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Hugo Simões Passos de Sousa Campos

Master in Marketing

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BUSINESS
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Lastly, I would like to end my academic journey with a quote from Winston Churchill,
"Success is not final, failure is not fatal, it is the courage to continue that counts."

ABSTRACT

Technology acts as an enabler and an experience enhancer on all stages of the retail experience. This research had the intent of understanding the nuances that exist between the attitudes formed towards different retail technologies, how they translate into behavioural intentions, what antecedent beliefs are behind those attitudes, and which bare the most impact in the decision to adopt or not said technology. This study focused on the Portuguese retail sector, on the technologies of Self-Service Checkout, MBWay Payment and Cashierless Stores.

The present research reviewed past literature on technology adoption models and developed its own model to fit the needs of the proposed study. It was possible to dive into the minds of consumers and retailers, through survey questionnaires and specialist interviews, that collected primary data and tested the model's hypotheses, regarding the antecedent beliefs of Usefulness, Ease of Use, Need for Interaction, Risk, Performance, Fun and Health Safety, as well as the difference between the attitudes towards each technology.

Multiple linear regression analyses were conducted, and the results provided valuable insights that reveal that different technologies in different stages of the adoption process are explained by diverse antecedent beliefs. Fun was found to be the strongest and the only predictor of the three technologies simultaneously. Ease of use and the lack of risk appear to be predictors that favour the adoption rate towards MBWay Payment. Usefulness and performance were predictors of both attitudes towards Self-Service Checkout and towards Cashierless Stores.

Keywords: Retail; Customer Journey; Self-service Technology; Shopper-facing Technology

JEL Classification System:

L81 Retail

O33 Technological Change: Choices and Consequences • Diffusion Processes

RESUMO

A tecnologia atua como facilitador e intensificador da experiência em todas as fases da experiência de retalho. Esta investigação teve como objetivo compreender as nuances entre as atitudes formadas em relação às diferentes tecnologias de retalho, como se traduzem em intenções comportamentais, quais crenças antecedentes estão por trás dessas atitudes e quais são as que mais impactam na decisão de adotar essa tecnologia. Este estudo incidiu sobre o retalho português, nas tecnologias de Máquina de Pagamento Automático, pagamento MBWay e Loja Autónoma.

Na presente investigação é revista a literatura existente sobre modelos de adoção de tecnologia e é desenvolvido um modelo ajustado às necessidades do estudo. Foi possível mergulhar na mente de consumidores e retalhistas, através de questionários e entrevistas com especialistas, numa recolha de dados primários e teste às hipóteses do modelo, quanto às crenças antecedentes de Utilidade, Facilidade de Uso, Necessidade de Interação, Risco, Desempenho, Diversão e Segurança da Saúde, assim como a diferença de atitudes entre cada tecnologia.

Análises de regressão linear múltipla foram realizadas e os resultados forneceram perceções valiosas que revelam que diferentes tecnologias em diferentes fases do processo de adoção são explicadas por diversas crenças antecedentes. Diversão foi considerada a mais forte e o único preditor das três tecnologias em simultâneo. A facilidade de uso e a ausência de risco aparentam ser preditores que favorecem a taxa de adoção do pagamento MBWay. A utilidade e o desempenho foram preditores de ambas as atitudes em relação às máquinas de pagamento automático e às lojas autónomas.

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GLOSSARY

DOI – Diffusion of Innovations Theory

SSCO – Self-Service Checkout

MBWP – MBWay Payment

CLS – Cashierless Stores

SST – Self-Service Technology

TAM – Technology Acceptance Model

UTAUT – Unified theory of acceptance and use of technology

VAM – Value-based Adoption Model

CHAPTER 1: INTRODUCTION

1.1 Background and Scope

"Supermercado é onde a tecnologia quiser"

"Supermarket is where the technology wants it"

- Expresso, 2021

A recent article in the newspaper *Expresso* starts its issue with this simple singular quote, which encapsulates in a few words the transformation process that is currently happening to supermarkets and large grocery stores all across the world. It all commenced with *small* but great technological innovations such as the barcode scanning, which posed as a boundless improvement in the customer journey (Inman & Nikolova, 2017), and we are now watching as the entire shape of a physical grocery store changes to make way for technological improvements, as with the cases of digital payment options and cashierless stores.

The horizon of possibilities for new technologies to appear in our daily lives is now greater than ever, and it is happening in the retail industry at an extremely accelerated rate. In-store technologies have changed, in a dramatic way, the dimensions in which retailers are able to provide their services to consumers (Bulmer et al., 2018). Technology acts as an enabler and an experience enhancer on all stages of the retail experience, from the moment the consumer steps into the grocery store, to the product identification phase and to the checkout process.

The present research focuses on the customer journey of a physical grocery store, with a special emphasis on the checkout stage of the journey. The geographical context is Portugal, where we have been witnessing several ground-breaking technological innovations in the retail sector. This study focuses on three technologies that have changed and shaped the Portuguese landscape of retail technology, two of which that have been particularly relevant to the sector in the short-medium term: the Self-Service Checkout and the MBWay Payment; and one that is currently emerging as the next great innovation: the Cashierless Store.

The rise of such technologies and the dynamics in which they are inserted into, produce a never-ending gap in literature which requires regular update with the consideration of new variables and the comparisons between new technologies. The present research proposes to contribute to the diminishing of that gap, studying new state of the art technologies together with technologies that have been around longer and that showcase some degree of adoption. A new model developed in the present study proposes new variables that focus on current societal issues, such as healthcare concerns, while creating unique connections that have been analysed in a single model before.

There is also a gap in literature in the study of the adoption of technology in large grocery stores through technology adoption models. The Portuguese setting is particularly relevant for this type as innovation in the sector is being held as a top priority. Additionally, this study takes both the side of

consumer and retailer, as well as the inputs from previous research simultaneously into a complete and fruitful discussion covering the topics in hand.

This study aims to dive into the minds of consumers and retailers, in an attempt to perceive the differences between the attitudes formed towards these three retail technologies. This research will also cover how the attitudes translate into behavioural intentions and what antecedent beliefs predict those attitudes, while distinguishing which bare the most impact in the decision to adopt or not a technology.

1.2 Relevance, Implications and Objectives

"Technology has changed how people shop and interact with brands" (Forbes, 2020). From a marketing point of view, the retailer-consumer relationship has become increasingly important as the shopping practice becomes an experience. Retailers resort to technology with the objective of creating engagement and an integrated experience with consumers (Blázquez, 2014), which is why it is more relevant than ever to explore the subject of in-store technology and its adoption process.

While gathering the perspectives of both the retail experts who implement the technology and the consumers who decide on its adoption, the present research attempts to create a fresh and up-to-date outlook on the subject in hand that can generate relevant outputs for both scholars and retail managers. In this sense, this study aims to narrow the existent gap between the retailer's and the consumer's expectation about a certain technology, to further guide the retailer into a more informed decision with an increased consideration for the consumer's perspective. It will be particularly relevant to the Portuguese retail context as the primary data collected focuses on this setting and the technologies in scope are currently in different stages of adoption in the country.

From a scholar's viewpoint, this dissertation will contribute to the existing knowledge on the technology adoption process as further research on the prevailing literature regarding adoption models and the antecedent beliefs that form the attitudes towards adoption. Curran and Meteur (2005) found that the antecedent beliefs vary depending on the circumstances and on the technology, which adds to the relevance of the present study which aims follow the proposed further research of the mentioned article. Additionally, previously studied variables will be put together into a new model and a new context, with the introduction of a completely new dimension that has not been studied and stands as particularly relevant in the present situational context.

In this sense, it is possible to define a research question that gives purpose to this dissertation, and from which it is possible to define steps and objectives in an attempt to provide an answer:

RQ: What are the antecedent beliefs that impact the attitude towards the adoption of each one of the three technologies in scope?

This proposed research question sets the tone for the definition of a set of objectives that should be achieved by the end of the present research:

- *To compare different technologies in different stages of the adoption process*
- *To provide managers with input regarding previously implemented technology*
- *To suggest ways in which managers may improve the adoption rate of a technology*
- *To study which dimensions bare the most effect on attitude towards a technology*
- *To contribute to the current knowledge on technology acceptance models*

1.3 Dissertation Delineation

The present dissertation is composed by six chapters: 1. Introduction; 2. Literature Review; 3. Methodology; 4. Retailer Interviews; 5. Quantitative Results and Analyses; and 6. Conclusions and Discussion.

In the next chapter, a review of the existing literature on the subject in hand will be undertaken, with the objective of providing a theoretical background on the theme, covering important topics such as a contextualization of the retail industry, a roadmap of the digital transformation in retail and an overview of both the retailer's and the consumer's perspectives. Additionally, a presentation of the technologies in scope will be given, as well as a dive into the different technology acceptance models, with particular focus on the relevant ones for the present study which will serve as a basis to the development of a unique model that fits the needs of the present research.

Afterwards, the research methods for qualitative data, through expert interviews, and quantitative data, through questionnaires, will be presented, followed by the analysis of the obtained results.

Finally, the most relevant conclusions will be explored and discussed in light of the inputs gathered in the literature review, in an inclusive manner that takes into consideration both sources of primary data. The underlying limitations to the research will be presented, as well as suggestions for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Contextualization: Technology in the Portuguese Retail Industry

"Retail is detail"

- James Gulliver, n.d.

Since the mid-1980s, retailers such as large grocery stores have been an example of innovation and modernization. According to the 2019 Retail Technology Report (TotalRetail, 2019), 74% of retailers were expected to increase spending on technology in the next 12 months. Large supermarkets have drastically changed not only the retailing structure, but also consumer's buying behaviour (Farhangmehr et al., 2000). Past research in retailing has unveiled that specific characteristics of these large retail stores, most notably price, quality, location, product assortment, service quality, and store environment, affect consumers' in-store attitudes and behaviours (Yoo et al., 1998).

Without disregarding all the previously mentioned store characteristics, that play an extremely important role in the in-store experience, the appearance of new technologies has emerged as a strong factor that is intimately linked with the changes and overall evolution in consumer habits (Kotler and Armstrong, 2006). In the last few decades, the industry of retailing has introduced many shopper-facing retail technologies and while it has witnessed several technologies failing, numerous others have succeeded and became part of our consumer journey in the large retailers' buying experience.

One of the most important retail technologies in history was the adoption of the UPC barcode scanning around 1981 , that not only revolutionized the logistics side of retail, but also posed as a boundless improvement in the customer journey, with even new 21st century technologies using it or being built around it (Inman & Nikolova, 2017). Throughout the next three decades, retail technology found its way into the customer journey in unimaginable ways, reaching grocery stores' shelves, shopping carts, and most notably our own hands, with the adoption of mobile apps by almost every large retailer in the world as a go-to tactic of increasing customer engagement and value.

In what concerns the Portuguese landscape of retailing, it is of paramount importance to briefly analyse data and statistics that represent the current state of the Sector. In fact, according to Statistics Portugal, in 2018 and 2019, the Sector displays a clear positive tendency of growth in terms of homologous trimestral variations, with growth rates reaching a percentage of 6.2% in the non-food products sub-sector and 4.7% food sub-sector, with an overall rate never dropping below 2.7% of trimestral growth in this last two years. However, given the pandemic circumstances that Portugal and the world as facing, the food sub-sector reached unusual growth rates in the first trimester of 2020, followed by an immediate shrinking of the sub-sector, and matching the tendency of shrinkage verified in the non-food sub-sector (INE, 2020). Evidently, these are unusual circumstances, where technology adopts a secondary role to public health concerns.

Albeit the current unusual and difficult circumstances the Retail Sector faces, and despite the evident disadvantage in size when compared to other international markets, the Portuguese Retail

Industry does not fall behind in terms of technology. In fact, the Sector has been up to date with the recent technology developments, even imposing itself as a pioneer in some of them, innovating throughout the customer journey and creating a unique relationship and environment between the Retailer and the Consumer (TotalRetail, 2019).

2.2 Customer experience: Introducing the Retailer-Consumer relationship

According to Schmitt (1999) - one of the first scholars underlining the importance of the concept - customer experience may be defined as the perception that originates from the stimulated motivation of a consumers' participation in a situation that adds value to products and services. In today's society, this concept of experience takes even greater relevance with companies being able to take advantage of the opportunities to create strong and enduring customer experiences that will in turn benefit the firm (Pine & Gilmore, 1998) by playing an important role in defining whether a company's offering succeeds (Gentile et al., 2007, Yakhlef, 2015).

The customer journey metaphor highlights the stages that individuals go through in their pathway towards relationships with the retailer or towards satisfying shopping experiences (Shavitt & Barnes, 2020). In this sense, a new approach is formed, with consumers and retailers both playing important roles in this new retail process, which requires both consumers and retailers to contribute to create the final service, engaging in smart partnerships (Pantano et al., 2018).

