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Human or Machine?

An experimental study of the effects of approachability on the intention to adopt a new technology

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Preface

This master thesis is one of a series of papers and reports published by the Center for Service Innovation (CSI). Centre for Service Innovation (CSI) is a coordinated effort by NHH to focus on the innovation challenges facing the service sector and involves 15 business and academic partners. It aims to increase the quality, efficiency and commercial success of service innovations and to enhance the innovation capabilities of its business and academic partners. CSI is funded through a significant eight-year grant from the Research Council of Norway and has recently obtained status as a Centre for Research-based Innovation (SFI).

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A very special gratitude goes out to our dear friend, Jesse Wright, for providing us her photos based on the specific criteria to be used as part of our experimental questionnaire and the employees of Meny Supermarket (Bergen Storsenter Branch) for collaborating with us to take photos of self-service checkout machines and also during our pre-study section.

Nevertheless, we wish to express our thanks to our families and friends for their kindness and support throughout this period, and to everyone who participated in our experiment.

Sara & Niusha

Executive Summary

Use of self-service technologies (SSTs) is spreading all over the world and businesses are replacing traditional service encounter with newly developed SSTs across several industries and thus, more researchers have invested their resources to explore different factors that might influence the technology adoption and the consumers' intention to use SSTs in various context. This paper combines the effect of approachability of new technology vs human counterpart on consumers' intention to use a service based on the technology acceptance model and then proposes a modified model that suits the purposes of this study. An experimental study is conducted to test the model and examine the effect of approachability of both human and machine factors on technology adoption in grocery store context. Perceived ease of interaction, perceived value, extroversion and attitude towards use are other factors that are identified based on literature review and are examined in this model to better understand consumer' behavioral intention. These factors are tested by the online experimental survey and the data collected is validated and analyzed to test the posed hypotheses. The effect of approachability of both human and machine factors was found to be significant, however, it had no significant influence on the other variables mentioned above. The other significant relationship was among the measure adopted from technology model. Effect of extraversion personality trait was found to be insignificant in all cases. The most significant relationship was between attitude toward using and intention to use. At last, the theoretical and managerial implications from are discussed based on the findings and suggestions for future research are given.

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1. Introduction

Imagine a group of friends, young college boys and girls want to go to a picnic and they have to do shopping on their way. They arrive at a supermarket, share a cart and grab whatever they need for the picnic from the shelves: packaged food, chocolates, sodas, cans, fruits, bread etc. They finish their shopping and go to pay. They arrive at a point that they have to make a decision at a glance. They need to choose to go to either cashier counter where the supermarket employee is waiting for them to give them service, scan their items and provide them the best method of payment; or they choose to go to the self-service checkout (SSCo) section where they have to scan the items themselves, add the items with no barcode like bread, weigh the fruits and add them to the list, choose the method of payment themselves and pay. What do they choose? Are they all choose the same option? Why do they choose cashier over SSCo or vice versa? What affects their intention to go to either SSCO or ask a human being to help them (or more specifically serve them) to pay? What affects their decision? Do all of them like to use the technology or some of them prefer to socially interact with the others? Would their decision be the same if they were alone at the grocery store or if they were younger or older? These are all the questions that grocery stores' businesses ask themselves to provide the best service and experience to their customers.

In today's ever-changing world, companies need to evolve constantly to keep up with the fast-moving trends and technology. These rapid advancements in technology has made a significant impact on consumers' behavior. Studying how customers confront these new technologies, accept them and adopt them has been become very important to the companies, because these can influence the pattern of customers' behaviors.

That's the reason why many researchers in recent years have worked on the topic of self-service technology, how customers adopt it and the factors that influence this adoption. Davis (1989) is among the first ones who studied on this topic. He developed and introduced Technology Acceptance Model (TAM). He states that there are many external variables that affect *perceived usefulness* and *perceived ease of use* of a user and eventually make him/her to either accept or oppose a new technology. Later on, Fisher (1998) studied SSTs as the technology to help front-line employees who have interaction with customers. In the beginning of this research era about

SSTs, some factors like reduced time, higher speed and less failures were studied and introduced as the most advantages of the self-service technologies (Meuter & Bitner, 1998). However, rising demands in service customization, other factors that might affect the adoption of SSTs have been being reviewed and investigated.

Referring back to the example mentioned in the beginning of this chapter, it is obvious that the answers to these questions are not the same for everyone. Many customers are inclined to interact with technology during their service encounters rather than interacting with a service employee, as these new services have been designed in a way to allow customers to use the technologies independently without any direct interaction or assistance from the firm employees (Meuter et al., 2000). Other studies show customers' perceived enjoyment (Demoulin & Djelassi, 2016), anxiety towards using technology (Gelbrich & Sattler, 2014) or preference of social interaction with the cashier counter (Dabholkar, 1992) as factors influencing adoption of SSTs. Demoulin & Djelassi (2016) found that not only *situational factors like time pressure and queue lengths* affect the decisions of customers and but also, enjoyment, self-efficacy, personnel responsiveness and SSTs compatibility directly or indirectly impact the consumers' intention to use.

1.1 Topic development and research question

Many researchers have studied the impact of technology on users, the way that customers cope with a new technology and adopt it, and the variables that influence the quality of using a technology. However, there was little research on human vs. machine comparison and the factors that make them approachable in the presence of the other, or how these factors of approachability influence consumers' intention to use.

While many researchers focused on the external variables which are more inclined to increase efficiency under different circumstances like time pressure, long queue or the quality of the given service, this study intends to focus more on visual factors that can have cognitive impact on consumers' decision. Such variables can be facial expressions or visual sights that grabs customers' attention and enables them to approach either human or machine. From this point of view, the decision is customers' immediate response to the visual stimulate when they arrive at the point that they have to choose between human or machine interaction.

As mentioned above, what makes the current research unique, is not only its focus on the approachability concept but also the comparison between two different factors, human and machine approachability. Therefore, this study investigates the following research question:

RQ:

"How the approachability of a new technology (vs the approachability of a human) affects the customers' decision to adopt it?"

1.2 Contributions

1.2.1 Theoretical contribution

Since the advent of self-service technology, many scholars have dedicated their resources to study this topic. Some of them studied the adoption and acceptance of this technology (Davis et al., 1989; Venkatesh et al., 2008), others examined the external factors (Adams et al., 1992; Walker et al., 2000). This study attempts to provide a more realistic insight by comparing the effects of external factors on both technology and human factor and its consequent influence on consumers' intention to use (adopt) a service or product. Thus, not only the external or situational factors which determine consumers' behavioral intention should be examined, the consumers' choice when it comes down to choosing between machine or human needs to be studied in order to find how consumers' act when both options are readily available to them and what factors might influence their decision. Therefore, although there has been a large number of studies with focus on TAM, this paper examines the adoption of a technology when a human factor is also present and an available option for consumers; it is believed that this might present a more realistic scenario and thereby more accurate results. The results of this study could create a foundation for other researchers to build upon in their future research.

1.2.2 Managerial contribution

The number of SSTs is growing rapidly and becoming more complex every day and there has been rapid technology advancements in the recent years which has propelled many industries to begin implementing automated machines and use more SSTs in the business (Demoulin & Djelassi, 2016). The main goal of this study is to explore and examine new factors that could

affect consumers' intention to use (adopt) new technology. It is vital for managers to have up to date knowledge in the new technological changes and recent studies conducted in their respective industries to find out what needs to be changed or enhanced in their services or products based on the newfound factors influencing consumers' intention to use.

This paper aims to provide new findings and insights on approachability of both human and machine factor that could help managers have a deeper understanding of what impacts consumers' perception of services and their behavioral intention. This would allow them to consider new factors when deciding what changes, they need to make to their services in order to attract and retain customers; thus, the findings of this study could assist them in making better business decisions.

1.3 Thesis Outline

In order to address the research question, the study starts with the theory chapter which entails part in-depth review of empirical and conceptual studies related to technology adoption and self-service technologies. This chapter begins with discussion of Technology Acceptance Model (TAM) and then moves forward with defining SST and service-encounter based on previous empirical studies. Next, the proposed conceptual model of this study is presented, and the concept of approachability is defined.

In the third chapter the posed hypotheses which are derived from the proposed model are presented in detail. The fourth chapter is methodology, in which the research design is fully described. In the fifth chapter, the data analysis and results of hypotheses testing is presented. In the final chapter, discussion of the results, theoretical and managerial implications, limitations and future research as well as conclusion of the study is presented.

2. Theoretical perspectives and research model

In this chapter, the theoretical concept of technology acceptance model (TAM) as well as SSTs are defined and described. Next, the proposed modified TAM model is presented. Finally, related terms and concepts relevant to the model and the purposes of this study are reviewed and defined.

2.1 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) (Davis et al., 1989) is built on the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) which was meant to help researchers understand how communication and information technology was adopted, however, the concept was actually used in much wider range of studies in private consumer field (e.g., Koufaris, 2002; van der Heijden, 2004; Nysveen et al., 2005; Hong & Tam, 2006). The TAM is made up of of five elements which are perceived usefulness, perceived ease of use, attitude toward use, intention to use, and actual usage. These elements have been developed to understand how users accept and adopt a new technology; based on this model, the perceived usefulness and ease of use of a technology would affect the users' attitude towards using it and this positive/negative attitude would in turn impact the users' decisions to use and his/her actual behavior (Venkatesh et al., 2007; Kulviwat et al., 2007; Davis, 1989). In this model, perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320) and the definition of perceived ease of use is as follows "the degree to which a person believes that using a particular system would be free of efforts" (Davis, 1989, p. 323). The definitions of attitude and intention are based on TRA, where attitude is defined as "a person's positive or negative evaluation of performing a specific behavior" (Fishbein and Ajzen, 2011, p. 20) and intention is defined as "a person's estimate of the likelihood or perceived probability of performing a given behavior" (Fishbein and Ajzen, 2011, p. 39). In this study, the formed constructs have been adopted from this model and modified to suit the purposes of this study. The constructs perceived usefulness and perceived ease of use have been modified and changed to perceived value and perceived ease of interaction accordingly. The definition of these modified concepts will be explained fully later in this chapter.

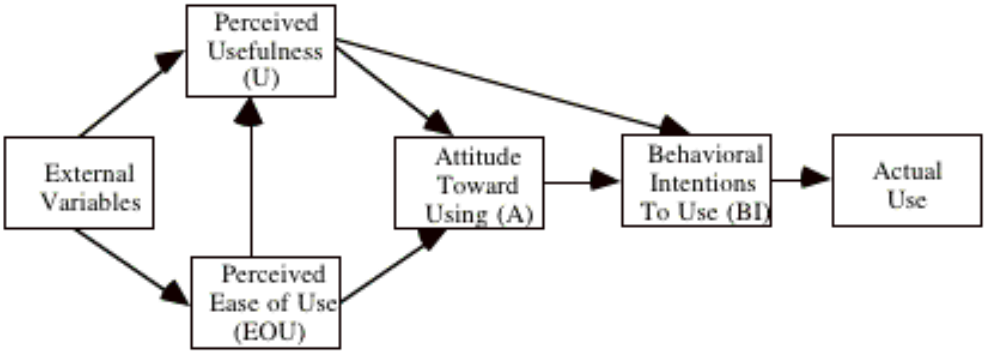

Figure 3: TAM model by Davis (1989)

2.2 Self- service technologies (SSTs)

In this chapter, definition of self-service technologies (SSTs) would be discussed at first and then SSTs classifications from different perspectives would be examined. Later, the SST that is studied in this paper will be introduced.

2.2.1 Definition and classification of SSTs

Self-service technologies (SSTs) are being referred to as a specific type of service technology where end-users are enabled to produce a service without being served by the personnel (Curran & Meuter, 2005). There are many examples of SSTs such as on-site self-services including airline check-in machines at the airports, check-out machines at hotels, grocery checkouts, vending machines at the metro stations, pay at the pump terminals and self-ordering machines at fast food restaurants or off-site services such as online bank transactions.

The extensive nature of research into SSTs has propelled researchers to develop a classification system in order to facilitate their research going forward. One of the common method of SSTs categorization is devised by Cunningham et al. (2008) which is based on customer perspective. Two dimensions of customization and separability were suggested by him as categorization of SSTs, thus the services are deemed to be either customized or standardized and have one of three levels of product or service separability which are highly separated, moderately separable and inseparable.

	Customized	Standardized
Separable from product/service	▪ Airline reservations ▪ Online car buying ▪ Online auctions	
Moderately separable	▪ Distance education ▪ Online banking	▪ Pay at the pump ▪ Retail self-scanning ▪ Internet search ▪ Tax software
Inseparable from product/service	▪ Online brokerage	▪ Interactive phone

Figure 1: Classification of SSTs by Cunningham et al. (2008)

Another popular classification is devised by Meuter et al (2000), where SSTs are divided into two dimensions: The first dimension is interfaces used by companies for self-service encounters such as online and internet-based interfaces, interactive kiosks, telephone and other interactive voice response technologies as well as video or CDs. The second dimension is purposes of the interface based on customers' perspective, meaning what SSTs allow customers to do and gain by using them. For example, numerous SSTs offer customer service such as complaint submission or delivery tracking. Furthermore, many of SSTs provide a platform for direct transactions with companies, online websites such as Amazon.com or Zalando.com are good examples of this type of services. Moreover, there are other SSTs that allow customers to provide services for themselves and learn; for instance, an interactive screen at the shopping mall would allow customers to learn about the layout of the shopping centre, find information about different stores and their location and enables them to navigate the Centre on their own.

Interface / Purpose	Telephone/ Interactive Voice Response	Online/ Internet	Interactive Kiosks	Video/CD*
Customer Service	▪ Telephone banking ▪ Flight information ▪ Order status	▪ Package tracking ▪ Account Information	▪ ATMs ▪ Hotel checkout	
Transactions	▪ Telephone banking ▪ Prescription refills	▪ Retail purchasing ▪ Financial transactions	▪ Pay at the pump ▪ Hotel checkout ▪ Car rental	
Self-Help	▪ Information telephone limes	▪ Internet information search ▪ Distance learning	▪ Blood pressure machine ▪ Tourist Information	▪ Tax preparation software ▪ Television/CD-based training

* Video/CD is typically linked to other technologies to provide customer service and transactions.

Figure 2: Classification of SSTs by Meuter (2000)

In addition, further research on adoption factors among different SST types by Walker and Johnson (2006) and Curran and Meuter (2005) shows that the influence of adoption factors differs based on each SST type which proved that classification of SSTs is certainly needed and useful. Another way to classify SSTs is suggested by Forbes (2008) where SSTs are divided into two types: (1) Internet based and (2) Non-internet based, he suggests that these two groups are different in their nature and application and thus the SSTs differences based on these dimensions need to be carefully examined and understood.

2.2.2 Self-checkout machine

The SST examined in this paper is self-checkout machine at grocery stores and their usage by customers. Previous studies show that there are various factors that could influence the customers' decision when it comes to choosing either service-encounter or self-service technology. These factors can be more influential at on-site SSTs where customers are physically present in the environment and exposed to all elements (Kokkinou & Cranage, 2015). As self-

checkout machines at grocery stores are the focus of this study, some factors that can impact the customer's decision in this specific situation have been considered such as queue lengths at the service-counter, time pressure (whether the customers are on a rush or not), number of items the customer is purchasing, type of items the customer is purchasing (produce or canned), etc. Due to the impact that these factors can have on the customers' decision, the researchers in this study have made sure to isolate these factors and keep them constant in all experiment scenarios to ensure that their effects are fully eliminated or reduced to an insignificant amount.

