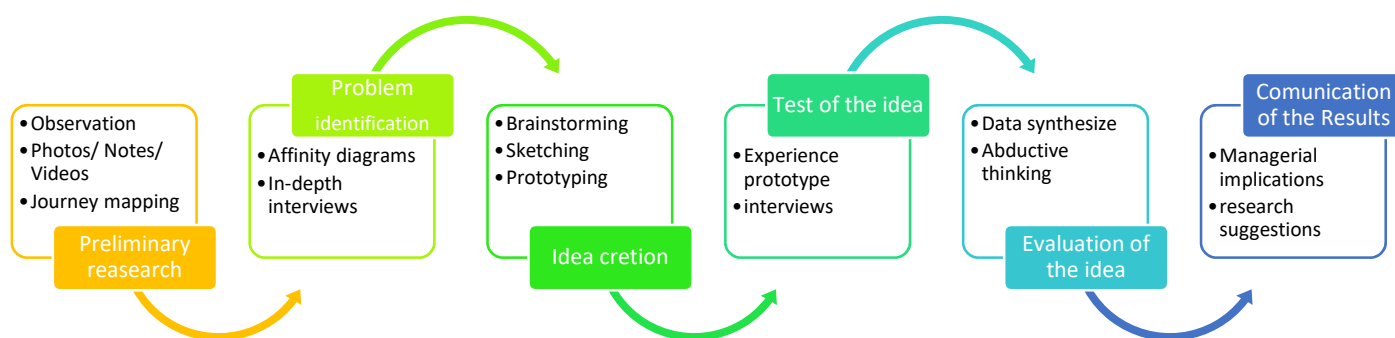
In the literature review multiple design process have been addressed, which therefore drove this study to a peculiar methodology, which appears to be a combination of different tools and practices derived from both "design science" and "design thinking". Figure 3 illustrates the processes undertaken in this research and the various tools and methods used. The process was inspired by the one addressed in "A Guide for Novice Researchers: Design and Development Research Methods", by Elis (2010), and has been slightly modified to better address the goal of the study.

The initial process was fieldwork, which involves "active looking, improving memory, informal interviewing, writing detailed field notes, and perhaps most importantly, patience" (DeWalt & DeWalt, 2002, p.vii). This initial data gathering was conducted trough on-site observation in different settings where physical SST was implemented. In general all this had the purpose get general knowledge about the self-service kiosks and canteen environment and then using this as a guide for further research.

The next figure shows all the tools used in this initial phase and also the second phase - problem identification:

Tabel 5 - Tools used in the Initial steps

Methods	Purpose
Observation (participant, direct or photo)	Whit this method the practitioners look into the desired setting of the study. To capture the reality, in doing so he/she has to describe events, behaviours, artefacts and interactions happening in the setting. Observation can be helped by different aids like video cameras and fields notes (Kawulich 2005).
Store intercepted interviews	This is a way for the researcher to amplify the knowledge of specific details observed and background information to interpret the behaviours. This type of interviews are short and made in the setting (Wasson 2000).
Photo narratives	This is a tool were the observed people participate in the data collection. The researcher gives to participants a camera who have to take pictures accordingly to what have to be analysed (Wasson 2000).

In-depth interviews	This type of interviews are made to generic are of interest, with a series of no predetermined questions, but with a clear idea of what needs to be explored (Saunders 2007).

This particular tools comes from the design tradition of using ethnography ways of research applied to design. The use of anthropological methods have been recognized the 80s and 90s, when researchers started to understand the importance of studying the product in its environment (Wasson 2000). This idea of understanding the relations between humans, artefacts and in their environment have its origins in the well-known "Actor network theory" by Latoure (2005). "Design" though do not use ethnography in the academic way, since ethnography in "design" is mostly done quickly whilst in the academic world it would take years. Moreover ethnography applied to design do not normally contextualize the research with theoretical background (Wasson 2000). The importance of the tools like observation, interviews and the others described in the table is well explained by Martin Hammersley and Paul Atkinson in their point of view of about ethnography, they believe that these tools make possible for the practitioner to participate, in people's life and activities, observing, listening and asking so that will be possible to highlight the problems that people face (Pink 2013).

- Journey mapping

Design though do not use only ethnographical methods at this point an example is the customer journey mapping which comes for the service design tradition. This is an illustration of the different touchpoints that are characteristic of the service studied. This type of tools is very similar to the service blueprint with the difference that it focuses on the information flow and the devices involved in the service. Moreover this is a much lighter tool than the service blue print because of the loss of the detailed information. The customer journey mapping starts with the identification of the touch points and establish a relation between the customer and the organization delivering the service. So it was used in this paper to help researchers identify different touch points of the service and thus relevant problems.

Problem identification

After the initial familiarization with Self Service Technologies and different settings, the following step was more structured and motivated to gather data specific to the canteen environment since this became the primary interest of this study. The idea of studying SSTs in canteen setting arose due to lack of specific literature regarding the topic, the closest research in the area was regarding public kiosks and then some general research related to the variety of SSTs and some main principles, that are outlined in the literature review and later became theoretical background of this study and helped the researchers to develop the questions used in the in-depth interviews, guided by the theoretical framework around SST, more specifically Dabholkar's 5 attribute model, presented in the literature review. In this second step of the process again there were used participant/ direct observations and this time in-depth interviews with customers. The location for this fieldwork, were CBS's canteens. The aim was to get knowledge regarding customers' behavior and identify problems related with the Self-Service Kiosks in canteen setting.

Idea creation

Once the data from the first and the second fieldwork was collected and organized based on affinity diagrams, a brainstorming method was initiated to come up with solutions to the identified problems. Sketches and prototypes, were used to develop the ideas into an artifact that could be tested and evaluated. The result was two prototypes, a prototype of a kiosk interface and a prototype of a mobile application. In the process of designing the prototypes, unique ideas were used based on some general principles that were presented in the literature review.

- Brainstorming

Brainstorming is a tool that designers use to create and solve problems, in fact brainstorming is a tool that probably most of the creative practitioners use to open their minds and explore new possibilities (Ambrose, Harris 2009). Managers and or designers can use this tool to create hypothesis about possible solution but this tool need to be used with some structure as Ogilvie, Tim, and Jeanne Liedtka also suggests, in fact in their book 'Designing for growth: A design thinking toolkit for managers' they suggest that to create more value out of the brainstorming, practitioners need to structure it. This means that once the ideas are on paper there is the necessity to divide them in clusters which will help develop a more compiling concept, which is as

well the way it was conducted in this paper. Furthermore a research by Sutton and Hargadon found that brainstorming is a tool that can be used to drive revenue for designers and firms, a tool that most of the time do not require much time to be effective in fact in the same research they found that most of their designers spend only 5% of their time allocated to a project for brainstorming (Sutton and Hargadon 1996, Kelley 2001).This all together shows how brainstorming helps design process and managers to create and explore solutions to problems and validates the reason for using this tool in this paper.

- Affinity Diagrams

Another tool used in this process is the "affinity diagram" a tool that is mostly used to group ideas that have been generated in the brainstorming process and it was created by Kawakita Jiroin the 1960s(Pqsystems.com, 2016). This tool works best when there is a large amount of data that needs to be grouped by their natural relationship. Team of designers should use this tool when the problem to solve is difficult because it helps the team with different type of expertise to think outside the box, and still be able to organize their work and that is the main reason why it was utilized in this project. Another way of using affinity diagrams is to gather problems and data across all the customers to highlight the problems in a well-structured way. Moreover this tool provides a great understanding of the customer needs and set directions for the solution implementation (Holtzblatt and Beyer, 2016).

- Sketches and drawings

Two of the most recognized tools that design use are sketches and drawings these are important for a series of reasons. Smith for example found that for designers and architects, sketches help to facilitate the visual dialogue, helps to decode complex concepts and helps to visualize the future which helps the decision making process. As Cross (2008) points out in "Designerly Ways of Knowing" designers use this tools for different reasons, one is the creation of a final visual representation that will give the guide line to build the artefact. This final drawing or drawings are made by the designers from the input that they receive, but the human mind cannot process input and create a final output instantaneously, it needs a slow process of representation that can be raw and brief, to clarify ideas and thoughts about what needs to be created. Designers uses sketches to condensate and visualize a great amount of information (Menezes, A. and Lawson, B.

2006). Which again become important in a sort of internal dialogue, but that can have even greater importance in a conversation with other stakeholders and co-workers.

Another specific tool of design is prototype. It somehow works like a sketch but has the plus to be more detailed and testable in some extend this characteristics makes it extremely useful for many reasons. One is solving problem which as seen before is also a design goal. Moreover, prototyping helps to have a deeper and better understanding of what it would be using and interacting with the solution. Designers see prototyping also as a way of making progress and moving forward, because it helps to discover problems at an early stage and before products or services are in the market. So prototype can also been seen as way to create new knowledge. (Kelley 2001, Fulton and Suri 2000).

Test of the idea

Once the prototypes were executed they were tested through experience prototyping, which was also video recorded so that it could be easier to recall the process during the summary of the data and also to allow the research observe in detail people's emotions and actions during the test, thus to validate the observation made during the test. Once the test was done it was followed by another set of questions, in the form of semi-structured interviews so that more data could be generated and help in further evaluation of the prototypes and generating some valuable knowledge useful for managers and practitioners.

- Experience prototype

The process of testing the prototype is also informative for the design process, which means that have a mock-up of what it could look like, the future product helps management and designers to take better and more informed decision. Experience prototype in fact is used to test hypothesis generated in the prototype creation. Moreover this practice gives insights that cannot be achieved with any other type of test for example the use of cases, because this method gives a practical experience that can be only achieved through the involvement of prospect customers in the test which creates real and hands-on insights. This insights are extended and helps designers in many ways, for example in understanding the relationships between customers, setting and artefact, that is why it was preferred method in this method in order to achieve its goals. It inspires,

confirms or rejects ideas, in doing so It also establish a shared point of view among the team(Kelley 2001, Fulton and Suri 2000,Tassi 2016)

Evaluation of the idea

In this phase of the process, all the data is synthetized and through abductive thinking existing principles are validated and new knowledge is generated, which could be applied to the improvement of the prototypes and for managerial implications regarding implementation of Self-Service Kiosks and mobile application solutions.

As Kolko noticed, sometimes designers have problems in understanding the solutions and the results gathered from the design process. Kolko in his paper present an interesting tool called "concept map" which facilities this communication, because this tool helps the designers to organize and represent the knowledge created for example in an experience prototype test. Moreover, as suggested by Kolko this tool can create a framework to understand the reality observed. To explain this tool helps the designers make sense of the knowledge produced through the process, due to the "reflection in action" that is used in doing this mapping.

To create the final product the designer need to, first prioritize the elements that will create the classification. Second arrange this elements in a way that highlight its hierarchy this creates the so called "index cards" which are the way in which the elements of the analysis are divided. Last the designer need to use this "index card" to create the primordial structure of the map on top of which will link all the other elements of the analysis. The designer will use circle to illustrate the entities and lines to show the relationship. Finally the designer will synthetize this map which will help to produce a model of understanding (Kolko 2010).

Communication of the results

The last part of the process is the conclusion where all the results are summarized and comprehensively communicated, followed by some managerial implications. In addition, proposals for further research are made that could develop further the propositions generated in this research or simply to facilitate the interest of other researchers and practitioners to investigate design problems in similar manner.

3.7. Reliability and Validity

In order to avoid bias and ensure reliability all the interviewees were only briefly familiarized with the purpose of the project, any literature or findings from the initial research have not been revealed to them. The idea is to prevent any potential influence on their responses and let the interviewees answer the questions and express their opinion only based on their knowledge and experience. In fact the questions in the interviews are structured in a way that they do not provide any form of deliberate interpretation or guidance that could affect the interviewee's answers. The questions are designed to be simple with lesser words, so that the respondents could freely express their position about the issue and if they decide to include more details. However, as it is a semi-structured interview, the questions are only guiding and the author keeps the right to add or change some in accordance to the specific case. In order to ensure reliability the authors make sure that the data presented matches the conclusion.

In order to ensure validity the authors have video recorded all the tests of the experience prototyping and have kept all their notes from the interviews, making them available upon request, so that the readers could familiarize themselves with the actual data that has been collected through the means of semi-structured interviews and experience prototype. Combining primary (the data that was collected) and secondary data (general principles summarized in the literature review) also improves validity and reliability as the conclusion will be more substantial, this approach could be considered as a triangulation "a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study" (Creswell & Miller, 2000, p. 126).

3.8. Research Problems and Delimitations

This study combines different methods and tools originating from "design practices" which made the process initially unstructured and confusing but it was improved on the way. Another set of problems arise by the fact that the study has a qualitative character which makes data collection more complicated and time consuming, compared to quantitative studies, which are usually more structured and focused on the number of participants. Moreover with qualitative studies it might be difficult to make quantitative predictions, meaning that even though this research is based on

some form of predictions of customers behaviors regarding SSK and mobile application usage, the results might not be definitive and complete, since the population sample is small, but still higher than 30, which is usually considered statistically reliable, but more research about usage might be required.

Furthermore, since the research relies mostly on primary data gather through observations and semi-structured interviews it could be influenced by biases and idiosyncrasies due to the influence of the researchers in the data collection process, which is usual in qualitative studies, where results are more easily influenced by the researcher's personal biases and idiosyncrasy. Additionally, the experience prototype is close to reality but not 100% replication, meaning that the people who participated in this process might be influenced by the given situation and have different perception when put in a real-life situation, but as mentioned in the literature experience prototype could always be implemented and a product or service tend to improve again and again. Despite that, the results are a good start for further prototyping and general principles and managerial implications could be derived from this research.

Another limitation of this study is that it was conducted in the Copenhagen area, a place with significant development in the technology sector, making people here more familiar and proficient in using Self-Service Technologies. Additionally, Danish culture, makes it easier for the implementation of SST, due to the high level of trust amongst the society. All these factors are favorable to this study but this considerations are not really taken into account in a more sophisticated way and require further research. Furthermore, these considerations make the results of this study subjective and limited in terms of geography. In order to issue this problems, the population sample was composed by people with different backgrounds, gender and ethnicity, but due to the small sample size it is still subjective and limited to the specific geographical environment. Since the focus of the research was primarily to think how SST could be used successfully in canteen environment, a more practical approach was used, focusing mostly on physical elements of the service, leaving room for future studies related to how culture influences the design of SST and the usage of mobile applications in similar environment.

4. Initial Observation

This section is devoted on the initial observation conducted in the beginning of this project, which took place in March 2016. The main idea was to gain a general overview of SSTs used in public spaces, which are traditionally some kind of kiosks servicing different purposes. The observation was conducted in a variety of settings around Copenhagen, such as metro stations, supermarkets and canteens. The attention was put on how different services are organized when utilizing the SSTs and on the interaction between the customer and the user-interface.

General observation from a variety of settings

All the places that have been observed showed us that SSKs were always well placed in consideration with the purpose they serve, meaning that "convenience" as suggested in the literature is already widely adopted concept and the kiosks were always positioned good enough to facilitate the overall efficiency and thus the customer journey. For example, the self-service ticketing machines for the public transportation in CPH, all places that were observed showed that the kiosks were placed in some of the best spots available so that it is convenient for customers and does not create any difficulties for users (Pictures in Appendix 1). In canteens and shops, the SSTs that were observed, were self check out kiosks, which are always used in the end of the customer journey and thus their location cannot vary much (Pictures in Appendix 2). All this initial review of the positioning of the kiosks did not bring any major impact on this project, but emphasized the principle that the positioning mostly depends on the function the SSTs serve and the main consideration that needs to be considered is convenience.

From this point, the observation moved away from the setting and focused on the interaction part. In general, there was nothing shocking discovered apart from the fact that all types of SSTs observed were mono-functioning, which means that they serve only 1 purpose based on the service where they were implemented. For instance, at the metro station in Copenhagen there are 3 types of kiosks, each doing one specific purpose - top up, purchasing tickets for metro and purchasing tickets for trains; each kiosk carried out a very specific task and had limited functional features, the top up machine only allows u to recharge a specific travel card, but if need to check prices or some other information, the kiosks does not serve this purpose, and this is what mono-functionality means. This kind of interaction did not have any specific interest to the authors, since

it was a straight forward process and customer interaction is relatively limited, since they cannot choose the way of use.

The only interesting setting that was observed was the café in the United Nations' building which recently had implemented a Self-service machine. Instead of ordering and paying to an employee, the journey slightly changed and the payment was not made in person but to the machine, where the customer selects the items himself and then pays, however, the ordering was still done face-to-face with the employee. This "semi-self service" was interesting, because it was not a complete self-service, meaning that the whole process is done by the customer. In this case the SSK is only a little part of the process, maintaining the core idea of being served. Similar thing was observed also in CBS's canteens, but over there the self-service includes a greater set of processes, the customer takes products mostly by himself and only a small part of the services provided are based on a face-to-face interaction with the employee, such as ordering a sandwich.

The canteens were a good example of a more complex type of self-service and made the authors thing about the ways SSTs are used. The main conclusion that was made is that self-service technologies could be applied in a variety of ways in order to increase efficiency and speed as long as it is logical and convenient for customers. This made the authors focus on something more specific regarding SST's in the observed settings, which was the interface of the machines used for the self-service points.

The first impression from the different interfaces, was that they all had a poor graphic design, as the reader could notice from the pictures in Appendix 1. From the pics provided it is clear that almost all (observed) interfaces are mono-colour, apart from the kiosks in United Nations' (UN) cafeteria and CBS's canteens. In the case of UN the interface was not specifically designed for customer use, but was just a normal cashier interface that employees usually use in such places. Even though it was optimized to some extend by separating categories with colours, which facilitates the memorizing effect and when used on a daily basis it helps the process of finding a product. In comparison, CBS's kiosks use the same colour for all the categories. However, this was not the most decisive aspect in relation to efficiency, since the interface used in the UN's kiosks was not really user-friendly, compared to the example of CBS.

However, the main issue observed was the organization of the interface, which was structured around 2 general ways. In the first case the process could be represented as a funnel path, where it starts by providing all the choices available until a selection is made which leads to a narrow set of processes, an example is the ticketing machines at metro stations. On the other hand, the other type of organization is more complex and the process is not so straight forward, at the beginning the customers still have a set of choices but then each of them could lead them to a variety of processes before it goes to the final stage, an example is the canteen Kiosks and the Rejserkort Kiosks observed.

The next thing that draw the attention of the authors was the interaction between the user and the kiosk. First observation - when people encountered the SKK they were usually not super focused on that, since they were also doing other things, such as using their phone, chatting with someone or simply not concentrated probably because they had something else on their mind. The next thing observed is that this lack of focus often made users stressed or frustrated and even angry when the process they were doing at the kiosks was not successful or took more time than expected. This issue was also seen with people who clearly did not use the kiosks on a daily basis, their lack of experience with the system made the whole process slow and frustrating to them, this was specifically observed at UN's setting, since the system was just implemented at the time of the observation. The stress and confusion among UN's customers were very high at the first day of the implementation, but highly decreased on the next day. After a week most people looked completely confident and relaxed when using the self-service kiosk and when there was someone who was still learning how to use it, the rest of the people who had to wait because of that, inexperienced and slow customer, were clearly annoyed.