Further developing and unravelling the concept, it is possible to understand consumer experience as a multidimensional construct that comprises emotional, cognitive, behavioural, sensorial and social components (Schmitt, 1999). Despite the distinctions between them, a customer experience can relate to specific aspects of a company's offering such as a brand, as explored by Brakus, Schmitt, & Zarantonello (2009), or as a technology as explored by McCarthy & Wright (2004), who developed a starting point for understanding and evaluating technology as an experience.

In this sense, this research proposes to explore the technology variable as part of the customer journey, or, in other words technology as a consumer experience that generates perceptions in the consumers' minds. Some of the new in-store technologies are the cases of automated CRM systems, checkout/cashier-less systems, augment/virtual reality, AI technologies, Internet-of-Things, or even robots. It is this synergy generated by the integration of the digital with the existing interaction with the physical that, according to Hagberg and colleagues (2017) needs more focus from scholars. Researchers must (re)evaluate the existing frameworks and models, and, additionally, to (re)search for innovative ways to better understand the currently emerging digital retailing landscape (Hagberg et al., 2017). This idea stands as one of the most important basis for the present research.

2.3 Digital Transformation in Retail

"It is not that we use technology, we live technology"

- Godfrey Reggio, n.d.

Digital transformation is defined as “the process of digitalization of previously analogue operations, procedures, organizational tasks, and managerial processes in order to drive value for customers, employees and other stakeholders with a view to gaining competitive advantages” (Evanschitzky et al., 2020, p.7).

As previously mentioned, throughout the last three decades, retail technology found its way into the customer journey in unimaginable ways (Inman & Nikolova, 2017). The evolution of retail has been extremely fast-paced, with the widespread of the Internet, mobile phones and smart-phones allowing consumers to gain power in the retailer-consumer dynamic (Grewal et al., 2018).

In-store technologies have changed, in a dramatic way, the dimensions in which retailers are able to provide their services to consumers (Bulmer et al., 2018). The physical store, which stands as the primary offline channel, is gradually being integrated with digital channels that offer a connected consumer experience (Alexander & Kent, 2020). In today's increasingly competitive marketplace, retailers have turned to shopper-facing technology (van Heerde et al., 2019) in an attempt to develop a competitive advantage (Thomas et al., 2020). The ramifications of digitalization in physical stores are of key importance; despite the surge in e-commerce, the grand majority of retail sales still take place in physical stores (Hagberg et al., 2017). It is creating a world of interaction between humans and machines, through the conception of a new form of contact between the two (Hofacker & Corsaro, 2020).

It is now undeniable that the world is presently witnessing countless attempts to integrate the digital and the physical in the retailing environment (Hagberg et al., 2017). Innovative service strategies have been implemented by retailers, with the purpose of enhancing shopping convenience to better serve customers’ needs (Thomas et al., 2020). In fact, nowadays, newer technologies such as the IoT (Internet of Things) and AI (Artificial Intelligence) have also been introduced to the field of retailing (Hagberg et al., 2017) and are shifting consumer patterns (Rafaeli et al., 2017), providing yet another revolutionary possibility for change.

The present research will focus on the impacts of IoT and AI on Shopper-Facing Technologies – “technologies used by shoppers and facilitated by retailers to enhance customer engagement with products, services, or brands” (Shankar et al., 2020, p.4). Shopper-Facing Technologies, such as self-service technologies (SSTs), are currently significantly influencing the relationship described in the last chapter between the Retailer and the Consumer, to the point that is being completely reshaped. (Thomas et al., 2020). It is of paramount importance to enter into the definition of self-service technologies (SSTs), as this concept stands as fundamental for this research; with SSTs being “technological interfaces that enable customers to produce a service independent of direct service employee involvement and without assistance from service employees” (Fernandes & Pedroso, 2017, p.1).

SSTs have been widely introduced throughout the Retail Industry, with the Portuguese Industry being in front-line for it. Despite a few having been successful, this success, however, does not imply that all SSTs, after being introduced, would result in a successful adoption (Kaushik & Rahman, 2015).

Self-service technologies are one of the newest and most important additions to many service venues that engage directly with the consumer, especially retailers and grocery stores. These recent innovations are becoming increasingly normal as consumers as well as employees have started to get dependent on machines like ATMs and self-checkouts. (McWilliams et al., 2016). In sum, SSTs are a way to enable consumers to serve themselves (Kaushik & Rahman, 2015), and despite being a popular technology worldwide, research on consumers' use and experiences of in-store retailer implemented innovations, the topic remains fairly limited and requires further investigation. (Bulmer et al., 2018).

2.4 Technologies in scope

The chosen technologies, Self-Service Checkout, MB Way Payment Method and Cashierless Stores are particularly relevant in the Portuguese Retail Industry. The contextual, geographical, and situational factors that pose as a unique as distinct environment to conduct this research, had an important weight in the decision of the technologies to focus on this study. As mentioned, the technological innovations in the fields of IoT and AI in what concerns Self-service technologies set the tone for this study, as its purpose is to assess the critical variables that contribute to the acceptance and adoption of SSTs. In a similar way as performed by Curran & Meuter (2005), this investigation will encompass three different SSTs, as a way to increase the strength of the testing process, as well as to determine whether the results are relevant across multiple self-service technologies.

Additionally, these technologies also stand tall in the global technological context in what concerns shopper-facing technology. They are, respectively, a technology implemented in the last 15 years, one introduced in the last 5 years, and one that is just now being introduced in Portugal.

2.4.1 Self-Service Checkout

The Self-Service Checkout technology (SSCO), also known as Self-Scanning, can be defined as "an automated process that enables shoppers to scan, bag, and pay for their purchases without the need for a cashier" (Inman & Nikolova, 2017, p.4). It disseminated among retailers in the 1990s, with an expectation of being available in 325.000 stores by 2021 across the globe (Bulmer et al., 2018). It poses, as such, as the oldest, most globally disseminated and most researched technology in scope under this study.

Analysing previous literature, a study conducted in 2010 emerges with particular relevance in what concerns the adoption of self-scans demonstrates that consumers in Russia and Germany should be addressed differently, and that it would not be easy to replicate the introduction of such technology in both countries under the same business model (Schliewe & Pezoldt, 2010), which showcases the importance of the geographical context of this investigation.

However, Portugal is no stranger to this technology, with the large retailer brand Continente being the first to implement a self-service U-Scan system in store (Jornal de Negócios, 2005). Since then, all other large retailers have also implemented this type of technology.

Bulmer and colleagues' findings point towards the fact that this technology has already been accepted by consumers, since result show that after trying SSCO at least once, shoppers quickly adapt their shopping practices accordingly, and demonstrate that the use of SSCO technology has become embedded in the routines of some grocery retailers' consumers (Bulmer et al., 2018).

According to other scholars, positive aspects of the technology, such as perceived waiting time in-store (Dabholkar & Bagozzi, 2002), social anxiety as a result of perceived crowding (Elms et al., 2016), the possibility of avoiding store employees (Meuter et al., 2000), and, crucially improving the efficiency of the consumer journey (Bulmer et al., 2018), have made possible for this technology to be widely adopted.

However, authors also suggest an apparent duality with this technology, as a SSCO can create problems for shoppers despite satisfying needs; it can be efficient and inefficient; SSCO may lead consumers to feeling inept or it may lead them to feel competent, depending on their experience; and, they can facilitate control or create chaos in the customer journey (Bulmer et al., 2018).

2.4.2 MB Way Payment Method

The development of mobile payment resulted in the disruption of the business environment, with particular emphasis and importance on the retail industry (Yan et al., 2021). Retailers currently are facing the challenge of reconfiguring systems to accommodate mobile consumers who expect quick and secure digital payment multichannel options (Taylor, 2016). Mobile payment technology brings value innovation (Liao & Yang, 2020). It was in this context that the proper conditions were fulfilled for a mobile payment method do succeed, such as MB Way.

MB Way is a mobile app that was developed in 2015 as the first worldwide technology that integrates ATM mechanics in a mobile payment solution (Observador, 2016). However, it is more than a simple mobile solution, as it allows consumers to not only engage in online payments, but also in physical in-store payments either through reading a QR Code or through Near Field Communication (MB Way, 2018), in a way that stands as an incredibly relevant innovation within the scope of this investigation, as consumers feel this type of payment service is more useful than the traditional payments via mobile phone (Liao & Yang, 2020).

This technology posed as a gateway for global innovation in what concerns in-store digital payments, while other mobile payment options have risen, such as in Belgium (Bancontact Payconiq), Germany and Austria (Bluecode), Denmark and Finland (MobilePay), among many others that founded, in 2019, the European Mobile Payment Systems Association (EMPSA, 2019).

2.4.3 Cashierless Stores - Just Walk-Out Technology

While Self-Service Technologies were introduced in Portugal in 2005 and MB Way was developed inside the country in 2015, the Cashier-less Store represents a brand-new state of the art technology in Portugal. Cashier-less Stores were introduced to the world in the end of 2017 with the innovative

Amazon Go, a shopping experience based on the Internet of Things, integrated with cameras, sensors and a mobile app (Schögel & Lienhard, 2018).

"Amazon conquered the physical world with Amazon Go" (Evanschitzky et al., 2020, p.191). The Company has been ahead of all of its competitors in the matter, creating a powerful competitive advantage over all other retailers (Grewal et al., 2018), which makes it impossible to discuss technological advances in Retail without mentioning this Industry giant. Amazon opened its first Amazon Go "without a checkout" grocery store in Seattle, WA in early 2017, being the pioneer of the Just Walk-Out Technology, a sophisticated innovative technology that tracks the consumer's purchases, allows them to leave the store without a physical check-out, and proceeds to automatically charge their account (Li, 2018).

In spite of its introduction by Amazon in 2017, it only reached Portugal in 2019 with the conception of Pingo Doce & Go, possessing the same technology that allows the customer to enter the supermarket, grab the desired products and walk out of the store without engaging in any waiting line or physical form of payment – all this with the aid of the in-store technology connected to a mobile app (Instituto de Marketing Research, 2019). In May 2021, Continente opened its own cashierless store in Portugal called Continente Labs, and designed to test the concept next to the consumer (Expresso, 2021).

2.5 Technology Adoption Process

Every breakthrough in technology means new opportunities for businesses, managers and marketeers, but it can also represent threats that if not accounted for may result in dire consequences. Newer technologies, business models and big data analytics suggest that the retailing industry is "on the verge of a quantum leap into an unknown shopping realm" (Grewal et al., 2017, p.1). Understanding the premises of technology acceptance is the safest and most promising way to increase the chance of success with technology-based service introductions. (Curran & Meuter, 2005). In the following chapter, both the consumer's and the retailer's perspective of the technology adoption process will be discussed.

2.5.2 Consumer's perspective

Consumers are, evidently, a fundamental part of the adoption process. The success of new Self-service technologies depends on how consumers perceive and adopt SST-enabled services (Kaushik & Rahman, 2015).

Retailers are implementing innovative strategies designed to improve shopping convenience to serve their consumers' needs in the best way possible (Thomas et al., 2020). However, SSTs for services are not guaranteed to give the desired results (Curran et al., 2003). Additionally, the significance of each step in the customer journey is likely to be normatively infused and embedded into a specific context. (Shavitt & Barnes, 2020).

When a customer has the chance to engage in a checkout process, they find that the increased efficiency often increases their level of emotional value, which means that they have a more positive

experience, since they had control over the course of the action. (McWilliams et al., 2016). However, customers who are not comfortable with technology, who wish to avoid interaction with the employees, may fail to learn the capacity of the new technology, consequently failing the adoption process. In the worst case scenario, but definitely a possible on with any given technology is the failure of service delivery, which leads to the non-adoption and discontinuation of the new SST (Curran et al., 2003).

Despite the existing risk, studies openly focusing on consumers' experiences of SST technologies, have received insignificant attention in the present literature, (Bulmer et al., 2018).

2.5.2 Retailer's perspective

"Technological revolutions have irrevocably altered the way retailers conduct business"

- Grewal et al., 2018

The increased disruption of business models through digital technologies force retailers to review and transform established practices and recognize new opportunities and challenges (Evanschitzky et al., 2020).

To explore the brand-new possibilities of the consumer experience, businesses must understand how the customer decision journey has changed and how customers' purchasing decisions are made (Rekettye, 2019). The consumers' desire for a more convenient shopping journey is making it tough for firms to create and maintain competitive advantages (Thomas et al., 2020).

Because of the increased competition from e-commerce and digital retail, the role of the physical store must be strengthened (Hagberg et al., 2017). It is of paramount importance how to best develop, introduce and manage new technologies in order to possess the best chance of consumer adoption and acceptance (Curran & Meuter, 2005), since failure in the introduction of a Self-Service technology can be very expensive to a company (Kaushik & Rahman, 2015), posing as a significant drain in Company resources if not broadly adopted by consumers (Curran & Meuter, 2005).

Previous studies have identified failures performed by Retailers in satisfying consumer expectations while attempting to innovate in-store, due to underlying differences between consumer and retailer perspectives (Pantano et al., 2018). This happens when in the moment of introduction of the technology, consumers have a different expectation regarding the innovation, than the one that the Retailer has.