2.3 Service-encounter

As shown from research done in the past, most service encounters occurred between a customer and an employee when they were both present. Due to the nature of this type of services, the majority of research was focused on the interpersonal interactions of both parties (Solomon et al. 1985; Mohr and Bitner 1995; Bitner, Booms, and Tetreault 1990; Surprenant and Solomon 1987). A good example for this type of research is the study conducted by Solomon et al (1985) in which the intricacies of customer and service provider interactions are carefully examined as well as the impact of the interaction on customers' satisfaction with the service provided. There are many other studies exploring the customer-employee interactions in a service setting (Martin and Pranter 1989; Grove and Fisk 1997) and numerous studies examining these types of interpersonal interactions in various context such as service recovery encounters and its effect on customer satisfaction with service (Tax and Brown, 1998; Smith and Bolton 1998). For example, Grove and Fisk (1997) examine customer-employee interactions in amusement theme parks in their study and according to their findings, perceived sociability of other customers and their adherence to implicit or explicit rules of conduct were the main factors affecting the customers' service experience. More studies have examined the factors affecting the evaluation of service encounters, for instance, customer-service provider interactions in hotels, airlines and restaurants was examined in a study by Bitner, Booms, and Tetreault (1990) to identify factors that have an impact on the evaluation of service encounters. They classified these factors into three key categories: 1) employee response to customer needs and requests 2) employee response to service delivery failure, and 3) unprompted and unsolicited actions by employees. While these studies investigate factors that determine customer satisfaction/dissatisfaction in interpersonal interactions with service providers, this study explores determinants affecting customers'

decision when it comes to deciding between service encounter and technology-based encounter, specifically the effect of approachability of the service provider on this decision.

2.4 Model

This study focuses on as well as the approachability and only two perception dimensions, perceived value and perceived ease of interaction adapted from the TAM to ensure the practicability of this research due to time and resource limitations.

Approachability of the service provider (e.g. service employee or self-service machine) is an important concept that can provide valuable insight and theoretical contribution and incite further research to draw possible theoretical and managerial implications. The importance of perceived value on consumers' behavior and purchasing decisions has been studied in previous research (e.g. Gardner and Levy 1955; Vinson et al., 1977; Schechter, 1984; Zeithaml, 1988) which has provided great insights on consumers inner thoughts and feelings towards products and services. Perceived ease of interaction has also been examined in different contexts and its significance on consumers' perception of services or products has been established (Chase, 1981; Chase et al., 1984; Walley & Amin, 1994; Soteriou & Chase, 1998; Schneider, 2002; Pugh et al., 2002). Besides these elements' theoretical and managerial implications, based on our pre-test results and past research which were discussed in previous chapters, for a survey-based experiments these elements were found to be decidedly suitable.

The following research model presented in Figure 4 is proposed based on the literature review.

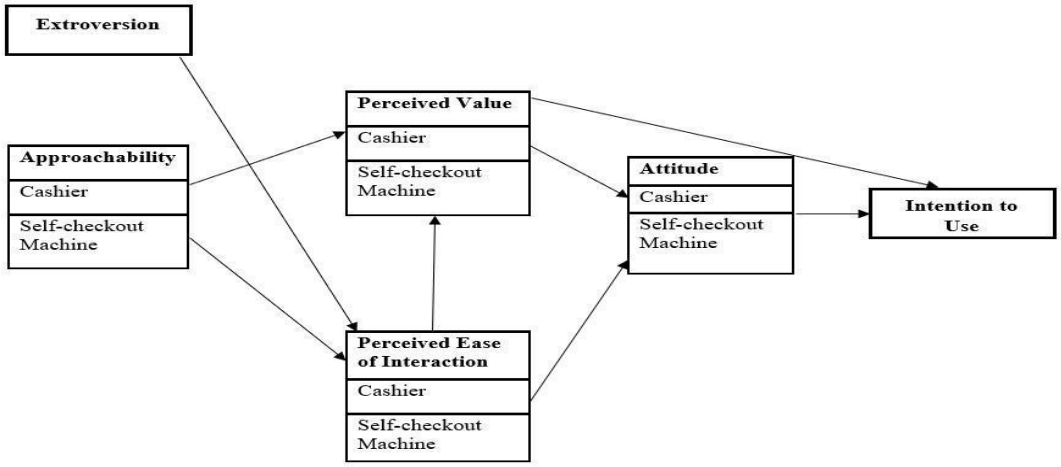

Figure 4: Research model

This model offers an overall overview of the research objective which helps to examine the causal relationships between the independent variable approachability and the dependent variable intention to use. This relationship also contains two mediating variables which have influence on the overall effect; the first one is perceived value of the service which in return influence the second variable perceived ease of interaction. These two leads to a change in users' attitude which eventually impact the dependent variable, the users' intention to use.

2.4.1 Perceived Value

Perceived value is defined as "consumer's overall assessment of the utility of a product or service, determined by a consumer's perception of what is received and given" (Zeithaml, 1988, p 14) or simply put a trade-off between perceived benefits and perceived costs according to Lovelock (2000). Zeithaml also realized that in use or purchase behavior of consumers, its "values" that determine the overall usefulness of a product or service and furthermore, Schechter (1984) states that "values" actually make global system that enables us to measure the worth of a service or a product based on different experiences that could be either quantitative, qualitative, objective or subjective. According to Gardner and Levy (1955), values have significant impact on people's lives and their behavior and considered as an important criterion in people's choice of specific actions over others (Vinson et al., 1977). Based on prior research, perceived value has been thought to be an important factor influencing intention to use or purchase a product or service (Hoffman and Novak, 1996; Shin and Kang, 2004; Lu & Hsiao, 2010). One common method of measuring value is the quality to price ratio; however, it is proven that seeing value only as a trade-off between price and quality is considered to be a very simplistic view (Sweeney & Soutar, 2001; Turel et al., 2007; Lu & Hsiao, 2010). Based on previous studies, there are various types of value such as emotional value, social value, functional value, etc. that might affect consumers' intention and decision. For instance, Sweeney & Soutar proposed in their modified model for value to be measured based on four dimensions: social value, performance/quality value, price/value for money and emotional value. Turel et al. (2007), however, did not considered this method of measurement adequate as he believed that the principal definition of perceived value was as an overall assessment. In recent studies, it was shown that perceived value has a positive effect on consumers' intention to use or purchase behavior (Petterson and Spreng, 1997; Cronin et al., 2000; Eggert and Wolfgang, 2002; Ryu et

al., 2012). A good example is a study by Kim et al. (2007), where the positive correlation between perceived value and intention to adopt the mobile internet on cell phones was confirmed.

2.4.2 Perceived ease of interaction

The significance of customer contact and its impact on the management of service operations has been studied and examined by quite a few researchers (Chase, 1981; Chase & Tansik, 1983; Schneider, 2004). Customer contact, which can be defined as the interaction between the company's employees (or systems) and its clients, has been studied for different purposes and has shown that it can be used as a tool to initiate the design of new services (Bearden et al., 1998; Cook et al., 1999), can impact the potential efficacy of service operations (Chase, 1981; Chase et al., 1984; Walley & Amin, 1994), and is considered to be a key factor in perceptions of overall service quality (Soteriou & Chase, 1998; Schneider, 2002; Pugh et al., 2002). In the past, customer contact has been defined in terms of customer's physical presence in the service system (Cook et al., 1999) and therefore, often researchers focused on face-to-face customer contacts (e.g., Kellogg & Chase, 1995; Soteriou et al., 1998). However, due to technological advancements throughout the years, this definition of customer contact which was limited physical presence was outdated and needed to be modified to include virtual presence as well (Zeithaml et al., 2002; Froehle & Roth, 2004; Parasuraman et al., 2005). According to Froehle & Roth (2004) technology can be add to customer service in different ways; one could be a completely technology-free customer contact where technology is not used at all, another could be a technology facilitated customer contact where technology is used by both the customer and the service personnel at the same time to improve the service experience. These two types are categorized as "face-to-face" service encounters as service provider and the customer are physically present in the same location (Froehle, 2006). There are other circumstances where the service providers and customers are not physically present in the same location, these types of contact are categorized as "face-to-screen" as customers are usually using some kind of visual or audible display/interface to interact with the service provider. One type is technology-mediated customer contact where customer and the service provider interact solely using a technology-based medium, such as e-mail or the telephone (Spears & Lea, 1992; Froehle, 2006). The last type is fully automated technology customer contact where the customer has no contact with the

(human) service provider (Froehle, 2006). In this paper, the researchers have focused on the technology-free customer contact and fully automated self-service and specifically what is consumers' perception on the ease of interaction in each case with the service provider. Ease of interaction in this study is defined as the simplicity and effortlessness of contact between the customer and the service provider.

2.5 Approachability

In this section, approachability and its definition for both human and machine factor is explained.

2.5.1 Approachability of SST

Approachability is one of the most important critical features of interaction design which means that the designers have to make sure that the product or service design conveys invitation to users to interact with the product or services (Ju & Takayama, 2009). The approachability concept is mostly vital when publicly used systems such as vending machines, kiosks or self-checkout machines are being designed (Dix, 2002). This concept should definitely be taken into account since its detrimental to user's experience if these systems/services do not properly convey invitation to potential customers passing by and engage them in interaction with the system (Ju & Takayama, 2009). Dissimilar to various aesthetic qualities, such as personality or visual form or, approachability is a dynamic aspect of a system which have properties that could differ during different times of the day, the state of the system, or the identity of the individual using the system (Ju & Takayama, 2009). It's the dynamic aspect of the interactive systems that makes it difficult for designers to ensure that the system is conveying approachability. According to Ju & Takayama, even long-term use and familiarity with the systems is not enough to reach the important sense of approachability, meaning even for users that have previous experience with using these interactive systems such as a self-checkout machine the designers cannot rely solely on users sense of familiarity and previous experience. Thus, this study intends to examine the impact of additional visual aid (visual instruction board) to find out whether it can be helpful in conveying the machine's approachability or not.

2.5.2 Approachability of human

Searching among many studies for a physical or facial expression which makes the holder of the expression more social and competence, the “Smile” expression was deemed to be used most. “Smile” expression has been used as a marketing tool in order to influence the customer in a positive way in the past years by many companies. Studies show that smiling faces are perceived as kinder, politer, more sociable and more pleasant than non-smiling faces (Wang et al., 2016). Many studies have proved the power of smile as a quick tool to provide interpersonal connection between strangers. In other words, smiling faces lead people to have a quick positive judgment of the expressers (Wang et al., 2016).

What is significant about “Smile” is the universal message that transfer to the expression receiver; the message is beyond the cultural bonds and can be universally understood. The understanding of such an expression is direct and demonstrates basic emotion which can be easily interpret (Otterbring, 2017).

Specifically, in the consumer behavior context, studies widely show the positive impact of the smiling service employee on short-term and long-term aspects of customers’ behaviors such as spending more time in the store, or higher level of satisfaction and loyalty (Otterbring, 2017). According to Bonnet and McAlexander (2012), in public service and among librarians, special attributes such a smile results in higher perceived approachability of attendees.

2.6 Extroversion-introversion

People with different personality types might have dissimilar psychological needs for interaction and communication, these differences can be clearly distinguished when it comes to extroverted and introverted personality types. Based on studies in the past, extroverts and introverts do have different preferences and needs for communication which is also reflected on their behavior on the Internet and using technology (Lu & Hsiao, 2010). The differences between extroverts and introverts was explained by Eysenck (1967) in terms of cortical arousal, where the extrovert pursues stimulation in the company of numerous people since her or she is not easily aroused. To compensate for his or her need of stimulation the extrovert craves excitement, needs people around to talk to and engage in various social interactions, likes to be cheerful and laugh and seeks opportunities for physical activities (Eysenck, 1975). Introverts however, can actually

function without the need for high levels of external stimulation since their arousal threshold is low (Eysenck, 1975). The introvert is portrayed as an individual that does not favor excitement, prefer books to people and is usually reserved except with his or her close friends (Eysenck, 1975). According to Storr (1988), unlike extroverts how need many people surrounding them, introverts focus more on building intimate relationships with few special people and are far more selective when it comes to choosing the people they closely associated with. Introverts find leisure activities that can be done in relative isolation without relying on other people very enjoyable and satisfying (Storr, 1988).

Furthermore, the effect of extroverts and introverts' personality types on consumers' online behavior as well as personalities impact on consumers' purchasing decisions has been an important factor which has been examined in past studies. Studies show that extroverts tend to belong to more online group compared to introverts (Ross et al., 2009) and when extroverted people are making purchase decisions in a virtual environment there is a higher chance for them to be influenced by their peers (Lu & Hsiao, 2010); it was also found that extroverts tend to use the internet for social interaction more than introverts (Ebeling-Witte et al., 2007).

3. Development of Hypotheses

Based on the proposed model, several hypotheses have been implied. The posed hypotheses are discussed in based on human and machine factor in this chapter.

3.1 Approachability

Companies constantly try to improve their services to their customers. In modern service marketing, firms try to make a long-term relationship with customers. They try to make customers from strangers to friends and later on to partners. While these bonds between firms and customers becomes stronger, both sides benefit from each other; clearly customers will be satisfied by getting better services and firms not only get higher profit but also can use customer feedbacks for constant improvements and develop customer loyalty. Thus, firms need to find a way to initiate this communication with the customers (Wilson et al., 2016, p. 136).

The way *Approachability* is defined in this study, it can be an initiative to attract customers. Therefore, the argument is that the smiling cashier can attract more people than the non-smiling

cashier and an informative self-checkout machine can also attract more people than non-informative self-checkout machine:

H1: Approachability has a positive influence on intention to use

According to Kim & Yoon (2012) when the cashier reacts emotionally to customer, it stimulates the response of customer in an emotional way and in sequence, the cashier responds in an emotional manner. Therefore, this "*ongoing emotion cycle*" (Kim & Yoon, 2012) provides an easy interaction between customer and cashier.

Based on halo effect, the person exposed to cashier's one attribute can interpret the other possible and related attributes (Forgas, 2011). Moreover, studies related to facial expressions show that people with smiley faces are perceived as more sociable and friendlier than people without any smile (Hack, 2014; Knutson, 1996; Magnini et al., 2013; Otta et al., 1994). As stated in the study of Garrido et al., (2016), people who get exposed to happy faces, have a perception of similarity between the possessor of smile and themselves; and according to Cialdini (2001) there is a strong link between similarity and liking, means that the possessor of smiles are socially more acceptable to the receivers (Critchley et al., 2000). Therefore, we expect that approachable cashier (smiling) can attract the customers to interaction and this negatively affects the perceived ease of interaction with machine:

H2a: Consumers will perceive the interaction with a human as easier when the human is approachable

H2b: Consumers will perceive the interaction with a self-service technology as more difficult when the human alternative is approachable

Existing literature about self-checkout service shows that the following five dimensions are constructs of assessment from customers' points of view: "*functionality, enjoyment, design, assurance, and convenience*" (Orel and Kara, 2014; Considinea and Cormican, 2016). A positive assessment of these dimensions makes the machines more attractive for customers to approach them. Approachability can be considered as a concept that can be interpreted directly or indirectly by seeing visual features. For instance, functionality and design are two of the features

that have an impact on the adoption of technology and interaction between human and machine. If the visual design implies a higher functionality of a machine, then it actually has a double effect on the exposed human.