UN's cafeteria and canteen

The observation at the particular setting at UN found out that the frustration among people came from the fact that product's labels were not matching the buttons and the SSK. An example, the soup label on the food counter were saying "soup of the day" but in the SSK was named "today's soup with bread", it seems as something of minor importance but in the observation most of the people that were getting soup were not able to find the button and had to ask for assistance. The second issues causing frustration was the particular way in which the SSK was designed, similar to

the one in the picture Appendix 2 (the UN has a canteen and a cafeteria separately, but the kiosk and the idea of the process was the same, however the picture in the Appendix is from the cafeteria) but with a greater number of items and all in one page. The particular design choice, with too many items on the same page, created confusion in many users. Additionally, since the interface was not specifically designed for customers in many occasions a pop up window with different errors appeared, which were typically issued by the cashiers, since it was designed for cashiers not for customers. An example for that was an error with the payment verification method which was really confusing for customers and there was some sense of embarrassment. This was an interesting observation, but after this initial week the authors did not have access anymore so the process moved to CBS's canteens, as they were the most interesting for the observers, due to the issued raised in the observation at UN's canteen and cafeteria.

CBS canteens

Comparing the SST implemented in CBS's canteens and UN's canteen it could be easily observed that the system at CBS was way more advanced and this is actually what boosted the interest of the authors and moved the focus on that. Even though the kiosks at CBS were much better, both visually and functional there were some problems there, which were instantly observed a short time spend there. The first thing, was random control checks that comes along with an alarm and the whole process freezes and the customer has to wait for an employee to do the check and unlock the system. The idea seems a good option to prevent theft and increase supervision, but was clearly frustrating and annoying customers.

The second issue observed at CBS's canteens was that quite often people forget or do not know that before putting credit/debit card to the payment device at the end of the purchase process they have to press pay. The problem was not causing some big complications but often slows the process.

Thirdly, categories of the products presented at the interface were not good enough, since for some categories there were so many products that the user really needs to focus to find the product he is looking for. Additionally, the labelling of some products on the interface was confusing, for example the bakeries and the different options for weighted products, which is the food from the buffet - many words for one product, that were not definite enough.
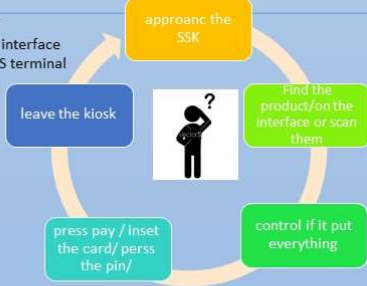
The main point derived from this very broad and unstructured observation of different settings where SST is utilized, is that every SST is unique to some extend as it is designed for a specific purpose. However, there are some common characteristics, such as the idea that SST should optimize efficiency and facilitate the customer journey, which is therefore translated in augmented experience. A good SST is the one that helps customers to do things easier and faster without creating confusion or additional stress. The most important factor that determines the success of the process when using a SST is its design, it is important to be service driven but at the same time customer oriented, as observed from the case at UN's setting. Final, conclusion is that even the best SST are not perfect and there is a room for improvement, which is actually what drove this project further in its decision to create a successful SST that could be implemented in canteen setting and thus to improve the process and the customer experience. In this attempt the research further focus is oriented towards canteens, as it provides an interesting environment for study and is a setting where SST's are not so common yet, additionally any specific literature regarding SSTs and canteens have not been found. In order to do so, as described at the methodology the CBS's canteens are taken as a case study, because it is an example of a relatively good SST in canteen setting.

5. Specific observation

In this section a second data gathering is conducted, specifically devoted on the self-service technology introduced at CBS's canteens. The data presentation is organized in two sections, the first is the presentation of data gathered through observation, but this time focused only on one setting - CBS's canteens. The second part is the data collected from the 31 semi-structured interviews with customers at CBS's canteens. Finally, a discussion based on the findings will be provided together with some general hypothesis that have been created throughout.

5.1.Journey mapping

Figure 8: CBS canteens journey map

Process	Initiation	Pre-service	In store	Taking food	Check out
Goals/what is doing	He/she starts to get hungry/thirsty	I have to get to the canteen.	I have to get the food and/or drinks	Get the food	Pay and go to eat.
Touch points	In the library / classroom/study-room	There are no signs that lead to canteen	1st dishes, cutlery 2nd warm food/sandwich bar 3th coffee sweets/bread 4th salad bar	If bagel meets employee otherwise not. Food and the different types of pates on the counter	SSKiosk And its interface The POS terminal
Thought process	I need to go to the canteen! What do I want? There will be still food ? Are they open?	What I want? Food will be good? Should I get something quick or some warm food? I wonder what there is today in the buffet?	What are this things on the table? Which one should I take? Will it be good? Will I be happy with my choice?	I'll get this meet and then this side a bit of this side. Should I get a drink? How much will it be if I get a drink?	How dose it works? Where is what I choose? Why there are so many types of buffet? This have to be scanned? Did I paid the correct amount for the buffet plate? What is they control me? ….. And many others.
Feelings	I decided to go to canteen.	I decided to go for Big canteen/small canteen	Overwhelmed, confused by the choices Hungry/thirsty Happy or not depending from the food	want to go to eat and fast	Not convicted Still don't know what is in his plate and if will be good. Still hungry and want to leave fast.

Initially a customer journey map (the picture below) was developed regarding CBS's canteens, and specifically the one located in SP, so that a better understanding of the service process in CBS canteens can be obtained. The journey map is also used further in the process of design, as it is gives some sort of visual representation of the service process at CBS canteens.

As illustrated in the journey mapping, the CBS's canteen process starts before the customer enters the service setting. In fact the customer starts the process in one of the rooms around the University, in many cases the customer is busy with other activities among them is possible to find: study, having lecture, or having some social activity with peers. In the journey map it is illustrated as "a customer who is studying"(for simplicity). Once he/she realizes the need for something from the canteen, either because thirsty or hungry and basically the process starts. The customer then decides to collect his/her belongings and move towards the canteen. While the customer is approaching the canteen, starts to wonder what exactly he/she wants, at this point in time, the customer might still in doubt what to buy, if to go for a sandwich or some warm food or some

snacks. So he/she will be probably wondering if there will be food and what food will be available in the canteen. Probably also wondering if the food will be good today.

Once at the canteen, the customer encounters different touch points, from the buffet to the fridges and so on. As shown in the journey map picture, it is possible to see that in this setting the customer journey is sometimes messy. That is because at first the customer has to look around to be aware of what is the offer of the day. During the decision phase the customer is probably asking him/her self some questions: "What should I take", "What is the food at the buffet?" "Which one of these dishes should I take?" and others. Once aware he/she decides what to eat, in this case the process separates, depending on which type of food is chosen - if it is a sandwich, the customer will encounter the bagel bar, otherwise he will use the buffet and will pick the preferred food himself. At this point the process splits depending on the customer's choice and later on it will converge in the check-out moment.

The check-out stage is an important moment for the customers, because they want to go out of the canteen and eat, so in this moment a variety of situations can occur. An example is that there is a queue because it is a "rush hour", in this case, depending on the customer mood the stage can change the overall experience. Let's make some example, in rush hours and I'm tired and hungry from a long class, the queue is long and the food that I found wasn't really what I wanted so I'm not really happy. In this case with the old employee check-out the situation could change with a smile or a joke, and that will make the customer go to eat with a smile. In the SSK case this is not possible so everything seems to lay on the speed of the SSK and how fast I can go out of there. Moreover if it is still one of the first times that I'm using the SSK at CBS I might have some difficulties. The other example is on the opposite side, a time when the canteen is quite and less customers are around, this is still the stage that can change my overall experience in positive or negative. An example of some thoughts that customers might have during this step (at the check-out kiosk) are: "How does it works?" "Were is the product that I want?" "Why there are so many types of buffet and which is mine?" "What happen if they control me?" or others.

The journey map suggests a typical way of the whole service process in CBS's canteens, although it was initially created for SP, it could be also general for the other canteens at the CBS's campus, with a very little change, such as the fact that only in SP the canteen occupies two floors - the

buffet on the first floor and "grab & go" on the ground floor, an element that in the other canteen is absent and instead all item are on one place, typically not occupying large area

Furthermore, with the journey map tool it was possible to realize the importance of the check-out touch point. To explain, when a customer proceeds in the service there are many touch points, which can be studied to see the relation between this and the customer, for example how the quality of food relates to the experience. One focus that this paper could have issued is the canteen layout, with the aim to improve the general flow. However, based on the observation, that rearrangement would have a minor impact on the general service. Moreover the starting point of the research originated from the initial interest in SSTs, since the authors believe that this technology will be widely implemented in the future in even greater variety of service areas. Thus it is important to suggest a general understanding of how to implement this technology successfully in the specific setting. The journey map made it clear that SSTs can change the opinion about the service in relation to canteens, since it is typically used as a final check point. The way people check out can have a great impact on the overall experience and could also influence the other touch points of the process in a sort of reversed-engineering of the canteens services. So this paper is focusing primarily on the improvement of the check-out as a key touch point in the canteen service. Additionally, alternative solutions from the wide application of SSTs will be considered, as an attempt to create an alternative to the self-service check out kiosk.

5.2. Canteen observation

In this section will be presented the specific observations regarding the SST used in CBS canteens. This observation have been carried out in a variety of venues around the CBS's campus, where SST is present, such as Solbjerg Pl,. 3, Dalgas Have, 15 and Porcelænshaven, 26, Graduate House, H. V. Nyholms Vej 21, Kilen, Kilevej 14 A/B and Flintholm, Stig Lommers Plads 2 . This set of observation were specifically carried out to find problems that customers faces in the use of the SST or because of the SST.

The first thing that was noticed were the queues that were formed in the rush hours even though it was almost the end of the official academic year (the observation took place in the middle of May until the middle of June). It was not really expected, since the whole process seemed very fast. Sometimes, the queuing was caused by people who were just slow with operating with the kiosks, other times it was just overcrowded and since the capacity of canteens is quite limited the amount of people inside and waiting for kiosk was simply too high. Additionally, most of the times the queuing was formed due to the random check controls, which freezes the kiosk until someone from the staff comes and checks.

In general it has been observed that customers have a general sense of confusion about what they have to do at the very first moment they face the kiosk. In particular, customers are struggling to find products on the interface, this mostly happened when they are not usual customers meaning that they do not use the SSK every day or when even though they were regular users, they simply got something from the canteen that they never did before and then finding the item usually took them longer time. This sense of confusion seems to arise from the fact that there are too much items on the same page and that they are not well organized. All this things are the main reasons for the queues, a phenomenon that was clearly unpleasant to customers and they seemed particularly annoyed when they had to wait for someone who was either not focused on the kiosk, because of chatting (other activities, could be messaging, reading something and etc.) or inexperienced with the kiosk and all that made people behind a bit annoyed.

Another thing that was noticed was the presence of employees, especially in rush hours, but usually one or maximum 2 in the busier canteens, such as the one in SP, during the rest of the time there was no continuous presence from employees, but usually it did not take long for the employee to come, when someone needed staff support or when it the random control check alarm turns on. On the other hand, if someone just wanted to ask something it was not always easy when the staff was not around, the customers had to wait a while until an employee comes out, especially in the smaller canteens, such as the one in Dalgas Have. The easiest way to get help was pressing the help button on the screen and then an employee hears an alarm and comes almost immediately, but what was noticed is that almost any one used it, either because they did

not see it or because did not know what it does, thus most of the customers just stayed there and waited until they see an employee.

An interesting situation occurred, once during one of the observations, where it was highlighted the role of the employee. A group of customers were at the check-out kiosk and one of them had some problem, so the other 2 guys tried to help him, while the employee was just watching instead of help the guy at the beginning of the confusion. It was not a typical situation in the conducted observation, but was clearly an indicator that employees should pay more attention and get involved whenever they observe a problematic situation, so that the problem could be resolved quickly. In general, the employees seemed prepared to work with the system and typically quite supportive, especially to customers who were clearly using the kiosk for the first time, most probably and exchange students or external teachers.

It was also noticed that typically customers do not buy more than 2-3 items at once. In that sense, an interesting phenomenon was noted, that the time spent at the SSK did not depend that much on the number of the items that the user got but mostly on the type of the products, if it is just a standard product with a barcode to scan or something, such as coffee, that has to be selected manually on the screen. Another thing that was making the time spent at the kiosk longer, was that often customers forget or do not notice that the "pay button" needs to be pushed before putting their debit/credit card, usually they were just inserting the card and waiting couple of seconds before they notice that this is not the way it works. This pay button was also one of the reasons for seeking help from the staff, because it happened couple of times that the users did not notice that they have to click pay, even after a while waiting and looking at the screen, then they started looking around for help, clearly not seeing the help button as well. Buffet products were also problematic, since there were too many options on the screen regarding buffet items and people visibly had confusion understanding what is what. Furthermore, many customers put their plate on the scale before selection the item from the buffet section on the screen, which did not work and they had to lift the plate after pressing the button and put it back after a few seconds.

All this initial observations of the canteens at CBS generally showed that process and the kiosks have some weak elements. In terms of the process, the main problems were the insufficient space of the canteens, especially in the bigger buildings such as SP and Dalgas, where in rush hours

people had to wait even before entering the canteen, also not enough kiosks again because probably the management did not have enough space to put more. Additionally, the random control checks, which were clearly implemented to have some sort of surveillance and prevent theft, were annoying for people and often slowed the process. Employees were often present, but sometimes was hard to find them and not fully supportive, since in a few occasions it was observed that they are not helping troubled customers if otherwise asked, which could be either a policy of the management or just unwillingness from the employees to get involved (an issue that will be tackled further).

In terms of the self-service check out, the physical design of the kiosk was clearly good and comfortable for customers, since no problems were observed arising from the physical design. On the other hand, the interface was generally appealing, but customers had problems finding products and utilizing its capabilities, such as the help button. Also some other minor complications that slowed the process a little bit, such as the problem with the scale and the pay button, even though it was not anything dramatic, since the majority of customers found out relatively quickly what they had to do it is an issue that is problematic.

The above notes are the foundation of the next step in the methodology - in-depth customer interviews. The notes from the observation, together with the relevant literature outlined in the review were used to create a few sets of questions that were asked during a semi-structured interview with customers of CBS's canteens (Presented in Appendix 5). The idea was to get more insights from customers, regarding SSTs in general and specifically to the observed issues at CBS, which were therefore used to identify the problems and find a reasonable solution, either by improving the SST used in CBS or thinking of an alternative one.

5.3. Semi-Structured Customer Interviews

This section presents the data gathered through semi-structured interviews, that were designed to get more insights from customers regarding SSTs in Canteens and specifically the one implemented at CBS's canteens (the full set of data is presented in Appendix 6). This set of data is important as it is an extension of the data collected through observation, aimed at achieving a more holistic view by also looking at the issue from a customer point of view and then in the end

of this section provide a discussion with the purpose to analyze the main points from the collected data.

The interviews were divided in 4 sections (as shown in the table below), each of them having a specific purpose (the interview guidance is presented in Appendix 5). First set of questions was conducted as an attempt to familiarize with the interviewee and his general perception of SSTs. Gender, age and occupation were mostly asked in order have an overview of the variety of the people interviewed and no further patterns or relations based on that were issued in this study. The next questions are all related to CBS's canteens, since it is the case study. The second section is aimed at understanding how people perceive the service at CBS, comparing the Self-Service system of organization with the old one, which was a traditional service, with a cashier at the check-out. The third part of the interview had the purpose to investigate in depth the case of the self-service kiosk implemented at CBS, and the questions were based on the previous observations and the literature review. The last section is very short but had a purpose to get some general view on an idea that came out during the observation as an attempt to explore different SST options suitable for the service at CBS canteens. The idea was related to the implementation of a mobile application as an alternative to the self-service kiosks.

Tabel 6: Questions catergories and purpouse

Categories	Purpose
General questions	To get an overview of the interviewee.
Comparison of the current service, based on Self-service technology and the traditional service used before in CBS canteens.	To gather data based on a comparison.
Questions, regarding CBS canteen kiosks:	To obtain specific data, regarding issues outlined in the literature and the observations
Future SST	An attempt to tackle an alternative SST

The respondents were 21 female and 10 male, the age varied between 19-53 years old, including not only students but also professors and staff from CBS. This gives the data sample a good range of users and thus having a broader insight. In addition, it happened that the majority of the interviewees were either students who studied something related to services or were employed in the service sector, which makes them more critical and therefore more helpful in terms of the information collected from them, being richer.

First set of questions - general

The table below is a brief summary of the answers from the first set of questions, collected in the interview.

Table 7 – Data from the First set of questions

Set 1	General questions	Answer Results	Reasons for the yes	Reasons for the no
Q1	Do you like using self-service technologies? Why? Why not?	Yes= 26 No=0 Neutral =5	Easy =/13 Fast=/ 30 Other: no queues, convenient, fun, cool, independent;	• Miss human interaction; • Miss sell opportunities; • Hard to understand or doesn't work;

Q2	Do you consider self-service technologies suitable for canteens or similar facilities? Why? Why not?	Yes= 28 No= 3	Faster= 8 Avoid queue=5 Others: staff can work on quality	• Prefer human interaction; • problems arise when you have a Varity of peoplein terms of age and background;
Q3	Do you use the Self-Service Kiosk in CBS canteens regularly?	Yes=24 No=4 n.a=3		

Most of the respondents answered positively to the question "Do you like using self-service technologies" (26 out of 31) and the rest stayed neutral. The main reason for the positive answers was SPEED, 30 out of 31 said that they like it because speeds up the process. The second most popular answer was that it is easy (13 out of 31). Accordingly, the answers to the question "Do you consider self-service technologies suitable for canteens or similar facilities?" were also mostly positive (28 out of 31) again expressing as a main factor speed. A few (5) added "less queuing" and "better service quality because employees had more time to focus on other tasks rather than cashiering". On the other hand, the people who said "no" (3) explained that in this way the services misses "human interaction", additionally (2) reasoned their answers by highlighting the problem of having different people using the kiosk in this specific setting, meaning different age and technology competence, which could create problems for older and non-proficient customers. To conclude this section of the questions they were asked if they are regular users of the Self-

Service Kiosks in CBS, having 24 positive answers, 4 negative ones and 3 n.a., which showed that the majority of the sample are regular users and most probably proficient with the system.

Second set of questions - comparison between traditional and self-service systems

Table 8 – Data from Second Set of Questions

Question Number	Example question	Answer Results	Comments
Q1	Do you face more problems compared to the old traditional way of servicing customers? What are they?	Yes=8 No=22	• Finding items on the interface; • First time I felt lost; • Check takes time; • Waiting when other people have difficulties; • No one to ask for info;
Q2	What do you like the most about the traditional way of servicing customers in the canteen that is missing now with the new SST?	Employee interaction=21 Anything=8 N.A.=1	• No Responsibility in traditional service, all lies on the employee; • asking questions not possible with SST; • no ways of cheating;

Q3	What is the best element of the current SST based service in the canteen?	Fast= 23 Intuitive interface=6 Convenient=13	• Convenient; • No human interaction; • Simple;
Q4	In general, which service do you like more and why?	SSK=31 Because is fast And no queue	• Fast; • Less queuing ;

The second set of questions was about the comparison between SSK and the employee based check out system (answers summarized in the above table). The first question was "Do you face more problems compared to the old traditional way of servicing customers? What are they?" the answer in this case were generally negative meaning that most of the people do have problems with the implementations of the SSK. Interestingly, the comments from many interviewees who expressed that they have faced problems, pointed out the same things that were observed in the previous stage. Some of the comments were pretty straight forward "I have problems to find the items", "the first time I felt lost" and someone also complained that the random controls carried out for preventing cheating are annoying.