During the process of decision of implementation of a new technology, retailers consider several financial metrics such as Return On Investment (ROI), the payback period, the net present value (NPV), among other financial criteria (Inman & Nikolova, 2017). When evaluating, once again, statistics from the 2019 Retail Technology Report (TotalRetail, 2019), it is revealed that for the executives responsible for the adoption decision of technology within retail organizations, the most important metric when deciding is the ROI. However, according to Inman and Nikolova (2017), retailers resort to the use of critical assumptions in what regards the reaction of shoppers to the new technology, which are then embedded into the financial calculations; in some cases, these reactions of consumers are simply implicitly assumed as positive without further research into the topic.

What retailers, in other words, typically consider when debating whether to introduce a technology is the capability to reduce the length of queues as well as staff related costs, and the capacity to acquire physical space required by more traditional systems used in points-of-sale (Bulmer et al., 2018). While retailers focus their attention on technologies that are able to reduce these types of costs, consumers showcase a growing interest towards pleasant experiences at the point of sale (Demirkan & Spohrer, 2014; Pantano et al., 2018).

In sum, many companies attempt to digitally transform themselves without understanding customer desire to interact with humans or having a clear idea on when and where technology will successfully scale. We might say that companies must learn to look at technology through the customers' eyes.

2.6 Technology Acceptance and Adoption Models

Throughout the years, some authors have attempted to attempted to develop models to explain technology acceptance through a consumer perspective, focusing on the perception and attitudes developed by the consumers, rather than the financial and managerial point-of-view. In this chapter, the present research will explore these models.

2.6.1 Technology Acceptant Model (TAM)

The Technology Acceptance Model evaluates users' acceptance of technology (Davis et al., 1989). It is derived from two previous models, the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). Although it was initially used in an individual's adoption of electronic mail system context (Ooi & Tan, 2016), it has been recently used in the grocery shopping technology setting (i.e. Inman & Nikolova, 2017). The Technology Acceptance Model (TAM) postulates the attitude regarding the usage of a new technology as a function of two external variables, which are perceived usefulness, perceived ease of use; combining these two factors into a construct, it is possible to study the adoption likelihood and the perception of a newly implemented technology. Additionally, it is important noting that the TAM has numerous times served as base for the development of a revised model that fits a specific context, such as in some of the models that will be explored next. This is the case of the TAM2 (Taherdoost, 2018), that adds two constructs: social influence - image, subject norms, voluntariness; and cognitive - result demonstrability, job relevance and output quality.

2.6.2 Attribute-based Model

As previously described in this review, Dabholkar describes most literature as focusing on the management perspective of quality. Therefore, in the Attribute-based Model the author proposes is based upon on consumer's perspective, to identify and study the underlying factors that make the customer participate in Self-Service option (Dabholkar, 1996), as this stands as critical to understand the consumer's in-store behaviour. The author identified expected speed of delivery, expected ease of use, expected reliability, expected enjoyment, and expected control as the critical variables in the usage

of SSTs. This model is both applicable for expectations of quality service and for perceptions of service quality. In the proposed study the only variables that did not display an effect on the service quality were expected speed of delivery and expected reliability (Dabholkar, 1996).

2.6.3 An attitudinal model of technology-based self-service

This model is based on the Technology Acceptance Model (TAM), with Dabholkar & Bagozzi (2002) identifying ease of use, usefulness, and enjoyment as the relevant determinants of attitude model (Dabholkar & Bagozzi, 2002), with all three illustrating the concept of customer perception. The model additionally proposes moderators that influence the relationship between the three TAM variables and the attitude towards using technology-based self-service: consumer traits – self-efficacy, inherent novelty seeking, need for interaction, self-consciousness; and situational factors – perceived waiting time, social anxiety. The findings from this model's testing suggest that marketeers should focus on the promotion the ease of use of their technology-based self-service, especially if the public audience has a high need for social interaction with employees.

2.6.4 SST Attitude/Intention to use Model

The Self-Service Technology Attitude/Intention to use Model supports the idea that multiple factors, some more influential than other, have an effect on the attitude towards a Self-Service technology. These factors were defined as perceived ease of use, perceived usefulness, the need for interaction with employees and perceived risk. According to the model, these factors will influence the attitude towards the SST and, consequently, the intention to use such SST (Curran & Meuter, 2005).

The model is tested across three different Self-service banking technologies which comprise automated teller machines (ATMs), bank by phone (BBP), and on-line banking (OLB) (Curran & Meuter, 2005), which attributes the model a special significance, given the similarities to the present research.

2.6.5 Value-based Adoption Model (VAM)

The Value-based Adoption Model (VAM) is part of a research by Kim, Chan & Gupta and it stands as a combined framework that represents a novel approach to study consumers' adoption of mobile technology. As the attitudinal model, this model is also a revised version of the TAM. The model also bases itself in theories such as theory of decision making and consumer choice (Kim et al., 2007).

However, as a revised version of TAM, the VAM takes into consideration that a technology user can be more outside of an organizational setting, namely a consumer. The model divides the variables that influence the perceived value and consequent adoption intention into two categories: perceived benefits – usefulness and enjoyment; and perceived sacrifices – technicality and perceived fee (Kim et al., 2007).

The VAM is applied by the authors specifically to M-Commerce, which although remaining extremely relevant to the study in-hand, may overlook some dimensions of the physical consumer journey. In this sense, it is important to also consider other technology adoption models.

2.6.6 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology focuses on information systems and on the behavioural intentions to use them. It resorts to the constructs of effort expectancy, performance expectancy, social influence and facilitating conditions (Venkatesh et al., 2003).

Several extensions to this model were later formulated, with the additions of hedonic motivation, price value and habit as antecedent determinants. Age, gender, experience, and voluntariness act as moderators for these constructs.

CHAPTER 3: MODEL DEVELOPMENT

3.1 Model Development

All the aforementioned technology acceptance models contributed significantly to the current knowledge on the adoption process of self-service technology, with each one of them being relevant to the retail sector.

Most of the explored models culminate in two important concepts of *attitude towards the SST* and *intention to adopt* the technology, as are the cases of the Technology Acceptance Model (TAM), the attitudinal model of technology-based self-service, the SST Attitude/Intention to use Model and the Hypothesis-based proposed model, defining attitude as a "*psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor*" (Curran & Meuter, 2005, p.105; Eagly and Chaiken, 1993, p. 1). The UTAUT and the Value Based adoption model focus solely on the *behavioral intention to adopt* as the predominant source of influence of the actual behaviour, which also stands extremely relevant to the present study. Furthermore, each respective model proposes antecedent beliefs, or dimensions for a simpler term, that explain how the attitude towards adoption is formed, and subsequently the behavioural intention to adopt, the two mentioned concepts as seen in the previous sub-chapter (Davis et al., 1989; Dabholkar, 1996; Dabholkar & Bagozzi, 2002; Curran & Meuter, 2005; Kim et al., 2007; Venkatesh et al., 2003).

As previously mentioned, the idea exposed by Hagberg and colleagues (2017) that researchers must (re)evaluate the existing frameworks and models, and, additionally, to (re)search for innovative ways to better understand the currently emerging digital retailing landscape, stands as a fundamental cornerstone for the present research.

Premises and conclusions from the mentioned models were analysed, and results considered to this part of the research, with the objective of developing a unique and applicable model that fits the needs of this study. However, for the intended study in this thesis, a focused model should be developed taking into account not only the previous literature on technology acceptance, but also the geographical and demographic characteristics of the region in which this study takes place, Portugal, as well as its current societal situation. Indeed, we find ourselves in a technological era where disruption has become normality (CBRE, 2021), whereas Portuguese companies are striving to become world pioneers in the introduction of technology in the retail sector.

The model that is hereby proposed intends to serve the purpose of adapting a value maximization perspective to the current needs of technological retailing landscape, as well as to fit the state of the Portuguese Retailing Sector, a sector that as previously seen is heavily investing in the introduction of new technology in the customer journey.

Suggested as further research by Curran and Meuter (2005) "*other factors could be included to gain a fuller understanding of the successful implementation of technology*" (Curran & Meuter, 2005). In a time where macro environmental factors gain increasing importance, such as the pandemic state the

world and Portugal are facing, or the privacy issues that have been discussed for several years, it becomes particularly relevant to pair the previously studied factors with these new ones. Finding ourselves in a COVID-19 era brings to light consumer needs of health safety that erstwhile were not as relevant, as well as additional risks that were not an issue of in the past, such as privacy risk, which may bare significant impact in the decision to adopt a technology and must not be ignored.

Through this line of thought, and first and foremost, the study by Curran and Meteur (2005) regarding the comparison between three banking self-service technologies strikes as the most relevant to the present research, with the authors proposing four antecedent beliefs that explain attitude towards adoption, which they had themselves derived from previously established literature on technology acceptance models. With these four dimensions as a cornerstone to the present study, nonetheless numerable antecedent beliefs / dimensions were considered to be part of a model that best explains the technological and socio-demographic context of this research, from which the following emerged as the most relevant:

Usefulness: defined by Curran and Meteur (2005) as well as in the Technology Acceptance Model (Davis et al., 1989) as the "*subjective probability that using the technology would improve the way a user could complete a given task*", and is directly related to the utility value that emerges from the use of the system (Pantano & Di Pietro, 2012). The TAM, in its own context, determines that usefulness is a strong determinant of behavioural intention to use a technology (Davis et al., 1989). The SST attitude/intention to use model also found usefulness to be significant when explaining attitude towards the adoption of the SST.

Ease of Use: first defined in the Technology Acceptance Model as the "*degree to which the prospective user expects the target system to be free of effort*" (Davis et al., 1989), and perfectly and in a rather simpler way described as the degree to which a system is user-friendly, in a manner that can be of use to a greater audience with consumers from different backgrounds, technological skills and capabilities (Kaushik & Rahman, 2015). On a similar note, ease of use can be described as encompassing effort and complexity into a single concept (Dabholkar, 1996), with this study determining that ease of use is an significant determinant of the service quality. The TAM, again in its own context, determines ease of use to have a significant yet indirect impact on behavioural intentions to use a technology (Davis et al., 1989), while the SST attitude/intention to use model finds ease of use to also be significant when explaining attitude towards the adoption of the SST (Curran & Meuter, 2005).

Need for interaction: is defined as a wish to maintain personal contact with personnel during a service encounter (Curran & Meuter, 2005; Dabholkar, 1992). This dimension is seen as valuable in a service encounter since consumers evaluate the quality of the service by the nature of the interaction (Dabholkar, 1996). Although the antecedent belief of need for interaction did not show evidence of being significant in any of the three technologies studied in the cornerstone article of this research (Curran & Meuter, 2005), the authors suggest that it might be relevant in another context, and given the cultural characteristics of the Portuguese population, it makes sense to include this dimension in the study.

Risk: can be described as the probability of a negative outcome when engaging in a certain behavior (Curran & Meuter, 2005), one that consumers will try to minimize as much as possible. Risk concerns, in the cited article, were the only significant antecedent belief in the newest SST, which demonstrates the importance it can have in certain contexts. Despite being such a broad term, risk may now bare different a meaning than the one it had in 2005 and before, as different risks such as privacy risk have emerged.

Performance: can be described in simple terms as "did its job". Although the concept of performance is used in UTAUT as the degree to which the use of a system can help in attaining a gain (Venkatesh et al., 2003) can be confused with the notion of usefulness, it is possible to define distinctly performance through the attitudinal model of technology-based self-service as encompassing the accuracy and reliability of the technology-based self-service (Venkatesh et al., 2003).

Fun: also know as enjoyment, is described by scholars as an intrinsic characteristic that arises from the novelty aspect (Dabholkar, 1996), as consumers value the fun involved in using a product/technology. Fun refers to the extent to which an activity of using a technology is perceived to produce enjoyment (Kim et al., 2007). This construct, according to the Value-based Adoption Model, represents an intrinsic and affective behaviour (Kim et al., 2007). The VAM, on the one hand, does not find enjoyment to have a great effect on perceived value compared to other dimensions. On the other hand, the Attribute based Model found enjoyment to be an important determinant, under three different situational contexts, of service quality (Dabholkar, 1996).

Health Safety: the COVID-19 pandemic emerged a disease and quickly turned into a public health crisis that affected everyone all over the world (UN, 2020), including the way in which consumers shop at and perceive grocery stores. Health Safety emerges as a construct extracted from the risk dimension presented above (Curran & Meuter, 2005), since health risk constitutes a large enough risk that has reached proportions to grant the need to be studied as an independent antecedent dimension. From a basis on the proposed definition of risk, health risk can be conceptualized as the probability of a negative outcome when engaging in a certain health defying behaviour.

3.2 Hypotheses

Throughout this literature review, a comprehensive review of articles and other forms of content pertaining to the subjects under study was presented, contributing to the development of a unique and focused model from which hypotheses can be derived and studied.

Firstly, this research will focus on the attitudes developed towards each Self-Service Technology, and how they differentiate from one another.