It is believed that some changes in the visual sight of a machine can boost these elements, so the customer would consider the machine more approachable. For instance, a machine with well-defined instructions can be perceived as more approachable by customers, as it directly assures customer that he or she could easily use the machine; this also increase the level of functionality in customer's mind. Moreover, one can indirectly predict the higher level of enjoyment by using the machine. Thus, the following statement of perceived ease of interaction regarding the self-checkout machine is proposed:

H3a: Consumers will perceive the interaction with a self-service technology as easier when the self-service technology is approachable

H3b: Consumers will perceive the interaction with a human as more difficult when the self-service technology alternative is approachable

It's obvious that every human being hopes for empathizing, manipulating, justifying etc., or finding a way to confront an unplanned interaction. It's not possible with the machine, as the interaction is not completely mutual. The machine can just response to the planned behavior not the unplanned one. Therefore, we believe that consumers perceive the interaction with an approachable human easier than an approachable machine.

H4: Consumers will perceive the interaction with an approachable human as easier than an approachable self-service technology

H5a: Consumers will perceive the value of a human as higher when the human is approachable

H5b: Consumers will perceive the value of a self-service technology as lower when the human alternative is approachable

People attitude towards self-service technology can be divided into two groups: the first group who are either fine with using SSTs or enjoy it, the second group who do not like to use SSTs or

have problem with using them (e.g. Technology anxiety). It is expected that an approachable self-service technology provides different kind of values for different categories described above (Collier and Barnes, 2015). For example, design features can make the first group more excited about experiencing the new machine/feature, or informational interface as an approachable feature can provide a conditional and emotional value, where the users of second group feel safer when they have more control over the machine.

H6a: Consumers will perceive the value of a self-service technology as higher when the self-service technology is approachable

In recent years, due to extensive and comprehensive usage of technology, people feel the urge to learn about technology. On the other hand, the new generation grew up with new technologies. For example, the millennials do not have any idea how to use old phones, because they have simply never seen one before. Therefore, it is believed that human counters would be assumed less valuable in the presence of an approachable self-service technology alternative.

H6b: Consumers will perceive the value of a human as lower when the self-service technology alternative is approachable

People consider a higher weight to social interactions in general. It's not always defined as a positive attribute. For example, shy people might not really interact with a lot of people during a day, but they felt a pressure of how they are seen from the other people's points of view. Therefore, we propose the following hypothesis which weighs a higher perception of value to interacting with human being rather that with a machine.

H7: Consumers will perceive the value of an approachable human as higher than an approachable self-service technology

3.2 Perceived ease of interaction

In both context of machine and human factor, the user should perceive the interaction as an easy one in order to value it. In TAM model itself, perceived ease of use (which has been defined as

perceived ease of interaction in this paper) is an antecedent of perceived usefulness, which is believed to provide a higher value in users' minds (Davis, 1989; Davis et al., 1989).

H8a: Perceived ease of interaction with a human has a positive influence on perceived value of the human

H8b: Perceived ease of interaction of a self-service technology has a positive influence on perceived value of the self-checkout technology

3.3 Perceived value

When the user dedicates a higher value in his or her mind to the human being, it directs him to behave accordingly. For example, when a shy person sees an approachable cashier, he or she prefers an interaction with that cashier compared to a neutral cashier; this can be perceived as value for the customer. This value makes the customer to want to start a conversation or even share a joke. This social value provides a new attitude for the customer. Therefore, the customer also prefers to approach the cashier with higher value; this can be interpreted as the perceived value of a human having a positive impact on intention to approach.

H9a: Perceived value of cashier has a positive influence on attitude towards using the cashier

H9b: Perceived value of cashier has a positive influence on intention to use

When someone perceives the interaction with self-service technology easier and dedicates a higher value to that machine, it makes him or her to have a higher level of trust to in the procedure. For instance, if someone perceives an SST machine more valuable, and sees a lack of functionality in the machine, he or she would most likely try to justify it in order to defend the other benefits that he or she receives from it. Therefore, it makes him or her to have a higher intention to approach the machine and use it.

H10a: Perceived value of self-checkout machine has a positive influence on attitude towards using the self-checkout machine

H10b: Perceived value of self-checkout machine has a positive influence on intention to use

3.4 Attitude

As mentioned above, when the consumer has a positive attitude towards either a human or a self-service technology, her or she would have a higher level of trust in them.
He or she would defend them even if they are not always correct. Therefore, it is proposed that this higher level of attitude has a positive impact on intention to use in both cases.

H11: Positive attitude towards using the cashier has a positive influence on intention to use
H12: Positive attitude towards using the self-checkout machine has a positive influence on intention to use

3.6 Extroversion/Introversion

Extroverted people are typically stimulated in social settings and satisfy their social needs by interacting with people around them and feeding off their energy. The extroverts love socializing, crave human interaction and seek out opportunities to actively engage others around them in conversation. In contrast, introverts prefer to have limited social interactions with other people and value their independence and solitude. Introverts appreciate interactions that have limited human contact as they are not comfortable social setting and socializing (Storr, 1988; Cunningham, 2007; Lu & Hsiao, 2010). The extrovert and introvert personality clearly affect their behavior and attitude towards human interaction; therefore, it is assumed that extroverts perceive ease of interaction with cashier positively as this would lead to higher chances of human interaction as opposed to self-checkout machine which will be perceived negatively as it is deemed to have no human interaction that can satisfy their social needs.

H13a: An extrovert consumer perceives the interaction with a human as more easy
H13b: An extrovert consumer perceives the interaction with a human as more difficult

4. Methodology

A two-step procedure is used to conduct this study. First, a qualitative pre-study in the field was conducted to provide a deeper insight of what really happens at a self-service check-out at a

grocery store. The second step is the main experiment which was conducted via an online survey. A quantitative experiment was chosen for the purposes of this study to examine the hypotheses and provide an answer to the research question.
In this chapter, the research development process is presented which begins with the pre-study and is followed by the discussion of main experiment and the complete research method.

4.1 Step one: Pre-Study

In the pre-test, some respondents mentioned the fact that they simply like to have a human interaction, some of them were getting nervous talking to cashiers, while some of them brought up the point that working with technology makes them nervous especially when they are not sure how to use it and how people in the line would perceive their level of knowledge. Considering these statements, there should be some visual elements which socially make the intention to approach either counter cashier or SST machines easier.

When one talks about SSTs, the first things that come to mind are speed and accuracy. SSTs and technology in general is used to make every process faster and more accurate; but is it just about time? Is there any other factor other than speed and accuracy from the customers' points of view? To answer these questions, a pre-test was conducted. The pre-test contained two parts: the observation and the interview, both parts were taken place in parallel.
The pre-test was done at one of the well-known grocery markets of Norway, called "Meny". The referred branch of this supermarket is located in the city center of Bergen, in one of the popular shopping malls of the city where there is high pedestrian traffic. Visitors are both Norwegians from Bergen and tourists from either other city of Norway or foreigners from abroad. By standing near the entrance, the behavior of customers approaching the counter was observed. Three observations were taken place at three different times, early in the morning (when it was mostly quiet), at noon (when it was quite busy because of lunch hour) and in the evening (when it was moderately busy). During these times, 30 people were interviewed. These people were chosen randomly, based on differences in gender, age, and use of cashier counter or self-service checkout.
Two significant outcomes from observation are listed below:

- It is not just about time and speed! Many people prefer to use cashier service when there is even a long queue at the cashier counter. Many people stopped and checked the queue length, and if the cashier counter was not busy, chose that service for payment.
- Sometimes people went to the self-service checkout to pay but then they changed their mind and stood in the queue for cashier counters.

By interviewing these people and asking them about their intention of using either cashier counter or self-service checkout, different opinions were received. Among different answers, some of them were more significant and interesting which are mentioned below[1]:

- Number of items
- Queue length
- Need for human interaction
- Perceived quickness
- Machine language (Machine failure)
- Having cash (Machine failure)
- Getting nervous talking to cashiers
- Lack of confidence to use the machines
- Lack of trust with regards to machines

4.2 Step two: Main study

The purpose of this study is to examine the effect approachability on consumers' decision to use. This chapter describes the methodology selected to answer the research question and to test the hypotheses. In this chapter the research design and the data collection method will be explained in detail.

[1] The full list of answers is attached in Appendix A

4.2.1 Research Design

There are several research design methods available to researchers and the chosen method will influence how well the research question is answered at the end. According to Saunders et al (2012), there are three different categories of research design: descriptive, exploratory and explanatory research which are to be carefully selected by the researchers depending on the objectives of their study and the relevant research that is available in their chosen topic. To explain or explore a topic and provide additional information about it the descriptive research is used, while in order to identify a problem and begin initial research about a theoretical idea exploratory research is used and it only provides better understanding of the topic rather than providing conclusive evidence (Saunders et al., 2012). However, since the aim of this study is to understand and explain the causal relationship between variables which enables the researcher to recognize the reason such phenomena occurs and thus predict future occurrences with better accuracy, the explanatory research is used (Saunders et al., 2012).

4.2.2 Research Approach

According to Saunders et al. (2012), there are two main research approaches: deductive approach and inductive approach. The former is used when hypotheses are formed, and data is tested based on an existing theory to find whether the theory is supported or not. In contrast, the inductive approach is used to develop a theory based on the findings of the analysis collected data (Saunders et al. 2012). For this study, the deductive approach is suitable as it uses existing theory to develop a conceptual model and test its hypotheses accordingly.

4.2.3 Data Type and Data Collection Method

Due to empirical nature of this study, primary data needed to be collected to test the hypotheses and thus the data was collected by using an experimental design. From two types of data that exist for research purposes, primary data has been selected for this study as this data is specifically collected by researchers for a particular research problem and answers the research question and meets the research objective and purpose. This will not be possible if secondary data is used since this data is gathered by other researchers for other research purposes in mind and thus it cannot explain the intricate relationship between the different variables clearly (Saunders et al, 2012).

There are various methods of primary data collection including interviews, observations, field experiments or surveys. Based on the nature of the research, an explanatory research method was chosen for this study and as such, a quantitative approach seems most appropriate. Thus, an experiment is conducted to collect the primary data needed as this method is the most suitable within the selected research. Furthermore, an online survey is used to conduct the designed experiment. According to Trochim (2006), experimental designs is among the strongest designs in terms of internal validity. As this study aims to explain a relationship between independent and dependent variables, it is important that a cause-effect inference with strong internal validity is shown from the findings. According to Cook & Campell (1979), in order to conduct an experiment and establish causality, three criteria must be fulfilled; first is that there must be an either positive or negative correlation between the independent and dependent variables, second is that any changes that occurs in the independent variables must happen before changes in the dependent variable, and the last criteria is ruling out any other possible explanations for the correlation between independent and dependent variables.

In this study, a survey was used as a tool to collect data for several reasons and the main ones were its capability to reach a large number in the minimum time possible while being cost efficient, avoidance of interviewer bias and providing the respondents with the opportunity to answer the survey whenever it suited them most.

4.2.4 Time Horizon

The time horizon of this study is cross-sectional which means that the phenomenon will only be studied at one point at time rather than over a long period of time (Saunders et al, 2012), this allows data to be collected efficiently from a large pool of respondents which generally enables easier use of statistical techniques and raises data reliability (Saunders et al, 2012; Kothari, 2009).

4.2.5 Experimental Procedure and Design

According to Breivik (2015), the classical experiment entails a design with pre and posttests, control group, random assignment, manipulation of treatment and controlled situation. However, since the experiment cannot be conducted in a controlled situation, a modified classical experiment is used instead. These types of experiments require a control and treatment group (s)

to determine which factors are actually producing (not producing) and effect (Breivik, 2015). Therefore, it is crucial that all factors in both control and treatment group are maintained identical except for the manipulated factor in the treatment group (s). The separation of the control group and treatment group (s) will allow the researcher to find out whether there are alternative explanations or threats of inference and thus makes it easier to rule them out; as such ruling out a causal relationship is possible by using the control group (Breivik, 2015). Moreover, it is necessary to manipulate the treatment (s) in a classical experiment despite any difficulties that exist sometimes in establishing whether the manipulation has worked before the effect is measured. To avoid such scenario, a pre-test should be done to ensure that respondents have understood the manipulation correctly, this test should be done in a way to be clear in what they are signalizing to the consumer without being too obvious in order to not give away the purpose of the manipulation too much.

In this particular experiment, to ensure that all factors are as similar as possible in both control and treatment group (s), identical pictures have been used for both human and machine factors. To select the pictures, two sets of cashier pictures (with smiling and neutral expressions) were shown to subjects from the selected population to ensure that the manipulation was clear and understandable; the same process was done for self-checkout machine pictures (with/without instructions) and the top choices were selected to be sued in the actual experiment. The pictures were also edited using Adobe Photoshop to ensure that all four of them had the same color intensity, warmth and feeling, in order to make them similar as possible for purposes of this study. Furthermore, the pictures of the cashier were further tested, the smiling expression in particular, to ensure the smile was perceived to be genuine and the self-checkout machine were tested further, the one with instruction specifically, to assess the clarity and visibility of the instructions.

Both the control group and the treatment groups were tested with the identical survey to make sure that the questions were clear and easy to comprehend in all groups. Another key element that plays a role in the success of the experiment is random assignments of respondents to the groups as it can be assumed that the four groups would be equal within the known probabilistic ranges if the sample size is big enough (Breivik, 2015), this elimination of systematic differences between the assigned respondents to control groups and treatment groups will ensure that there is

selection bias and thus, the strength of internal validity will be increased and the researcher will find it easier to assess whether the independent variable will cause the outcome (affect dependent variable) or not (Trochim, 2006). The survey in this study was designed using Qualtrics which is an online survey creating tool which is accessible to NHH students; using this software, the option for random assignment was enabled in the survey flow.

As mentioned early on, even though the classical experiment necessitates that there is control in the test situation, this has been impossible in this study as the respondents answered the survey in their own random environments and on their private device (phone, computer or tablet); and therefore, according to Breivik (2015) this study is referred to as field experiment since the test situation cannot be controlled by researchers. There are several risks in this type of design, the main one being the unobserved effect that might exist in each unique situation for instance respondents in control and treatment groups communicating with each other and thus rendering the manipulation useless. However, even in realistic situations, the respondents are exposed to unobserved factors and by making them take the survey in their natural environments might produce more realistic responses.

This study uses factorial design which is best suited for the research purpose as the study intends to examine how approachability cues for both cashier and self-checkout machine will affect consumers' intention to use each of these services in a grocery store. A factorial design allows the researcher to study both main effects and interaction effects among variables. In this experiment subjects were randomly allocated to a 2 (Service providers: Cashier/Self-checkout Machine) x 4 (Approachability: Neutral/Smiling/Instructions/No instructions) between-subjects factorial design. The neutral situation for both human and machine was used as a control group to observe and assess variations between approachability cues. Thus, the study includes the following three treatment conditions:

• Cashier neutral – Self-checkout machine with instruction

• Cashier smiling – Self-checkout machine without instruction

• Cashier smiling – Self-checkout machine with instruction

4.2.6 Sample

In this study, convenience sampling technique was chosen to access the subjects from the given population; this decision was mainly based on the fact that it is an easy method in terms of its accessibility. The selected sample population for this study were students and the survey was distributed online to ensure that all subjects find it easy to participate in the survey. To make sure the results from the survey were robust, the survey was distributed in the two following ways: first, all active students at Norwegian School of Economics were asked to fill in the survey via their student webmail and next the survey was shared with a broader audience via different social media platforms to increase response rate.

4.2.7 Survey Design and Procedure

As explained in the data collection section, cross-sectional survey has been used in this study to conduct the experiment. This type of survey allows the data to be collected from the sample population at one point in time, also this data collection method makes it possible for researchers to observe many variables at the same time (Iacobucci and Churchill, 2010).