In the question "What do you like the most about the traditional way of servicing customers in the canteen that is missing now with the new SST?", majority (21) answered immediately that they are missing the contact with the employee from the old check out process. Another interesting

answer was " I miss the lack of responsibility", meaning that in the traditional service the customer does not need to do anything apart from taking out the wallet and pay. Another reply was "it is not possible to ask questions" both of these answers are clearly related to the fact that an employee is not responsible for the check-out anymore. Only 8 people were not missing anything from the old check out. The next question, which was regarding the best element of the new self-service system again confirmed that the thing that people like the most about it, is the speed, since (23) people said the new way is faster, others (13) used convenient but in the same sense. Only 6 cited as the best aspect of the service, the fact that SSKs are intuitive, this is really important to be underlined because only few people find as a best quality of the SSK in CBS the fact that is intuitive. In general, the second set of questions makes it clear that people generally love the new self-service system in CBS's canteens, because they perceived it as faster than the traditional one. The fact that customers in CBS canteen prefer the new service which includes a self-service kiosk is completely clear from the last question in the section, which asked the interviewees "Which service do you like more and why?" - 31 people said the current service with the self-service kiosk, because it is faster. A fact that is not necessarily true, as observed in the initial observation, but as suggested in the literature, occupied time feels shorter than not occupied, meaning that probably the customers have this feeling and that is why pointing out speed as the main reason for their answers. However, it a categorical remark that people like the self-service check out based on technology, which also confirms that it is an appropriate implementation to a canteen service.

Third set of questions - regarding CBS's SKKs

Table 9 – Data from the Third Set of Questions

Questions	Suggested question	General answer	Comments
Q1	Do you find it easy to find products on the screen? Have you ever experienced difficulties finding a particular product?	First sub-question: Y=24 N=5 n.a.=1 Second sub-question: Y= 17 N=12	• No logical classification; • Problem with bakery, bun and cakes and similar; • Pictures are not clear;

		n.a.=2	• Problems to browse around;
Q2	Is it easy to navigate in the menu? E.g. buying something then going back to buy something else, payment etc.	Y= 29 N=2	• It is annoying to press pay; • Annoying when you have to buy 2 or more items ;
Q3	Have you experienced queuing in the canteen, since they introduced the SSK? Do you feel pressured by the other people on the queue?	Regarding queue: Y=21 N =10 Regarding pressure: Y=16 N=11 N.a.=4	
Q4	Do you feel confused sometimes? What makes the confusion?	Y=14 N=15 n.a=2	• The First time; • Coffee and bakery section; • Don't know exactly which is my product; • Buffet;
Q5	Do you perceive the service as fast? Do you see something particular as a problem that slows the process?	Y=31	• Missing contactless paying option; • Fast in most of the cases; • Can't find productsquickly; • Problems with interface and credit card; • Inexperienced people make it slow; • Random checks slow it down;

			• Problem when credit card is not accepted; • Selection product takes time; • Random controls; • credit card processing takes longer;
Q6	How enjoyable do you find using the SSK and does this affect your overall experience of the service?	I enjoy it =9 And 22= like it but none has particular enjoyment feelings	
Q7	Would like to see an actual picture of the product that you are buying or a more detailed information, regarding content, price etc.? OR you are satisfied with the existing pictures and info provided?	Y=21 Also price also info 10= Others are satisfied the way it is or they did not care that much	
Q8	Have you ever cheated using a self-service, e.g. getting a large coffee and paying for a small one (either deliberately or unconsciously)?	Y=14 N=17	
Q9	Have you ever experienced a need to contact the staff for something, regarding the Kiosk or the service? What was that?	Y=13 N=18	• 7=Not for interface problems; • Majority never have noticed the help button; • The staff is not there • System blocked • Selected wrong product

Q10	Do you feel in control when using the machine or there are some elements that are not clear?	Y=29 n.a.= 2	• All feel in control; • Better categorisation is needed;
Q11	Have you ever experienced any failures and system crashes? What happened and how the problem was solved? In what way did it influence your experience?	Y=8 N=21 N.a.=2	• Failures did not influence the experience; • The problems were quickly resolved by the staff ;
Q12	Do you agree or disagree that the self-service system operates quick enough?	Y= 30 N.a=1	
Q13	Are you satisfied or dissatisfied with the self-service in this particular canteen? Why?	Satisfied=17 It's fine=8 Very =4 not very satisfied = 2	• Saves time; • Finding my product is sometimes hard; • Buffet section is confusing; • No cash payment option;
Q14	Do you have any suggestions for further improvement?	Make all the products possible to be scanned Better info in general for more transparency	

The third set of questions (presented in the table above) was specifically designed to gather insights about the self-service technology used in CBS's canteens, with specific questions that would either illustrate some problems about this specific setting or suggest some key elements for

further consideration. The first question which is actually combining 2 questions is "Do you find it easy to find products on the screen? Have you ever experienced difficulties finding a particular product?" and the answers were mostly positive in fact 24 interviewees answered that they do not have any problems, 1 though mentioned some difficulties to navigate in the menu of the system. Furthermore, 3 people answered that they have experienced problems with finding items on the screen. Four - mentioned that had a problem with the no logical classification of the products, the clearest problem was about the bakery products, such as cookies, bread and so on and the weighted products section.

This can be also related with the answers for question 7, where examples were given about a problem understanding which is the bakery product that they got, because of the low quality of the pictures and Danish names for some pastries. In question 7, the participants have been asked if they would prefer to see an actual or just better pictures about the products and also additional detailed information. The answers were mostly positive with 21 people answering yes out of 31. However, 10 answered that the pictures and the information are not really important for them, however they still recognized that would be good to have better pictures and information and could be useful in general.

In the specific case of question number 2 (regarding navigation), 29 people answered that they do not have any problems in navigating around the menu. Two main issues were acknowledged in the answers to this question - first, people find annoying that they have to press pay when inserting their cards in the payment device, same problem also noticed in the initial observation; second - in order to buy 2 regular coffees for example, one have to go back to the initial screen and select the coffee again after the first time, since there is no option to select quantity.

The third question was "Have you experienced queuing in the canteen, since they introduced the SSK? Do you feel pressured by the other people on the queue?" which brings two different types of results. About the first part of the question, 21 people experienced queuing and 10 did not. On the other hand 16 felt under pressure by people queuing after them and 11 didn't. It was pointed out that such pressure is only present in this type service, since before when the cashier was present at the checkout, the speed was depending on him/her and the pressure from the crowd was on him not on the other customers on the queue.

In Question 4 (regarding confusion with the kiosk) the result was balanced with 14 people who answered that there are aspects of the self-service that confuses them and 15 - that everything is completely clear. The answers highlighted as the most confusing aspect the fact that customers do not always understand clearly which their product is. An example given was the buffet section and again bakeries. Similar results have been found in question number 10, in fact this question that is about if the customers feel in control when using the machine, highlighted the same problems about the content. However, it should be also noted that probably because all the interviewees were already proficient users, it was expected that most of them would answer that they feel in control, which confirms that the learning process for such technologies, once completed affects customers' perception of the specific technology, as suggested in the literature.

Again the answers to question number 5 supported the findings that customers find the service to be fast with the kiosk, and once more the problems outlined before has been identified as factors that slow the process - products are not easy to find; random controls; and generally difficulties with the interface have been mentioned as factors that slow down the process. One thing that have been mentioned by a customer was that sometimes the credit card processing takes longer time than the actual selecting process.

Question number 6 was about enjoyment and here the results were interesting. In fact only 9 people find the process enjoyable, all the others express the feeling that they like it but there is no particular excitement about be the process and in general stayed neutral in relation to how it affects their overall experience. The main point was that people perceive the kiosk as a mean to finish their purchasing process and no particular importance was made in relation to enjoyment and overall experience, but a general conclusion could be made that the kiosk was only serving its main purpose and did not bring any influence on the enjoyment which as mentioned in the literature could be decisive regarding overall experience and service quality.

Question 8 was quite interesting, since it really requires honesty from the interviewees. It asked if the interviewees ever cheated (either deliberately or unconsciously) and the answers were surprisingly balanced with 14 people that admitted cheating even though by mistake and 17 that were completely sure that they never cheated. Creating a general sense that trust in customers from the service provider, which could be considered as high, is confirmed, however the system

gives room for unconscious cheating, which as stated in the literature review, should be avoided at all costs and in this case illustrates a poor system design.

Questions number 9 and 11 explored issues regarding failure of the SSK and the need to contact employees. Most people answered that they never really needed to contact an employee (18/31), but could have asked for information regarding a particular product for instance if there was an employee just right next to them in the particular moment they were choosing a product. 13 of the people said that they needed help from the staff and in most cases problems related to the kiosk (6/13 people). Additionally, only a few people (2/6) said that they have experienced some kind of system failures when using the kiosk and explained that the problem was easily resolved by the staff members or they simply moved to another functioning kiosk, so it was not something that influenced negatively they customer journey. An important note was made in asking this question, that almost anyone of the interviewed people noticed the "help" button on the kiosk interface and more over no one knew what exactly it does, assumptions varied from "informative text on the screen" to some sort of "FAQ section" and only few actually expected that an employee will come.

Questions 12 and 13 were asked just to confirm the perception aroused from the previous answers and as expected almost all answered that the system operates quick enough (30 out of 31) and also the majority was generally satisfied with the self-service system, only 2 were dissatisfied mostly because having problems understanding some sections such as the buffet and lack of information for products, also price calculations for the buffet section and some minor navigation issues as already mentioned. Despite that the result was high only 4 people expressed their great satisfaction, which means that even though the service was satisfying it was not great for most of the interviewees.

The final question was aimed at getting some specific suggestions for improvement. Many people said that all the products should be available for scanning so that the problems in finding the products in different categories could be eliminated. Others were more concerned with transparency about the prices and the information about the products and that this should be emphasized in further development of the system. Some suggested that the system should be

more self-explanatory and in cases where it is not 100% clear what needs to be done, something as a pop up window or info section should be available.

Table 11 – Data from the Final set of Questions

Section 4	Question suggestion	Answer results	Reason for Yes	Reason for No	Comments
Q1	Do you think Self-Service Kiosks in canteens could be replaced by a mobile application?	Y=24 N=7	• Time saving; • Convenience; • Practicality;	• Apps are Overhyped; • Old fashion; • Risks of cheating;	• Better as an addition then replacement; • What if don't have battery or internet?;
Q2	If such a mobile application existed, would you use it (assuming that it is good and reliable mobile app)?	Y=24 N=6 N.A.=1	• Maybe; • Sometimes; • Depending on its functionality;	• I don't like m. apps; • I am not good with mobile app;	• People will cheat more; • If it works good; • No everyone is a tech. savage

The last section of the semi-structure interview was designed as a result of the initial observation, where some ideas were born, e.g. an idea of a mobile application that might replace the kiosk and solve some of the problems observed. The generic idea, was that the application will serve the same function as the kiosk. But before thinking further about such an option it is important to have customers' perspective. Here majority of people had positive attitude 24 out of 31 people said that a mobile application could replace the kiosk if was good enough, pointing out speed improvement and convenience as the main drivers of this implementation. However, many people expressed their concerns that it should not be implemented as a replacement of the kiosk but as

an addition, since it requires smart phones and internet, which not everyone has, also concerns about what would happen if they do not have battery. On the other hand people who said categorically "no" to this suggestion, explained that it creates risk of cheating and it is not so practical and that the trend regarding mobile applications as an option for SST is overhyped.

Consequently, the results for the second question of the section gave similar results, the same people who said yes on the previous section also confirmed that they would use such an application if it was implemented, maybe not all the time as some expressed but will be used. Some also added that the main factor determining the use of the mobile application will be its functionality and reliability. Furthermore, people who were negative regarding the application idea, mostly based their answer on the perception that they do not like mobile applications or that they had so many that they do not want to install anything else. Also expressing concerns that it requires some sort of proficiency and not suitable for people who mostly use their phone for communication.

Discussion

Based on the findings from the observation and semi-interviews an "affinity diagram" was created. The diagram is organized based on the different attributes mentioned in the literature review and accordingly all important points from the data were organized by colours according to the category they fall in. The idea is to create an easier and comprehensive understanding of the data that has been collected.

In general the data suggests that there are a lot of problems with interface of the kiosk and its functionality, such as inaccurate pictures of the items; names on the screen do not match product names; unclear sections (e.g. weighted products); help button is not visible enough and does not suggest what it does; illogical categorisation of products; and repetitive tasks that could be avoided (e.g. when ordering 2 coffees, you have to select once then go back and select once again). All these, elements slow the check-out process and create problems regarding navigation, which frustrates and annoys people. Those are the main problematic areas which are predominantly related to the Ease of Use and Control from the attribute based model proposed in the Literature Review, thus they have to be addressed adequately and redesigned in order to improve the overall quality of the system and thus of the service.

In terms of the process organization, after the implementation of the self-service kiosk, the main issues were regarding the lack of cash payment option; older people and not proficient users with the system, who make the overall check-out process slow and create queues, which is additionally influenced by the limited space capacity and random control checks from the staff. Furthermore, employee support was not available all the time to ask for information or just for general questions. However, the staff is on overall well prepared and cooperative when customers need help with the kiosk, which as pointed out in the literature, is crucial for the success of the self-service technology and the overall service quality perceived by customers. Furthermore, the implementation of this self-service kiosk put the pressure on the individual customer when at the check-out point, since the speed and accuracy of the process depends on him/her, while in traditional check-out service, it lies on the employee. Additionally, this increased responsibility have created another interesting phenomenon - "peer pressure", when the person is at the check-out, a feeling that he/she is slowing the process arises and especially if the user is struggling to find something the feeling of "peer pressures" increases and creates negative experience for the customer.

Random control checks are also an issued resulted from the implementation of the SSK that affect the overall process. People are generally a bit annoyed from this checks because they slow the process down and also this kind of surveillance is a bit too much for some customers, since when it happens to them and somebody comes to check them they feel like thieves although there is nothing to worry about. In cases when the user have mistaken something and the control check acknowledges that the person might feel embarrassed, thus it is important that the staff is very polite and delicate in such situations avoiding any direct accusations which might offend the customer. Additionally, the control check is signalled by alarm which irritates people in proximity who are sitting around - eating or studying.

In terms of enjoyment, the self-service check out is not considered as something fun but mostly perceived as just a mean to finish the purchase process and just a natural part of the process. Based on the suggestion in the literature that it could play an important role in the overall evaluation of the service the issue requires attention and further development so that it could bring to customers some sort of excitement, than just a dull narrow process.

Regarding Reliability, the system could be considered quite save and reliable, since almost any failures were acknowledged in the data. In the rare cases when there is a problem, the staff resolve the issue instantly or simply directs the customer to an alternative kiosk. In general it could be concluded that the system is reliable and there is no obvious need for improvement in this direction.

Furthermore the problem with the design of the interface (e.g. organization and product information) creates possibilities for unconscious cheating, which influenced both the business and the customer, since he/she might fall in an embarrassing situation if caught at the random control checks. For example, the case with the weighted products is highlighting this issue, lack of information makes customers select something that in reality might not be what they got (e.g. selecting dish of the day, when actually got buffet only). Cheating as suggested in the literature should be avoided at all cost and needs to be redesigned in this case, so that there is no room for unintended illegal choices.

It has to be noted that the service at CBS's canteens is based to a large extend on trust, since the random control checks does not guarantee that no one cheats. Even though there are screens on top of the kiosks to show the staff what the user is getting it is still not 100% reliable, because a member of the staff is not present all the time. However, since no additional control was introduced for almost a year of usage, which means that the trust that the service provider has in customers is confirmed to be valid. Additionally, our data did not show any signs of deliberate cheating, thus no further thoughts will be directed towards this issue, and only the aspect of the unintended illegal choices will be issued further.

One final aspect from the data needs an attention and that is human interaction, majority of the people interviewed explained they are missing it, when compared with the old traditional service at CBS's canteens with a cashier. But an important remark was further acknowledged, which basically shows that it is not a drawback and people still prefer using the self-service system, since it allows faster servicing process and is convenient for such places where people are quite often in a hurry.

To conclude this section, the problematic issues were divided into two main categories (presented in the table below) - problems related to the interface design and its functionality; and problems

related to elements outside of the self-service technology, but which influence the whole concept of having a successful SST in a canteen setting, which in this case are based on the specific case of CBS canteens. These problems are further issued in the next section and used in the prototype creation process together with some heuristics outlined in the literature.

Table 12 – Problematic elements divided in 2 categories

Interface design and functionality	Elements supporting the function of the SSK
Illogical categorization	Adequate support in case of system failures
Inaccurate pictures	Additional Payment methods
Insufficient information about the products on the screen	Older and non-proficient people make the process for the rest much slower
Poor labeling	Not always someone to ask questions or require support
ineffective or repetitive tasks	Stress from random control checks
More clarity about the weighted products	The alarm from the random control checks annoys people sitting in proximity
Lack of "fun" factor	"peer pressure"
"Help" button is not visible	cheating
not self-explanatory	
illegal options	

6. Idea Creation Process and Prototype generation

This section is devoted on the process of idea creation and consequently on the prototypes that have been developed. It is important to be noted that the process was not so straightforward as it is presented here, and as noted in the Literature about "reflection in action", every step done in this project generated a great variety of ideas and brainstorming was a continues activity that was following the whole process from the initial observation to the test of the prototypes. Sometimes ideas were born during the interviews and so on. All ideas were noted and further evaluated at the start of the prototype development.

6.1. The process of idea formation

The start of this project was initiated by the authors interest in self-service technologies as a mean to improve services and customers experience, which is also related to the studied program by the authors. However, the initial focus was on SSTs that could be physically observed in a specific type of setting, starting from metro stations and ending up in canteens. The lack of relevant literature regarding canteens and the potential for implementation of SSTs in this type of setting, made the focus moved from the general perspective to the specific setting. The general observation have already generated some ideas, regarding interface for example and how every step should be clear and that the important things should draw the attention of the users, since they often do not pay enough attention when using physical SSTs in public spaces. Additionally, the general observation brought the idea that SSTs could be amazing if implemented appropriately and facilitated further by additional elements, such as employees, spatial layout and positioning.

The biggest brainstorming actually arose during the observation of CBS's canteens, where some problems were already observed, such as insufficient information, navigation inefficiencies, employee interaction and general organization of the kiosk interface. Furthermore, the semi-structured interviews at CBS confirmed the problems initially observed and were narrowed down to very specific elements, additionally new problematic zones were revealed from the

interviewees (See the affinity diagram, Appendix 7) and variety of ideas were formed, which will be specifically explained in the next section, regarding prototypes.

The main ideas were formed out of all data collection and literature revealed. The first one came after a video about a mobile application used in a grocery shop in Sweden. It was simple and was representing a portable scanner. The idea really intrigued the authors of the project, since it seemed a perfect solution for a great number of problems that were discovered. Additionally, the idea was supported by the fact that canteen settings as observed are like little convenient stores where user usually pick just a few items and unlike big grocery stores where customers buy a great number of products and the whole thinking of walking around with a phone and scanning around might seem a bit odd and not very convenient, in the canteen setting it could actually be convenient and really save time and just make the whole process even simpler.