H1: Attitudes towards different SSTs used for the checkout phase will be separate and distinct from one another.

H2: The attitude towards a more broadly adopted technology will be more positive than those less broadly adopted.

Secondly, a connection between the attitude towards the SST and the behavioural intention to use it will be studied.

H3: The attitude towards a specific SST will influence a consumer's behavioural intentions to use that SST.

Lastly, each of the seven dimensions that compose the model will be studied in regard to a relationship with the attitude towards the SST, to determine whether they are significant antecedent beliefs, and to what extent.

H4: The usefulness of the SST will be positively related to the attitude towards the SST.

H5: The ease of use of the SST will be positively related to the attitude towards the SST.

H6: The need for interaction with employees will be negatively related to the attitude towards the SST.

H7: The risk of the SST will be negatively related to the attitude towards the SST.

H8: The performance of the SST will be positively related to the attitude towards the SST.

H9: The fun in the use of the SST will be positively related to the attitude towards the SST.

H10: The health safety perceived from the use of the SST will be positively related to the attitude towards the SST.

All of the presented hypotheses come together in a visual representation through the conceptual framework that is displayed in the next sub-chapter.

3.3 Conceptual Framework

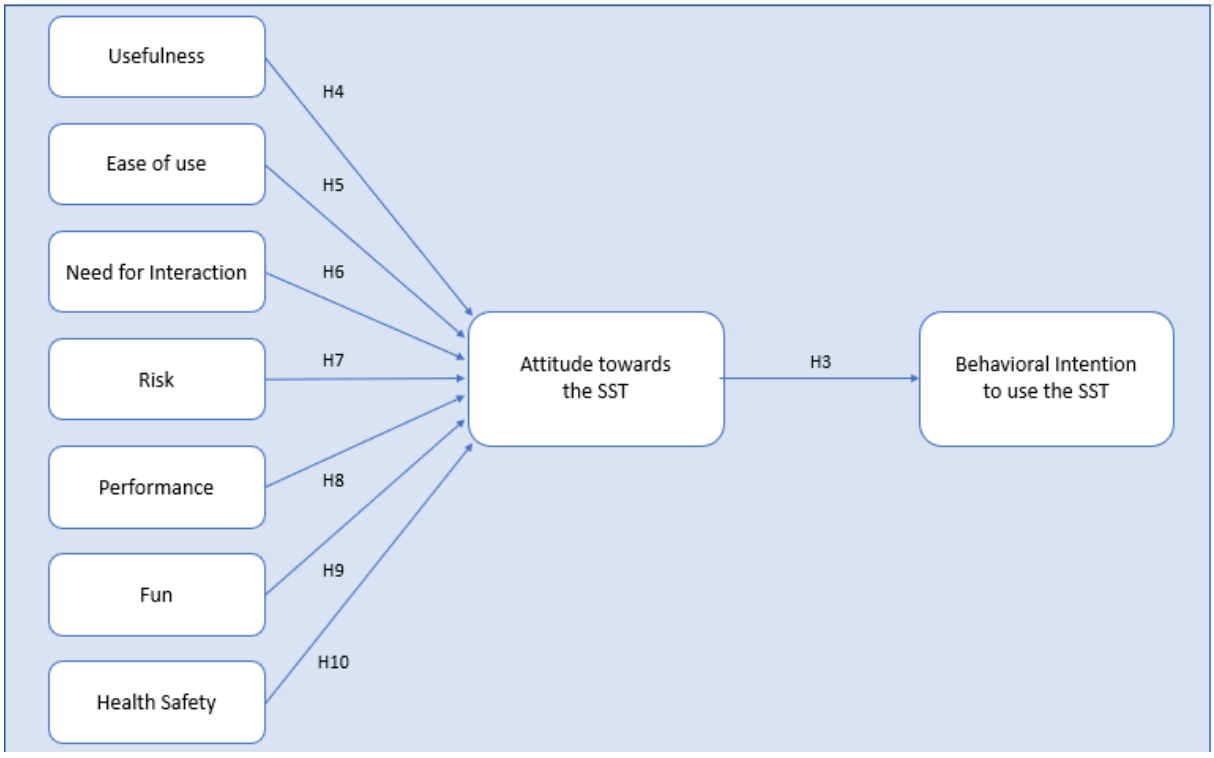

Figure 1 - Conceptual Framework

CHAPTER 4: METHODOLOGY

In this chapter, the methodology used in order to study the proposed hypotheses will be presented. Firstly, secondary data will be discussed, followed by the unveiling of the primary data, which stands as the main form of data collection in this research and encompasses both qualitative and quantitative research.

4.1 Secondary Data

Resorting to secondary data has proven essential in constructing a possible scenario with literature on similar topics and related subjects, that even though do not paint the full picture of the present circumstances give a plausible and steady base to start the research.

Secondary data stands as a cornerstone to the present research, as the extensive literature on technology acceptance models, particularly the articles that cover self-service technology lay a solid basis for the conceptualization of this study. The research on the antecedent beliefs that form the attitude towards adoption serves not only as theoretical background, but also as root for the formulation of hypotheses, questionnaire design and quantitative data collection and analyses. The SST attitude/intention to use model (Curran & Meuter, 2005) stands as the most relevant use of secondary data, with noteworthy mentions of the Technology Acceptance Model (Davis et al., 1989), the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), the Value-based Adoption Model (Kim et al., 2007) and the Attribute based Model (Dabholkar, 1996) which provided this research with valuable insights, knowledge and a solid background of information.

4.2 Primary Data

The primary data of this research will encompass a qualitative and a quantitative part. In similar fashion to the sub-chapter 2.5 where a retailer's perspective and a consumer's perspective of the technology adoption process is depicted, the qualitative research will consist on gathering insights from the ones responsible for implementing the technologies in scope in the two largest grocery retailers in Portugal, through interviews, while the quantitative data will consist of the three questionnaires to the target audience of such retailers, in an attempt to study the consumer perspective.

4.2.1 Qualitative Research

This part of the research will involve interviews that will be conducted digitally. It is important to note that this is not the primary method of research, as the qualitative data stands as the focal point of this study, and as the main source of data and outputs for analysis. In this sense, the main objective of this part of the research is to gather real-world knowledge with a different perspective that would not be possible through quantitative data, as a way of enriching the discussion and reaching stronger conclusions that can have clear managerial implications. Since the present dissertation is contextually connected to Portugal, it is important to consider expert knowledge in this particular Portuguese sector.

Two interviews will be held with persons of interest responsible for the adoption of innovation in the two largest retailers in Portugal, Continente and Pingo Doce, which are also the most innovative ones and have been pioneers in implementing the technologies in-scope in this dissertation in the last years and even decades.

The interviews will be semi-structured: a guide of topics to discuss will be created and structured, even though the aim is to have an open interview where the interviewee has free space to follow different discussion paths, with the following guide standing merely as indicative of the topics to discuss. Follow-up questions and clarifications may be included in each interview in an unstructured manner. In this sense, in the next table the interview guide will be displayed:

1. My study focuses on how the consumer reacts and adopts self-service technology implemented in the Customer Journey. What I would like to start by understanding is how the process of adopting and implementing a technology by the Retailer works, such as, for example with the cases of the Self-service checkout, MBWay Payment and Cashierless stores.
2. In what part of the innovation process is the consumer, and the way in which he interacts and perceives the technology in question, taken into account?
3. Is some type of customer segmentation used in the technology development process? Is the technology is aimed at early adopters or how is the less tech-savvy consumer considered?
4. What do you think consumers value in a technology they will use in store? What do they value in the mentioned technologies of Self-service checkout, MBWay Payment and Cashierless stores.
5. In my study, I consider some antecedent beliefs to the use of a technology by the consumer that will lead to the formation of their attitude towards the adoption of that technology, such as usefulness, ease of use, risk, need for interaction, performance, fun and health safety. What do you consider to be the most important antecedent beliefs for the consumer in this process? Are there any dimensions that you consider important in addition to those described?
6. What do you consider to be the trends for the future of in-store technology?

4.2.2 Quantitative Research and Data Collection

For the quantitative data part of this study, it was pertinent to resort to online questionnaires, which stand as the most efficient and appropriate way of collecting consumer insights.

The study was designed to find evidence on the relationship between behavioural intention to use a technology, the attitude towards that technology, and the antecedent beliefs that may form that attitude, as proposed in the developed model in Chapter 3. Additionally, the questionnaires will serve as the main source of primary data to test the proposed hypotheses and reach the main conclusions of the present research. Together with the qualitative data, the analyses and obtained results will contribute to enrich the discussion regarding the topic in hand.

The surveys were designed through the Qualtrics' platform, and the results were analysed resorting to the SPSS software.

Due to the resource constraints, responses were obtained through a non-random method, with the bulk of responses emerging from a network of contacts. Every participant willingly and voluntarily took part in the study without receiving any sort of payment or compensation. The survey was shared digitally, through e-mail, social media and other forms of digital communication, in order to maximize the number of participants.

4.2.2.1 Procedure

The questionnaires were composed by five blocks: (1) Introduction; (2) Screening Question; (3) Technological Context; (4) Technological Attributes; (5) and lastly (5) Demographics. After a brief introduction to the study, participants were presented with a screening question – "Do you currently reside in Portugal?" – which intended to filter the responses to the survey by allowing to proceed with the questionnaire only those that answered as "Yes" and that are, therefore, under the scope of analysis.

Next, the threshold of residents in the country were presented with the Technological Context where they were randomly and evenly assigned to one of three possible supermarket technologies: 1) Self-service Checkout, 2) MBWay Payment, or 3) Cashierless Stores. To clarify, three different surveys were created for each one of the three technologies. Respondents, through the randomizer function of Qualtrics were initially randomly assigned to one of the three questionnaires. This function was implemented due to the fact that asking participants to answer all sets of questions for the three technologies would significantly reduce the rate of responses; and in this way it would be possible to maximize the randomness of the three samples of participants. The three surveys were developed from a base model of the same questions for each one of them, replacing solely the name of the SST, accompanied by minor language adaptations that do not impact any meaning of each sentence.

In block (3) regarding the technological context, participants were given a description of the technology, complemented with an illustrative picture, and asked a set of five questions to assess their usage and knowledge of the technology. These first four of the five questions were dichotomous questions that only had the choices of Yes/No and determined whether the participant was familiarized with the technology, if he knows how to use it, if he knows any supermarket that offers this technology, if his usual supermarket offers this technology and whether had ever used the technology before. When the answer to this last one regarding the past use of the technology was positive, a sixth question would appear, using a likert-type scale to determine how often the respondent uses that technology.

After being familiarized with the technology to be addressed in their questionnaire, participants proceed to the main block of questions where it was (i) first measured the seven antecedent beliefs that form an attitude towards the technology, including: (I) Usefulness, (II) Ease of use, (III) Need for interaction, (IV) Risk, (V) Performance, (VI) Fun, (VII) Health Safety, (ii) then their attitude towards the technology, and (iii) finally their intention to use the SST.

At the end of the survey, demographic data was collected, regarding the gender, age, nationality, degree / level of school, current employment status, marital status and gross personal income per month.

4.2.2.2 Measures

The measures used to study each of the seven components of the model, as well as the attitude and behavioural intention were all adapted from multiple renowned articles, which add to the validity of the present study. Each item, however, was adapted to fit the technologies in scope as well as the context in hand. The full adaptation from the original was structured in a table of adaptation of constructs and respective sources, which can be consulted in the end of the present chapter.

The first construct in the model was Usefulness, which measured through the scale proposed by Curran & Meuter (2005), adapting a three-item scale for attitude towards the SST, which in turn was created/used by Adams et al. (1992), Davis et al. (1989), Igbaria et al. (1996) and Jackson et al. (1997). Each one of the three items/questions defined to measure this construct was quantified through a psychometric Likert-type scale of 7 points (1 - Strongly Disagree to 7 – Strongly Agree).

Secondly, Ease of Use was measured similarly to the previous construct, resorting to the scale proposed by Curran & Meuter (2005) which in turn adapted the three items from Dabholkar (1994) and Davis et al. (1989). Each one of the three items/questions defined to measure this construct was quantified through a psychometric Likert-type scale of 7 points (1 - Strongly Disagree to 7 – Strongly Agree).

Thirdly, Need for interaction was measured, again, through the three-item scale proposed by Curran & Meuter (2005) and adapted from Dabholkar (1996). Each one of the three items/questions defined to measure this construct was quantified through a psychometric Likert-type scale of 7 points (1 - Strongly Disagree to 7 – Strongly Agree).

Fourthly, Risk was a construct that Curran & Meuter (2005) adapted to a four-item scale, which will be the one endorsed by the present study. It was first adapted by the authors from Dabholkar (1996); Meuter and Bitner (1998) and Murray (1991). Each one of the four items/questions defined to measure this construct was quantified through a psychometric Likert-type scale of 7 points (1 - Strongly Disagree to 7 – Strongly Agree).