The survey was prepared in Qualtrics and distributed through its email function to 3163 students who have registered email at Norwegian School of Economics. The Qualtrics link was also distributed to students by publishing a link on a Facebook event catering to data collection purposes; the survey link was active for 10 days and 409 responds were collected in total, after removing the empty responds and cleaning the data, 312 were left for analysis purposes. No personal identification was requested, and all IP addresses were anonymized and hence, all respondents were assured that their response would be anonymous. No further actions were taken regarding the anonymity assurance of the survey due the insensitive nature of the questions and the fact that the sample population were not connected to any company. To ensure high rate of responds, the respondents were offered the opportunity to win an Amazon gift card worth $25, according to Saunders et al. (2012) a widely used strategy to raise respond rates for survey is use of monetary incentives.

The participants were instructed to read the given scenario carefully in order to answer the survey questions; they were told that the goal of the survey was to evaluate their grocery shopping experience. After reading the text-based scenario, the participants were asked to choose

either the cashier or the self-checkout machine as a checkout option in the grocery store. Next, the respondents were asked to answer statements regarding both cashier counter use and self-checkout machine use in the store based on the scripted scenario and information given in the beginning of the survey; the first set of questions cashier vs. Machine is based on their respond to the previous question (full questionnaire in appendix B). The same text-based scenario was given to everyone, but the pictures of cashier and the self-checkout machine were altered and randomly assigned to respondent in order to establish one control group and three separate treatment groups. The pictures given to the control group were both neutral (no smile/no instruction), and for all three treatments the pictures were switched up to create three different possible combinations. Next, all respondents were asked about their experience using self-service checkout machines in grocery stores as well as a few personality questions to later determine whether they are extravert or introvert. Last of all, the participants were asked to fill out demographics section including gender, age, educational level, employments status, sexual orientation and marital status. In this survey, the respondents were selected randomly by Qualtrics to be involved in one of the four treatment groups: control group (both neutral), treatment one (neutral-instructions), treatment two (smile-neutral) or treatment four (smile-instructions).

4.2.8 Measures

To test the proposed model in this study, all the constructs in the model except extroversion were measured using a seven-point Likert scales (ranging from 1= “strongly disagree”, “disagree”, “somewhat agree”, “neither agree nor disagree”, “somewhat agree”, “agree”, to 7= “strongly agree”) and extroversion was measured using a five-point Likert scales (ranging from “1=strongly disagree” “disagree”, “neither agree nor disagree”, “agree”, to 5= “strongly agree). Moreover, to avoid single measurement influence, ease of interaction construct for both human and machine and extroversion were measured with five items, perceived value for both human and machine were measure with four items and both attitude towards use and intention to use of both human and machine were measured with three items.

The ease of interaction items for both human and cashier are adapted from Dabholkar (1996), and Davis et al., (1989). The wordings in a few items were adjusted to suit the purpose of this study. The perceived value items for both human and machine were derived from Davis (1989)

and Adams et al., (1992). The original items were modified slightly to be better suited for the human aspect of the construct. The attitude towards use items were adapted from Dabholkar (1996) and the intention to use were adapted from Dabholkar (1996), Venkatesh and Bala (2008) and Jackson et al., (1997). Extroversion items were adapted from IPIP Scales (NEO-PI-R) 20-items scale. The items "I find it difficult to approach others" and "I don't talk a lot" were reverse coded for the analysis purposes. The summary of the adapted measures and their sourced can be found in Appendix G: survey measures.

5. Data Analysis

This chapter examines the data preparation process before it is used in the analysis. The steps taken include is assessment of measures using confirmatory factor analysis (CFA), assessment of construct reliability and validity and common method bias.

5.1 Data Screening

The quality of data was checked after all data was collected. To ensure that all questions in the survey were answered, the "force response" function in Qualtrics was used which resulted in satisfactory high response rate. The screening started with removing the incomplete responses, then then the data was screened to spot for careless responses based on post-hoc response time approach as well as manipulation checks incorporated in the survey. According to (Huang et al., 2012) lack of cognitive processing of the survey leads to shortened response time, thus, we examined the reading time of the text-based scenario in the beginning of the survey for all treatments and removed all cases with reading time less than 20 seconds. The next step was to

ensure that respondents had actually remembered what images they have seen as their answers were supposed to be based on the images they were presented with. For example, respondents presented with the image of cashier smiling were removed if they responded that the cashier was neutral (non-smiling) in the image. The final dataset comprised of 312 total respondents. This number of responses was made up of 78 datasets for all treatment groups.

Construct	**Full Sample**
Gender	
Male	51.1%
Female	48.95
Age	
18-24	59%
24-35	40%
35 & above	1%
Education	
High school	5.1%
Bachelor	39.7%
Master's	54%
PhD	1.3%

Table 4: Sample demographic

An additional step was taken to check for outliers, however, as this study does not include any continuous variable, the sample demographic was checked. As shown in Table 4, two outliers in the age and education categories are identified, yet as these factors are not relevant to the model in this study, these particular responses were not removed from the dataset.

5.2 Method

This study has used structural equation modelling (SEM) to analyze the collected data, according to Hair et al (2010) this statistical method is suitable when testing the causal relationship between variables. The latent constructs in this study are set to be measured and determined by indicators which makes SEM an appropriate statistical tool to test the model in this paper (Blunch, 2008). Moreover, the data have been collected using Likert-type scales which are ordinal in nature and do not have metric properties, thus special estimators need to be used. The maximum likelihood (ML) estimator which is the most commonly applies SEM estimator was chosen for the purposes of this study; the ML estimator applies the means of model parameters to reproduce the covariance matrices of the variables (Hox & Bechger, 1999; Crisci, 2012)

An important criterion of using this estimator is the normal distribution of data (Russell et al., 1998), thus, a normality test has been done on all variables. This test has been done by applying the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk test which compute the significance for the differences from normality (Hair et al., 2010) in the statistics software SPSS. All construct items were found to be statistically significantly different from normal distribution based on the finding in Appendix B: Normality Test. To corroborate these results, the kurtosis and skewness of all items were taken into consideration and based on the report in Appendix C: Descriptive Statistics, none of the items exceeded the common thresholds, an absolute kurtosis value of >7 and an absolute skew value of >2 as a deviation from normality (Curran et al., 1995) which suggests sufficient normal distribution (Trochim & Donnelly, 2006; Field, 2000 & 2009; Gravetter & Wallnau, 2014).

5.3 Confirmatory factor analysis (CFA)

The CFA assesses the contribution of all items to their respective construct and thus allows the researcher to test how well the theoretical model matches the collected data (Hair et al., 2010). As latent constructs (i.e. the dependent variables and mediating variables) cannot be observed directly, they are observed using indicators that can measure different aspects of the constructs. Most often, the sum of these indicators or items can provide a good measure of the construct, however, how well these items can actually measure the proposed constructs can only be tested via construct validity (Hair et al., 2010).

To test the Goodness-of-Fit (GOF) of the model, a confirmatory factor analysis (CFA) was conducted using the statistical software LISREL8.8. In this program, the different constructs are set up as latent variables with their respective observable measurement items and their respective relationships which can be pre-specified in this type of analysis. According to Hair et al. (2010), to collect enough evidence to ensure model fit, it is recommended to use and report multiple fit indices such as Chi-square, the standardized root mean residual (SRMR), the root mean square error of approximation (RMSEA), the comparative fit index (CFI) and the Tucker-Lewis Index (TLI) which is also known as non-normed fit index (NNFI).

This study has followed this suggestion and as illustrated in Appendix D: CFA, the results indicate an overall satisfactory fit of the measures for both measurement models of cashier and self-checkout machine. According to Hair et al. (2010), for sample data with more than 250

respondents and observed variables between 12 and 30, the idea CFI would be above 0.92; both measurement models have CFI= 0.99 which is good since this study falls in the described category. The recommended RMSEA is <0.08 and both have good fit with RMSEA of 0.060 (cashier) and 0.066 (machine). Both models yielded NNFI of 0.98 and SRMR of 0.042 which is within acceptable range (Hair et al., 2010; Bollen & Long, 1993). The cashier model yielded Chi-Square of 347.70 with 160 degrees of freedom and the machine model a Chi-Square of 368.07 with 160 degrees of freedom. All these indices indicate a releasably good fit of the model for both cashier and machine items, however, these fit indices only confirm that the current model fit relatively well with the data and it is not an indication that this is the best model for the gathered data.

As both models yielded a decent fit, no items were removed and all questions for all constructs were used in the analysis. Moreover, there were some modifications indices suggested by LISREL to be added to the model for a better fit, however, as these modification suggestions were not theoretically supported, they were ignored.

5.4 Construct Validity

The confirmatory factor analysis is also applied here to examine construct validity, defined as "the degree to which a measure assesses the construct it is purported to assess." by Peter (1981, p.14). As the relationships between constructs and items is pre-specified in CFA, relatively path estimates, or high loading are expected to link these variables. Hair et el. (2010), suggests these loadings to be at least above 0.5 and preferably over 0.7 if possible. In both measurement models as shown in Table 4, the standardized factor loadings are 0.7 and above for all items which suggests that they load well on their respective constructs and have high convergent validity (Hair et al., 2010).

Construct	Item	Description	Loadings
Ease of Interaction (Cashier)	EasC_1	The cashier seems easy to interact with	0.87
	EasC_2	Interacting with the cashier seems to require little effort	0.90
	EasC_3	Interacting with the cashier seems simple	0.74
	EasC_4	The cashier seems friendly	0.84
	EasC_5	The cashier seems approachable	0.82
Perceived Value (Cashier)	ValC_1	The cashier makes my grocery shopping experience satisfying	0.85
	ValC_2	Using the cashier counter improves my shopping experience	0.88

	ValC_3	I find the cashier helpful when grocery shopping	0.78
	ValC_4	Using the cashier counter provides a better shopping experience	0.82
Attitude (Cashier)	AttC_1	Using the cashier counter is a good idea	0.82
	AttC_2	I like the idea of interacting with the cashier	0.87
	AttC_3	I have a positive attitude toward using the cashier counter	0.94
Intention to Use (Cashier)	IntenC_1	I intend to use the cashier counter on a regular basis in the future	0.92
	IntenC_2	I plan to use the cashier counter as often as possible	0.92
	IntenC_3	My intention to use the cashier counter is high	0.94
Ease of Interaction (Machine)	EasM_1	The self-checkout machine seems easy to interact with	0.87
	EasM_2	Interacting with the self-checkout machine seems clear and understandable	0.89
	EasM_3	Interacting with the self-checkout machine seems to require little effort	0.75
	EasM_4	The self-checkout machine seems simple to use	0.91
	EasM_5	The self-checkout machine seems user-friendly	0.90
Perceived Value (Machine)	ValM_1	The self-checkout machine makes my grocery shopping experience satisfying	0.85
	ValM_2	Using the self-checkout machine improves my shopping experience	0.88
	ValM_3	I find the self-checkout machine useful when grocery shopping	0.83
	ValM_4	Using the self-checkout machine provides a better shopping experience	0.83
Attitude (Machine)	AttM_1	Using the self-checkout machine is a good idea	0.82
	AttM_2	I like the idea of using the self-checkout machine	0.92
	AttM_3	I have a positive attitude toward using the self-checkout machine	0.95
Intention to Use (Machine)	IntenM_1	I intend to use the self-checkout machine on a regular basis in the future	0.91
	IntenM_2	I plan to use the self-checkout machine as often as possible	0.93
	IntenM_3	My intention to use the self-checkout machine is high	0.95
Extroversion	Ext_1	I make friends easily	0.81
	Ext_2	I feel comfortable around people	0.84
	Ext_3	I don't mind being the center of attention	0.72
	Ext_4	I find it difficult to approach others	0.71
	Ext_5	I don't talk a lot	0.73

Table 5: Convergent Validity Measures

5.5 Construct Reliability

Internal consistency between multiple measures (interrelatedness between measure) is assessed by reliability. Cronbach's alpha is the most popular and widely used measure of reliability and thus it has been used in this study to measure all items used in the final analysis. The recommended lower limit for Cronbach's alpha value is 0.7 (Hair et al., 2010; Saunders et al., 2012) and alphas above this value show that the collective items used in forming the construct have good internal consistency and thus measure the same thing. These alphas are also an indication that the selected items are good in measuring the proposed constructs (Hair et al., 2010). As illustrated in Table 6, the Cronbach's alpha of all measures is more than 0.8 which indicates that these items are good measures for the proposed constructs in this study.

Cronbach's Alpha		
	Alpha	***No. of Items***
EaseC	.935	5
EaseM	.934	5
PvalueC	.906	4
PvalueM	.907	4
AttC	.921	3
AttM	.922	3
IntC	.950	3
IntC	.951	3
Extra	.872	5

Table 6: Cronbach's alpha-All measure

Common Method Biased

Common method variance, variance that is based on measurement method rather than the constructs the measures denote, can lead to biased observation of correlations among variables as it is one type of systematic error variance (Podsakoff et al., 2003; Meade et al., 2007). To address the issue of common method bias, Harman's single-factor test which is one of the most common and widely used techniques to identify common method variance is used in this study. This technique assumes that if a substantial amount of common method variance is present, it is probable that most of the covariance among measures in the data can be accounted for by a single variable (Podsakoff et al., 2003). As illustrated in Appendix E: Harman's Single-Factor Test, the single factor was found to account for less than 50% for both cashier and machine items and therefore common method bias do not seem to be an issue in this study.

Since satisfactory results were achieved through CFA and all the construct assessments, as shown in Table 7, the final constructs were computed by calculating the means of the relevant items to be used in the final analysis.

Construct	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
EaseC	4.9422	1.18272	1.399	-.488	.125
ValueC	4.5833	1.09283	1.194	-.188	.593
AttitudeC	5.1513	1.25261	1.569	-.675	.459
IntentionC	4.6127	1.47217	2.167	-.151	-.594
EaseM	4.8749	1.21665	1.480	-.335	-.301
ValueM	4.5500	1.10716	1.226	-.125	.485
AttitudeM	5.1101	1.27717	1.631	-.567	.140
IntentionM	4.5513	1.46670	2.151	-.028	-.591
Extrovert	3.3556	.82373	.679	-.119	-.929

Table 7: Descriptive Statistics

5.6 Results

In this chapter, the results of the conducted analysis will be presented. To test the hypotheses, two different analyses were performed: ANOVA and multiple regression. For the first seven hypotheses the ANOVA was used, and to test the other six hypotheses multiple regression analysis was performed. The use of both analysis method will be explained next as well as their respective results.

5.7 ANOVA

To test and examine the first seven hypotheses in this study, a variation analysis (ANOVA) was performed. This analysis was conducted for each of the four different observation groups (including control group) and the proposed constructs. According to Iacobucci (2013), this statistical method is used to detect any variances in respondents' evaluations when they are given different treatments. It compares the means of two or more independent groups as well as comparing how much people within the different groups vary. To run the test, the gathered data must meet the ANOVA requirements which are as follow: dependent variable should be

continuous, independent variable must be categorical, sample independence, sample randomness, normal distribution of the dependent variables, homogeneity of variances and no outliers (Trochim, 2006). As examined in previous section, it was affirmed that all data requirements were met to run this analysis in this study.

The ANOVA provides information about the means for each dependent variable and different treatment groups. The null hypothesis is that all means are equal (or not significantly different), however, regarding which profile means are different compared to another no information is provided (Iacobucci, 2013). To reject the null-hypothesis, at least one mean should be significantly different from others; this can be done when p-value< 0.05.