The second idea was regarding kiosks, since the one observed at CBS's canteens seemed well designed and properly functioning, also people seemed to be satisfied with it, it was decided that it is a good idea, proven that is working. Thus made the project focus on this idea first and try to come up with new interface design of CBS's kiosks which is aimed at improving the following attributes Ease of Use, Control, Speed and Enjoyment by fixing the problematic elements outlined by customers and observation. However, it is important to mention that the kiosk at CBS's canteens is used as a generic design and physical elements of the kiosk are not issued, additionally graphical design of the interface is also not emphasized, since it requires specific technical skills, which were not available at that time. Thus colours and visual aspects are mostly based on the current design of the interface, but what is suggested are mostly elements that improve the overall functionality of the interface.

6.2. Prototype of the Kiosk Interface

The idea of this prototype was mostly driven by an observation of the metro ticketing kiosk, where the process observed was straight forward and logical with limited choice of options. On the other hand, this prototype includes more options in terms of functionality but the general idea is to make the whole process more organized and straight forward for users, decreasing the time spend

for searching an item and selecting multiple items from the menu. The principles suggested on the literature also guided the process of creating the new elements and issue the reviewed problems.

Starting from the initial page of the prototype, the ideas was to make the system more pleasurable to people, since at the moment it was not brining any emotional influence to the customer, which as mentioned in the Literature is crucial for having a successful SST. Additionally, the setting also influenced this choice, because unlike the busy public areas, such as transport stations, this type of setting allows for a more customized interface bringing more than just servicing the purpose, but emotional experience. Furthermore, many interviewees mentioned that they miss interaction with employees. Even though that interaction could be also boring and unfavourable if the employee is only doing his main purpose, but sometimes a little joke, a little smile or just a general "Have a nice day" could influence the customer emotionally, thus making him leave with a positive experience.

In this relation it was decided that the starting screen of the Kiosk could be a funny picture with a catchy phrase, which will be constantly changed (e.g. a database with this pictures could be considered and generated on a random basis every time when the user uses the kiosk.). Moreover, a general greeting message and another funny "meme" was added at the end of the process. The idea is contradicting a bit the heuristics suggested in the literature, which explain that any unnecessary distraction should be avoided, but that is why this is only at the beginning and the end of the process. It is not expected to slow the process, since they are very short and the user would typically need no more than a second to acknowledge and process what is observed. Also they have the idea of drawing the attention of the customer at the beginning and make him focus on the following process.

In relation to navigation of the process a few key elements were added and some reorganized. First of all there is a start button on the initial screen, which initiates the process, because one of the Heuristics explains that it is important for the users to identify the beginning of the process. Furthermore, based on the suggested principle that users should always be able to go back to a previous step of the process, thus a "back button" and a "home button" were introduced on top of the page (similar to a computer browser), which are available at every step of the process. The main point for adding this was also related to the fact that more categories and sub-categories

were added. A "close" button was also introduced for pop-up windows, such as the one that pops up when the customer has to put the given weighted products on the scale, this is believed to allow more flexibility and give feeling of control to users.

In terms of the homepage, it was rearranged because it was observed that customers often spend a few seconds screening all the categories, which are on top of the interface as a side bar and most of the space bellow was occupied with an advertisement of some product. So it was decided that it will be much better for users to select their initial category if they are located at the centre of the screen and move the advertisement on one of the sides, which in the particular prototype is on the left with an example of advertisement for the other idea presented in this paper - a mobile application. Additionally, to speed up the initial selection of category, pictures representative of the category were included, because as suggested with the literature visual representation is important so that the communication could be conducted on multiple channels and also facilitates the cognition process. A short text on top was also added ("Scan Item or Select Category") to answer the issue proposed by customers that the system is not "self-explanatory" and adopt the principle pointed by Sandners that some sort of explanation or example of what needs to be done is crucial.

Based on the input that no one visualizes the "Help" button, it was moved under the categories but still in a central position, also made bigger, so that it does not leave any chance for not seeing it. Additionally, the button is made available at all steps of process. As suggested in the literature review, the button was designed with evident contrast to the rest of the page thus considered to be easily noticeable.

In terms of categories and organization of the products, the major change is related to the addition of sub-categories. Since some categories in the CBS's design had too many products and because many interviewees expressed difficulties finding products it was acknowledged the need for adding sub-categories, thus making the product choice shown in a specific page much lower allowing users' quick orientation and selection. As proposed in the heuristics section, sequential presentation of information is better than simultaneous. Even though this new organization of the process requires more clicks then the initial design, it is expected that with accurate category names will speed the process up.

To give an example for the new way of organization (categories and sub-categories) "hot drinks" section is presented. The "hot drinks" is the main category and "coffee" and "others" are sub-categories. Once the type of coffee is selected it goes to another sub-category which shows different sizes. All categories and sub-categories are made as simple as possible and with as lower number of choices as possible. In addition, for every page the product choices are positioned in the middle with a decent size, occupying most of the screen space. The idea was to improve visibility and thus speed up the process. Furthermore, at the last sub-category whenever there is a size choice the pictures of the products were designed according to the size that they represent (e.g. small coffee has smaller picture than the big coffee choice).

Another example that has been designed to illustrate the idea of the new categorisation is related to "Bakery", which is then sub-divided in bread and pastry, which are further divided in another set of sub-categories, e.g. white bread and dark bread. However, this categorisation is only to illustrate the idea and in reality it will depends on the products offered in a particular canteen setting. Thus, it is important to emphasize that the categorisation should be logical and if for example a piece of dark bread and a piece of white bread cost the same, they should not be in different sub-categories, since it is not very logical; instead it is better if you have just one main product for selection, then 2 products with the same price and same physical appearance but different ingredients (e.g. instead of dark and white bread with both categorise having the same range of products with the same prices, a good categorization will be having only category bread and particular products could be renamed as for example "white/dark bun".

The buffet section was also re-organized to address the main issues marked in the collected data. First, applying more representative pictures and creating a clear distinction between different options, not only textual. Second, prices were made visible (example prices, not matching reality). Third, once the product type is selected a pop up comes up, which explains what needs to be done both written (by text) and graphical (with picture). The inspiration for this visual explanation came from the SKK for rejserkort at the metro stations of Copenhagen, where the screen shows visually with animation what to do. Furthermore, the moment the food is weighted another window pops up, which provides a detailed information of price calculation instead of only giving the final price, since many users expressed their need for clear information of the price formation process. An

"OK" button is provided in this case again to put emphasize on control and also gives time to the user to process the information regarding price before move to the next step.

Another idea regarding information was implemented to address this need of more information emphasized by users. A button "product info" was added under each product, which once pressed brings another pop up window, with detailed information, regarding nutrition characteristics of the product (e.g. macro nutrients, calories, allergens). The idea is that, since the products do not have a barcode, typically do not have a package and thus this information is not available.

In terms of colour style, the topic has not been additionally researched and was selected based solely on the authors' perceptions. Apart from the colours, better and bigger pictures were added for all products and categories, in this first prototype they are only examples, but the idea is to represent adequately every product and category which as suggested in the literature will improve the cognitive process of the users and could avoid misunderstanding for products and categories, as it is a common problem among customers.

Additionally, the pay button was made bigger, since it was also considered not visible enough according to the collected data. The idea is also that one should be able to pay instantly once putting a credit/debit card in the payment device, but since this requires a more advanced prototype it was not mentioned to the participants of the further test for this prototype.

The last element of the new redesigned kiosk interface is related to the purchase list, which is visible on the right side of the home screen, once a product is selected. The new addition includes + and - buttons next to the product, which allows users to increase/decrease the quantity of the selected product. This improvement allows customers to buy multiple numbers of products without doing the same repetitive process, of going to a category and selecting a product again and again. The main idea is again to speed up the process and create an easier way of editing the purchase list, which is also expected to add further value to the perceived control by customers.

6.3. Prototype of the Mobile Application

As already discussed, the idea for the App. is very generic at this initial prototype and aims to test the propensity of customers to use something like that but this time having a more visible example

of what it is and how it might look. Then see if this provokes any problems or complications in terms of canteen setting. However, it requires some changes to the canteen setting that need to be addressed.

Firstly, all products must be possible for scanning, which means that a bar code needs to be created for everything. The easiest way that was suggested, is by putting a barcode in front of everything that will be visible and easy to scan with a phone. For example, a barcode on the coffee machine, a barcode in front of the bakery stand. It is crucial that the canteen setting is organized in such a way that it is always clear what the barcode is for and also easy to be find, not hidden in between some other information.

Secondly, the weighted products also should be scanned, so another type of scales needs to be implemented and put around the buffet. The idea is similar to the scales used in grocery stores, but instead of printing the barcode, once the food is weighted, it will generate the code electronically on the screen of the scale, which saves costs from paper and is more environmentally friendly; and makes the scale size smaller, compared to the one that also print barcodes, which is crucial if there is not much space in the canteen, as in the case of CBS or Fazer.

This first generic prototype is very lean and basic and only the main purpose of the App is issued in the prototype (scanning items and paying). The design is based on the one usually used in mobile application designed for scanning barcodes in order to get product information (e.g. QR & Barcode). For simplification and due to lack of technical capabilities, the design does not include registration process and account management, but the idea is that in the registration process, the customer uses his e-mail to register and then syncs his payment methods. Once it is done every time the app is opened the initial screen will be as shown in the prototype.

To start with the presentation of the App., a focus on cheating must be put. The application is predominantly based on trust, which is not considered a major drawback, since the observation at CBS showed that the management there believes in the honesty of its customers and the control is not so strict. However, in order to exert some control and still leave the perception to customers that cheating will be caught, the same random checks as in CBS's will be conducted even with the implementation of the App. (e.g. a staff member will simply ask the customer to see his mobile receipt on the way to the exit from the canteen). Thus, every time when the user opens the app. a

pop up will appear, explaining that the user should pay for the products while still in the canteen area and should keep the receipt available in case he is selected for random control check. The design implemented an "ok" button for this note, so that everyone could pay attention to it and then confirm to proceed further.

On the next step the customer already should see through the camera of his/her phone and be able to scan a barcode by directing it towards the camera. Once the product is scanned another pop up will appear with a picture of the scanned product, price specification and some general information regarding the product, such as nutritional values and allergens. Then the user has to confirm that by pressing the button "Add" or if it is a mistake the button "Delete". After that the customer is returned to the camera screen and sees that there is 1 item in his cart (noted with a digit on top of the button "View Cart". In case the user cannot scan a particular item, there is an option "Can't Scan" which is visible at the camera screen in the bottom right corner. The idea is that if for some technical reasons the product cannot be scanned, the numbers from the barcode will be put manually.

When the customer is ready to pay, he must review its cart, by pressing "View Cart" and then the new page represents a purchase list, which is exactly the same as the one implemented in the Kiosk prototype, again with options to add and delete products. From this page the user could always go back and scan more products by pressing the button "back to scan". Once ready to pay, the user just needs to click "pay" and then a page will show up where he/she must select a payment method (depending on the initial preferences registered in the account creation). The idea is that the customer will have the most popular payment methods, such as credit/debit card payment and PayPal option, which is considered as a really good alternative in an international environment, where foreigner might not be able to operate with their foreign card, thus using a PayPal is expected to resolve the problem. After paying, there an overview of the payment is presented together with some formal greetings.

In the top left corner a menu button is introduced, which gives opportunity for further edit of Payment Methods and Account Settings, such as change of e-mail and password. Additionally, a section with Frequently Asked Questions (FAQs) is implemented, where everything that could arise as a problem will be explained, so that the need for help from the staff members could be

diminished. Another function that was added to this menu is an option to check the purchase history and keep an overview of the products bought and expenditure overview. Next to the menu button, the name of the customer will be shown, as an attempt to make it more personalized. Additionally, there is an option to turn on/off the light of the phone's camera, since it might be necessary if it is too dark in the setting.

In terms of design, all buttons (apart from the Menu) were made of simple text, which is considered to be sufficient for right understanding from users and should avoid any misunderstanding or lack of clarity . Additionally, there is a variety of buttons, which allow users to go back or further to the next/previous steps of the process, regardless at what stage they are at the moment. All this is expected to increase the perceived control from users and ease the process, thus making the App. pleasant and fast for usage.

In general, there is room for implementation of more features to the App, but for this initial prototype it is important to understand if customers perceive it as something useful and could use it without further complications. Additionally, it is interesting to see if the design is comprehensive enough or it requires some development. The results from the experience prototyping will give the required data and from that point it will be easier to think about additional features and further development.

7. Experience Prototyping

This section is aimed at presenting the data from the test of the prototypes. Both prototypes - the mobile App. and the kiosk interface, have been tested by 18 people - 11 women and 7 men, and the age range was between 22 and 38 years old. It is important to mention that 5 of the participants had no prior experience with CBS's self-service kiosks and have never tried self-service in canteen environment, thus their test of the interface could be very conclusive to what extend the prototype succeeded in achieving its purpose to be self-explanatory and logical. On the other hand, the other group of participants who have experience with CBS's canteens and SKKs are important because they will evaluate the prototypes based on a real technology, making their evaluation very important to see if the prototype is in reality better than the one implemented in reality and thus to verify that the problems found and the principles from the literature have

resulted in developing something good and useful. In terms of background, all characters were relatively unique since almost none of them had something in common with the others, in terms of employment or study. This made the sample rich and various, thus the results are expected to vary more or to decisively point out the same points, which in this specific case ensures the validity of the findings.

In terms of reality representation, the tests took place at CBS's buildings, where typically a room was specifically arranged to represent a canteen setting, by organizing different stands, such as buffet, coffee area and general products. It was mostly designed for the test of the mobile application, but also to give some general overview to the participants who had no prior experience with canteens. Since the idea of the experience prototype is that the setting should be similar or at least closer to reality. The tests were conducted around the end of July and were distributed in approximately 1 week, since on average the tests together with the interviews took on average between 1 and 2 hours, depending on the participant.

In terms of data organization in this section, it is separated into two parts, first - the data obtained from the recorded videos and second - the data gathered from the semi-structured interviews, conducted with each participant immediately after the test of the prototype.

7.1. Video Data from the Interface Prototype

To start the section the data organization presented in Appendix 9 needs to be discussed first. The results presented are from 16 out of the 18 videos that have been recorded because when the videos were reviewed, in 2 of them nothing specific was not mentioned or noticed. In the experience prototype regarding the kiosk's interface, the participants were asked to do some specific tasks in order to complete a full test of the prototype, thus the main activities were separated in 7 main categories, according to the their purpose - Initial Image; Find products; Add/delete; Info button; Home/back button; Price page; Final page. Then each category has been given a binary choice easy/not easy and noticed/not noticed and have given the value of one to the binary category based on what was observed, while 0 means not available/ not observed. Apart from the binary coding, a section with textual remarks was also added, since there were interesting remarks outside of the main categories. The diagram used for coding the data is

presented in Appendix 6. The main idea of this coding was to give a more structured way of the data since the sample size is not that small. This way also allowed for easier analysis of the data.

The first category "Initial Image" is related to the participants' reaction to the funny meme used in the prototype. "Find Product" - relates to the activity of finding a specific products that the participant has been asked and specifically if it was easy or not. "Add/Delete" category is related to the purchase section and the options adding and deleting products. "Info button" was category designed to see if the participant noticed the button or not. "Home/Back" category in relation to the buttons implemented in the design, if they were comprehensive and logical, represented again by easy and not easy in terms of coding. "Price range" category is about the specific part of the kiosk interface were the price for the buffet category have been presented. "Final pic. reaction" is about the reaction and if the participants either notice or not the final picture and the greetings.

Discussion

Based on the videos interpretation, the initial page did not facilitate any visible reaction to majority of the participants, in fact only 6 people actually expressed some emotions, which were something between joy and "what is this weird thing". A bit disappointing, since the effect that was indented was more like "a wow effect" creating positive emotions in people. On the other hand the results from the next category were really interesting. All the participants seemed to find their products easy and quickly and no one had problems with the way of organization and categorization of the products used in this prototype, which confirms the idea that this way the design allows for much better processing and faster journey.

In consideration of the "add/delete" option 9 people found it easy to interact with the specific section and majority considered it as useful feature. Some minor problems were observed, where a few people who expressed an opinion that it might be bigger and with more contrasting colour, since the buttons were not immediately noticed. However, only a few (3) expressed inability to use it, either because not recognized as an option or simply did not understand what its purpose was. One participant that had difficulties with that features said "I never did that, I never used the plus I always went back and did the process again" another participant deleted the item but when asked to add a similar item she went back to select the category. So the facilitator asked why and the answer was because was more intuitive to go back to the category.

In terms of the other buttons, they were relatively recognizable and only a few people did not know what the "home button" in particular does, so instead in the case where "home" button would be easier to press, they instead were just pressing the back button couple of times. Some participants believed that if they would press the "home button" this will delete everything, another reason why a few participants did not press the "home button" was because they did not know where that would bring them. Moreover, the "info button" was hard to test if it is noticeable, since when the interviewer asks the question, the participant is actually guided to look for it, which cannot guarantee that in reality the button would be noticed. But in general the video shows that majority of people instantly acknowledge the button and have an idea what it probably does.

In terms of the added information, regarding prices at the buffet section, mostly the people who can compared it with the kiosks introduced in CBS's canteens showed interest in it and clearly noticed the added feature, but in general it was not something that drew people's attention or at least it was not observed from the video materials.

The final page at the end of the process was interesting for observation, since in the videos it was acknowledged that half of the participants noted that funny image and the greetings and had been surprised in a positive way, some simply smiled. In fact 4 participants even laughed at the picture giving the impression that they ended the process with a nice feeling. This is in line with the main idea for the implementation of this feature, which was to provoke some positive emotions to the users and even though it was only 50% of the people who reacted, it could be considered as a successful feature.

7.2. Interviews' Data regarding the Interface Prototype

In this section the data collected from the interviews from the Experience Prototyping of the Kiosk Interface will be presented. The interviews have been carried out with each participant right after the test of the prototype and were conducted in the form of semi-structured interviews. The guiding questions are available in Appendix 11 and the obtained data in Appendix 12. The questions are divided in five categories, based on their purpose - "Enjoyment", "Personalization", "Ease of Use", "Functionality" and "General questions".

Enjoyment

The first set of questions are related to the Enjoyment attribute, with the purpose to explore the feelings that arose in the participants regarding the prototype, and specifically what was the impact from the features of the prototype that were designed to improve the perceived enjoyment among customers. Majority of the participants answered that they like the idea, with only 2 expressing scepticism. Some of the comments were that it "makes the process less boring" and that the design is considered more "user-friendly". On the hand, the negative comments were either because it was not important to the user, simple saying that he "does not care" that much about the fun part; or it was not considered appropriate for the environment according to one of the participants. This positive attitude towards the funny elements and its influence on the overall experience, was noted by 15 out of 18 respondents in the second question - "Did that influence your experience of the service? How?". Some of interesting comments are "it forced me to have positive feelings" and "they made the process more enjoyable". Among the 2 negative answer the respondent give these answers "I didn't take it seriously didn't feel professional" and "I wouldn't like to have it on my self-service". At the end of this set of questions was asked to give some suggestion to how make the SSK more enjoyable and many ideas came out, , such as "Some pop up that gives you funny instructions", "Inspirational quotes or educational things", "background music when using the system", "as less click as possible because my mind is not there I just need to go out as fast as possible", "Jokes about what is going on in relation to the university life". In general the whole idea of making the service more pleasurable and funny was quite successful and most participants appreciated the attempt and required even more funny elements.