Since in this study the model is expanded to seven constructs (compared to the four proposed by Curran & Meuter (2005)), the two following dimensions were adapted from different models, whereas the last one of Health Safety was adapted from the previously described construct of Risk.

The Performance dimension was adapted from Dabholkar & Bagozzi 2002, which in turn used the four-item scale from Dabholkar (1994). Each one of the four items/questions defined to measure this construct was quantified through a psychometric Likert-type scale of 7 points (1 - Strongly Disagree to 7 – Strongly Agree).

The Fun construct was similarly adapted from Dabholkar & Bagozzi (2002), which once again adapted the four-item scale from Dabholkar (1994). Each one of the four items/questions defined to

measure this construct was quantified through a psychometric Likert-type scale of 7 points (1 - Strongly Disagree to 7 – Strongly Agree).

The last construct of the antecedent beliefs is Health Safety, which was adapted from the previously described construct of Risk, as it stands as a large enough risk that has reached proportions to grant the need to be studied as an independent antecedent dimension. In this sense, the description of the risk in the three-item scale proposed by Curran & Meuter (2005) as described above was adapted into a description that relates to health risk.

Having defined the measures for the seven antecedent beliefs, it is of paramount important to also define the measure of Attitude towards the SST, which was adapted from the three-item measure proposed by Curran & Meuter (2005) and previously created and studied by Barki and Hartwick (1994); Dabholkar, 1996 and Harrison et al. (1997). Each one of the three items/questions defined to measure the attitude was quantified through a psychometric Likert-type scale of 7 points, although using different metrics when measuring feelings towards the SST (1 - Strongly Disagree to 7 – Strongly Agree), how pleasant it is to use the SST (1 – Very Unpleasant to 7 – Very Pleasant), and the extent to which the respondent likes the SST (1 – Strongly Dislike to 7 – Strongly Like).

Lastly, the Behavioural intention to use the SST was measured through the single item measure created by Curran & Meuter (2005) for their context and adapted in this study to fit the present shopping context.

Construct		Original Item	Adapted Item	Scale	Authors
Antecedent beliefs of attitude towards the SST	Usefulness	The SST is useful for doing my banking	The SST is useful for doing my grocery shopping	(strongly disagree, strongly agree) - likert type scale - 7 items	Curran & Meuter, 2005 (Adams et al., 1992; Davis et al., 1989; Igbaria et al., 1996; Jackson et al., 1997)
		Using the SST improves the way in which I do my banking	Using the SST improves the way in which I do my grocery		
		Using the SST makes doing my banking easier	Using the SST makes doing my grocery shopping easier		
	Ease of Use	Learning to use the SST was easy for me	Learning to use the SST was / will be easy for me		Curran & Meuter, 2005 (Dabholkar, 1994; Davis et al., 1989)
		I find the SST difficult to use	I find the SST difficult to use (R)		
		It was easy for me to become skillful at using the SST	It was / will be easy for me to become skillful at using the		
	Need for Interactio	I enjoy seeing the people who work at my bank	I enjoy seeing the people who work at my supermarket (R)		Curran & Meuter, 2005 (Dabholkar, 1996)
		Personal attention by the people at my bank is not important to me	Personal attention by the people at my supermarket is not important to me		
		The people at my bank do things for me that no machine could	The people at my supermarket do things for me that no machine could (R)		
	Risk	I feel secure conducting my banking business using the SST	I feel secure conducting my shopping using the SST		Curran & Meuter, 2005 (Dabholkar, 1996; Meuter and Bitner, 1998; Murray, 1991)
		I feel safe conducting my banking business using the SST	I feel safe conducting my shopping using the SST		
		I know that the SST will handle my business correctly	I know that the SST will handle my shopping correctly		
		There is little danger that anything will go wrong when I use the SST	There is little danger that anything will go wrong when I use the SST		
	Performance	Using a touch screen for self-service means I will get just what I	Using the SST means I will be able to process the payment		Dabholkar & Bagozzi 2002 (Dabholkar 1994)
		Using a touch screen for self-service will result in errors in the	Using the SST will result in errors in the payment (R)		
		is something I don't expect to work very well	Using the SST is something I do not expect to work very well		
		Using a touch screen for self-service will be reliable	Using the SST will be reliable		
	Fun	Using a touch screen for self-service will not be interesting	Using the SST will not be interesting (R)		Dabholkar & Bagozzi 2002 (Dabholkar 1994)
		Using a touch screen for self-service will be entertaining	Using the SST will be entertaining		
		Using a touch screen for self-service will not be fun	Using the SST will not be fun (R)		
		Using a touch screen for self-service will be enjoyable	Using the SST will be enjoyable		
	Health Safety	I feel secure conducting my banking business using the SST	I feel my health is secure conducting my shopping using the		Curran & Meuter, 2005 (Dabholkar, 1996; Meuter and Bitner, 1998; Murray, 1991)
		I feel safe conducting my banking business using the SST	I feel my health is safe conducting my shopping using the SST		
		I know that the SST will handle my business correctly	I know that the SST will be provide me a hygienic experience		
		There is little danger that anything will go wrong when I use the SST	Regarding my health, there is little danger that anything will go wrong, when I use the SST		
Attitude towards the SST		How good or bad do you feel about using the SST?	How good or bad do you feel about using the SST?	(very bad, very good) - likert type scale - 7	Curran & Meuter, 2005 (Barki and Hartwick, 1994; Dabholkar, 1996; Harrison et al., 1997)
		How pleasant or unpleasant is it to use the SST?	How pleasant or unpleasant is it to use the SST?	(very unpleasant, very pleasant) - likert type scale - 7 items	
		How much would you say that you like or dislike using the SST?	How much would you say that you like or dislike using the SST?	(strongly dislike, strongly like) - likert type scale - 7 items	
Behavioral Intention to use the SST		When you have routine banking to do, how likely are you to use the SST?	When you have routine shopping to do, how likely are you to use the Self-Service Checkout?	(extremely unlikely, extremely likely) - likert type scale - 7	Curran & Meuter, 2005

CHAPTER 5: QUALITATIVE DATA ANALYSIS

5.1 Retailer Interview I - Analysis and main takeaways

One of the first relevant takeaways from the interview with Dr. Frederico Santos is his unique perspective on technology, as he views it as an enabler, an experience simplifier or even an accelerator of experiences. This insightful description deductively and automatically points towards the usefulness, ease of use and performance dimensions in-scope in the present study, as they emerge as key antecedent beliefs in the retailer's perspective.

According to Dr. Frederico Santos, the checkout process is divided into 5 categories / phases:

Waiting Time
Product Identification
Customer Identification (when applicable)
Payment
Document issuance

These phases are sequential and start with a period of waiting time, which ideally does not exist, go through the product identification phase for example with the use of barcodes (which stands as an increasingly relevant phase in the current state of retail technology) and, if applicable depending on the consumer, a customer identification is in order that allows for the participation in loyalty programs. Afterwords, payment is due and documents such as invoices are issued. These phases vary between themselves on the extent to which each one is more the responsibility of the client or the retailer, whether it is done with the customers devices and whether it is a fully digital or physical experience. These are the aspects that change the experience for the consumer in the checkout phase of the consumer journey.

Dr. Frederico Santos provides the useful example of the self-scanning Continente Store that although not in scope for this study, has the consumer identification, the payment and the document issuance phases fully digitalized. The major break-through that the brand new cashierless stores provide is the complete digitalization of the product identification phase, which may contribute for higher scores in the antecedent beliefs of usefulness (improves one of the phases of the experience significantly), ease of use (less tasks and less effort on the customer side), and health safety (less contact with physical store devices).

In what concerns mobile payments such as the MBWay payment method, the interviewee considers that the difference is not significant when compared with, for example, credit card technologies. This take covers the usefulness dimension of the present research, in a manner that may suggest that this innovative payment might not be considered such a strong determinant of behavioural intentions as is suggested in the TAM (Davis et al., 1989), since according to the interviewee there are several different

technological options to achieve this same goal. On an interesting side note, the interviewee mentions that it is not about forcing the consumer to adopt a technology, but to give them options.

Regarding the timeline of the adoption process, Dr. Frederico Santos states that every innovation goes through generational and cultural evolutions, which is something normal, giving the example that 10 years ago much less people were willing to pay using a card. However, the interviewee also notes that there are still consumers who refuse to pay by card, going to the extent of withdrawing money from an ATM before entering the grocery store for not trusting the supermarket's payment methods. In fact, according to Dr. Frederico, a great majority of the Portuguese population uses cash to grocery shop, still not embracing trivial technologies such as credit/debit cards or any mobile payment technology, an idea that enhances the purpose of this research, giving it relevance and practical implications.

After being asked in a more straightforward but open way about the antecedent beliefs that are behind the attitude towards the adoption, the interviewee describes a balance of different criteria, in a "game" of positive and negative dimensions. On the negative side, the extra effort and time that is needed as a first-time technology user, with a lot of uncontrollable risks associated with the experience, which encapsulates the ease of use as well as risk dimension portrayed in the present study. When the benefits outweigh the negatives, that is when the consumer decides to try the technology, and that is the moment all the other dimensions come into play.

5.2 Retailer Interview II – Analysis and main takeaways

Eng.º Luís Ribas insightfully starts by describing technology's main objective in retail as the enhancement of the shopping experience, providing the consumer benefits from its usage.

The interviewee highlights the main benefit of the self-checkout technology as a way for consumers to avoid previously unavoidable waiting queues, pointing out that on the one hand consumers would typically prefer a normal checkout till as a way of not having to conduct the checkout task themselves, whereas on the other hand consumers enjoy both the quickening of the checkout process and subconscious less perceived checkout time due to the consumer's mind being occupied while performing the self-checkout.

Through this duality of perceived benefits and sacrifices, the interviewees insights serve as guidance towards the importance of the usefulness dimension that emerges from the aforementioned benefits such as avoiding a waiting period in the checkout process.

Eng.º Luís Ribas explains that offering both technological and non-technological solutions is Pingo Doce's model, as is the cases of the self-service checkout technology operating in parallel with normal shopping tills, and also the payment methods with MBWay payment, Multibanco and physical cash being consistently and simultaneously available. The only exception is the cashierless store Pingo Doce & GO that requires an app to conduct the grocery shopping.

Another important takeaway that emerged from this interview is the difference in what the retailer and the consumer consider a benefit. What might look like a benefit for the retailer may be perceived as

a worse service by the consumer. This can be case of a full transformation from normal checkout tills to self-service checkout technology, where, for example, a consumer that is used to chat with the checkout employee while their items are being scanned, will consider the change to the SSCO a downgrade in service quality. This notion perfectly encapsulates the need for interaction antecedent of the proposed model.

Regarding the MBWay payment method, the interviewee views several different scenarios that can generate distinct incremental benefits. When discussing a change from physical cash payment to the MBWay payment, the incremental benefit is huge. However, when discussing a change from a contactless card payment to the MBWay payment, the incremental benefit is relatively minor.

When considering the antecedent beliefs that form the attitude towards the technology, Eng.º Luís Ribas highlights convenience as the predominant dimension (portrayed in the model as usefulness), as health safety concerns due to the COVID-19 pandemic pose as an outlier and privacy risk concerns only affecting a smaller plethora of individuals.

Additionally, the interviewee analyses the Portuguese landscape of retail consumers, which can be described by its multitude of characteristics of the up-to five generations the visit the store on a regular basis. With an inverted demographic pyramid in the country, leaving the older segments of the population that value the current physical in-store experience to cater to early-adopters of technology would be a mistake.

According to the Eng.º Luís Ribas, solutions to current retail problematics are already here, even if only as a prototype in a lab, and the challenge now is to determine what the consumer actually values.

CHAPTER 6: QUANTITATIVE RESULTS' ANALYSIS AND DISCUSSION

In this chapter, a quantitative analysis to the results obtained through the questionnaires will be conducted. Objective and quantifiable results will be extracted, and conclusions will be drawn. Although there will be a separate sub-chapter dedicated to the discussion of the results, an analysis of the outcomes will be conducted throughout the presentation of the forthcoming analyses, as a way of contextually and cohesively explaining the results.

6.1 Demographics

In terms of demographic characteristics, the samples revealed fairly homogeneous across the three groups of study.

Study I – Self-Service Checkout

A total of 92 valid responses were collected. Regarding demographic characteristics, the sample presents a predominance of women (60,9%) over men (39,1%), married or in a domestic partnership (53,3%), and with ages mainly ranging from 35 to 64 years old (66,3%). Mostly Portuguese citizens (95,7%), employed (76%) and with a gross income up to 1499€ (53,3%), this sample presents high levels of education with nearly all participants holding an academic degree (58,6%). (Appendix D)

Study II – MBWay Payment

In whole, 86 questionnaires were completed. The majority of the sample is Portuguese (97,7%) and composed by women (55,8%), either married/ in a domestic partnership (43,0%) or single (40,7%), and with ages ranging from 25 to 54 years old (68,6%). Most participants hold an academic degree (73,3%), are full-time workers (75,6%) and have a gross income up to 1499€ (58,1%). (Appendix E)

Study III – Cashierless Stores

The Cashierless Stores' survey totalled 91 responses from mostly women (54,9%), participants married or in a domestic partnership (46,2%), and with ages evenly ranging from 18 to 64 years old (92,3%). Most with a gross income up to 1499€ (54,9%), the vast majority holds an academic degree (59,4%) and is currently employed full-time (67,0%). (Appendix F)

6.2 Usage and Knowledge

In order to test the knowledge that the participants of the survey possessed of each respective technology, as well as the degree to which they used them, the respondents were asked a series of questions. With this analysis, the present study aims to explore the current usage rates and knowledge of each of the SSTs.