To find more detailed information about which observation means are significantly different from each other, additional analysis is needed. The post hoc tests are used to give specific details about the ANOVA results and the statistically significant differences between the groups, as in which particular group differed from another. Post hoc tests are designed for circumstances that the researcher has already gotten a significant different result for a factor that comprises of three or more means and thus additional examination of the differences amongst means is required to offer detailed information on which means are significantly different from each other (Hair et al., 2010). The results of the analysis and the related post hoc tests are summarized in Table 8: ANOVA, and a detailed explanation regarding their relation to the hypotheses is presented in the following paragraphs; for detailed overview of the analysis results and post hoc test, refer to Appendix F: ANOVA Results & Post Hoc Test.

The Tukey post hoc test which is the one of the most popular tests for conducting post hoc tests on a one-way ANOVA was used in this study. This test requires the sample groups to have the same sizes for effective results and it is widely used as it is efficient is preventing type I error. As all treatment groups in this study have the same sample size, this choice of post hoc test was ideal.

5.8 Hypothesis Testing: H1-H7

Hypothesis 1 proposed that approachability has a positive influence on intention to use. Comparing all different observation groups we can see that there is a statistically significant difference between groups as determined by one-way ANOVA ($F(3,308)=5.344$, $p=.001$) for intention to use cashier (UseC) and ($F(3,308)=5.126$, $p=.002$) for intention to use machine

(UseM). To determine which exact groups showed significant difference we refer to the Tukey test where it is shown that there was a statistically significant between treatment group 1 and 2 with p=0.006 (UseC) and p=0.008 (UseM) as well as 2 and 3 with p=0.005 (UseC and UseM). There was no statistical significance for treatment group 1 and 3 and the control group with any other groups for both UseC and UseM constructs (P>0.05 in all those instances). As approachability was manipulated for the treatment groups, the significant results for these treatments and the non-significant result for the control group, would indicate that hypothesis 1 is supported.

Hypothesis 2 proposed that consumers will perceive the interaction with a human as easier when the human is approachable (a) and consumers will perceive the interaction with a self-service technology as more difficult when the human alternative is approachable (b). As seen in the results, there are no statistical significance between ease of interaction with cashier or machine construct and approachability, all the means have non-significant results (p>0.05). Based on this, hypothesis 2 a and b are not supported.

Hypothesis 3 was similar to hypothesis 2, it proposed that consumers will perceive the interaction with a self-service technology as easier when the self-service technology is approachable (a) and consumers will perceive the interaction with a human as more difficult when the self-service technology alternative is approachable (b). Similar to H2, there are no statistical significance between ease of interaction with machine or cashier construct and approachability, all the means have non-significant results (p>0.05). Based on this, hypothesis 3 a and b are not supported.

Hypothesis 4 is similar to hypothesis 2 and 3, it was proposed that consumers will perceive the interaction with an approachable human as easier than an approachable self-service technology. Like H2 and H3, there are no statistical significance between ease of interaction with machine or cashier construct and approachability, all the means have non-significant results (p>0.05). Based on this, hypothesis is not supported.

Hypothesis 5 proposed that consumers will perceive the value of a human as higher when the human is approachable (a) and consumers will perceive the value of a self-service technology as lower when the human alternative is approachable (b). As seen in the results, there are no statistical significance between perceived value of cashier or machine construct and

approachability, all the means have non-significant results ($p>0.05$). Based on this, hypothesis 5 a and b are not supported.

Hypothesis 6 is similar to hypothesis 5, it proposed that consumers will perceive the value of a self-service technology as higher when the self-service technology is approachable (a) and consumers will perceive the value of a human as lower when the self-service technology alternative is approachable (b). Similar to H5, there are no statistical significance between perceived value of machine or cashier construct and approachability, all the means have non-significant results ($p>0.05$). Based on this, hypothesis 6 a and b are not supported.

Hypothesis 7 is similar to hypotheses 5 and 6, it proposed that consumers will perceive the value of an approachable human as higher than an approachable self-service technology. Like H5 and H6, there are no statistical significance between perceived value of cashier or machine construct and approachability, all the means have non-significant results ($p>0.05$). Based on this, hypothesis 5 a and b are not supported.

5.9 Multiple Regression

Several multiple regression analyses were conducted to test the remaining hypotheses proposed in this study. Each one examined the relationship between ease of interaction (cashier & machine), perceived value (cashier & machine), extroversion, attitude (cashier & machine) and intention to use (cashier & machine) constructs to find whether each hypothesis is supported or not.

To use multiple regression as a data analysis tool, there are four assumptions that needs to be met in order to proceed with the analysis. The suggested criterion are as follows: size; absence of outliers; absence of multicollinearity and singularity; normality, linearity and homoscedasticity of residuals (Tabachnick and Fidell, 2013). The sample size of this study adheres to the required sample size ($N \geq 50 + 8m$; m is the number of independent variables), there are also no outliers as shown in Table 7 in the previous chapter (Pallant, 2004; Tabachnick and Fidell, 2013). Multicollinearity and singularity address the problems arising due to the inter-correlated relationships between the independent variables which could cause complications in multiple regression (Tabachnick and Fidell, 2013). According to Tabachnick and Fidell (2013), the statistical problems created by multicollinearity arise at bivariate correlations of 0.9 and above, and since all construct correlations are below this threshold in this study, it is assumed that there

would be no problem of multicollinearity. Moreover, the singularity is not a problem either in this study, as singularity would terminate the running of multiple regression in SPSS. The last assumption to look into is the normality, linearity and homoscedasticity of residuals, and according to Tabachnick and Fidell (2013), as failure of normality is not as serious as the problems of nonlinearity and heteroscedasticity, the confirmation of this criteria was not pursued.

5.10 Hypothesis testing: H8-H13

Hypothesis 8 proposed that perceived ease of interaction with a human has a positive influence on perceived value of the human (a) and perceived ease of interaction of a self-service technology has a positive influence on perceived value of the self-checkout technology (b). As shown in the results in Appendix F: Multiple Regression, the Sig. values for both hypotheses are less than 0.05 which indicate significant positive influence on perceived value of human and SST. Thus, both hypotheses 8 a and b are supported.

Hypothesis 8 proposed that perceived ease of interaction with a human has a positive influence on perceived value of the human (a) and perceived ease of interaction of a self-service technology has a positive influence on perceived value of the self-checkout technology (b). As shown in the results in Appendix F: Multiple Regression, the Sig. values for both hypotheses are less than 0.05 which indicate significant positive influence on perceived value of human and SST. Thus, both hypotheses 8 a and b are supported.

Hypothesis 9 proposed that perceived value of cashier has a positive influence on attitude towards using the Cashier (a) and perceived value of cashier has a positive influence on intention to use (b). As shown in the results in Appendix F: Multiple Regression, the Sig. values for both hypotheses are less than 0.05 which indicate significant positive influence on attitude towards using the cashier as well as intention to use. Thus, both hypotheses 9 a and b are supported.

Hypothesis 10 proposed that perceived value of self-checkout machine has a positive influence on attitude towards using the self-checkout machine (a) and perceived value of self-checkout machine has a positive influence on intention to use (b). As shown in the results in Appendix F: Multiple Regression, the Sig. values for both hypotheses are less than 0.05 which indicate significant positive influence on attitude towards using self-checkout machine as well as intention to use. Thus, both hypotheses 10 a and b are supported.

Hypotheses 11 and 12 proposed that positive attitude towards using the cashier has a positive influence on intention to use and positive attitude towards using the self-checkout machine has a positive influence on intention to use respectively. As shown in the results in Appendix F: Multiple Regression, the Sig. values for both hypotheses are less than 0.05 which indicate significant positive influence on intention to use. Thus, both hypotheses 11 and 12 are supported.
Hypothesis 13 proposed that an extrovert consumer perceives the interaction with a human as easier (a) and an extrovert consumer perceives the interaction with a human as more difficult (b). As shown in the results in Appendix F: Multiple Regression, the Sig. values for both hypotheses are higher than 0.05 (p=0.603 & p=0.533 respectively) which indicate non-significant influence on ease of interaction with human. Thus, both hypotheses 13 a and b are not supported.
The summary of results are shown in the Table 8: Results of Hypothesis testing.

Hypothesis	**Results**
H1: Approachability has a positive influence on intention to use	Supported
H2a: Consumers will perceive the interaction with a human as easier when the human is approachable	Not Supported
H2b: Consumers will perceive the interaction with a self-service technology as more difficult when the human alternative is approachable	Not Supported
H3a: Consumers will perceive the interaction with a self-service technology as easier when the self-service technology is approachable	Not Supported
H3b: Consumers will perceive the interaction with a human as more difficult when the self-service technology alternative is approachable	Not Supported
H4: Consumers will perceive the interaction with an approachable human as easier than an approachable self-service technology	Not Supported
H5a: Consumers will perceive the value of a human as higher when the human is approachable	Not Supported

H5b: Consumers will perceive the value of a self-service technology as lower when the human alternative is approachable	Not Supported
H6a: Consumers will perceive the value of a self-service technology as higher when the self-service technology is approachable	Not Supported
H6b: Consumers will perceive the value of a human as lower when the self-service technology alternative is approachable	Not Supported
H7: Consumers will perceive the value of an approachable human as higher than an approachable self-service technology	Not Supported
H8a: Perceived ease of interaction with a human has a positive influence on perceived value of the human	Supported
H8b: Perceived ease of interaction of a self-service technology has a positive influence on perceived value of the self-checkout technology	Supported
H9a: Perceived value of cashier has a positive influence on attitude towards using the cashier	Supported
H9b: Perceived value of cashier has a positive influence on intention to use	Supported
H10a: Perceived value of self-checkout machine has a positive influence on attitude towards using the self-checkout machine	Supported
H10b: Perceived value of self-checkout machine has a positive influence on intention to use	Supported
H11: Positive attitude towards using the cashier has a positive influence on intention to use	Supported
H12: Positive attitude towards using the self-checkout machine has a positive influence on intention to use	Supported
H13a: An extrovert consumer perceives the interaction with a human as easier	Not Supported

H13b: An extrovert consumer perceives the interaction with a human as more difficult	Not Supported

Table 8: Results of Hypothesis testing

6. Discussion, Implications, Limitations & Conclusion

In this chapter, the results of the hypotheses testing which was presented in chapter 5 will be discussed. Next, the theoretical and managerial implications of the results will be discussed and then the limitations of this study and the possible future research avenues will be mentioned before concluding the study.

6.1 Discussion

The purpose of this thesis was to examine the approachability of a new technology influencing consumers' behavioral intention to use it. Moreover, the effect of ease of interaction and perceived value of human and new technology on attitude were studied. The objective was to develop a better understanding of why consumers adopt new technology (or not), based on the approachability factor. As such, the research question, "How the approachability of a new technology (vs the approachability of a human) affects the customers' decision to adopt it?" must be answered. This particular factor regarding technology adoption has not been researched to a great extent and needs to be explored in more detail to derive concrete answers. Hence, the key objective of this study was to provide new findings and insights to the influence of approachability on consumers' attitude and intention to use and to create a starting point for further studies.

Based on the results in the previous chapter, it was found that 12 out of 21 hypotheses were not supported due to insignificant effects. The results from the first seven hypotheses which were designed to measure the effect of approachability (human vs. machine) on intention to use were insignificant except one. The overall positive influence of approachability on intention to use in two treatment groups showed significant effects. The first one was in treatment group 2 where the approachability of cashier (human) were manipulated and the next was treatment group 3 where both human and machine approachability were manipulated. As no significant effect were found in treatment group 1, the effect of machine approachability could not be determined, and it is assumed that the significant effect in the combination treatment group is probably derived

from the human counterpart. Thus, it is assumed that approachability of human could positively influence the consumers intention and no actual conclusion could be derived as to determine whether approachability machine has any direct influence on consumers' intention.

Furthermore, the effect of approachability of human and machine on attitude, perceived value or ease of interaction were all insignificant. Meaning that there was no significant difference between the impact on these factors in all the control and observation groups, thus suggesting that the approachability factors chosen were inadequate in portraying the approachability of human and machine. Therefore, the approachability effect could only be examined in limited extent and the study was not able to observe any direct impact from the independent variables on the dependent variables.

Moreover, the constructs and their respective relationships that were adopted from Davis (1989) TAM model yielded significant results for both human and machine constructs. According to the results, there is a strong impact from ease interaction on perceived value and as well as attitude towards use; the same results were shown about the effect of perceived value on attitude and intention to use. Furthermore, there was also a strong effect from attitude on consumers' intention to use, these results are in accordance with the results found in various studies on technology adoption and use (Davis et al., 1989; Dabholkar,1996; Dabholkar et al., 2003; Venkatesh and Bala, 2008; Blut et al., 2016).

However, the impact of personality trait of extroversion on consumers' perception of ease of interaction with human or machine were insignificant in all observations. This could be due to inadequate measurement items used in the survey; perhaps if more items from the scale were used, concrete results from this factor could be found.

Overall, the results suggest that approachability could influence consumers' intention and it can be assumed that if approachability of the service provider is enhanced, it would have a positive influence on consumers' attitude and intention with regards to that service.

6.2 Theoretical Implications

This study has the objective to examine the approachability of new technology (vs. human) and its effect on consumers' intention to use. As no studies were found that investigated this particular dimension and its effect on consumers' intention to use (adopt) technology or service counter, no deduction could be drawn by comparing the findings of this study with others. The

insights from the conducted pre-test and experiment in this paper clearly shows the difficulty of portraying the approachability, in particular the technology (machine) and its direct or indirect effect on subsequent variable in the proposed model.

As most of our findings were insignificant, this study was not able to make any substantial contribution to the growing discussions on technology adoption factors. Thus, strong arguments can be made regarding the impact of approachability on intention as it cannot be determined whether the measures used in this study were strong enough to be replicated in future studies.

Furthermore, as the conceptual model in this study is derived from TAM, by incorporating perceived ease of interaction, perceived value from both human and machine perspective as well as the personality trait of extroversion. Based on the significant results found in this study, the modified constructs proved to be adequate tools for measurement of both human and machine perspectives and perhaps could be replicated in other studies. Identical to many other SST adoption-related journals, this study also recognizes the significant effect from attitude toward using on intention to use.

6.3 Managerial Implications

The key objective has been to explore and investigate new factors that could influence consumers' attitude and intention to use new technology. It is necessary for managers to be aware of new findings in the SST field and adoption of technology to figure out which factors need to be improved or enhanced in their services or products and which to minimize or remove.

As explained previously, this study was unbale to derive any conclusions regarding the approachability effect on consumers perception of ease of use, value or attitude and thus, no clear directions could be given on how this factor could be manipulated to positively influence intention.

However, even though mostly insignificant findings were derived from the analysis in this study, the link between approachability and intention was drawn and it begs managers attention to this unexplored factor that might have significant influence on consumers' intention to use. Yet, as no other breakthroughs were achieved in this paper, it is assumed that the findings of this study would have limited use for managers and their need for new insight into consumers behavior regarding SST and technology adoption.

6.4 Limitations and Future Research

Similar to most studies, it is important to consider the limitations of this study and its impact on future research. It needs to be mentioned here that this study is written as master's thesis, as such the time and resource limitations naturally result in a more limited scope of research. The other limitations and suggestion for future research will be discussed in the following part.

6.4.1 Limitations

Based on the unsatisfactory results of this study, it can be assumed that further research in this field with improved research design could yield better findings, thus, it is crucial to recognize and acknowledge the limitations of this paper to facilitate future research.

Due to limited time and resource, this study was unable to include more factors from the extended TAM model (i.e. social anxiety, technology readiness, etc.) as well as considering more criterion for depicting approachability in both human and machine.