Personalization

In relation to the personalized messages, such as "Thank you" and "Have a nice day" all participants reacted mostly positive. However, a lot of the people did not actually noticed them, explaining that the funny memes drew their attention. Additionally, majority of the people expressed a more neutral position, pointing out that it is still a machine and such messages does not make it more personalized. Thus only 6 people have been actually influenced by the messages and had a better perception about the service, but majority simply were not impressed since it is not something special and pretty common in relation to self-service technologies.

The third set of questions was related to the "Ease of Use" attribute and the overall outcome of was that the interface prototype was generally comprehensive and easy to use. In fact 4 out of 5 question got a positive answer form all the participant. First it was asked if they liked the interface structure and organization and two comments provoke the authors interest - "it was easier to find things and more approachable even if it was a bit longer", "it was easier because it was guiding your way in the process". On the other hand some pitfalls have been highlighted by some respondents, such as the importance of logical categorisation (e.g. the bakery section, in the design case separates bread in dark and white, whilst having the same price, so they asked why it was separated in another sub-category). Furthermore, a suggestion was made that if the main categories are available all the time, which might be actually better, since it will save 1 or 2 clicks.

The second question from this section was related to the variety of buttons implemented and in this case two comments have been highlighted from the overall positive answers. One suggested that the "Purchased Products Section" would have been better if was bigger and moved on the left side, about the same section have also been suggested to change the colours of the "add" and "delete" buttons. An important aspect though, that needs attention, is that some of the interviewees wondered what the "Help button" as well as the "Home" button do. Many also suggested to have an icon instead for the info button. The last thing that needs to be noted form this set of question was that only 2 respondent's experience have not been influenced by the interface structure and organization. A comment that is really interesting was:

"the features influenced my experience in a positive way because was easy and clear and I wasn't expected to know how things are called".

On the other side:

 "...categories are already clear and the buttons were only a plus, they didn't affect the experience".

The critiques will be further evaluated, but in general the perceived "ease of use" shows good results, and also confirms that this aspect was successfully revised in the prototype.

Functionality

The results about "Functionality" are also generally positive. This set of questions were about specific functions implemented. The first question was about the "Information option" which was generally well accepted, but very few found the function as truly useful, but explained that it might be for people who take track of their diet or people with allergies. Thus it was proposed, that such information should be physically available at the place where the products are located and not on the kiosk. However, in further discussion, the majority agreed that a simple icon symbolising if the specific product has some type of allergic ingredients could be added to the pictures of different products, thus it will not require any additional processes and will be useful to people who need such information, at the same time without being annoying for others (meaning that it will not be distracting. In general, the button was noticed from all participants and was clear what it does, but still some expressed that its visibility could be improved further, either by relocation or button style.

From question number 3 of this section, which was related to the detailed information about the weighted products, a clear point was made by participants who had also experienced the kiosks at CBS's canteens, that this additional information was valuable and truly missed in the CBS design. Main comments were:

"….because make it clear and a better experience"

"... it is important and I'll use it in the later purchases"

"...was very important so you do not feel cheated"

Only 3 people have evaluated this addition as useless, since they are only interested in the final price.

In terms of the "Purchased Product Section" the participants were asked if they found it easy to add and delete products and if it is a useful add-on. Only 2 people said that it was not easy, firstly because the buttons were too small and second one pointed out that it is not clear to her and prefers to go to a category and select the item once again, if she needs to get 2 or more products of the same kind. However, the general attitude towards it was positive.

In general, the answers from this section showed that the features implemented to improve functionality were favourable to the participants and their general perception of functionality has been enhanced, which therefore influence positively their perception of the experience.

Some interesting comments were:

"It didn't require much time to figure out the system...",

"...it influenced my experience positively because of the increased amount of info",

"...clear view of prices is good for budget control...",

"it gives me relaxed and positive experience..." and

"good functionality and comprehensive design"

General questions

The last section of the interview, was aimed at confirming the overall perception regarding the prototype and to evaluate its possible application. All participants have expressed confidence in using the interface and furthermore a willingness to use it in reality. Interestingly, all the people who have also experienced the kiosks at CBS's canteens undoubtedly said that they prefer this design (prototype) over the other one and that they had a more favourable experience using the prototype than the original one. Some comments:

"I was very conformable because there were better pictures and in general was more comprehensive with the added options...",

"…mostly because of the picture that were better and brighter",

"...this one is better than the one in the canteen...",

"...it is better than the existing and I will definitely use it...".

One comment from a participant who never tried a self-service technology regarding canteens was a good remark of the prototype - the girl said that she would like to have that in her work place, because it is easy and will make the canteen service much faster. The second interesting comment was from an experienced user, who was sceptical in the beginning expressing an opinion that the CBS's canteens' design is already good, but after the test of the prototype he

changed his mind and said that would much rather use an interface like the one from the prototype than the original one.

As a conclusion of the interview, each participant was asked to share freely any concerns or suggestions regarding the prototype that were not mentioned throughout the interview, which are summarized here:

- implementation of a better "Info" button or in general another approach regarding product information
- the "help" button needs to be more comprehensive in terms of what exactly would do
- suggestion for adding, promotional materials (e.g. what is on discount) in the beginning of the process.
- suggestion for having a shopping basket on each screen
- quick link to the different categories always available
- consideration of the categorization, in order to be logical in all cases (e.g. the example with the bread).

To conclude this section, both the videos and the interviews have indicated that the prototype is relatively good and the main points of achieving easier and more comprehensive design where achieved. Additionally, all added elements and options increased the perceived functionality and enjoyment and therefore it resulted in a better general experience. Thus the overall result could be evaluated as successful, since all participants liked the prototype and expressed readiness and willingness to use it in reality. The only aspect that requires further thoughts and more radical improvement is in terms of "personalization", which clearly did not have the expected impact. Apart from that some minor elements require further improvement in order to achieve its maximum efficiency and greater positive impact on the overall experience of the users.

7.3. Video Data from the Mobile Application Prototype

The results from the videos are presented in Appendix 13. They are organized chronically, and for each customer there are two types of notes - first category is based on comments from the customers made during the test; and the second category - authors' notes based on observation. In this section only the most intriguing notes are presented and discussed.

The first issue was related to handling the phone and the purchased products and arose almost immediately with the first participant, where he expressed his concern that if he needs to get more products and especially from the buffet it will be hard for him to carry his phone as well. However, from the video it is noticeable that he actually managed everything and was not so much a practical issue but rather based on personal concerns in that particular case. Not surpassingly this was not the only case when this issue appeared there were a few other participants that pointed out that it will be hard to walk around with all the products and also carrying the phone. Thus it was suggested that using a tray might help, but then the next concern was that this option requires more space, because at some point the customer needs to put down the tray and scan all the items before leaving the canteen. So this issue was noted as the main drawback regarding the implementation of a mobile app. in canteens.

One of the participants was concerned about the fact that the app. would remember her card details and in case it is stolen they will have her details. Although the concern was reasonable, once she thought about it, she figure out that she already has other mobile application on her phone that keep her card details anyway. Probably the lack of security features in the prototype influenced this participant but it was explained to her that it is only a generic prototype that has the purpose to examine its usability and what issues in terms of the process it could provoke. Even though it was not an issue that was aimed at being tested in this first experience prototyping, it was noted and in further development of the prototype it will be addressed.

It is important to mention that as originally planned the initial text on the first screen was acknowledged from every participant, and the "danger" sign together with the "ok" button definitely served their purpose to draw the attention of the user and read the message, instead of just skipping it.

In terms of the main activity - scanning products did not went so smoothly in the beginning, but it was realized that it is hard for participants to actually imagine that the sketching represented the screen of a phone with open camera and a target in the middle which should be directed towards the barcode. Then a real phone and a mobile application used for scanning barcodes (the one mentioned in the prototype section) were presented to the users for a better visual representation and most of them immediately understood what it is and how it works. Only one

participant who never used a self-service in canteens before and not even in shops could not figure exactly how the scanning procedure works, but then it was explained to her that she needs to scan the barcodes and everything was clear after that. This though left an impression, that there should be something like a quick guide or aids at the first time when the application is opened, which shall explain briefly what is expected from the user, even though that all the other 17 participants did not experience problems and did not show any signs that they do know what to do (e.g. scanning the barcode and what is barcode...).

In terms of the buttons and navigation it went smooth for most of the participants. Only a few had problems with the add/delete buttons in the purchase list, but since they also had the same issue with the interface prototype it was not considered as a new problem. Furthermore, only 3 people actually noticed the "Can't scan" button and were not sure what it does, only one of them suggested that it is probably for manual putting of the barcode number. When asked what would you do if cannot scan a product almost everyone said ask a staff member, thus raised the concern that this button should be more visible and self-explanatory or maybe part of the "guiding tips" given as an example for solution in relation to the scanning issue.

In general, the videos did not show any major concerns regarding the application's functionality and operation but indicated a valid point that needs to be further considered, regarding the handling process, when one has to carry all his/her products and also his/her phone. Apart from this, the participants were mostly impressed and seemed that they liked the idea.

7.4. Interviews Data regarding Mobile Application Prototype

In this section the data from the interviews made after the test of the mobile application is presented (Appendix 13). The questions in this interview are only 7, because there are not so many functions that require attention. The general idea is to understand if such technology is applicable in canteen environment and if customers would use it. Then in general the interview is aimed at finding problems with the navigation and to see if everything is comprehensive and easy to use. At the end of the interview, the participants have the chance to express ideas or concerns freely.

As already discussed in the previous section, regarding the video data it was obvious that people like the idea, thus not surprisingly 16 out of 18 participants answered the first question positively, stating that they would use the App. if it is implemented. The main reason was that most participants expected it to be much faster than the kiosk procedure, since its only scanning and would avoid queuing, which as observed before happens quite often in the "rush hours". However, it has its pitfalls in relation to handling (as noticed in the videos), specifically when the customer takes something from the buffet it becomes quite hard for to have a plate in your hands and at the same time operating with the phone. Thus a suggestion by a few customers was made that the app. should be used for everything else apart from the weighted products and should be used in conjunction with the kiosk, not as sole option. This is in fact was a bit disappointing, since it changed the initial idea of the app and it was not expected that handling would be such a problematic issue. However, the idea to implement the app for only the rest of the products is still in line with the purpose and actually makes it easier, since there will be no need for additional re-arrangement of an existing canteen setting and no need for purchasing additional scales. Everything needed would be to apply barcodes to all unpackaged products, such as coffee and pastry, as discussed in the prototype creation section.

The real inspiration regarding this prototype came from a few participants, who were initially very sceptical and firmly against mobile application. In fact their attitude change after the test of the prototype and in the discussion they expressed an interest and acknowledged the potential of the app., stating that they would also use it once finalized and implemented. Only 2 participants remain negative even after the test, pointing out as a main reason their negative perception of mobile application and stated that it requires more incentives in terms of functionality, which could stimulate them to use the App.

In terms of "Ease of Use" the application itself was considered as comprehensive and straight forward from all participants. The only problem was the "I cannot scan" button, which majority clearly did not understand. But it was also not issued properly, since the authors should have designed one more page that shows what it does, once the button is pressed and then if the people still do not know what it is, then it could be concluded that there is a problem. However, it has been noted for improvement and more attention will be put in a further experience prototype.

On the question if there was something confusing, apart from the "Can't Scan" button, one participant stated that "View Cart" button was not clear where would lead and that this was the way to process to the next step - payment. In fact, this calls for a more comprehensive text on the button instead of "View Cart", maybe a symbol of cart might have a better effect, such as the one usually used in websites for online purchases. This needs to be further evaluated and applied in the next prototype.

Question number was asked because it was intended to approach how customers would feel regarding the idea of "cross-selling", but was specifically mentioned that the App. would only make suggestions based on regular purchases. For example, if 6 days in a row a customer buys coffee and cake, on the 7th day the App. would automatically ask if the customer also wants to add cake, once the coffee is scanned, this way additional scanning will be avoided. The idea is mostly practical then business oriented but the participants were sceptical and most of them proposed to add a section with "favourite products". Which considering it now, seems as a much better option. In terms of cross-selling, since not everyone likes it, it was considered that the idea still could be implemented but with an on/off option, so that people who find it annoying could eliminate it.

Another idea of the App was to give customers a greater choice of payment options, which to a greater extend have been appreciated by the participants, who suggested that "PayPal" is a good alternative and that "Mobile Pay" should be also included. An idea that is not very relevant, since registering a card once, does not require that much of an effort. Moreover a participant suggested the possibility to automatically detect when leaving the canteen setting and automatically pay, however, in order to evaluate this suggestion is requires further technical capabilities and knowledge but is a good idea that probably could be developed as long as it is not too expensive from managerial perspective.

Unlike the kiosk interviews, this time people had many more idea to propose. Some of the most interesting are presented and discussed here. First, since majority of participants expressed their concerns that people would cheat more in this way, since there is no direct supervision and random checks from time to time are not enough. Thus an idea to put a scanner on the way to the exit, so that everyone could scan their receipt there and the result to appear on a screen visible to

the employees, just like it is at the moment with the Kiosks at CBS's canteens. The idea was also discussed with a professional who is doing a master's program in DTU and works in the technology sector, his name is Patiu Rabiu and he explained that it should not be difficult and expensive to create and implement this solution. It is expected that such an option should have a very strong effect on any possible cheaters, since it obviously works for the kiosks.

In relation to the handling process when having weighted products, one participant suggested that if the setting is organized like an assembly line it could work. The idea could be considered in some particular canteens, but generally it is a bit old-fashioned design and not everyone would like to design the layout in this way. But in general it is a good idea that could solve the handling problem and could certainly fit in some particular servicescape.

Another idea concerning scanning requires attention. It was suggested that scanning might be problematic for Smart phones with bad camera so he thinks that instead it should be just like the kiosk having a list with products and selecting them. This was further supported by another participant who stated that he would prefer "browsing option" instead of scanning. Therefore, it was considered that it could be implemented no instead but in addition to the scanning function, giving customers more flexibility. On the other hand it makes the application much more complicated so it needs to be addressed properly and further prototypes should be made.

To conclude, the idea is considered achievable and useful from almost all of the participants. Even the sceptical ones, stated that with "favourite function" they would use it, others stated that maybe not going to use it every time, but in cases when the canteen is busy would be definitely a preferable option for them. Majority also stated that they would prefer the App. over the Kiosk, which means that the proposed ideas in the prototype creation are fruitful and could be successfully applied after further improvements. However, in order to make the App even more appealing, it was also considered to add more functions, such as information regarding the canteen service (e.g. when does it open, when does it close, when the buffet is served, menu for the day etc.) even a real-time information regarding how busy is the canteen, or if after the closing time there is a lot of food left in the buffet, a notification through the App. could be made. The capability of such an App. are numerous and thus a more extensive research and further

prototyping is required, especially now, knowing that the idea has a potential it could be an interesting future project.

8. Discussion and Managerial Implications

H From all the primary data that has been collected and analyzed it could be concluded that Self-Service Technologies could be a successful implication in a canteen setting and have the potential to improve the overall customer experience in a positive way. However, as suggested also in the literature review, this experience depends on multiple factors and perceptions that need to be present in order to utilize the full capacity of the technology. It was confirmed that "Ease of Use", "Speed" and "Control" are among the most important attributes required for the creation and adoption of a successful Self-Service Technology in a canteen setting.

Moreover, "servicescape" and "employee participation" are key facilitators of the SST prosperity and the customer experience, since any system cannot function in isolation. Additionally, the promotion of the SST is very important when the service is newly introduced and needs to point out the benefits that would bring to customer. This issue, was not in depth analyzed in the study, because it was not an important aspect in terms of the prototype creation, but it was noted in the conducted interviews that it is crucial to communicate the advantages of a certain SST to customers, which from a managerial perspective corresponds to promotion.

"Enjoyment" is an additional attribute, which is not applicable in all kinds of settings, but was found to create positive perception among customers and also brings greater satisfaction from the service. This is important, specifically in cases where the human interaction is limited, since it could reduce the feeling of missing personal communication. However, it must be noted that in very busy or formal settings, e.g. a canteen in an office building or similar, it might not be appropriate, because it could affect the speed of the process, creating additional distraction. The issue requires more attention and further research regarding its applicability in a variety of settings, but in general it has been found to drive positive experience to customers.

In terms of "Reliability", this attribute was not studied in depth in this paper because almost any related problems have not been acknowledged in the data analysis. However, the general

perception is that a SST must be reliable before anything else. Minor problems are acceptable, as long as they are solved instantly and does not affect customer's journey. This is one of the cases, where employees and the layout of the setting are crucial factors to diminish a potential problem of system failure or similar.

The other elements that have been highlighted both in the literature review and the analysis, are related to functionality and efficiency, essential for the initial stimulus towards customers and their attitude and willingness to use a particular SST. Regardless of its main purpose a good SST needs to be efficient and useful before anything else, otherwise customers would ignore it, especially in cases where other options are available. Additionally, more functionality could also incentivise customers to use a particular SST and on overall it brings a more favourable user perception towards it. However, it must be noted that more features and functionality are not always applicable and sometimes it might be inefficient or simply adding too much distraction, which slows the total process. Therefore, as suggested in the heuristics proposed in the Literature, if the SST is represented by a Kiosk it might be better to keep the design simpler and not adding too many features, which in a busy environment would not bring any benefits. On the other hand the analysis suggests, that this approach could have a great potential in the development of mobile applications as another example of SST. Due to the fact that mobile applications do not have the restrictions that arise with kiosks, such as "peer pressure" and "lack of convenience", adding more functionality in a Mobile Application could result in a better service and improved customer experience.

Finally, the Interface of Design is another crucial element, which must be addressed adequately and customer participation is very important for creating a good design. The heuristics, suggested in the Literature are just a small piece of all the knowledge in regards to that. But a few main principles, could be derived from the design of the prototypes in this project. First, the design must be comprehensive and self-explanatory so that it could diminish the need for employee participation and optimize to process efficiently. The process must be always reversible, meaning that a back button is required. Additionally, "confirm" buttons are essential to make the process visible and logical. Avoiding additional distraction is another key element of the good design, but is not necessarily applicable, since it should be only avoided if it does not have any other intention, or if it is not appropriate for the given environment. On the other hand, presenting too much

information at once is always frustrating to people and slows the process, thus as suggested in Literature a sequential data presentation must be designed rather than simultaneous. The last element acknowledged from the analysis is that logical categorisation and adequate names for different products are not only essential for the overall "ease of use" but also prevent unintended illegal choices.

From managerial perspective, this study does not only outline some main principles that must be considered when designing a SST and implementing it in a canteen setting, but also represents a process that could be adopted by managers or designers in order to create new solutions for their business or improve existing services. Furthermore, the project presents two prototypes of SSTs that could be utilized and further develop by managers or practitioners. The Kiosk Interface prototype requires some minor improvement, but in general has been positively evaluated by customers and based on their input suggestions for further prototyping have been presented in the previous section.

In terms of the Mobile Application Prototype, it was concluded that it has a great potential and could transform the customer journey tremendously. It gives a great opportunity for managers to expand the ways customers are serviced in canteens and could reduce the costs related to buying physical kiosks and servicing them, it is particularly valuable in cases where a company operates in a variety of settings and owns a large number of canteens, such as Fazer (more than 1200 canteens). Additionally, such application could facilitate the "cross-selling" practices of the business and optimize consumption, as suggested by giving actual product information to users through notifications regarding discounts or excess food in the buffet.