Study I – Self-service Checkout

On the first survey, 70% of the respondents said to be familiar with how the self-service checkout works, with almost 90% knows a supermarket that offers the possibility to use it, which was expected from a technology that has been in the country for more than 15 years and that is generally widespread.

However, only 51% say the supermarket they usually go to has it this technology available. 75% say they have already used it, of which 62% say they do not use it often. (Appendix M)

Study II – MBWay Payment

Regarding the second Study, 74% is familiar with how the MB WAY payment works, while almost 81% knows a supermarket that offers the possibility to use it, which is surprising considering that the technology has been around for not much longer than 5 years. 77% say the supermarket they usually go to has it this technology available, while 62% say they have already used it, of which 89,5% say they do it "often". (Appendix N)

Study III – Cashierless Stores

In what concerns Study III regarding Cashierless Stores, 61,5% is not familiar with how the cashierless store works, with only 21,3% saying they know a supermarket that works this way. However, only 4,4% say the supermarket they usually go to has this technology available. Additionally, 13,2% say they have already used it, of which 75% say they do not use it often, which is surprising high considering that there are only 2 active locations with this type of technology in Portugal. (Appendix O)

6.3 Reliability Analysis

A reliability analysis to each of the seven antecedent constructs' scales will be performed. It is of paramount importance to conduct this type of analysis in present research, since it allows for a future analysis to be performed with confidence on the reliability of the scales used. Indeed, a reliability analysis provides information regarding the relationships between each item, within each construct. Additionally, a reliability analysis will be conducted on the attitude towards each SST. No analysis is required on the behavioural intention to use the SST since this construct is composed by only one item.

Cronbach's alpha results are directly connected to the average correlation of the items it is measuring. In this reliability analysis, a rule of thumb will be used to determine how reliable a construct in the forthcoming analyses, defining Cronbach's alpha thresholds for what is considered an acceptable value (George & Mallery,2003):

Above .9 and below 1	Excellent
Above .8 and below .9	Good
Above .7 and below .8	Acceptable
Above .6 and below .7	Questionable
Above .5 and below .6	Poor
Below .5	Unacceptable

Study I – Self-service Checkout

The constructs that display greater internal consistency among their scale items, in Study I regarding the Self-service Checkout, are Health Safety with a Cronbach's alpha of (α=0.896), risk with a Cronbach's

alpha of (α=.891), usefulness with (α=.891) and performance and performance and fun with (α=.820) and (α=.813), respectively. In the computed average of the items for each of these five antecedent beliefs the results were positive, ranking as having a "good" internal consistency and are therefore, reliable. (Appendix G)

On the other hand, the two remaining constructs of ease of use and need for interaction display lower Cronbach's alphas of (α=.681) and (α=.640), respectively, which throw the dimensions into the "questionable" category of the reliability rule of thumb. In this sense, and even though the remaining analyses for these constructs will still be performed, the reliability of the measures should not be taken at face-value, as the reliability of the items cannot be fully accepted.

Additionally, it is possible to state that the three items that compose the scale of attitude towards the SST are reliable and fully consistent, as the dimension displayed an "excellent" Cronbach's alpha of (α=.938).

Study II – MBWay Payment

In study II, referring to the MBWay Payment technology, the reliability indexes are visually different from the ones obtained in Study I for the same constructs. In fact, the ones that this time around displayed greater internal consistency among their scale items were usefulness (α=.975) and risk (α=.941), with "excellent" Cronbach's alphas. With "good" or "acceptable" Cronbach's alpha values stand the constructs of Performance with (α=.801), Health safety (α=.789) and fun (α=.789). Again, as in Study I, ease of use and need for interaction were the ones with the lowest Cronbach's alphas, although the dimension ease of use displayed an "acceptable" value of (α=.711). However, the same did not happen to the need for interaction construct which has a Cronbach's alpha value of (α=.599), standing in the threshold between "questionable" and "poor". In this sense, it is not possible to conclude that there is internal consistency between the item of this construct and therefore, is not a reliable measure. (Appendix H)

Additionally, it is possible to observe that the three items that compose the scale of attitude towards the SST are, once again, reliable and consistent between one another, as the measure portrayed an "excellent" Cronbach's alpha of (α=.950).

Study III – Cashierless Stores

When analysing the conducted reliability analysis to the dimensions that correspond to Study III (cashierless stores), the ones that display greater internal consistency among their scale items are usefulness, risk and health safety, respectively with "excellent" Cronbach's alpha values of (α=.929), (α=.905) and (α=.906). In a similar fashion, the construct of performance with a good value of (α=.866) also presents internal consistency among its items. (Appendix I)

In this particular questionnaire, ease of use has an "acceptable" Cronbach's alpha of (α=.759) and can be considered reliable for further analysis. Need for interaction despite having a higher Cronbach's

alpha than in the other two studies, it still stands at a "questionable" value of (α=.686). On the other hand, the construct of fun has less reliability in this survey when compared to the others, although it is still displayed in the "good" category with (α=.703).

Additionally, the Cronbach's alpha of the attitude towards the SST measure has a significantly high value of (α=.931), which once again demonstrates the greater internal consistency among the scale item of this measure.

6.4 Attitude and Behavioural Intention to Use

To test the different attitudes that participants have towards each technology, a paired samples t-test was conducted. This is possible since the assumptions of scale of measurement (which needed to be continuous or ordinal), random sampling and adequacy of sample size are all met. Additionally, the sample is sufficiently large to evoke the Central Limit Theorem that the normalized sum tends to a normal distribution, even if the original variables are not normally distributed.

When conducting the paired samples t-test between the pairs of the three technologies, it is possible to observe that pair 1 consisting of SSCO and MBWay Payment have a significant correlation with a p-value of (p=.001), while pair 2 consisting of SSCO and MBWay Payment have (p=.047), and pair 3 consisting of MBWay Payment and Cashierless Stores have (p=.001). The meaning behind these values is that there are different attitudes for each one of the different technologies, which supports H1 that stated that attitudes towards different SSTs used for the checkout phase will be separate and distinct from one another. (Appendix P).

Now that H1 was accepted, it is possible to state that the attitudes are separate from each other, H2 will be tested with a simple comparison of the means. Using descriptive statistics (Appendix Q), it is evident that the attitude towards the Self-Service Checkout ($\bar{x}$=3.9746) was inferior to those of the attitude towards the MB Way Payment ($\bar{x}$=5.2829) and the attitude towards the Cashierless Stores ($\bar{x}$=4.8974). Therefore, and unlike the study of Curran and Meuter (2005), the attitude towards a more broadly adopted technology was not more positive than those less broadly adopted, rejecting H2.

Additionally, and before the study of the relationship between the antecedent constructs and the attitude towards the SSTs, it is of paramount importance to study the association between the attitude towards the SST and the behavioural intention to use the technology, as this is an integral part of the proposed conceptual model that translates attitudes into actual real intentions.

In Study I regarding Self-Service Checkout, first conducting a Pearson correlation analysis, it is clear that attitude towards the SST is highly correlated with behavioural intention to use the SST with a "ρ" (Pearson correlation coefficient) of (ρ=.786) (Appendix R), from which we can derive meaning that there is a strong positive correlation between the attitude and the behaviour intention towards the use of the Self-Service Checkout. Through a linear regression between the dependent variable of behavioural intention and the independent variable of attitude, it will be possible to determine whether these correlations mean that the constructs are also determinants of the attitude. Analysing the ANOVA table

(Appendix R), it can be determined that the slope of the line is not zero, with a significance of (p=.000), which is ideal. In the sub-section of this model and given that the study is at this moment dealing with only 1 independent variable, the multicollinearity assumption is not applicable, and the sample size is enough to study the R Square comfortably, which stands at a .619 with a significance of (p=.000), which means the model is a good fit and the independent variable of attitude integrated in this particular model explains 61.9% of the dependent variable of behavioural intention to use the SST. Looking at the standardized coefficient for attitude towards the SST validates once again these results, with a value of .786 and a significance of (p=.000). In this sense, H3 is supported by the findings in Study I.

In Study II, in what concerns the MBWay Payment, conducting a Pearson correlation test, it is clear that attitude towards the SST is highly correlated with behavioural intention to use the SST with a "ρ" (Pearson correlation coefficient) of (ρ=.703) (Appendix S), from which we can derive meaning that there is a strong positive correlation between the attitude and the behaviour intention towards the use of the MBWay Payment. Applying once again a linear regression between the dependent variable of behavioural intention and the independent variable of attitude, it will be possible to determine whether these correlations mean that the constructs are also determinants of the attitude. Analysing the ANOVA table (Appendix S), it can be seen that the slope of the line is not zero, with a significance of (p=.000), which is ideal. The multicollinearity assumption is once again not applicable, given that the study is at this moment dealing with only 1 independent variable and the sample size is enough to study the R Square comfortably, which stands at a .703 with a significance of (p=.000), which means the model is a good fit and the independent variable of attitude integrated in this particular model explains 70.3% of the dependent variable of behavioural intention to use the SST. When looking at the standardized coefficient for attitude towards the SST validates once again these results, with a value of .703 and a significance of (p=.000). In this sense, H3 is supported, in the same way as Study I, by the findings in Study II.

Finally, on Study III, in what concerns the Cashierless Stores, applying a Pearson correlation analyis, it is clear that attitude towards the SST is highly correlated with behavioural intention to use the SST with (ρ=.735) (Appendix T), from which we can derive meaning that there is a strong positive correlation between the attitude and the behaviour intention towards the use of the Cashierless Stores. Analysing through a linear regression the relationship between the dependent variable of behavioural intention and the independent variable of attitude, it will be possible to determine whether these correlations mean that the constructs are also determinants of the attitude. Analysing the ANOVA table (Appendix T), it can be seen that the slope of the line is not zero, with a significance of (p=.000), which is ideal. The multicollinearity assumption is once again not applicable, given that the study is at this moment dealing with only 1 independent variable and the sample size is enough to study the R Square comfortably, which stands at a .735 with a significance of (p=.000), which means the model is a good fit and the independent variable of attitude integrated in this particular model explains 73.5% of the dependent variable of behavioural intention to use the SST. When looking at the standardized coefficient

for attitude towards the SST validates once again these results, with a value of .735 and a significance of (p=.000). In this sense, H3 is supported by the findings in Study I, II and now also III.

6.5 Antecedent Dimensions

Since in this stage of the analysis we are dealing with means of the items of each construct, the use of parametric tests as is the Pearson correlation test suits the intended purpose, of analysing relationships between overall Likert-type scales, to attempt to study correlations between the antecedent constructs and attitude towards the SST, as was proposed by Dabholkar (1996). However, given that the Pearson correlation test does not distinguish between dependent and independent variables and thus is not enough to establish a causal relationship between each dimension and attitude towards the SST, a multiple linear regression will be conducted.

6.5.1 Study I – Self-service Checkout

Analysing the relationship between the antecedent beliefs in Study I and the attitude towards the Self-service checkout using the Pearson correlation test, it is possible to obtain coefficients of correlation and their respective significance (Appendix J). When looking at the significances (henceforward referred to as "p", short for p-value), all of the averages of the items of the antecedent constructs, 6 out of 7 have a significance of (p=.000), which means the correlation coefficient is indeed significant and explains the correlation between the construct and the attitude towards the SSC. The only other, ease of use, has a significance of (p=.028), which still stands as significant, since (p<.05). It is now possible to analyse the coefficient values with confidence that they are significant.

From studying the correlation coefficients, it is clear that fun, risk, performance and health safety are highly correlated with attitude towards adoption with a "ρ" (Pearson correlation coefficient) of (ρ=.816), (ρ=.812), (ρ=.781) and (ρ=.751), respectively, meaning that there is a strong positive correlation between these three dimensions and attitude towards the Self-Service Checkout. Later, through a multiple linear regression it will be possible to determine whether these correlations mean that the constructs are also determinants of the attitude. On another noteworthy analysis, usefulness (ρ=.599) and need for interaction (ρ=.417) only showcase a moderate positive correlation with attitude towards the technology, whereas ease of use actually has negative (ρ=-.199), although negligible correlation.

Before critically analysing these results, it would be possible to state that correlations between the values of (ρ=.400) and (ρ=.800) would be somewhat expected for constructs that have, in previous studied literature revealed to be predictors of different technologies in diverse contexts (Curran & Meuter, 2005; Dabholkar, 1996).