Moreover, the survey sample used in this study was mainly limited to students and perhaps using a larger pool of participant with more diverse backgrounds could provide better and deeper insights into factors influencing consumers' intention. Also, the experiment was conducted using an online survey and thus, the external factors that might have influenced participants responses could not be controlled. Perhaps, an experiment conducted in a controlled environment would have results in more accurate findings; all the factors mentioned here could have a negative impact on the reliability of this research.

As for the data analysis, many issues were faced in conducting the analysis using LISREL, which prompted the use of ANOVA instead. It is possible that if the analysis were conducted with LISREL software, slightly better and accurate results were achieved, especially with regards to relation and correlation among variables. Also, since the results contained mostly insignificant effects regarding approachability and its influence on the proposed constructs in the model, it is safe to assume that a better depiction and design of approachability manipulations could yield more satisfactory results.

6.4.2 Future Research

Regarding SSTs and technology adoption, there is a lot of potential that could be explored and thus there is need for future research in this field. As discussed earlier, this study only focused on

one dimension of approachability for both the human factor and the machine factor. By extending the time and resources, more criterion could be added to create a better and more comprehensive depiction of approachability and its effect on consumers' intention could then be studied. Furthermore, the model could be extended to include more existing factors that affect technology adoption (i.e. enjoyment, perceived satisfaction, etc.) and explore their relationship with other constructs as well as effect of approachability on these additional factors.

Moreover, in terms of reliability and validity, the research methodology could be improved. An important factor to consider is the sample size, by conducting the study using a larger sample data the reliability would be increased as well as its possibility to be generalized. In addition, conducting this experiment in a lab, where external factors are controlled and observed, would allow the results to be more reliable and it also enables better understanding of participants responses as questions can be clarified. Overall, there is still plenty of new directions this study can be taken into and further explored and improved.

6.5 Conclusion

This paper has the objective to investigate the effects of approachability of new technology (vs human) on consumers' intention to use SST or service counters as well as its impact on consumers' perception of ease of interaction, perceived value and attitude towards using which are other important factors that strongly influence intention to use. Therefore, the purpose of this study is to fill in the gaps that exist in the current discussions in the SST and technology adoption field. An online experiment was conducted to answer this study's research question. The analysis yielded mostly insignificance results and thus the majority of hypotheses were rejected. The approachability had a positive effect on intention, however, it did not have any impact on all the other factors affecting intention. Moreover, no links were found between extroversion and perceived ease of interaction. Yet, there were significant links between the constructs adapted from TAM and an especially strong effect from attitude towards using and intention to use was found. The findings of this paper confirm the relationship between perceived ease of interaction and perceived value on attitude and consequently on intention which replicated the findings of related studies in this field. Nevertheless, need for future research was recognized since further investigation is needed to gain insight into what factors significantly influences consumers' intention to use. This study highlights the importance of consumers' acceptance of new

technologies and underlying factors that influence them to adopt them. Thus, it is crucial for managers to keep themselves updated on changes of consumer behavior and its underlying cause. To conclude, this paper has attempted to provide new insights on factors influencing technology adoption and drawn attention to the importance of understanding consumers' perception of technology.

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The Items in Each of the Preliminary IPIP Scales

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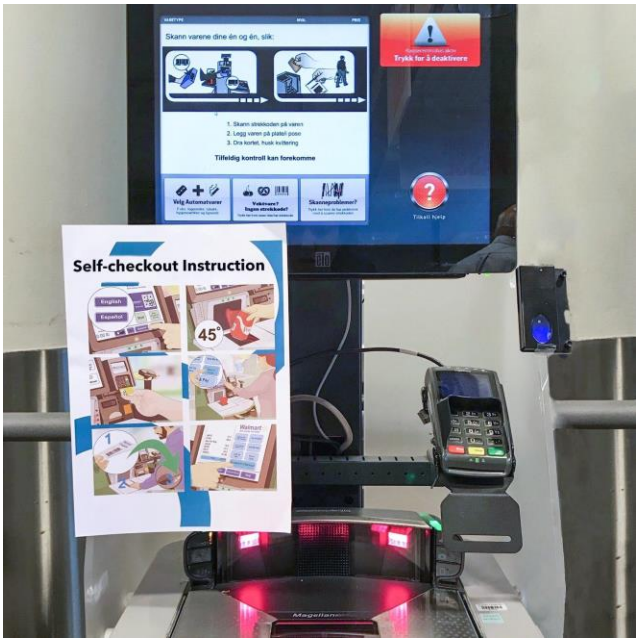
Appendices

Appendix A: Experiment images

Photos used for treatment groups in the experiment:

Picture of self-checkout machine (Neutral)



Picture of self-checkout machine (Informative)

Picture of cashier (Neutral)

Picture of cashier (Smiling)

Appendix B: Qualtrics Survey

Introduction for all treatment groups

Dear Participant,

This survey is conducted as a part of our master's thesis at the Norwegian School of Economics (NHH), and takes about 5-7 minutes to complete. We greatly appreciate your participation. In this survey you are going to answer a few questions regarding grocery shopping experience. Please try answering the questions honestly and accurately. By completing this survey and submitting your email address, you will get the chance to participate in a lucky draw ***to win one of twenty $25 Amazon gift cards.*** Note that the survey is anonymous and all data will be treated confidentially by the researchers. If you submit your email address it will not be tied to your answers and you will therefore remain anonymous. Should you have any questions about the survey, please do not hesitate to contact us at sara.malakoutisemnani@student.nhh or niusha.baradaran@student.nhh.no and we will respond promptly.

Scenario script fixed for all treatment groups

Please read the following script carefully.
You have finished studying/working for the day and you are free for the rest of the evening. On your way home you decide to do your grocery shopping for the next few days, so you stop by the new supermarket to purchase the ingredients you will need. You are now in the store, going through different aisles to pick up the items on your list. At the end of your shopping, you look at your shopping basket which is half full of packaged items and realize that you can only pay by card as you don't have enough cash. Now you are moving slowly towards the exit and since it is a quiet day, you see that there are no queues for either the cashier counter or the self-checkout machines.

Example survey questions: Control group

Which of the following would you choose?

○ Cashier

○ Self-checkout machine

The next four questions are related to cashier counter use. Please answer the questions truthfully and accurately based on the scripted scenario.

T0-C1 What do you think about the cashier counter?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
The cashier seems easy to interact with (1)	○	○	○	○	○	○	○
Interacting with the cashier seems to require little effort (2)	○	○	○	○	○	○	○
Interacting with the cashier seems simple (3)	○	○	○	○	○	○	○
The cashier seems friendly (4)	○	○	○	○	○	○	○
The cashier seems approachable (5)	○	○	○	○	○	○	○

T0-C2 Please choose to what extent do you agree/disagree with the statements below.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
The cashier makes my grocery shopping experience satisfying (1)	○	○	○	○	○	○	○
Using the cashier counter improves my shopping experience (2)	○	○	○	○	○	○	○
I find the cashier helpful when grocery shopping (3)	○	○	○	○	○	○	○
Using the cashier counter provides a better shopping experience (4)	○	○	○	○	○	○	○

T0-C3 Please choose to what extent do you agree/disagree with the statements below.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
Using the cashier counter is a good idea (1)	○	○	○	○	○	○	○
I like the idea of interacting with the cashier (2)	○	○	○	○	○	○	○
I have a positive attitude toward using the cashier counter (3)	○	○	○	○	○	○	○

T0-C4 Please choose to what extent do you agree/disagree with the statements below.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I intend to use the cashier counter on a regular basis in the future (1)	○	○	○	○	○	○	○
I plan to use the cashier counter as often as possible (2)	○	○	○	○	○	○	○
My intention to use the cashier counter is high (3)	○	○	○	○	○	○	○

The next four questions are related to self-checkout machine use. Please answer the questions truthfully and accurately based on the scripted scenario.

T0-M1 What do you think about the self-checkout machine?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
The self-checkout machine seems easy to interact with (1)	○	○	○	○	○	○	○
Interacting with the self-checkout machine seems clear and understandable (2)	○	○	○	○	○	○	○
Interacting with the self-checkout machine seems to require little effort (3)	○	○	○	○	○	○	○
The self-checkout machine seems simple to use (4)	○	○	○	○	○	○	○
The self-checkout machine seems user-friendly (5)	○	○	○	○	○	○	○

T0-M2 Please choose to what extent do you agree/disagree with the statements below.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
The self-checkout machine makes my grocery shopping experience satisfying (1)	○	○	○	○	○	○	○
Using the self-checkout machine improves my shopping experience (2)	○	○	○	○	○	○	○
I find the self-checkout machine useful when grocery shopping (3)	○	○	○	○	○	○	○
Using the self-checkout machine provides a better shopping experience (4)	○	○	○	○	○	○	○

T0-M3 Please choose to what extent do you agree/disagree with the statements below.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
Using the self-checkout machine is a good idea (1)	○	○	○	○	○	○	○
I like the idea of using the self-checkout machine (2)	○	○	○	○	○	○	○
I have a positive attitude toward using the self-checkout machine (3)	○	○	○	○	○	○	○

T0-M4 Please choose to what extent do you agree/disagree with the statements below.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I intend to use the self-checkout machine on a regular basis in the future (1)	○	○	○	○	○	○	○
I plan to use the self-checkout machine as often as possible (2)	○	○	○	○	○	○	○
My intention to use the self-checkout machine is high (3)	○	○	○	○	○	○	○

Man.C What was the facial expression of the cashier in the picture?

○ Smiling (1)

○ Neutral (2)

Man.M Was there any instruction available for the machine?

- ○ Yes (1)
- ○ No (2)

Exp Have you ever used self-service checkout in the grocery store before this experiment?

- ○ Never (1)
- ○ Sometimes (2)
- ○ About half the time (3)
- ○ Most of the time (4)
- ○ Always (5)

Ex-Int For each statement choose the response that best represents your opinion about yourself:

	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
I make friends easily (1)	○	○	○	○	○
I feel comfortable around people (2)	○	○	○	○	○
I don't mind being the center of attention (3)	○	○	○	○	○
I find it difficult to approach others (4)	○	○	○	○	○
I don't talk a lot (5)	○	○	○	○	○

D1 What is your gender?

- Male (1)
- Female (2)
- Other (3)

D2 What is your age?

- Under 18 (1)
- 18 - 24 (2)
- 25 - 34 (3)
- 35 or older (4)

D3 What is your level of education?

- Less than high school (1)
- High school graduate (2)
- Bachelor degree (3)
- Master's degree (4)
- PhD (5)

D4 What is your employment?

- Student (1)
- Employed (2)
- Unemployed (3)

D5 What is your sexual orientation?

- ○ Heterosexual (1)
- ○ Homosexual (2)
- ○ Bisexual (3)
- ○ Other (4)
- ○ Prefer not to say (5)

D6 What is you marital status?

- ○ Single (1)
- ○ Married/In a relationship (2)

Appendix C: Normality Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
EaseInteraction_M	.081	312	.000	.979	312	.000
PerceivedValue_M	.080	312	.000	.979	312	.000
Attitude_M	.100	312	.000	.956	312	.000
Intention_M	.075	312	.000	.970	312	.000
Extrovert_M	.118	312	.000	.966	312	.000

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Intention_C	.077	312	.000	.971	312	.000
Attitude_C	.103	312	.000	.952	312	.000
EaseInteraction_C	.081	312	.000	.976	312	.000
PerceivedValue_C	.083	312	.000	.981	312	.000

Extrovert_C	.123	312	.000	.962	312	.000

a. Lilliefors Significance Correction

Appendix D: Descriptive Statistics

Cashier

	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Inter_1C	5.03	1.329	1.767	-.601	.137	-.043	.274
Inter_2C	4.92	1.389	1.929	-.411	.137	-.527	.274
Inter_3C	4.53	1.476	2.180	-.062	.137	-.961	.274
Inter_4C	5.17	1.311	1.720	-1.005	.137	.641	.274
Inter_5C	5.07	1.301	1.693	-.831	.137	.246	.274
Val_1C	4.42	1.190	1.416	.068	.137	.114	.274
Val_2C	4.36	1.280	1.638	.008	.137	.002	.274
Val_3C	5.18	1.236	1.526	-.895	.137	.850	.274
Val_4C	4.37	1.294	1.675	-.041	.137	-.271	.274
Att_1C	5.04	1.230	1.514	-.199	.137	-.175	.274
Att_2C	5.30	1.406	1.976	-1.026	.137	.664	.274

Att_3C	5.11	1.444	2.084	-.657	.137	-.228	.274
Use_1C	4.81	1.474	2.174	-.322	.137	-.523	.274
Use_2C	4.50	1.609	2.588	-.137	.137	-.795	.274
Use_3C	4.53	1.564	2.447	-.140	.137	-.747	.274
Extra_1	3.61	.959	.920	-.435	.137	-.414	.274
Extra_2	3.63	.946	.895	-.439	.137	-.518	.274
Extra_3	2.98	1.188	1.411	.054	.137	-1.051	.274
Extra_4	3.36	.984	.969	-.197	.137	-1.121	.274
Extra_5	3.29	1.045	1.093	-.069	.137	-1.059	.274
Valid N (listwise)							

Machine

	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Inter_1M	5.03	1.329	1.767	-.601	.137	-.043	.274
Inter_2M	4.93	1.367	1.868	-.370	.137	-.564	.274
Inter_3M	4.54	1.468	2.154	-.051	.137	-.960	.274
Inter_4M	4.99	1.368	1.873	-.589	.137	-.385	.274

Inter_5M	4.89	1.292	1.668	-.384	.137	-.346	.274
Val_1M	4.42	1.198	1.435	.027	.137	.195	.274
Val_2M	4.37	1.251	1.566	.067	.137	.061	.274
Val_3M	5.02	1.280	1.640	-.527	.137	.048	.274
Val_4M	4.39	1.275	1.627	-.006	.137	-.245	.274
Att_1M	5.04	1.230	1.514	-.199	.137	-.175	.274
Att_2M	5.17	1.440	2.075	-.708	.137	-.046	.274
Att_3M	5.11	1.438	2.067	-.649	.137	-.233	.274
Use_1M	4.79	1.469	2.158	-.282	.137	-.537	.274
Use_2M	4.35	1.579	2.495	.119	.137	-.674	.274
Use_3M	4.51	1.559	2.429	-.098	.137	-.740	.274
Extra_1M	3.61	.946	.895	-.443	.137	-.346	.274
Extra_2M	3.62	.938	.881	-.421	.137	-.515	.274
Extra_3M	2.91	1.154	1.332	.156	.137	-.931	.274
Extra_4M	3.36	.984	.969	-.197	.137	-1.121	.274
Extra_5M	3.29	1.042	1.085	-.073	.137	-1.055	.274
Valid N (listwise)							