9. Conclusion

To conclude, this project have successfully presented a process aimed at answering the given research question - "**How to create a successful self-service technology solutions for canteen environment**". A process that could be also utilized by managers and practitioners to develop new SSTs and successfully implement them. The main points were to highlight the need of customer involvement in the design process and the importance of identifying and solving problems that

arise from a customer perspective, with the idea to improve customer experience and their overall perception of the service and the business itself.

Additionally, the project proposed two prototypes of SSTs that could be developed further and successfully implemented in canteen environment, since both were positively evaluated by customers. This design process and the analysis also outline some general principles and theories that must be issued, when designing a SST, not only in a canteens but also in places with similar setting, such as the attributes proposed by Dabholkar (Speed, Ease of Use, Control, Reliability and Enjoyment), which influence the quality of the self-service technology and therefore the overall customer experience proposed. Additionally, factors that facilitate the success of the implemented SST, such as employee involvements, servicescape and promotion. Moreover elements that are crucial for creating positive customer experience and stimulate them to use SST, such as functionality, convenience and efficiency. Finally, an interface design process and relevant heuristics were introduced as the interface plays a key role in the customer perception and willingness to use SST.

The project also suggests topics and issues for further research. Some possibilities are researching more in-depth how each of the above mentioned factors and attributes affects the users, which requires a more extensive data gathering and quantitative approach. Furthermore, the use of mobile applications in canteen setting could be studied more in-depth in order to see users attitude towards this SST, since in this project the sample size was not significant due to the qualitative nature of the study and its exploratory purpose. Last phenomenon that would be interesting for research is how culture affects the application of SSTs in canteens and what is the role of trust in this kind of service. Since in the specific case-study it was observed that Danish environment provides the conditions for SST implementation, but then it is hard to generalize, since this cultural issue requires more in-depth research.

It is important to mention that the study does not take into consideration managerial and employee perspective, which could be considered as a major drawback of this study, because it does not present a holistic view of the topic. Therefore in case of replication of this study or adoption of the methodology for another topic, it is recommended to include management and employees view of the issue.

10.Bibliography

Ahn, T., Ryu, S. and Han, I., 2007. The impact of Web quality and playfulness on user acceptance of online retailing. *Information & management*, *44*(3), pp.263-275.

Alexander, C., 1964. *Notes on the Synthesis of Form* (Vol. 5). Harvard University Press.

Ambrose, G. and Harris, P., 2009. *Basics design 08: design thinking* (Vol. 8). Ava Publishing.

Anitsal, I. and Paige, R.C., 2006. An exploratory study on consumer perceptions of service quality in technology-based self-service. *Services Marketing Quarterly*, *27*(3), pp.53-67.

Anon, (2016). [online] balancedscorecard.org. Available at: http://www.balancedscorecard.org/portals/0/pdf/affinity.pdf [Accessed 14 Sep. 2016].

Arbnor, I., & Bjerke, B. (2009). Methodology for Creating Business Knowledge (3rd ed.). SAGE Publications.

Archer, L. B. 1984. Systematic method for designers. *In Developments in design methodology* (Ed. N. Cross), pp. 57-82, London: John Wiley.

Atoji, C. (2016). Self-service technology helps companies help themselves. [online] SearchCIO. Available at: http://searchcio.techtarget.com/tip/Self-service-technologies-help-companies-help-themselves [Accessed 15 Sep. 2016].

Atsrim, F., Buertey, J.I.T. and Boateng, K., 2015. Managing the Design Process in the Construction Industry: A Literature Review. *Architecture Research*, *5*(1), pp.16-30.

Bagozzi, R.P., 1990. Buyer behavior models for technological products and services: A critique and proposal. *Advances in telecommunications management*, *2*(3), pp.43-69.

Banathy, B.H. and Jenlink, P.M., 2003. Systems inquiry and its application in education. *Handbook of research for educational communications and technology*, pp.37-58.

Barnes, D.C., Beauchamp, M.B., & Webster, C. 2010. To delight, or not to delight? This is the question service firms must address. Journal of Marketing Theory and Practice, 18 (3), 295 – 303.

Bateson, J.E., 1985. Self-service consumer: An exploratory study. *Journal of retailing*.

Bitner, M. (2016). [online] Available at: http://www.personal.psu.edu/gxq102/Research/NSFWorkshop2007/2007NSF/NSF2007_MaryJo.pdf [Accessed 10 Sep. 2016].

Bitner, M., J., 1992. Servicescapes: the impact of physical surroundings on customers and employees.

Boland R.J. and Collopy F., 2004. Attending to reflexiveness and enactment. Managing as Designing, 90-95. Stanford, CA: Stanford University Press.

BOLAND, R., 2004. Design Matters for Management. IN BOLAND, RJJ & COLLOPY, F.(Eds.) Managing as Designing.

Braha, D. and Reich, Y., 2003. Topological structures for modeling engineering design processes. *Research in Engineering Design*, *14*(4), pp.185-199.

Brown, T., 2008. Design thinking. *Harvard business review*, *86*(6), p.84.

Bryman, A., & Bell, E. (2015). Business Research Methods. Oxford University Press, USA.

Buchanan, R., 1992. Wicked problems in design thinking. *Design issues*,*8*(2), pp.5-21.

Buchenau, M. and Suri, J.F., 2000, August. Experience prototyping. In*Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques* (pp. 424-433). ACM.

Business Department of Business and Management, Aalborg University.

Cho, H. and Fiorito, S.S., 2010. Self-service technology in retailing. The case of retail kiosks. *Symphonya*, (1), p.42.

Collier, J.E. and Barnes, D.C., 2015. Self-service delight: Exploring the hedonic aspects of self-service. *Journal of Business Research*, *68*(5), pp.986-993.

Collier, J.E. and Sherrell, D.L., 2010. Examining the influence of control and convenience in a self-service setting. *Journal of the Academy of Marketing Science*, *38*(4), pp.490-509.

Constantine, L.L. and Lockwood, L.A., 1999. *Software for use: a practical guide to the models and methods of usage-centered design*. Pearson Education.

Cowles, D. and Crosby, L.A., 1990. Consumer acceptance of interactive media in service marketing encounters. *Service Industries Journal*, *10*(3), pp.521-540.

Cowles, D., 1989. Consumer perceptions of interactive media. *Journal of Broadcasting & Electronic Media*, *33*(1), pp.83-89..

Creswell, J. W. & Miller, D. L. (2000). Determining validity in qualitative inquiry. Theory into Practice, 39(3), 124-131.

Cross, N., 1984. *Developments in design methodology*. John Wiley & Sons.

Cross, N., 1990. The nature and nurture of design ability. *Design Studies*,*11*(3), pp.127-140.

Cross, N., 2001. Design cognition: Results from protocol and other empirical studies of design activity.

Cross, N., 2006. *Designerly ways of knowing* (pp. 1-13). Springer London.

Dabholkar, P.A., 1996. Consumer evaluations of new technology-based self-service options: an investigation of alternative models of service quality. *International Journal of research in Marketing*, *13*(1), pp.29-51.

Davenport, T.H. and Beck, J.C., 2002. The strategy and structure of firms in the attention economy. *Ivey business journal*, *66*(4), pp.48-54.

Davis, F.D., R.P. Bagozzi and P.R. Warshaw, 1989, User acceptance of computer technology: A comparison of two theoretical models, Management Science 35 (8), 982-1003.

DeWalt, Kathleen M. & DeWalt, Billie R. (2002). Participant observation: a guide for fieldworkers. Walnut Creek, CA: AltaMira Press.

Dorst, K. and Cross, N., 2001. Creativity in the design process: co-evolution of problem–solution. *Design studies*, *22*(5), pp.425-437.
Dorst, K., 2006. Design problems and design paradoxes. *Design issues*, *22*(3), pp.4-17.

Dubberly, H. 2005. *[Beta] How do you design?*. [online] Dubberly.com. Available at: http://www.dubberly.com/articles/how-do-you-design.html [Accessed 12 Aug. 2016].

Dunne, D. and Martin, R., 2006. Design thinking and how it will change management education: An interview and discussion. *Academy of Management Learning & Education*, *5*(4), pp.512-523.

Durkin, M., 2004. In search of the internet-banking customer: exploring the use of decision styles. *International Journal of Bank Marketing*, *22*(7), pp.484-503.

Eastlick, M.A., Ratto, C., Lotz, S.L. and Mishra, A., 2012. Exploring antecedents of attitude toward co-producing a retail checkout service utilizing a self-service technology. The International Review of Retail, Distribution and Consumer Research, 22(4), pp.337-364.

Evbuomwan, N.F.O., Sivaloganathan, S. and Jebb, A., 1996. A survey of design philosophies, models, methods and systems. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, *210*(4), pp.301-320.

Finn, A., 2011. Customer delight: Distinct construct or zone of nonlinear response to customer satisfaction?. *Journal of Service Research*, Journal of Service Research, 15(1), 99 – 110.

Forman, A.M. and V. Sriram, 1991, The depersonalization of retailing: Its impact on the 'lonely' consumer, *Journal of Retailing* 67 (2), 226-243.

Garud, R., Jain, S. and Tuertscher, P., 2009. Incomplete by design and designing for incompleteness. In *Design Requirements Engineering: A Ten-Year Perspective* (pp. 137-156). Springer Berlin Heidelberg.

Gill, B., 2003. *Graphic design as a second language*. Images Publishing.

Guiry, M., 1992. Consumer and employee roles in service encounters. *NA-Advances in Consumer Research Volume 19*.(Association for Consumer Research, Provo, UT) 666-672.

Gwizdka, J. and Spence, I., 2007. Implicit measures of lostness and success in web navigation. *Interacting with Computers*, *19*(3), pp.357-369.

Hatchuel, A. and Weil, B., 2009. CK design theory: an advanced formulation.*Research in engineering design*, *19*(4), pp.181-192.

Hatchuel, A., 2001. Towards Design Theory and expandable rationality: The unfinished program of Herbert Simon. *Journal of management and governance*, *5*(3), pp.260-273.

Hoffmann, M., 1997, July. Is there a "Logic" of Abduction. In *Proceedings of the 6th Congress of the IASS-AIS* (pp. 13-18). Mexico: International Association for Semiotic Studies in Guadalajara. Holbrook, M.B. and Hirschman, E.C., 1982. The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of consumer research*, *9*(2), pp.132-140.

Holtzblatt, K. and Beyer, H. (2016). *Contextual Design: The Encyclopedia of Human-Computer Interaction, 2nd Ed.* [online]. The Interaction Design Foundation. Available at: http://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/contextual-design [Accessed 1 Aug. 2016].

Huang, H. and Lai, H.H., 2008. Factors influencing the usability of icons in the LCD touchscreen. *Displays*, *29*(4), pp.339-344.

Huang, Y., P., andSandnes, F., E. 2006. Chord level error correction for portable braille devices. *IEE Electronics Letters*, 42(2), pp. 82-83.

Hubka, V., 2015. *Principles of engineering design*. Elsevier.

Hui, M.K. and Bateson, J.E., 1991. Perceived control and the effects of crowding and consumer choice on the service experience. *Journal of consumer research*, *18*(2), pp.174-184.

Jian, H.L., Sandnes, F.E., Huang, Y.P., Cai, L. and Law, K.M., 2008. On students' strategy-preferences for managing difficult course work. *IEEE Transactions on Education*, *51*(2), pp.157-165.

Johnson, H. (2016). [online] Available at: https://www.entrepreneur.com/article/275891 [Accessed 6 Sep. 2016].

Jones, J.C., 1992. *Design methods*. John Wiley & Sons.

Kallweit, K., Spreer, P. and Toporowski, W., 2014. Why do customers use self-service information technologies in retail? The mediating effect of perceived service quality. Journal of retailing and consumer services, 21(3), pp.268-276.

Kawulich, B.B., 2005, May. Participant observation as a data collection method. In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* (Vol. 6, No. 2).

Kelley, T., 2001. Prototyping is the shorthand of innovation. *Design Management Journal (Former Series)*, *12*(3), pp.35-42.

Kimbell, L., 2009. Design practices in design thinking. *European Academy of Management*, pp.1-24.

Kolko, J., 2010. Abductive thinking and sensemaking: The drivers of design synthesis. *Design Issues*, *26*(1), pp.15-28.

Kotler, P., 1973. Atmospherics as a marketing tool. Journal of Retailing, 49, pp. 48–64.

Kotler, P., Marketing Management, International edition, 2003, p. 457

Kuada, J. (2011). Research methodology: a project guide for university students. Centre for International

Ladyman, J. (2007). Structural realism. The Stanford Encyclopedia of Philosophy.

Langeard, E., J.E.G. Bateson, C.H. Lovelock and P. Eiglier, 1981, Marketing of services: New insights from consumers and managers, Report No. 81-104 (Marketing Science Institute, Cambridge, MA).

Latour, B., 2005. Reassembling the social: An introduction to actor-network-theory (Clarendon Lectures in Management Studies).

Lawson, B. 1997. How designers think: the design process demystified. 3rd ed. Oxford: Butterworth - Heinemann.

Lawson, B., 2006. *How designers think: The design process demystified*. Routledge.

Ledingham, J.A., 1984. Are consumers ready for the information age. *Journal of advertising research*, *24*(4), pp.31-37.

Levitt, T., 1981. Marketing intangible products and product intangibles*. Harvard Business Review* 59 (3), 94–102.

Lin, I.Y., 2004. Evaluating a servicescape: the effect of cognition and emotion. *International Journal of Hospitality Management*, *23*(2), pp.163-178.

Maguire, M.C., 1999. A review of user-interface design guidelines for public information kiosk systems. *International Journal of Human-Computer Studies*,*50*(3), pp.263-286.

Maister, D.H., 1985, The psychology of waiting lines, in: J.A. Czepiel et al., eds., The service encounter: Managing employee/customer interaction in service businesses (Lexington Books, Lexington, MA), 113-126.

Martin, R., 2005. Validity vs. reliability: Implications for management. *Rotman Magazine*, pp.4-8.

Martin, R., 2006. Designing in hostile territory. *Rotman magazine*, pp.4-9.

Martin, R.L., 2009. *The design of business: why design thinking is the next competitive advantage*. Harvard Business Press.

Menezes, A. and Lawson, B., 2006. How designers perceive sketches. *Design Studies*, *27*(5), pp.571-585.

Meuter, M. L., Ostrom, A. L., Roundtree, R. I., &Bitner, M. J. (2000). Self-service technologies: understanding customer satisfaction with technology-based service encounters. *Journal of Marketing*, 64 ,50 –64.

Meuter, M.L., Ostrom, A.L., Roundtree, R.I. and Bitner, M.J., 2000. Self-service technologies: understanding customer satisfaction with technology-based service encounters. Journal of marketing, 64(3), pp.50-64.

Moritz, S. (2016). *). Service Design - Human Computer Interaction.*. [online] hci.liacs.nl. Available at: hci.liacs.nl. Available at: http://hci.liacs.nl/files/PracticalAccess2ServiceDesign.pdf [Accessed 12 Aug. 2016].

Norman, D., A. 1998. The Design of Everyday Things, The MIT Press.

Orel, F.D. and Kara, A., 2014. Supermarket self-checkout service quality, customer satisfaction, and loyalty: Empirical evidence from an emerging market. Journal of Retailing and Consumer Services, 21(2), pp.118-129.

Parasuraman, A., V.A. Zeithaml and L.L. Berry, 1988, SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality, *Journal of Retailing* 64 (1), 12-40.

Peter, P., Donnelly Jr., J. and Pratesi, C., 2006. Marketing. McGraw-Hill.

Pine, B.J. and Gilmore, J.H., 1998. Welcome to the experience economy. *Harvard business review*, *76*, pp.97-105.

Pine, B.J. and Gilmore, J.H., 1999. *The experience economy: work is theatre & every business a stage*. Harvard Business Press.

Pink, S., 2013. *Doing visual ethnography*. Sage.

Pqsystems.com. (2016). *Affinity diagram (What is it? When is it used?) | Data analysis tools | Quality Advisor*. [online] Available at: http://www.pqsystems.com/qualityadvisor/DataAnalysisTools/affinity_diagram.php [Accessed 7 Jun. 2016].

Pullman, M.E. and Gross, M.A., 2003. Welcome to your experience: where you can check out anytime you'd like, but you can never leave. *Journal of Business and Management*, *9*(3), p.215.

Ritchey, T., 1991. Analysis and synthesis: on scientific method–based on a study by Bernhard Riemann. *Systems research*, *8*(4), pp.21-41.

Rossman, G. B., & Wilson, B. L. (1985). Numbers and words combining quantitative and qualitative methods in a single large-scale evaluation study. Evaluation review, 9(5), 627-643.

Rowe, P., G., 1987, Design thinking. Massachusetts Institute of Technology. Massachusetts, USA.

Rowley, J., 1995. Multimedia kiosks in retailing. *International Journal of Retail & Distribution Management*, *23*(5), pp.32-40.

Royal Institute of British Architects, 1980. *RIBA handbook of architectural practice and management*. RIBA Publications.

Sandnes, F.E., 2008. Directional bias in scrolling tasks: a study of users' scrolling behaviour using a mobile text-entry strategy. *Behaviour & Information Technology*, *27*(5), pp.387-393.

Sandnes, F.E., Jian, H.L., Huang, Y.P. and Huang, Y.M., 2010. User interface design for public kiosks: an evaluation of the Taiwan high speed rail ticket vending machine. *Journal of information science and engineering*, *26*(1), pp.307-321.

Schön, D.A., 1983. *The reflective practitioner: How professionals think in action* (Vol. 5126). Basic books.

Simon, H.A., 1969. The sciences of the artificial. *Cambridge, MA*.

Simon, H.A., 1973. The structure of ill structured problems. *Artificial intelligence*, *4*(3-4), pp.181-201.

Smith, W., Dunn, J., Kirsner, K. and Randell, M., 1995. Colour in map displays: issues for task-specific display design. *Interacting with Computers*, *7*(2), pp.151-165.

Strauss, A., & Corbin, J. (1998). Basics of qualitative research: procedures and techniques for developing grounded theory. Thousand Oaks, California: Saga Publication.

Sutton, R.I. and Hargadon, A., 1996. Brainstorming groups in context: Effectiveness in a product design firm. *Administrative Science Quarterly*, pp.685-718.

Tassi, R. (2016). *Servicedesigntools.org.*. [online] Servicedesigntools.org. Available at: : http://www.servicedesigntools.org/tools/8 [Accessed 14 Jul. 2016].

Van Gorder, B.E., 1990. Satisfying the customer of the '90s. *Credit*, *16*(2), pp.10-15.

Wasson, C., 2000. Ethnography in the field of design. *Human organization*, *59*(4), pp.377-388.

Williams, F., A.F. Phillips and P. Lum, 1985. Gratifications associated with new communication technologies, in: K.E. Rosengren et al., eds., *Media gratifications research (SAGE Publications, Beverly Hills)*, 241-252.

Wolf, M.J., 1999. The entertainment economy. The mega-media forces that are re-shaping our lives. *New York: Penguin Books. A comparison of promotional strategies in Paris and London." European Planning Studies*, *5*(2), pp.137-161.

Zeisel, J., 1984. *Inquiry by design: Tools for environment-behaviour research* (No. 5). CUP archive.

Zeithaml, V et al., Services Marketing, 5th edition, 2008, p. 56.

Appendices

Appendix 1- General observation

Customers do not pay attentio. That make them frustrated when they can't find things at the first sight.