It is also pertinent to mention some limitations to this analysis, as in the coefficient of the ease of use construct that does not present a credible coefficient. It is also important to remember that both ease of use and need for interaction, for the study of Self-Service Checkout, hold a questionable Cronbach's alpha, which do not vouch for the reliability of the scale used for the constructs.

Additionally, some construct relationships such as fun and risk and also performance and risk appear to have a moderately high correlation which could mean they have some degree of multi-collinearity. Therefore, an analysis of Variance Inflation Factors (VIF) should be performed: when looking at the VIF, all values for all variables are bet 1 and 10, which indicates that there is no multicollinearity between the constructs and the assumption of the multiple linear regression is validated (Appendix J).

Despite these mentioned limitations, it is coherent to accept that these are valid results for the correlations between the constructs and the attitude towards the technology, since they are significant and make sense in the context of the study.

Performing a multiple linear regression, attitude towards the SSCO was defined as the dependent variable, whereas the constructs were defined as the independent or explanatory variables. Through the analysis of the Normal P-P Plot of Regression Standardized Residual (Appendix J), it is possible to confirm the linear relationship assumption of each independent variable with the dependent variable, as they appear to follow into the straight line, with only slight deviations. Additionally, analysing the records through a scatterplot (Appendix J), it is observable that none of the points fall out of the expected -3 to 3 interval, which is ideal, while also validating the homoscedasticity assumption through the distribution of the values; likewise through the Residuals Statistics table it is possible to confirm a minimum standard residual of -2.721 and a maximum of 2.164 which again fall into an acceptable interval. Cook' distance also stands a value much lesser than 1, which is ideal. Analysing the ANOVA table (Appendix J), it can be determined that the slope of the line is not zero, with a significance of (p=.000), which is also ideal.

When looking at the multiple linear regression model summary (Appendix J), it is appropriate to consider the Adjusted R Square value instead of the R Square, since this study is dealing with a limited sample and with the objective of adding reliability and precision with a value that considers the impact of other independent variables. The Adjusted R Square value is .830, with a significance of (p=.000), which means that the developed model explains 83% of the variance in the dependent variable and is, therefore, a good fit.

Looking at the standardized coefficients (displayed in the framework below) and its significances, since the unstandardized are not suitable for comparison among the different variables, it is possible to observe that the antecedent beliefs of ease of use, need for interaction and risk are not statistically significant, findings that do not support H5, H6 and H7. On the other hand, usefulness was significant at the 0.05 level, performance was significant at the 0.01 level and fun and health safety were significant at the 0.001 level, providing support for H4, H8, H9 and H10. When analysing the standardized coefficients that these four constructs made a significant contribution to change in the dependent variable of attitude towards the Self-service Checkout, with fun having the strongest impact on the attitude, also supported by the Part value of 0.200.

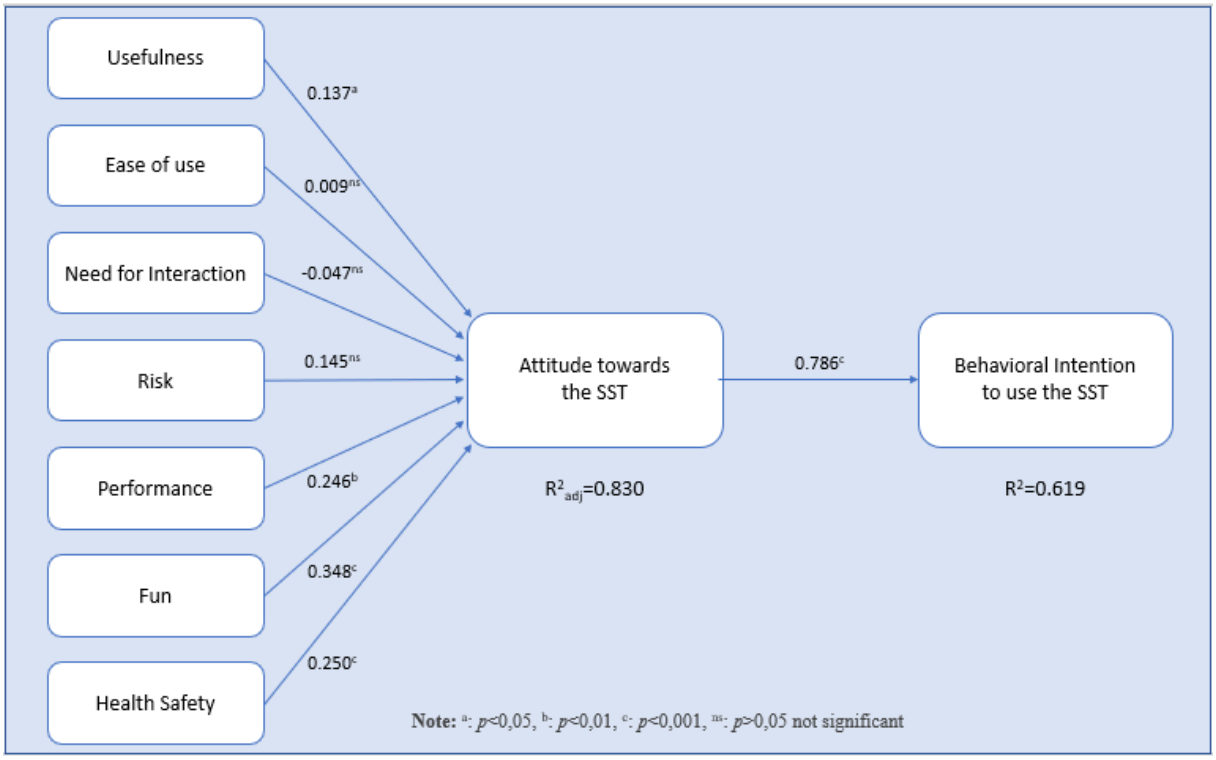

Figure 2 – Self-Service Checkout

6.5.2 Study II – MBWay Payment

When analysing the association between the constructs in Study II and the attitude towards the MB Way Payment using the Pearson correlation test, it is possible to obtain coefficients of correlation and their respective significance (Appendix K). When looking at the significances, all of the averages of the items of the antecedent constructs, similarly to Study 1, only 6 out of 7 have a significance of (p=.000), which means the correlation coefficient is indeed significant and explains the correlation between the construct and the attitude towards the MBWay Payment. However, it is not ease of use that has a different significance here, it is the construct of need for interaction that has a significance of (p=.125), which does not stand as significant, since (p>.05). It is now possible to analyse the coefficient values with confidence that they are significant, with the exception of the need for interaction, which should not be taken into consideration for this particular analysis.

From studying the correlation coefficients, it is clear that risk, fun and usefulness are highly correlated with attitude towards adoption with a "ρ" (Pearson correlation coefficient) of (ρ=.828), (ρ=.778) and (ρ=.721), respectively, meaning that there is a strong positive correlation between these three dimensions and attitude towards the MBWay Payment. Later, through a multiple linear regression it will be possible to determine whether these correlations mean that the constructs are also determinants of the attitude. On another noteworthy analysis, performance (ρ=.679), ease of use (ρ=.658) and health safety (ρ=.634) only showcase a moderate positive correlation with attitude towards the technology.

Before critically analysing these results, it would be possible to state that correlations between the values of (ρ=.400) and (ρ=.800) would be somewhat expected for constructs that have, in previous

studied literature revealed to be predictors of different technologies in diverse contexts (Curran & Meuter, 2005; Dabholkar, 1996), with only fun falling slightly out of this interval.

It is also pertinent to mention some limitations to this analysis, as in the coefficient of the need for interaction construct that is not significant. It is also important to remember that the antecedent of need for interaction, for the study of MBWay Payment, held a questionable Cronbach's alpha, which do not vouch for the reliability of the scale used for this construct.

Additionally, some construct relationships such as risk and performance and also performance and risk appear to have a moderately high correlation which could mean they have some degree of multi-collinearity. Therefore, an analysis of Variance Inflation Factors (VIF) should be performed: when looking at the VIF, all values for all variables are bet 1 and 10, which indicates that there is no multicollinearity between the constructs and the assumption of the multiple linear regression is validated (Appendix K).

Despite these mentioned limitations, it is coherent to accept that these are valid results for the correlations between the constructs and the attitude towards the technology, since they are significant and make sense in the context of the study.

Performing a multiple linear regression, attitude towards the MBWay Payment was defined as the dependent variable, whereas the constructs were defined as the independent or explanatory variables. Through the analysis of the Normal P-P Plot of Regression Standardized Residual (Appendix K), it is possible to confirm the linear relationship assumption of each independent variable with the dependent variable, as they appear to follow into the straight line, with only slight deviations. Additionally, analysing the records through a scatterplot (Appendix K), it is observable that none of the points fall out of the expected -3 to 3 interval, which is ideal, while also validating the homoscedasticity assumption through the distribution of the values; likewise through the Residuals Statistics table it is possible to confirm a minimum standard residual of -3.627. and a maximum of 2.173 which fall into an acceptable interval. Cook' distance also stands a value much lesser than 1, which is ideal. Analysing the ANOVA table (Appendix K), it can be determined that the slope of the line is not zero, with a significance of (p=.000), which is also ideal.

When looking at the multiple linear regression model summary (Appendix K), it is appropriate to consider the Adjusted R Square value instead of the R Square, since this study is dealing with a limited sample and with the objective of adding reliability and precision with a value that considers the impact of other independent variables. The Adjusted R Square value is .800, with a significance of (p=.000), which means that the developed model explains 80% of the variance in the dependent variable and is, therefore, a good fit.

Looking at the standardized coefficients (displayed in the framework below) and its significances, since the unstandardized are not suitable for comparison among the different variables, it is possible to observe that the antecedent beliefs of usefulness, need for interaction, performance and health safety are not statistically significant, findings that do not support H1, H3, H5 and H7. On the other hand, ease of

use and risk were significant at the 0.01 level and fun was significant at the 0.001 level, providing support for H2, H4 and H6. When analysing the standardized coefficients that these three constructs made a significant contribution to change in the dependent variable of attitude towards the MBWay Payment, with fun, once again in the same manner as in Study I, having the strongest impact on the attitude, also supported by the Part value of 0.241.

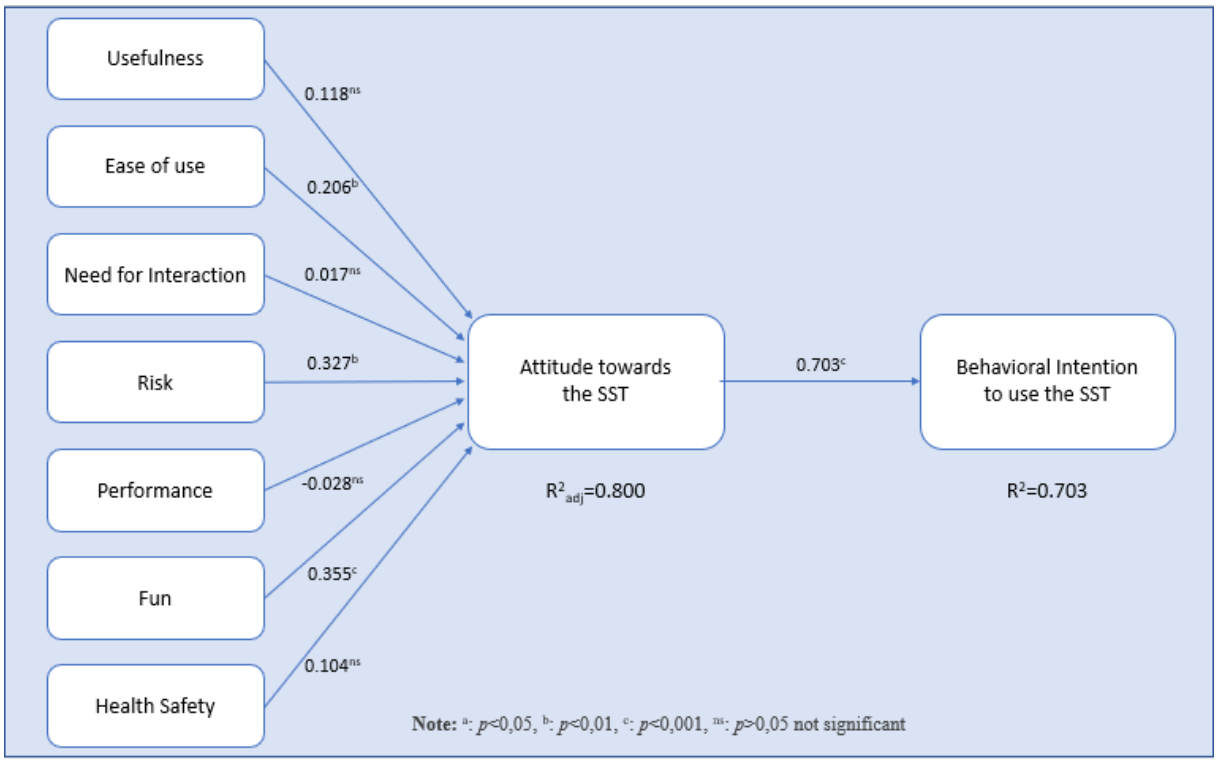

Figure 3 – MBWay Payment

6.5.3 Study III– Cashierless Stores

Looking at the relationship between the antecedent beliefs in Study III and the attitude towards the Cashierless Stores using the Pearson correlation test, it is possible to obtain coefficients of correlation and their respective significance (Appendix L). When looking at the significances, all of the averages of the items of the antecedent constructs have a significance of (p=.000), which did not happen in Studies I and II, and means the correlation coefficient is indeed significant and explains the correlation between the construct and the attitude towards the Cashierless Stores. It is now pertinent to analyse the coefficient values with confidence that they are significant.