Appendix E: CFA

Cashier Measurement Model

Sample Size = 312

Cashier Measurement Model

Covariance Matrix

	Inter_1	Inter_2	Inter_3	Inter_4	Inter_5	Val_1	
Inter_1	1.77						
Inter_2	1.49	1.93					
Inter_3	1.25	1.31	2.18				
Inter_4	1.27	1.35	1.22	1.72			
Inter_5	1.14	1.34	1.24	1.22	1.69		
	Val_1	0.91	0.98	0.83	0.86	0.83	1.42
	Val_2	0.93	0.92	0.89	0.82	0.81	1.15
	Val_3	0.90	0.96	0.78	0.83	0.89	0.93
	Val_4	0.85	0.83	0.87	0.72	0.73	1.01
	Att_1	0.83	0.97	0.78	0.74	0.72	0.97
	Att_2	0.98	1.02	0.90	0.89	0.92	1.06
	Att_3	1.19	1.24	1.12	1.03	1.09	1.19
	Use_1	1.12	1.14	1.18	0.98	1.06	1.21
	Use_2	1.20	1.27	1.27	1.06	1.07	1.29
	Use_3	1.17	1.14	1.21	1.08	1.09	1.29
Extra_1	0.04	-0.01	-0.03	0.02	-0.06	0.01	
Extra_2	0.06	0.08	0.04	0.08	-0.04	0.08	
Extra_3	-0.06	-0.03	-0.12	-0.01	-0.18	0.00	
Extra_4	0.00	0.01	-0.11	-0.08	-0.07	0.03	
Extra_5	0.00	-0.03	-0.08	-0.03	-0.04	0.02	

Covariance Matrix

	Val_2	Val_3	Val_4	Att_1	Att_2	Att_3	
	Val_2	1.64					
	Val_3	1.03	1.53				
	Val_4	1.30	1.01	1.67			
	Att_1	0.93	0.95	0.86	1.51		
	Att_2	1.13	1.18	1.11	1.21	1.98	
	Att_3	1.21	1.23	1.18	1.39	1.67	2.08
	Use_1	1.27	1.23	1.21	1.25	1.53	1.67
	Use_2	1.29	1.21	1.24	1.24	1.60	1.72
	Use_3	1.31	1.24	1.27	1.23	1.58	1.72
Extra_1	-0.10	0.00	-0.11	0.07	-0.03	-0.03	
Extra_2	-0.06	-0.03	-0.09	0.20	-0.02	-0.02	
Extra_3	-0.19	-0.05	-0.25	0.07	-0.11	-0.14	
Extra_4	-0.12	-0.08	-0.10	0.11	-0.09	-0.09	
Extra_5	-0.10	-0.03	-0.14	0.15	-0.02	-0.03	

Covariance Matrix

	Use_1	Use_2	Use_3	Extra_1	Extra_2	Extra_3
	Use_1	2.17				
	Use_2	1.98	2.59			
	Use_3	1.96	2.20	2.45		
Extra_1	-0.01	-0.01	-0.08	0.92		
Extra_2	-0.03	-0.02	-0.11	0.63	0.89	
Extra_3	-0.16	-0.14	-0.22	0.66	0.70	1.41
Extra_4	-0.09	-0.14	-0.21	0.57	0.55	0.58
Extra_5	0.01	0.00	-0.03	0.57	0.60	0.71

Covariance Matrix

	Extra_4	Extra_5

Extra_4 0.97
Extra_5 0.54 1.09
Cashier Measurement Model
Number of Iterations = 8
LISREL Estimates (Maximum Likelihood)
Measurement Equations
Inter_1 = 1.16*EaseInte, Errorvar.= 0.43 , R² = 0.76
(0.060) (0.044)
19.16 9.69
Inter_2 = 1.25*EaseInte, Errorvar.= 0.36 , R² = 0.81
(0.062) (0.042)
20.33 8.57
Inter_3 = 1.09*EaseInte, Errorvar.= 0.98 , R² = 0.55
(0.073) (0.086)
15.04 11.44
Inter_4 = 1.10*EaseInte, Errorvar.= 0.51 , R² = 0.70
(0.061) (0.049)
18.02 10.41
Inter_5 = 1.06*EaseInte, Errorvar.= 0.56 , R² = 0.67
(0.061) (0.052)
17.36 10.72
Val_1 = 1.01*PerValue, Errorvar.= 0.40 , R² = 0.72
(0.055) (0.040)
18.27 9.94
Val_2 = 1.12*PerValue, Errorvar.= 0.38 , R² = 0.77
(0.058) (0.042)
19.32 9.12
Val_3 = 0.96*PerValue, Errorvar.= 0.60 , R² = 0.61
(0.060) (0.054)
16.14 10.96
Val_4 = 1.06*PerValue, Errorvar.= 0.55 , R² = 0.67
(0.061) (0.052)
17.41 10.43
Att_1 = 1.01*Attitude, Errorvar.= 0.49 , R² = 0.68
(0.057) (0.045)
17.61 10.93
Att_2 = 1.22*Attitude, Errorvar.= 0.48 , R² = 0.76
(0.064) (0.047)
19.28 10.04
Att_3 = 1.36*Attitude, Errorvar.= 0.23 , R² = 0.89
(0.062) (0.036)
22.08 6.21
Use_1 = 1.35*Intentio, Errorvar.= 0.34 , R² = 0.84
(0.064) (0.037)
21.14 9.20
Use_2 = 1.48*Intentio, Errorvar.= 0.40 , R² = 0.84
(0.070) (0.044)
21.19 9.15
Use_3 = 1.47*Intentio, Errorvar.= 0.30 , R² = 0.88
(0.067) (0.037)
21.94 8.03
Extra_1 = 0.78*Extrover, Errorvar.= 0.32 , R² = 0.66
(0.047) (0.034)
16.61 9.31
Extra_2 = 0.80*Extrover, Errorvar.= 0.26 , R² = 0.71
(0.045) (0.031)
17.70 8.32
Extra_3 = 0.87*Extrover, Errorvar.= 0.65 , R² = 0.54
(0.060) (0.062)
14.42 10.60
Extra_4 = 0.70*Extrover, Errorvar.= 0.48 , R² = 0.51

(0.051) (0.044)
13.84 10.83
Extra_5 = 0.76*Extrover, Errorvar.= 0.51 , R^2 = 0.53
(0.053) (0.048)
14.33 10.64
Correlation Matrix of Independent Variables

	EaseInte	PerValue	Extrover	Attitude	Intentio
EaseInte	1.00				
PerValue	0.72	1.00			
	(0.03)				
	22.09				
Extrover	0.00	-0.07	1.00		
	(0.06)	(0.06)			
	-0.05	-1.11			
Attitude	0.72	0.85	-0.01	1.00	
	(0.03)	(0.02)	(0.06)		
	22.32	40.09	-0.24		
Intentio	0.69	0.84	-0.07	0.87	1.00
	(0.03)	(0.02)	(0.06)	(0.02)	
	20.35	38.55	-1.09	49.83	

Goodness of Fit Statistics
Degrees of Freedom = 160
Minimum Fit Function Chi-Square = 347.70 (P = 0.00)
Normal Theory Weighted Least Squares Chi-Square = 339.42 (P = 0.00)
Estimated Non-centrality Parameter (NCP) = 179.42
90 Percent Confidence Interval for NCP = (130.27 ; 236.33)
Minimum Fit Function Value = 1.11
Population Discrepancy Function Value (F0) = 0.57
90 Percent Confidence Interval for F0 = (0.41 ; 0.75)
Root Mean Square Error of Approximation (RMSEA) = 0.060
90 Percent Confidence Interval for RMSEA = (0.051 ; 0.069)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.035

Expected Cross-Validation Index (ECVI) = 1.40
90 Percent Confidence Interval for ECVI = (1.24 ; 1.58)
ECVI for Saturated Model = 1.34
ECVI for Independence Model = 43.69
Chi-Square for Independence Model with 190 Degrees of Freedom = 13677.50
Independence AIC = 13717.50
Model AIC = 439.42
Saturated AIC = 420.00
Independence CAIC = 13812.55
Model CAIC = 677.05
Saturated CAIC = 1418.04
Normed Fit Index (NFI) = 0.97
Non-Normed Fit Index (NNFI) = 0.98
Parsimony Normed Fit Index (PNFI) = 0.82
Comparative Fit Index (CFI) = 0.99
Incremental Fit Index (IFI) = 0.99
Relative Fit Index (RFI) = 0.97
Critical N (CN) = 185.71
Root Mean Square Residual (RMR) = 0.065
Standardized RMR = 0.042
Goodness of Fit Index (GFI) = 0.90
Adjusted Goodness of Fit Index (AGFI) = 0.87
Parsimony Goodness of Fit Index (PGFI) = 0.69
The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
Val_1	Extrover	12.4	0.16
Val_2	Attitude	19.7	-0.51

Val_2	Intentio	11.1		-0.35
Val_3	EaseInte	8.8	0.23	
Val_3	Attitude	25.1		0.60
Val_4	EaseInte	8.1	-0.22	
Att_1	Extrover	21.1		0.21
Use_1	PerValue	8.8		0.28
Use_1	Attitude	15.5		0.43

The Modification Indices Suggest to Add an Error Covariance

Between	and	Decrease in Chi-Square	New Estimate
Inter_2	Inter_1	11.6	0.13
Inter_5	Inter_1	20.0	-0.17
Val_4	Val_1	9.1	-0.11
Val_4	Val_2	35.9	0.23
Att_1	Inter_2	14.7	0.11
Att_1	Val_1	9.0	0.09
Use_3	Inter_2	11.5	-0.09
Use_3	Use_2	16.2	0.17
Extra_2	Att_1	12.6	0.09

Machine Measurement Model

Sample Size = 312

Measurement Model Machine

Covariance Matrix

	Inter_1	Inter_2	Inter_3	Inter_4	Inter_5	Val_1
Inter_1	1.77					
Inter_2	1.48	1.87				
Inter_3	1.23	1.28	2.15			
Inter_4	1.43	1.50	1.41	1.87		
Inter_5	1.29	1.40	1.33	1.49	1.67	
Val_1	0.93	0.99	0.84	0.94	0.89	1.43
Val_2	0.90	0.91	0.89	0.92	0.88	1.14
Val_3	0.95	1.03	0.88	0.98	0.96	1.02
Val_4	0.83	0.82	0.86	0.81	0.80	1.01
Att_1	0.83	0.97	0.78	0.85	0.76	0.98
Att_2	1.03	1.10	1.02	1.13	1.00	1.17
Att_3	1.18	1.22	1.12	1.22	1.13	1.20
Use_1	1.12	1.14	1.20	1.18	1.14	1.24
Use_2	1.14	1.18	1.25	1.16	1.12	1.31
Use_3	1.17	1.15	1.23	1.19	1.14	1.31
Extra_1	0.06	0.03	-0.02	-0.02	-0.02	0.02
Extra_2	0.08	0.12	0.04	0.02	0.03	0.08
Extra_3	0.03	0.11	-0.05	0.01	-0.04	0.04
Extra_4	0.00	0.02	-0.11	-0.10	-0.09	0.03
Extra_5	0.01	0.00	-0.07	-0.07	-0.03	0.02

Covariance Matrix

	Val_2	Val_3	Val_4	Att_1	Att_2	Att_3
Val_2	1.57					
Val_3	1.11	1.64				
Val_4	1.26	1.12	1.63			
Att_1	0.91	1.04	0.86	1.51		
Att_2	1.21	1.36	1.19	1.32	2.07	
Att_3	1.17	1.36	1.16	1.38	1.81	2.07
Use_1	1.25	1.38	1.22	1.27	1.67	1.69
Use_2	1.29	1.33	1.24	1.28	1.68	1.70
Use_3	1.29	1.38	1.27	1.24	1.71	1.73
Extra_1	-0.08	-0.03	-0.10	0.08	0.00	-0.02
Extra_2	-0.04	-0.06	-0.08	0.21	-0.01	0.00
Extra_3	-0.15	-0.04	-0.19	0.16	-0.05	-0.04

Extra_4 -0.11 -0.11 -0.10 0.11 -0.10 -0.10
Extra_5 -0.10 -0.07 -0.13 0.16 -0.04 -0.02

Covariance Matrix

	Use_1	Use_2	Use_3	Extra_1	Extra_2	Extra_3
Use_1	2.16					
Use_2	1.95	2.49				
Use_3	1.96	2.22	2.43			
Extra_1	0.00	-0.02	-0.06	0.89		
Extra_2	-0.02	-0.03	-0.10	0.61	0.88	
Extra_3	-0.05	-0.07	-0.14	0.61	0.66	1.33
Extra_4	-0.10	-0.16	-0.21	0.55	0.55	0.55
Extra_5	0.01	-0.01	-0.02	0.55	0.60	0.68

Covariance Matrix

	Extra_4	Extra_5
Extra_4	0.97	
Extra_5	0.54	1.09

Measurement Model Machine
Number of Iterations = 9
LISREL Estimates (Maximum Likelihood)

Measurement Equations

Inter_1 = 1.15*EaseInte, Errorvar.= 0.44 , R^2 = 0.75
(0.060) (0.042)
19.16 10.46
Inter_2 = 1.22*EaseInte, Errorvar.= 0.39 , R^2 = 0.79
(0.061) (0.039)
20.04 9.88
Inter_3 = 1.11*EaseInte, Errorvar.= 0.93 , R^2 = 0.57
(0.071) (0.080)
15.51 11.64
Inter_4 = 1.25*EaseInte, Errorvar.= 0.31 , R^2 = 0.84
(0.060) (0.034)
20.97 8.99
Inter_5 = 1.16*EaseInte, Errorvar.= 0.32 , R^2 = 0.81
(0.057) (0.033)
20.42 9.56
Val_1 = 1.01*PerValue, Errorvar.= 0.41 , R^2 = 0.71
(0.055) (0.040)
18.27 10.18
Val_2 = 1.10*PerValue, Errorvar.= 0.36 , R^2 = 0.77
(0.057) (0.039)
19.35 9.41
Val_3 = 1.06*PerValue, Errorvar.= 0.51 , R^2 = 0.69
(0.060) (0.049)
17.74 10.46
Val_4 = 1.06*PerValue, Errorvar.= 0.51 , R^2 = 0.69
(0.060) (0.049)
17.69 10.49
Att_1 = 1.01*Attitude, Errorvar.= 0.49 , R^2 = 0.68
(0.057) (0.044)
17.68 11.17
Att_2 = 1.33*Attitude, Errorvar.= 0.32 , R^2 = 0.85
(0.063) (0.037)
21.20 8.72
Att_3 = 1.36*Attitude, Errorvar.= 0.22 , R^2 = 0.89
(0.061) (0.032)
22.25 6.84
Use_1 = 1.34*Intentio, Errorvar.= 0.36 , R^2 = 0.83
(0.064) (0.037)
20.99 9.86

Use_2 = 1.48*Intentio, Errorvar.= 0.31 , R^2 = 0.87
(0.067) (0.036)
21.89 8.73
Use_3 = 1.48*Intentio, Errorvar.= 0.23 , R^2 = 0.90
(0.066) (0.031)
22.58 7.40
Extra_1 = 0.76*Extrover, Errorvar.= 0.32 , R^2 = 0.65
(0.046) (0.034)
16.44 9.35
Extra_2 = 0.79*Extrover, Errorvar.= 0.25 , R^2 = 0.72
(0.045) (0.030)
17.72 8.17
Extra_3 = 0.83*Extrover, Errorvar.= 0.65 , R^2 = 0.51
(0.059) (0.060)
13.97 10.74
Extra_4 = 0.70*Extrover, Errorvar.= 0.48 , R^2 = 0.50
(0.051) (0.044)
13.81 10.80
Extra_5 = 0.76*Extrover, Errorvar.= 0.51 , R^2 = 0.53
(0.053) (0.048)
14.24 10.63

Correlation Matrix of Independent Variables

	EaseInte	PerValue	Extrover	Attitude	Intentio
EaseInte	1.00				
PerValue	0.72	1.00			
	(0.03)				
	22.48				
Extrover	0.01	-0.06	1.00		
	(0.06)	(0.06)			
	0.15	-1.01			
Attitude	0.71	0.86	0.00	1.00	
	(0.03)	(0.02)	(0.06)		
	22.22	43.66	-0.02		
Intentio	0.67	0.85	-0.06	0.87	1.00
	(0.03)	(0.02)	(0.06)	(0.02)	
	19.96	41.30	-0.95	51.45	