The experience is mostly stressful and not enjoyable mostly in the first use or if the customer don't use the kiosk often (like every day or multiple times a week).

it is boring when is not frustrating to use the SSK

People do not like to queues and they find it frustrating when someone is making mistakes

All interface have poor graphic and design

1st page

2st page

1st page

3rd page

4thpage
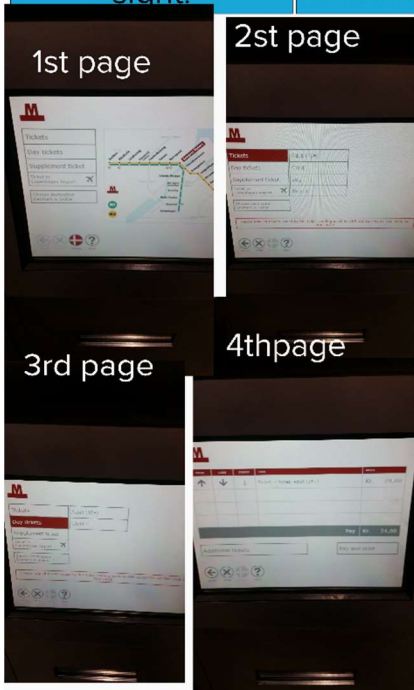
Two ways of working of the kiosk interface. 1st that make the customer follow predetermined path (see ticketing machine in the metro stations). 2nd with no predetermined path and customer have to navigate in the subpages to purchase something (CBS kiosk)

2st page

3rd page

Appendix 3 – Various Observations

Metro ticket machine

Most of the time when customers use the self-service with which are not familiar. They do not understand the logic of action. Meaning that they do not understand what pressing a button will do and bring them.

Various setting observations

UN kiosk

Too much items in one page seems to create confusion

Interfaces are over simplify and neat with no color or mono-color and no use of image.

Rejsekort kiosk

Tiket machine in train station

CBS kiosk bakery page

All interface have poor graphic and design

The organization of item in the page is important in cbs is to confused

Appendix 4 – Cbs specific observation

In rush hours the queues didn't seems to be reduced.

The product label and the name on the ssk have to be the same we noticed that if people do not see the same name is difficult for them to find the product.

We observed that there is no relation between time to check out and numbers of items. But it seemed more that less time was used by people that were already familiar. .

there are always 2 employees present at to help in the rush hours but they didn't do much a part from checking and sometimes help with the payment if the pos have problems

Customer struggling to find the product, in most cases, and mostly if they are not used to the ssk or if the product is not their usual.

People do not like to queues and they find it frustrating when someone is making mistakes

An employee or two are always present in the main canteen at cbs during rush hours. Which don't make sense to implement ssk if then u still use people to control and help the check out. Before in rush hours they were 4 now 2.

that people forget to press the pay button

people that were familiar helps people that were not.

most of the time when people had problem to find the right button to press other customers (which were friends and more expert) helped.
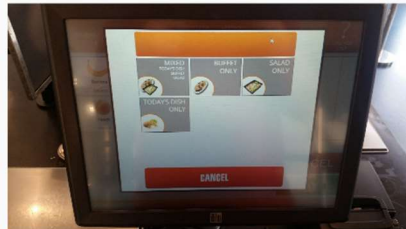
difficult to find somebody in the restaurant

In general a senses of confusion about what they have to do

if there are too much item in one page that creates confusion

Appendix 5 – Initial interviews questions

1. General questions

1. Gender, age and occupation?

2. Do you like using self-service technologies? Why? Why not?

3. Do you consider self-service technologies suitable for canteens or similar facilities? Why? Why not?

4. Do you use the Self-Service Kiosk in CBS canteens regularly?

2. (If applicable) Comparison of the current service, based on Self-service technology and traditional service used before in CBS canteens:

1. Do you face more problems compared to the old traditional way of servicing customers? What are they?

2. What do you like the most about the traditional way of servicing customers in the canteen that is missing now with the new SST?

3. What is the best element of the current SST based service in the canteen?

4. In general, which service do you like more and why?

3. Questions, regarding CBS canteen kiosks:

1. Do you find it easy to find products on the screen? Have you ever experienced difficulties finding a particular product?

2. Is it easy to navigate in the menu? E.g. buying something then going back to buy something else, payment etc.

3. Have you experienced queuing in the canteen, since they introduced the SSK? Do you feel pressured by the other people on the queue?

4. Do you feel confused sometimes? What makes the confusion?

5. Do you perceive the service as fast? Do you see something particular as a problem that slows the process?

6. How enjoyable do you find using the SSK and does this affect your overall experience of the service?

7. Would like to see an actual picture of the product that you are buying or a more detailed information, regarding content, price etc.? OR you are satisfied with the existing pictures and info provided?

8. Have you ever cheated using a self-service, e.g. getting a large coffee and paying for a small one (either deliberately or unconsciously)?

9. Have you ever experienced a need to contact the staff for something, regarding the Kiosk or the service? What was that?

10. Do you feel in control when using the machine or there are some elements that are not clear?

11. Have you ever experienced any failures and system crashes? What happened and how the problem was solved? In what way did it influence your experience?

12. Do you agree or disagree that the self-service system operates quick enough?

13. Are you satisfied or dissatisfied with the self-service in this particular canteen? Why?

14. Do you have any suggestions for further improvement?

5. Future SST

1. Do you think Self-Service Kiosks in canteens could be replaced by a mobile application?
2. If such a mobile application existed, would you use it (assuming that it is good and reliable mobile app)?

Appendix 6 – Results of general interviews

Set 1	General questions	General answer	Reason mostly cited for the yes	Reason for the no	Abbreviations
	Gender age occupation?				Female (f), Student (s), Employed (emp.)
1	Do you like using self-service technologies? Why? Why not?	Yes= 26 No=0 Neither =5	Easy =/13 Fast=/ 30 Other: less queue, convenient, fun, independent	Miss human interaction Miss sell opportunities Hard to understand or doesn't work	Quick (q), Like (l)
2	Do you consider self-service technologies suitable for canteens or similar facilities? Why? Why not?	Yes= 28 No= 3	Faster= 8 Avoid queue=5 Others: staff can work on quality,	Prefer human interaction, people need to be always the same	Yes(y), No(n),
3	Do you use the Self-Service Kiosk in CBS canteens regularly?	Yes=23 No=4 n.a=3			I prefer it (pref)

Set 2	Comparison questions (ssk vs traditional)				Abbreviations
1	Do you face more problems compared to the old traditional way of servicing customers? What are they?	Yes=8 No=22	To find items, Firs time I felt lost Check takes time For other people difficulties No one to ask for info		Find (f)

2	What do you like the most about the traditional way of servicing customers in the canteen that is missing now with the new SST?	People missing the employees aspect=21 Nothing= 9 n.a.=1 Lack of responsibility No possible to ask for questions Other people cheating			Interaction (i)
3	What is the best element of the current SST based service in the canteen?	Fast= 17 Convenient Intuitive=6 No human interaction			Talk (t)
4	In general, which service do you like more and why?	SSK=31 Because is fast And no queue			Efficient (eff.)

3	Regarding CBS ssk	General answer	Reasons for yes	Reasons for no
1	Do you find it easy to find products on the screen? Have you ever experienced difficulties finding a particular product?	Y=10 /21 N=3/ 6 n.a=1	But sometimes I have problems to browse around	No logical classification Problem with bakery, bun and cakes and similar. Pictures are not clear
2	Is it easy to navigate in the menu? E.g. buying something then going back to buy something else, payment etc.	Y= 29 N=2		It is annoying to press pay Not when you have to buy 2 or more items

3	Have you experienced queuing in the canteen, since they introduced the SSK? Do you feel pressured by the other people on the queue?	For queue Y=20 N =10 For pressure Y=16 N=13		
4	Do you feel confused sometimes? What makes the confusion?	Y=14 N=15 n.a=2	First time Coffee and bakery Don't know exactly which is my product Buffet	
5	Do you perceive the service as fast? Do you see something particular as a problem that slows the process?	Y=31	Particular problem Can't find product. Random controls. Problems with interface and with credit card	missing contactless paying option to make it faster Fast in most of the cases in general sometimes what makes it slow are inexperienced peop but random checks slow it down yes when the credit card is not accepted selection product takes time random controls the longest is the credit card process that take the most
6	How enjoyable do you find using the SSK and does this affect your overall experience of the service?	Enj.=9 Others likes but none has particular enjoyment feelings		
7	Would like to see an actual picture of the product that you are buying or a more detailed	Y=21 Also price also info 10= Others are satisfied the way it is		

	information, regarding content, price etc.? OR you are satisfied with the existing pictures and info provided?	or they don't care		
8	Have you ever cheated using a self-service, e.g. getting a large coffee and paying for a small one (either deliberately or unconsciously)?	Y=14 N=17		
9	Have you ever experienced a need to contact the staff for something, regarding the Kiosk or the service? What was that?	Y=13 N=18 Non for interface problems Never notice the help button They are not there System blocked		
10	Do you feel in control when using the machine or there are some elements that are not clear?	Y=29 n.a.= 2	All feel in control But content need to be changed	
11	Have you ever experienced any failures and system crashes? What happened and how the problem was solved? In what	Y=8 N=13 Not relation with experience		

	way did it influence your experience?			
12	Do you agree or disagree that the self-service system operates quick enough?	Y= 13 N.a=1		
13	Are you satisfied or dissatisfied with the self-service in this particular canteen? Why?	Satisfied=17 It's fine=8 Very =4 2 only for coffee	It save time	Have problem with the buffet
14	Do you have any suggestions for further improvement?	Make all the product to scan=2 Better info in general for more transparency Could be implemented in an app		

4	**Future SST**			
1	Do you think Self-Service Kiosks in canteens could be replaced by a mobile application?	Y=15 N=4	Not to replace =2 Save more time Save more time Is a common thing	App are overhype Old fashion People need to see employ to not cheat
2	If such a mobile application existed, would you use it (assuming that it is good and reliable mobile app)?	Y=15 N=3 n.a=1	Use it some times People would cheat more Depending on functionality	I don't like app

Appendix 7 – Affinity diagram

Appendix 8 – Kiosk prototype

1.

2.

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9.

10.

11.

12.

13.

14.

15.

16.

17.

1.

2.

3.

4.

	N°	Products	Price	
⊕	1	*Coca Cola*	15 Dkk	⊖
⊕	2	Tuna Sandwich	25 Dkk	⊖
⊕	1	Buffet Plate	54 Dkk	⊖
		Tot	94 Dkk	

Name

back to scan   Pay

5.

6.

7.

Name

Payment Successful!
Thank you!

Coca-Cola
            1 * 25dkk
Tuna Sandwich
            2 * 45dkk
Waighted product
            1 * 55dkk

            Tot.
            170dkk

Have a nice day!

8.

9.

Appendix 10 – Video review kiosk

Case number / experie nce or not	Thigs to be observed	Easy/ Noticed	Not easy / Not noticed	Problems	Comments
	Initial image		1		
	Find products	1			
	Add delate	1			
	Info button		1	When asked for find more info she used the help button. She didn't notice the product info button	
	Home /back	1			
	Price page		1		
1 no experie nce	Final pic reaction	1		She noticed the final funny pic and she laugh,	
	Initial image		1		
	Find products	1			
	Add delate		1	I never did that, I never used the plus I always went back and did the process again	more familiar with the minus button to delate stuff
	Info button		1	she didn't know what to do	
	Home /back		1	home button everything will be delated	she pressed the back button instead of home to go to the main page
2 experie nce	Price page		1		
	Final pic reaction		1	no reaction	
3 experie nce	Initial image		1		
	Find products	1			

	Add delate	1			
	Info button		1		
	Home /back	1			
	Price page				
	Final pic reaction	1			
	Initial image		1	She asked if she had the mobile app	
	Find products	1			
	Add delate		1	she deleted the item but not added cause more intuitive to go back to the category	
	Info button	1		that's nice	
	Home /back	1			
	Price page	1			
4 experience	Final pic reaction	1		She really liked the funny pic and laughed a lot	
	Initial image		1		
	Find products	1		buffet wasn't clear because she thought she would pay for the possibility to get the buffer	
	Add delate	1			
	Info button		1	she went to help button but when explained she found easily the info button	
	Home /back		1	she used back 3 times, because she thought that the home will bring her to the cat pic page	
5 no experience	Price page		1		
	Final pic reaction		1		
6 no experience	Initial image		1		
	Find products	1			

	Add delate			1	maybe the task wasn't described clearly	
	Info button	1				
	Home /back	1				
	Price page		1			
	Final pic reaction			1	he finally asked if it took only one min but actually took 5	
	Initial image		1			
	Find products	1				
	Add delate			1	wasn't sure how to add extra coffee	
	Info button	1				
	Home /back	1				
7 no experience	Price page		1			
	Final pic reaction		1			
	Initial image		1			On the home page she noticed the ad and she thought that she had to use the phone
	Find products	1				
	Add delate	1				
	Info button	1				
	Home /back	1				
	Price page					She noticed the page and she said that she was surprised with the price
8 experience	Final pic reaction	1				Not a big reaction
9 experience	Initial image	0				
	Find products	1				

#	Action				Comment
	Add delate		1		He went back to hot drinks when asked to add the same coffee.
	Info button				When asked to find info, he pressed help.
	Home /back		1		He didn't see the buttons
	Price page	1			
	Final pic reaction		1		No reaction
	Initial image		0		
	Find products	1			She looked a bit around before press for all the categories
	Add delate		1		Because the items were not the one she choose… but she noticed
	Info button	1			
	Home /back	1			
10 experience	Price page	1			Quite reaction but she laughed
	Final pic reaction				
	Initial image	0			
	Find products	1			
	Add delate	1			
	Info button	1			She find it when asked, so she didn't noticed before
	Home /back	1			
11 experience	Price page	1			She laughed and she liked it
	Final pic reaction				
12 experience	Initial image		0		
	Find products	1			

	Add delate	1			
	Info button	1			
	Home /back	1			O don't know where the home button is going to take me
	Price page				
	Final pic reaction		1		Not impressed
	Initial image		1		
	Find products	1			
	Add delate	1			
	Info button	1			With pointing out where to look
	Home /back	1			She was a bit slow
13 experie nce	Price page	1			
	Final pic reaction		1	Print or don't print the recipe she likes it	She was impressed
	Initial image		1		
	Find products	1			
	Add delate	1			Pointing out the place where to look
	Info button	1			Asked to go to bread before
	Home /back	1			She used the back button because she wasn't sure about the home and she thought that the home will delate everything. Because she thought that home will go to the page with the AD
14 experie nce	Price page				
	Final pic reaction	1			Ehehehe nice
15 experie nce	Initial image	0			
	Find products	1			

	Add delate	1			Pointing out the PPS(purchased product section)
	Info button	1			When already on the page
	Home /back	1			
	Price page	1			She noticed the price was too high for a woman
	Final pic reaction	1			Seems she noticed it but not really sure
	Initial image	0			
	Find products	1			
	Add delate	1			
	Info button	0			Not tested
	Home /back	1			Assuming that keeps truck of the information
16 experie nce	Price page				
	Final pic reaction		1		Not reaction at all
	Initial image	0	10	6= N.A	
	Find products	16			
	Add delate	9	7		
	Info button	10	4		
	Home /back	13	3		
	Price page	5	5		
RESOUL TS	Final pic reaction	6	8		

Appendix 11 – Interviews questions for the kiosk

Before you start the survey please fill in the following:

Gender: Male / Female
Age:
Occupation:
Previous experience in canteens with self-service kiosks: Yes / No

Questions regarding Enjoyment

1. Did you like the funny memes in the beginning and in the end of the process?

2. Did that influence your experience of the service? How?

3. Do you have any suggestions how the service could be more enjoyable?

Questions regarding Personalization

1. Did you notice the personalized messages, such as "Good Morning", "Thank you" etc.?

2. Did you like them?

3. Did it affect you overall experience of the service? How?

Questions regarding Ease of use

1. Did you like the idea of having more categories and sub-categories with fewer items displayed on the screen or that annoys you or confuses you somehow?

2. Did you recognize all the buttons and did they make sense to you, e.g. "back button", "home button", "help button", "info button", "quit button"?

3. Did the buttons make the process easy and seamless (flawless)?

4. In general was it, easy to navigate in the menu? If not could you specify where you had difficulties?

5. Did all these features affect you overall experience of the service? How?

Questions regarding Functionality

1. Did you like the product information option and would you use it?

2. Is the info button visible and clear that it is a button?

3. Did you like detailed information regarding weighted products, e.g. price per kg, amount of food you got and the calculation formula, or you find it useless?

4. Did you find it easy to add/ items from your purchase list? Did you like this feature?

5. In general, did these created a sense of increased functionality?

6. Did all these features affect you overall experience of the service? How?

General questions

1. In general, do you feel comfortable using this interface?

2. Would you like to use it, if it was available in actual canteen kiosks?

Please feel free to express any concerns or ideas regarding this prototype in the blank space below:

Appendix 12 – Results of interviews after Experience prototype Kiosk

Question N°	Interviewee N°	Gender	Age	Occupation	CBS	Used CBS Kiosk?
	1	F	23	Stud.	Y	Y
	2	M	26	Stud.	Y	Y
	3	F	31	Stud.	Y	Y
	4	F	28	Stud.	Y	Y
	5	F	24	Stud.	Y	Y
	6	M	29	Emp.in tech	N	N
	7	F	24	Stud.	N	N
	8	M	38	Empl.in tech	Y	N
	9	F	29	Stud.	Y	Y
	10	F	27	Emp.in tech	N	N
	11	M	36	Self-empl	N	N
	12	F	26	Stud	Y	Y
	13	M	25	Stud.	Y	Y
	14	F	26	Stud.	Y	Y
	15	M	22	Stud.	Y	Y
	16	F	30	Stud.	Y	Y
	17	F	24	Stud.	Y	Y
	18	M	28	Stud.	Y	Y

Question N° /Set	Interviewee N°	Answer	Comment 1	Comment2
1.1	1	Y		
	2	Y		
	3	Loved them make it less boring		
	4	didn't notice them	I didn't have any emotion about it	I don't care
	5	Y		

		6	Y	
		7	Y	
		8	Y	
		9	Y	
		10	Y	
		11	Y	
		12	Is not funny but a bit weird	
		13	good and is user-friendly	I like It
		14	Yes is better for personal service	
		15	I like it make the process less boring	
		16	Y	
		17	Y	
		18	Y	
2.1		1	made the process more enjoyable	
		2	it made me smile and I would talk about it	
		3	I think yes and it made it lighter	
		4	N	
		5	It makes the process more cheerful	
		6	Yes was a comfortable feeling	
		7	Yes I was more relaxed even though I wasn't focusing one the memes	
		8	I feel more relax in the approach of using the ssk	
		9	more enjoyable	
		10	more friendly	
		11	I have a positive feeling	made me smile
		12	I was surprised	
		13	It's ok	
		14	it put a smile on my face	
		15	Positive	
		16	Y nice	
		17	I didn't take it seriously didn't feel professional…. I wouldn't like to have it on my ssk	
		18	it forced me to have positive feelings	