Goodness of Fit Statistics
Degrees of Freedom = 160
Minimum Fit Function Chi-Square = 368.07 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 379.41 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 219.41
90 Percent Confidence Interval for NCP = (166.30 ; 280.23)
Minimum Fit Function Value = 1.17
Population Discrepancy Function Value (F0) = 0.70
90 Percent Confidence Interval for F0 = (0.53 ; 0.89)
Root Mean Square Error of Approximation (RMSEA) = 0.066
90 Percent Confidence Interval for RMSEA = (0.058 ; 0.075)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.0012
Expected Cross-Validation Index (ECVI) = 1.53
90 Percent Confidence Interval for ECVI = (1.36 ; 1.72)
ECVI for Saturated Model = 1.34
ECVI for Independence Model = 47.08
Chi-Square for Independence Model with 190 Degrees of Freedom = 14743.61
Independence AIC = 14783.61
Model AIC = 479.41
Saturated AIC = 420.00
Independence CAIC = 14878.66
Model CAIC = 717.04
Saturated CAIC = 1418.04

Normed Fit Index (NFI) = 0.98
Non-Normed Fit Index (NNFI) = 0.98
Parsimony Normed Fit Index (PNFI) = 0.82
Comparative Fit Index (CFI) = 0.99
Incremental Fit Index (IFI) = 0.99
Relative Fit Index (RFI) = 0.97
Critical N (CN) = 175.49
Root Mean Square Residual (RMR) = 0.065
Standardized RMR = 0.042
Goodness of Fit Index (GFI) = 0.89
Adjusted Goodness of Fit Index (AGFI) = 0.86
Parsimony Goodness of Fit Index (PGFI) = 0.68
The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
Val_1	Extrover	13.5	0.16
Val_2	Attitude	23.4	-0.54
Val_2	Intentio	11.3	-0.34
Val_3	Attitude	34.5	0.69
Val_3	Intentio	8.6	0.32
Val_4	EaseInte	9.0	-0.22
Att_1	Extrover	24.4	0.22
Use_1	EaseInte	8.7	0.17
Use_1	PerValue	19.0	0.40
Use_1	Attitude	32.7	0.57
Use_2	Attitude	7.9	-0.29

The Modification Indices Suggest to Add an Error Covariance

Between	and	Decrease in Chi-Square	New Estimate
Inter_2	Inter_1	20.7	0.14
Inter_5	Inter_1	9.5	-0.09
Inter_5	Inter_4	8.8	0.09
Val_3	Val_2	9.1	-0.10
Val_4	Val_1	8.1	-0.10
Val_4	Val_2	36.6	0.21
Att_1	Inter_2	19.3	0.13
Att_1	Val_1	9.7	0.09
Att_3	Val_2	8.5	-0.07
Use_3	Use_1	10.2	-0.11
Use_3	Use_2	35.0	0.24
Extra_1	Att_1	8.9	-0.08
Extra_2	Att_1	13.4	0.09

Appendix F: Harman's Single-Factor Test

Cashier

Total Variance Explained

Component	Initial Eigenvalues	Extraction Sums of Squared Loadings

	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.546	47.732	47.732	9.546	47.732	47.732
2	3.397	16.987	64.720			
3	1.451	7.257	71.976			
4	.716	3.581	75.557			
5	.580	2.900	78.457			
6	.534	2.672	81.130			
7	.450	2.249	83.378			
8	.445	2.225	85.604			
9	.409	2.044	87.647			
10	.374	1.869	89.517			
11	.339	1.694	91.211			
12	.298	1.488	92.699			
13	.261	1.305	94.004			
14	.244	1.219	95.223			
15	.219	1.097	96.320			
16	.187	.935	97.256			

17	.171	.854	98.110			
18	.144	.718	98.828			
19	.131	.655	99.484			
20	.103	.516	100.000			

Extraction Method: Principal Component Analysis.

Machine

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.904	49.520	49.520	9.904	49.520	49.520
2	3.385	16.926	66.446			
3	1.499	7.495	73.942			
4	.711	3.554	77.496			
5	.573	2.867	80.362			
6	.510	2.552	82.915			
7	.450	2.248	85.163			
8	.403	2.017	87.180			
9	.394	1.970	89.151			

10	.371	1.855	91.006			
11	.271	1.354	92.359			
12	.268	1.342	93.701			
13	.236	1.179	94.880			
14	.194	.969	95.850			
15	.181	.907	96.757			
16	.164	.818	97.574			
17	.151	.755	98.329			
18	.138	.691	99.020			
19	.107	.536	99.556			
20	.089	.444	100.000			

Extraction Method: Principal Component Analysis.

Appendix G: ANOVA Results & Post Hoc Test

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
InterC	Between Groups	12.969	3	4.323	3.129	.026
	Within Groups	425.523	308	1.382		

	Total	438.492	311			
ValC	Between Groups	7.373	3	2.458	2.064	.105
	Within Groups	366.668	308	1.190		
	Total	374.041	311			
AttC	Between Groups	21.329	3	7.110	4.647	.003
	Within Groups	471.258	308	1.530		
	Total	492.587	311			
UseC	Between Groups	33.240	3	11.080	5.344	.001
	Within Groups	638.605	308	2.073		
	Total	671.846	311			
InterM	Between Groups	14.263	3	4.754	3.265	.022
	Within Groups	448.494	308	1.456		
	Total	462.757	311			
ValM	Between Groups	7.824	3	2.608	2.136	.096
	Within Groups	376.080	308	1.221		
	Total	383.904	311			
AttM	Between Groups	23.443	3	7.814	4.925	.002

	Within Groups	488.668	308	1.587		
	Total	512.111	311			
UseM	Between Groups	31.736	3	10.579	5.126	.002
	Within Groups	635.605	308	2.064		
	Total	667.342	311			
EXT	Between Groups	.735	3	.245	.347	.791
	Within Groups	217.502	308	.706		
	Total	218.237	311			

Post Hoc Test

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
InterC	Control	Machine	.35897	.18821	.227	-.1272	.8452
		Human	-.04359	.18821	.996	-.5298	.4426
		Combine	.40769	.18821	.135	-.0785	.8939

	Machine	Control	-.35897	.18821	.227	-.8452	.1272
		Human	-.40256	.18821	.143	-.8887	.0836
		Combine	.04872	.18821	.994	-.4375	.5349
	Human	Control	.04359	.18821	.996	-.4426	.5298
		Machine	.40256	.18821	.143	-.0836	.8887
		Combine	.45128	.18821	.080	-.0349	.9375
	Combine	Control	-.40769	.18821	.135	-.8939	.0785
		Machine	-.04872	.18821	.994	-.5349	.4375
		Human	-.45128	.18821	.080	-.9375	.0349
ValC	Control	Machine	.18269	.17471	.723	-.2686	.6340
		Human	-.15385	.17471	.815	-.6052	.2975
		Com	.23397	.1747	.5	-.2173	.6853

		bine		1	39		
	Machine	Control	-.18269	.17471	.723	-.6340	.2686
		Human	-.33654	.17471	.219	-.7878	.1148
		Combine	.05128	.17471	.991	-.4000	.5026
	Human	Control	.15385	.17471	.815	-.2975	.6052
		Machine	.33654	.17471	.219	-.1148	.7878
		Combine	.38782	.17471	.120	-.0635	.8391
	Combine	Control	-.23397	.17471	.539	-.6853	.2173
		Machine	-.05128	.17471	.991	-.5026	.4000
		Human	-.38782	.17471	.120	-.8391	.0635
AttC	Control	Machine	.48291	.19807	.072	-.0287	.9945
		Human	-.13675	.19807	.90	-.6484	.3749

					1		
		Combine	.40171	.19807	.180	-.1099	.9133
	Machine	Control	-.48291	.19807	.072	-.9945	.0287
		Human	-.61966*	.19807	.010	-1.1313	-.1080
		Combine	-.08120	.19807	.977	-.5928	.4304
	Human	Control	.13675	.19807	.901	-.3749	.6484
		Machine	.61966*	.19807	.010	.1080	1.1313
		Combine	.53846*	.19807	.035	.0268	1.0501
	Combine	Control	-.40171	.19807	.180	-.9133	.1099
		Machine	.08120	.19807	.977	-.4304	.5928
		Human	-.53846*	.19807	.035	-1.0501	-.0268
UseC	Control	Machine	.46154	.23057	.190	-.1341	1.0571

	Human	-.29915	.23057	.565	-.8947	.2965
	Combine	.47436	.23057	.170	-.1212	1.0700
Machine	Control	-.46154	.23057	.190	-1.0571	.1341
	Human	-.76068*	.23057	.006	-1.3563	-.1651
	Combine	.01282	.23057	1.000	-.5828	.6084
Human	Control	.29915	.23057	.565	-.2965	.8947
	Machine	.76068*	.23057	.006	.1651	1.3563
	Combine	.77350*	.23057	.005	.1779	1.3691
Combine	Control	-.47436	.23057	.170	-1.0700	.1212
	Machine	-.01282	.23057	1.000	-.6084	.5828
	Human	-.77350*	.23057	.005	-1.3691	-.1779

InterM	Control	Machine	.37436	.19323	.215	-.1248	.8735
		Human	-.06667	.19323	.986	-.5658	.4325
		Combine	.40769	.19323	.152	-.0914	.9068
	Machine	Control	-.37436	.19323	.215	-.8735	.1248
		Human	-.44103	.19323	.104	-.9402	.0581
		Combine	.03333	.19323	.998	-.4658	.5325
	Human	Control	.06667	.19323	.986	-.4325	.5658
		Machine	.44103	.19323	.104	-.0581	.9402
		Combine	.47436	.19323	.069	-.0248	.9735
	Combine	Control	-.40769	.19323	.152	-.9068	.0914
		Machine	-.03333	.19323	.998	-.5325	.4658
		Hum	-.47436	.1932	.0	-.9735	.0248

		an		3	69		
ValM	Control	Machine	.19872	.17694	.676	-.2583	.6558
		Human	-.16026	.17694	.802	-.6173	.2968
		Combine	.23077	.17694	.561	-.2263	.6878
	Machine	Control	-.19872	.17694	.676	-.6558	.2583
		Human	-.35897	.17694	.180	-.8160	.0981
		Combine	.03205	.17694	.998	-.4250	.4891
	Human	Control	.16026	.17694	.802	-.2968	.6173
		Machine	.35897	.17694	.180	-.0981	.8160
		Combine	.39103	.17694	.123	-.0660	.8481
	Combine	Control	-.23077	.17694	.561	-.6878	.2263
		Machine	-.03205	.17694	.99	-.4891	.4250

					8		
		Human	-.39103	.17694	.123	-.8481	.0660
AttM	Control	Machine	.50427	.20170	.062	-.0167	1.0253
		Human	-.14103	.20170	.897	-.6620	.3800
		Combine	.42735	.20170	.149	-.0937	.9484
	Machine	Control	-.50427	.20170	.062	-1.0253	.0167
		Human	-.64530*	.20170	.008	-1.1663	-.1243
		Combine	-.07692	.20170	.981	-.5979	.4441
	Human	Control	.14103	.20170	.897	-.3800	.6620
		Machine	.64530*	.20170	.008	.1243	1.1663
		Combine	.56838*	.20170	.026	.0474	1.0894
	Combine	Control	-.42735	.20170	.149	-.9484	.0937

		Machine	.07692	.20170	.981	-.4441	.5979
		Human	-.56838*	.20170	.026	-1.0894	-.0474
UseM	Control	Machine	.43590	.23003	.232	-.1583	1.0301
		Human	-.30342	.23003	.551	-.8976	.2908
		Combine	.46154	.23003	.188	-.1327	1.0557
	Machine	Control	-.43590	.23003	.232	-1.0301	.1583
		Human	-.73932*	.23003	.008	-1.3335	-.1451
		Combine	.02564	.23003	1.000	-.5686	.6198
	Human	Control	.30342	.23003	.551	-.2908	.8976
		Machine	.73932*	.23003	.008	.1451	1.3335
		Combine	.76496*	.23003	.005	.1708	1.3592

	Combine	Control	-.46154	.23003	.188	-1.0557	.1327
		Machine	-.02564	.23003	1.000	-.6198	.5686
		Human	-.76496*	.23003	.005	-1.3592	-.1708
EXT	Control	Machine	-.12821	.13456	.776	-.4758	.2194
		Human	-.02821	.13456	.997	-.3758	.3194
		Combine	-.03077	.13456	.996	-.3784	.3168
	Machine	Control	.12821	.13456	.776	-.2194	.4758
		Human	.10000	.13456	.880	-.2476	.4476
		Combine	.09744	.13456	.887	-.2502	.4450
	Human	Control	.02821	.13456	.997	-.3194	.3758
		Machine	-.10000	.13456	.880	-.4476	.2476

		Combine	-.00256	.13456	1.000	-.3502	.3450
	Combine	Control	.03077	.13456	.996	-.3168	.3784
		Machine	-.09744	.13456	.887	-.4450	.2502
		Human	.00256	.13456	1.000	-.3450	.3502

*. The mean difference is significant at the 0.05 level.

Appendix H: Survey measures

Construct	Items	Reference(s)
Ease of Interaction (Cashier)	The cashier seems easy to interact with	Dabholkar (1996), and Davis et al., (1989)
	Interacting with the cashier seems to require little effort	
	Interacting with the cashier seems simple	
	The cashier seems friendly	
	The cashier seems approachable	
Perceived Value (Cashier)	The cashier makes my grocery shopping experience satisfying	Davis (1989) and Adams et al., (1992)
	Using the cashier counter improves my shopping experience	
	I find the cashier helpful when grocery shopping	
	Using the cashier counter provides a better shopping experience	
Attitude (Cashier)	Using the cashier counter is a good idea	Dabholkar (1996)
	I like the idea of interacting with the cashier	
	I have a positive attitude toward using the cashier counter	
Intention to Use (Cashier)	I intend to use the cashier counter on a regular basis in the future	Dabholkar (1996) Venkatesh and Bala (2008) and Jackson et al., (1997)
	I plan to use the cashier counter as often as possible	
	My intention to use the cashier counter is high	

Ease of Interaction (Machine)	The self-checkout machine seems easy to interact with	Dabholkar (1996), and Davis et al., (1989)
	Interacting with the self-checkout machine seems clear and understandable	
	Interacting with the self-checkout machine seems to require little effort	
	The self-checkout machine seems simple to use	
	The self-checkout machine seems user-friendly	
Perceived Value (Machine)	The self-checkout machine makes my grocery shopping experience satisfying	Davis (1989) and Adams et al., (1992)
	Using the self-checkout machine improves my shopping experience	
	I find the self-checkout machine useful when grocery shopping	
	Using the self-checkout machine provides a better shopping experience	
Attitude (Machine)	Using the self-checkout machine is a good idea	Dabholkar (1996)
	I like the idea of using the self-checkout machine	
	I have a positive attitude toward using the self-checkout machine	
Intention to Use (Machine)	I intend to use the self-checkout machine on a regular basis in the future	Dabholkar (1996) Venkatesh and Bala (2008) and Jackson et al., (1997)
	I plan to use the self-checkout machine as often as possible	
	My intention to use the self-checkout machine is high	
Extroversion	I make friends easily	(The IPIP-NEO)
	I feel comfortable around people	
	I don't mind being the center of attention	
	I find it difficult to approach others	
	I don't talk a lot	