3.1	1	n.a		
	2	N		
	3	some pop up that give you funny instructions		
	4	Inspirational quotes or educational stuff		
	5	background music when using the system		
	6	instead of help an avatar		
	7	Remember standard purchases, Promotion or account o have bonus		
	8	some funny sound when you add stuff		
	9	funny sound to the classical "tick tick"		
	10	n.a		
	11	pop ups for ordering food with short funny message		
	12	n.a		
	13	n.a		
	14	n.a		
	15	n.a		
	16	n.a		
	17	as less click as possible because my mind is not there I just need to go out as fast as possible		
	18	jokes about what is going on in the University like exams jokes		
1.2	1	Y		
	2	N	because I just want to finish so if would give me thumbs up is ok	
	3	N	but I noticed the jokes	
	4	Y	that was nice	
	5	N		
	6	Y		
	7	N	but I like them even better if they would remember my name	
	8	Y	but it was too normal is like the audio messages	
	9	Like it		

	10	Y		
	11	Y		
	12	Y		
	13	Y		
	14	Y	It was really nice and is a plus that make me feel like was a personal service	
	15	Y		
	16	N	because the picture took away the attention	
	17	N		
	18	Y		
2.2	1	Y		
	2	n.a		
	3	Y	I appreciated the jokes	
	4	Y		
	5	N	I didn't noticed because of the meme	
	6	Y		
	7	N		
	8	Y	But it was too normal and also because I got used to audio message in others setting	
	9	Y	like it	
	10	Y		
	11	doesn't matter		
	12	doesn't matter since is still a machine		
	13	Y	more user friendly	
	14	Y		
	15	Y		
	16	N		
	17	N		
	18	Y		
2.3	1	Y	it was nice that the machine is acting like a human	
	2	N		
	3	N		
	4	Y	it was more personal and friendly	
	5	N		
	6	N	was a plus but nothing special	

	7	Y	it effected a bit	
	8	N	more sarcasm is needed	
	9	N	It doesn't influence the overall experience	
	10	N	but the meme and what would make it even better would be the personal message	
	11	N		
	12	N		
	13	Y	it had a positive impact	
	14	Y		
	15	N		
	16	N		
	17	N	because I didn't felt important	
	18	Y	in a positive way and she thinks it gives a nice touch	
1.3	1	Y		
	2	Y	I like It	
	3	Y	it was easier to find things and more approachable even if was a bit longer	
	4	Y	logical and easy	
	5	Y	like it	
	6	Y		
	7	Y	It was easy and simple when there were many products	
	8	Y		
	9	Y	it was easier because it was guiding your way in the process	
	10	Y	was fine	
	11	Y	he likes it but instead of the home a better solution would be a panel with all the categories	
	12	Y	but only if the different categories are proper labelled and make sense, for example dark and with bun have the	

			same price why different categories ?	
	13	Y		
	14	Y	The amount is good	
	15	Y		
	16	Y		
	17	Y	was fine a part for the bread category	is better to have better pic than have an extra click
	18	Y	it is nice for beginners and it is easy to find products	
2.3	1	Y		
	2	Y	but I would prefer the add delete section bigger or moved to the left	
	3	Y	it was	I wonder how the help button works
	4	Y	but I thought the home would cancel everything	
	5	Y	I noticed most of them a part form the home	
	6	Y	easy	
	7	y		
	8	Y	maybe the add and delete button needs different colours	
	9	Y	but I don't see the point for the info button in the kiosk is better if the info were on the product on the buffer	
	10	Y	but instead of the info button like you have it only an icon would be better	
	11	Y		
	12	Y		
	13	Y	Maybe "the add and delete" were closer	

				would be closer to you can see what it changes (????)	
	14	Y		info button is ok	
	15	Y		button are fine but he doesn't' know what the home button does but once he does it is fine	
	16	Y		home button no idea of what it does because she didn't use it also the help button is not clear	
	17	Y			
	18	Y		was logical	
3.3	1	Y			
	2	Y			
	3	Y			
	4	Y			
	5	Y			
	6	Y			
	7	Y			
	8	Y			
	9	Y			
	10	Y			
	11	Y			
	12	Y			
	13	Y			
	14	Y			
	15	Y			
	16	Y			
	17	Y		but the cancel everything was missing	
	18	Y		structured and nice	
4.3	1	Y			
	2	Y		It was easy	
	3	Y		was easy	
	4	Y			
	5	Y		generally easy	I had problems with the add delete and home button
	6	Y		I didn't have problems	
	7	Y		no difficulties	

		8	Y	I had no problems with buttons	
		9	Y		
		10	Y	but I had some doubt about the home button	
		11	Y		
		12	Y		
		13	Y	was straight forward	
		14	Y		
		15	Y		
		16	Y		
		17	Y		
		18	y		
	5.3	1	Y		
		2	N	because categories are already clear and the buttons were only a plus	
		3	Y	in a positive way because was easy and clear and I wasn't expected to know how things are called	
		4	Y	nice, easy and quick to use	
		5	Y	they influenced positive the experience	
		6	Y	they influenced positive the experience	
		7	Y	because was quick and easy	
		8	Y	they improved my experience	
		9	Y		
		10	Y	because was easy to navigate	
		11	Y	Positive	
		12	Y	because was more clear what to do and to have an overview	
		13	Y	because was more functional and comprehensive	
		14	Y		
		15	Y	was a positive experience	
		16	Y		

		17	N	they didn't affect the experience	
		18	Y	Positive	
1.4		1	Y		
		2	Y/N	not the one tested but I would use it for the buffet	
		3	Y	sometimes I would use it	
		4	Y	and definitely I would use it	
		5	Y	I liked It and I would use it	
		6	Y	for nuts allergies for example	
		7	Y	I would use it for allergies and calories	
		8	Y		
		9	Y	for the buffet	
		10	N	I don't care	
		11	Y	very good option and more details the better	
		12	Y	but I wouldn't use it	
		13	Y	and she would use it for sweets	
		14	Y	I would use it some times	
		15	Y	but maybe less info I would keep only the allergies one	
		16	Y	but I wouldn't use it because I'm not interested and I think it might create queue	
		17	N	I don't care	
		18	Y		
2.4		1	Y		
		2	I didn't recognize it may be bigger would be better		
		3	Y		
		4	Not immediately visible		
		5	Y		
		6	Y	was clear	
		7	N	I don't noticed	
		8	Y		
		9	Y		

		10	N	an icon would be better	
		11	Y	but maybe should be even more visible	
		12	N	it was small and she didn't noticed it but she didn't look for it before asked to	
		13	Y		
		14	Y		
		15	Y		
		16	Y		
		17	Y	and I noticed before I had to use it	
		18	Y		
3.4		1	Y		
		2	Y	because make it clear and a better experience	
		3	Y	it is important and I'll use it in the later purchase	
		4	N	I care only about the final price but is good to have the price on the button	
		5	Y	it needs to be there how is now is not clear	
		6	Y	it is very useful because I want to know what I pay for what I got	
		7	Y	but I didn't notice all the info	
		8	Y	was very important so you do not feel cheated	
		9	Y		
		10	N	I don't care	
		11	Y	I like it	
		12	Y	but it wasn't clear if was cheaper to have a plate or not	
		13	Y		
		14	Y	Is needed	
		15	Y		
		16	Y		
		17	N	it was useless	
		18	Y		
4.4		1	Y		

		2	N	it wasn't big enough and on the wrong side	
		3	Y	perfect and easy	
		4	Y	and was good to have it	
		5	N	didn't notice because it easier to follow the pictures	
		6	Y		
		7	Y		
		8	Y		
		9	Y		
		10	Y	was super easy	
		11	Y	Y	
		12	Y		
		13	Y		
		14	Y	very visible and needed	
		15	Y		
		16	Y		
		17	Y		
		18	Y		
5.4		1	Y		
		2	Y		
		3	Y	more function and more info but more cluttered	
		4	Y		
		5	Y		
		6	Y		
		7	Y		
		8	Y		
		9	Y		
		10	Y		
		11	Y		
		12	n.a		
		13	n.a		
		14	Y		
		15	Y		
		16	Y		
		17	N	because for me these is standard	
		18	Y		
6.4		1	Y		
		2	Y		

	3	Y	it didn't require much time to figure out the system	
	4	Y		
	5	Y	it influenced my experience positively because the increased amount of info	
	6	Y		
	7	Y	Good efficient and easy to find products	
	8	Y	because clear view of prices which is good for budget control	
	9	Y	positive	
	10	Y	better experience	
	11	Y	positive experience and very easy	
	12	Y	it give me relaxed and positive experience	
	13	n.a		
	14	Y	no problem easy and quick	
	15	Y	positive experience and very easy	
	16	n.a		
	17	Y	it make me avoid a bed experience	
	18	Y		
1.5	1	Y		
	2	Y		
	3	Y	I was very conformable because there were better picture and in general was more clear	
	4	Y		
	5	Y		
	6	Y	was easy	and fast
	7	Y		
	8	Y		
	9	Y		
	10	Y		
	11	Y		
	12	Y		
	13	Y		
	14	Y		
	15	Y		

	16	Y		
	17	Y		
	18	Y		
2.5	1	Y		
	2	Y		
	3	Y	mostly because of the pic that were better and brighter	
	4	Y		
	5	Y		
	6	Y	I would like it in my work place	
	7	Y		
	8	Y		
	9	Y		
	10	Y		
	11	Y	it changed his mind it would prefer this then regular ssk	
	12	Y	is better than the existing	
	13	Y		
	14	Y		
	15	Y	this one is better than the one in the canteen	
	16	Y		
	17	Y	is better than the existing and I will definitely use it	
	18	Y		
1.6	1	the app will make the process much easier for people who is buying for 1 or 2 products		
	2	up selling and promotional features in the screen in between the start and the home otherwise in the coffee cards		
	3	I think is already good		
	4	n.a		
	5	n.a		
	6	if something goes wrong and the kiosk get stocked how long would it take before someone		

		fix it and give me some help		
	7	How to control if people pay avoid cheating		
	8	Play more with the colours for the background and add promotion and discounts		
	9	n.a		
	10	better info button		
	11	having a shopping basket icon on each screen	at the end of the process to have summarised the nutrients in my food	
	12	I'm concerned with the funny pictures	The "help" button is not clear what it does better if it was "call a staff member for help"	
	13	inserting the card and paying without have to press the pay button		
	14	n.a		
	15	help is visible all the time and that is very nice		
	16	Instead of the home button a quick link to the main categories either on the side or with links like in a website and the home button make it a basket button		
	17	Just need simplicity I'm looking for functionality		
	18	n.a		

Appendix 13 – Video review of the app

Observation N	Form customer	From us
1	She says that would be difficult to handle the phone meanwhile buying stuff She didn't remember the initial message	But we noticed that without realizing she put her phone in a way that she can handle the plate and the phone at the same time. So probably with max 2 items it would work better than more than 2
2	She doesn't want for the app to remember the card info. For here it's really important the security She remembered the initial mention	But when talked about mobile pay she said that she has her car info there.
3	When adding it would be nice to decide already how many items u want.	It actually good to have the option in the adding page to decide the number of same item you want to purchase

	Here as well the guy found a way how to handle the phone and get food Didn't remember the initial message	
4	No problem with handling. I would do that on the way	What we don't know but probably pay or put his phone away
5	Notight to say	
6	She understood how it works no problems She didn't notice the can't scan button	
7	He used the visa button image instead of the text	
8	No problem or things to be noticed	
9	Can't scan button add manually the barcode, she say that is because she has experience with the barcodes	It would make sense if you couldn't scan a product? Yes it would
10	She also pressed on the visa pic instead of the card number	
11	Not particular problems with button or anything She pressed on the Card button and not on the visa image	She didn't take the food with her in this trial
12	He would read the text because of the sing and also because I go through a payment so I'll be extra careful	He did' t take the stuff with him

	When asked to buy a cola he didn't understand that he had to scan the barcode

No Problem with the scale when he understood how it works he got pretty smoothly He also pressed on the visa pic | |
| 13 | She didn't got that she had to scan the barcode, she never used ssk before
Once she tried 1 times and she understood was pretty smooth

She pressed the MasterCard pic
No problem with any buttons and the menu she would assume that the was it or she would try it | The handling is not being tested |
| 14 | She asked where she left her stuff…. She can't handle more the 1 thing at the time and she would need a tray but she say that she wouldn't be able to get | Probably the payment process should be shorter |

	Bigger trays because in the canteens are not big enough in the Once tried with the tray she actually managed But she need space to put the tray down She pressed the visa pic	
15	Before she said that was clear and after she said that it wasn't because nothing was written there. She wouldn't press the plus button but she would have gone back to scan She pressed on the card button She would expect a real receipt	Handling no tested
16	No particular problems with the scanning She got it without explain anything She pressed on the card not the pic There is no security questions ?	No problem with handing
17	No problems with the UI and button	No handling tested

	He pressed on the MasterCard pic	

Appendix 14 – Interview app questions

Before you start the survey please fill in the following:

Gender: Male / Female
Age:
Occupation:
Previous experience in canteens with self-service kiosks: Yes / No

1. Would you use this mobile application if it is introduced in your canteen? Why or why not?

2. Do you find it easy to operate with the app or you find it confusing?

3. (If applicable) Please specify what was confusing or problematic.

4. Do you think this app could actually make the canteen experience faster and easier? Please explain you answer.

5. Would you like it, if the app could make suggestions based on your regular purchases?

6. Are there any other payment options you would like to have?

If you have any concerns or suggestions you would like to share, please use the blank space below:

Appendix 15 – Interview results for the app

Question N°		Gender	Age		Occupation	CBS	Kiosk experience
	1	F		29	Stud.	Y	Y
	2	M		36	Self-Emp.	N	N
	3	F		26	Stud.	Y	Y
	4	M		25	Stud.	Y	Y
	5	F		26	Stud.	N	N
	6	F		28	Stud.	Y	Y
	7	F		27	Emp.in a tech comp.	N	N
	8	F		24	Stud.	N	N
	9	M		29	Emp.in a tech comp.	N	N
	10	M		22	Stud.	Y	Y
	11	M		38	Emp.in a tech comp.	N	N
	12	F		24	Stud.	Y	Y
	13	F		24	Stud.	Y	Y
	14	F		30	Stud.	Y	Y
	15	F		28	Stud.	Y	Y
	16	F		23	Stud.	Y	Y
	17	M		26	Stud./Emp.in Service	Y	Y
	18	F		31	Stud./Emp.in Service	Y	Y

Question N°/Set	Interviewee N°	Answer	Comment 1	Comment2
1	1	Y	because is quicker and I like to use app	
	2	Y	because is easy to use and it saves time	
	3	N	is not worth it doesn't benefit me a lot	
	4	Y		
	5	Y	I like SST in general	
	6	Y	but not always because I might run out of battery so I want other option as well	
	7	Y	it is easier and faster and it saves time	
	8	Y	it is fast and easy to edit purchase	
	9	Y	because there are not queue	
	10	Y	Fast and easy	
	11	Y	because is natural thing today	
	12	Y	because is flexible pay as I move	
	13	N	because I won't have space in my hands to hold phone and products	
	14	Y	but not for weighted product its harder to hold the items	
	15	Y	it is easier and I actually changed my mind	
	16	Y	it is easy and I like it because I can check my payment methods and history	
	17	Y	it is definitely faster than SSK and a better experience	
	18	Y	I like SSt is convenient and easier	
2	1	Y	I don't know what the "can't scan" button do	
	2	Y	yes was easy	
	3	Y	pretty easy	
	4	Y		
	5	Y		
	6	Y	but instead of "+" "-" I would prefer "add more" "cancel"	
	7	Y		
	8	Y		

	9	Y	it was quit intuitive	
	10	Y		
	11	Y		
	12	Y	it was easy	
	13	Y	easy enough	
	14	Y		
	15	Y		
	16	Y		
	17	Y	extremely simple	
	18	Y	easy enough	
3	1		I don't know what the "can't scan" button do	
	2	n.a		
	3	n.a		
	4	n.a		
	5	n.a		
	6	n.a		
	7	view chart was not clear that would lead me to pay		
	8	n.a		
	9	n.a		
	10	"Can't scan" button was not clear what it does		
	11	n.a		
	12	I don't want the card to be remembered because there were not security feature		
	13	"Can't scan" button was not clear what it does I thought was start to scan		
	14	n.a		
	15	n.a		
	16	n.a		
	17	n.a		
	18	n.a		
4	1	Y		
	2	Y	compering to the regular ssk because by having this app you skip the queue	
	3	Y		
	4	Y	cause its easy	
	5	Y		
	6	I'm not sure that will improve the experience		
	7	Y	because there will not be queue I have the control and	

			I'm not dependent form others	
	8	Y	because not queue	
	9	Y	the app is better than the kiosk because is faster	
	10	Y	because is faster but would be good to still have the kiosk	
	11	Y	it has a good potential and make skip the queue	
	12	Y	because no wait at the kiosk	
	13	N		
	14	Y	but if you have to weight something would be the same and there will not be space (cbs) to put your items	
	15	Y		
	16	Y	because there is no need to wait anywhere	
	17	Y	It's easier and faster for few items I would exclude the weighted product, and I would use it as an express line	
	18	Y	I think is as fast and easy but is more fun	
5	1	Y	but not for up selling only for smart suggestions	
	2	Y	but also something like a favourite list	
	3	N	but I would like a favourite button	
	4	Y		
	5	Y		
	6	N		
	7	Y		
	8	Y	plus a favourite list	
	9	N	because I buy something different everyday	
	10	Y	but only if it is reasonable, not upselling I would put a switch button	
	11	Y		
	12	Y		
	13	N	suggestion but a favourite, but I still wouldn't use it	
	14	N	but a favourite list would be nice	

	15	N	it would be irritating but a favourite list would be good	
	16	N	but a favourite list would be good	
	17	Y		
	18	Y	with special offers	
6	1	mob ail pay option		
	2	as many as possible		
	3	the more the better		
	4	Useful???		
	5	n.a		
	6	n.a		
	7	for me is good with the one u have but others might want different options		
	8	Just the card is ok		
	9	Monthly fee, depending on what you buy		
	10	n.a		
	11	Bluetooth that detect when you leave and make automatic payment as you leave		
	12	n.a		
	13	mob ail pay option		
	14	mob ail pay option		
	15	vouchers for coffee		
	16	n.a		
	17	n.a		
	18	n.a		
1.2	1	I'm concerned that people would cheat, and how it would be if I want to pay by cash but I would still choose the app over the kiosk		
	2	I would need a tray, it would be good if the canteen setting would be like an assembly line,	I would like to have a favourite option	
	3	it would be good to choose the payment currency		
	4	a favourite list		
	5	n.a		
	6			
	7	An option to turn off the recommendation		
	8	scanning is annoying I prefer to select the products like in the kiosk		
	9	What to do if it freezes		

	10	Controls????		
	11			
	12	to have the buffet of the day available on the app so I can see which food there is		
	13			
	14	I'm concerned with the weighted produced and carrying around the food and hold the phone		
	15	security and cheating		
	16	option to contact the developer to suggest things and report mistakes		
	17	security and cheating	I would add a browsing option that would work like the Starbucks app	I would create a system to spot the cheaters and a sort of yellow red card system
	18	n.a		
2.2	1	app over the kiosk		
	2	If you would have kiosk and app which one would you use? the app		
	3			
	4	extra question… he would use the app if there is no queue and if he wants something form his favourite list		
	5			
	6	Extra question... I prefer the app over the kiosk because I don't have to choose items but just scan them		
	7	Extra question... I would use the app over the kiosk		
	8	I would choose kiosk over the app because I don't like scanning but if is busy she would considered the app		
	9			
	10	app in the case there is queue or if I have less things		
	11	n.a		
	12			
	13	app are overhyped		
	14			
	15			
	16	app over the kiosk		
	17			
	18			