From studying the correlation coefficients, it is clear that fun, risk and performance are highly correlated with attitude towards adoption with a "ρ" (Pearson correlation coefficient) of (ρ=.791), (ρ=.731) and (ρ=.751), respectively, meaning that there is a strong positive correlation between these three dimensions and attitude towards the Cashierless Stores. Later, through a multiple linear regression it will be possible to determine whether these correlations mean that the constructs are also determinants of the attitude. On another noteworthy analysis, usefulness (ρ=.529), ease of use (ρ=.598) and health

safety (ρ=.694) only showcase a moderate positive correlation with attitude towards the technology, whereas need for interaction has a slightly lower correlation coefficient of (ρ=.453).

Before critically analysing these results, it would be possible to state that correlations between the values of (ρ=.400) and (ρ=.800) would be somewhat expected for constructs that have, in previous studied literature revealed to be predictors of different technologies in diverse contexts (Curran & Meuter, 2005; Dabholkar, 1996).

It is also noteworthy to mention a slight limitation to this analysis, in the sense that the antecedent of need for interaction, for the study of Cashierless Stores, held a questionable Cronbach's alpha, which do not vouch entirely for the reliability of the scale used for this construct, but still stand as moderately reliable to pursue further analysis, as follows.

Performing a multiple linear regression, attitude towards the Cashierless Stores was defined as the dependent variable, whereas the constructs were defined as the independent or explanatory variables. Through the analysis of the Normal P-P Plot of Regression Standardized Residual (Appendix L), it is possible to confirm the linear relationship assumption of each independent variable with the dependent variable, as they appear to follow into the straight line, with only slight deviations. Additionally, analysing the records through a scatterplot (Appendix L), it is observable that none of the points fall out of the expected -3 to 3 interval, which is ideal, while also validating the homoscedasticity assumption through the distribution of the values; likewise through the Residuals Statistics table it is possible to confirm a minimum standard residual of -2.071 and a maximum of 2.666 which again fall into an acceptable interval. Cook' distance also stands a value much lesser than 1, which is ideal. Analysing the ANOVA table (Appendix L), it can be determined that the slope of the line is not zero, with a significance of (p=.000), which is also ideal.

When looking at the multiple linear regression model summary (Appendix L), it is appropriate to consider the Adjusted R Square value instead of the R Square, since this study is dealing with a limited sample and with the objective of adding reliability and precision with a value that considers the impact of other independent variables. The Adjusted R Square value is .774, with a significance of (p=.000), which means that the developed model explains 77% of the variance in the dependent variable and is, therefore, a good fit.

Looking at the standardized coefficients (displayed in the framework below) and its significances, since the unstandardized are not suitable for comparison among the different variables, it is possible to observe that the antecedent beliefs of ease of use, need for interaction, risk and health safety are not statistically significant, findings that do not support H5, H6, H7 and H10. On the other hand, usefulness and performance were significant at the 0.05 level and fun was significant at the 0.001 level, providing support for H4 and H9. When analysing the standardized coefficients that these four constructs made a significant contribution to change in the dependent variable of attitude towards the Cashierless Stores, with fun having the strongest impact on the attitude, also supported by the Part value of 0.245.

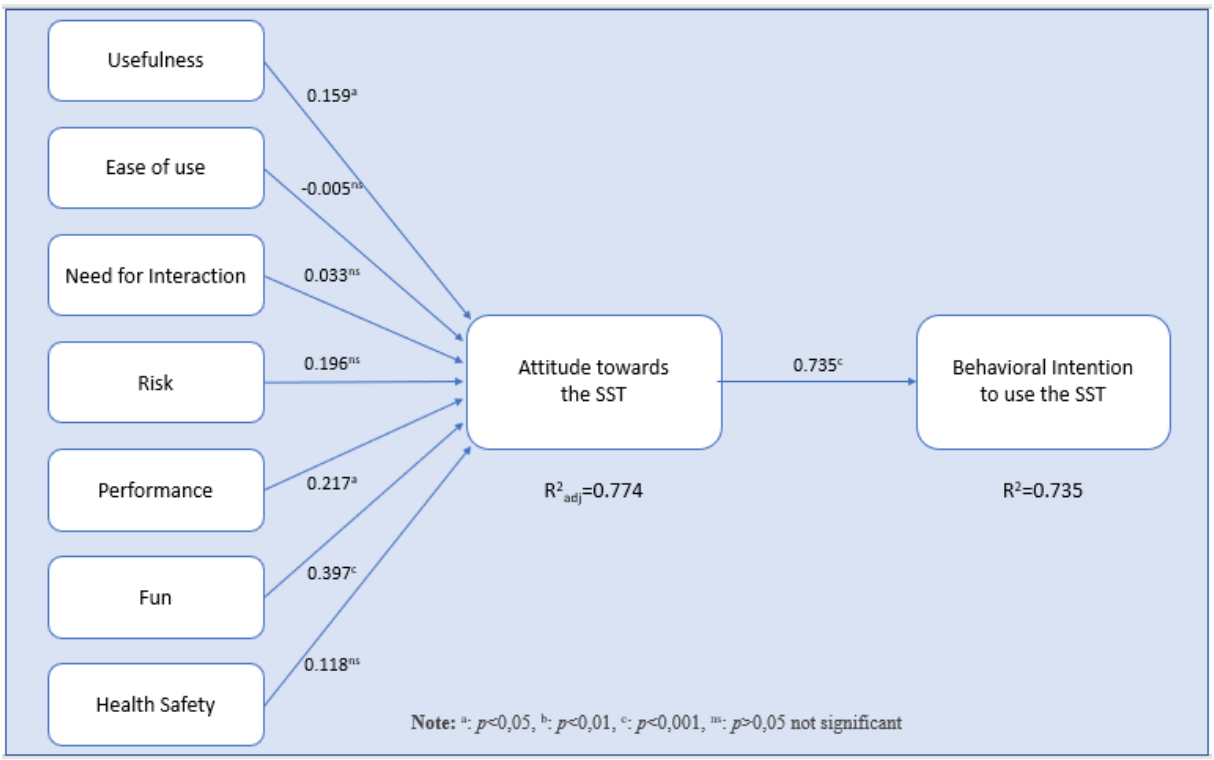

Figure 4 - Cashierless Stores

6.6 Discussion

As stated in the introduction of this study, it aims to dive into the minds of consumers and retailers, with the intent of understanding the nuances that exist between the attitudes formed towards these retail technologies, how they translate into behavioural intentions, what antecedent beliefs are behind those attitudes, and which bare the most impact in the decision to adopt or not said technology. With that purpose, 10 hypotheses were formulated and tested, and their answers will be discussed in the following paragraphs.

From the acceptance of H1 - Attitudes towards different SSTs used for the checkout phase will be separate and distinct from one another, it can be concluded that the different technologies will generate different attitudes, which stands as a cornerstone for the rest of the hypotheses and for the validity of the present research.

The rejection of H2 - The attitude towards a more broadly adopted technology will be more positive than those less broadly adopted – brings up an interesting topic for discussion, in the sense that the findings of Curran and Meuter (2005) support this hypothesis, which would be the expected result. In fact, it would be logical that an older and more widely adopted technology would generate more positive attitudes and consequently more behavioural intentions to use that technology. However, this was not the case with the three technologies under scope, as the average of the attitude items towards the Self-Service Checkout was inferior to those of the attitude items towards the Cashierless Stores and even less

then the average of the attitude items towards the MB Way Payment. The difference in attitudes will be discussed in light of the different constructs, in the following paragraphs.

Usefulness, performance, fun and health safety were the significant predictors of the attitude towards Self-Service Checkout. These four constructs are extremely important for the present analysis since they may help explore the reason to why H2 having been rejected, and the reason for Self-Service Checkout to be the technology with the lowest attitude towards adoption, despite being the most widely spread and broadly adopted. Since these four constructs are significant predictors, they should be the ones in which retailers who aim to increase acceptance of the Self-Service Checkout focus. Indeed, for having been installed in Portugal for more than 15 years ago and with now being used by most large retailers in the country, the Self-Service Checkout still has a low adoption rate when compared to much newer and unknown technologies.

Ease of use, risk and fun are the dimensions that predict the attitude towards MB Way payment. These three constructs, which besides fun are not common between the other technologies in-score which are in different adoption stages, showcase that the predictive constructs may be dependent on time. As the interviewee Dr. Frederico Santos stated, that every innovation goes through generational and cultural evolutions, which is something normal, giving the example that 10 years ago much less people were willing to pay using a card.

Regarding Cashierless stores, Dr. Frederico Santos suggests that the major break-through that the brand new cashierless stores provide is the complete digitalization of the product identification phase, which may contribute for higher scores in the antecedent beliefs of usefulness (improves one of the phases of the experience significantly), ease of use (less tasks and less effort on the customer side), and health safety (less contact with physical store devices). In the present study for this technology, ease of use and health safety were found not to be significant, with usefulness standing out as the significant one from the mentioned constructs. In this stage of adoption, the model results point towards usefulness, as well as performance and fun as the main antecedent beliefs that define the attitude towards the cashierless stores. The complexity of the technology would suggest that ease of use would be one the most important constructs, which was not verified by the model. However, as seen from the study of the MBWay Payment method, ease of use might come into play as a predictor in a later stage of the adoption process.

As mentioned, ease of use is a significant predictor for the attitude towards MBWay Payment, but not to the other two technologies, which could mean that this construct might come into play as a predictor in a specific phase of the adoption process. Davis (1989) also found other constructs to be more influential driving usage behaviour, such as usefulness. A possible conclusion from the comparison of the results of the multiple linear equation with the attitude rates and knowledge rates, demonstrates the ease of use is a predictor for the most knowledgeable and most positive attitude, meaning that a technology that differentiates by its ease of use is capable of attracting more positive attitudes.

The dimension of usefulness is a significant predictor for the attitudes towards Self-Service Checkout and Cashierless Stores, but not for the attitude towards MBWay Payment. From previous literature, usefulness comes as a strong significant linkage to usage (Davis, 1989), which make this results not surprising, with the exception of the MBWay case. Dr. Frederico Santos stated that in what concerns this type of mobile payments such as the MBWay payment method, the difference is not significant when compared with, for example, credit card technologies, which can explain why the dimension is not a significant predictor of the technology. Regarding the other two SSTs, the added value when compared to the existing alternatives can be larger. However, when studying this results with the attitude towards use rates, it is possible to conclude that ease of use bares a more positive impact on the attitude than usefulness.

In what concerns need for interaction, Curran and Meuter (2005) reach the conclusion that this construct is not significant in any of the studied banking technologies, although proposing that it might be relevant in another context, which is what is attempted here. However, in the present study for the context of grocery store technology, need for interaction was also not significant for any of the three proposed SSTs. There were also problems in the reliability in the study of the Cronbach's alpha values, which might indicate that the items that compose the scale to measure this dimension might not be the most appropriate.

The construct of risk is significant for MBWay Payment but not for Self-Service Checkout and for Cashierless Stores. As suggested by Dr. Frederico Santos, on the field it is noticeable that a large segment of consumers are still scared to use payment technology – in the case of the MB Way payment, this might be attenuated by the fact the usage and knowledge statistics showcase that the MBWay payment is the most well-known of the three technologies, despite being implemented 10 years after the SSCO. With a broader familiarization with the technology, consumers feel less at risk when attempting to use the SST. It is also noteworthy that in the study of Curran and Meteur (2005), risk is the only significant predictor to the technology with the lowest attitude ratings, which is the opposite of what it is possible to observe here. In fact, similarly to ease of use, when comparing the attitude rates with the antecedent beliefs, risk (or the lack of it in this case) appears to be favouring the adoption towards MBWay Payment.

In what concerns the construct of performance, that stood as a significant predictor for Self-Service Checkout and for Cashierless Stores but not for MBWay Payment, it is relevant to address the statement of Eng.º Luís Ribas in the retailer interview, that when discussing a change from a contactless card payment to the MBWay payment, the incremental benefit is relatively minor. Exploring this notion, after defining performance as "did its job", the notions of the interviewee help deconstruct the performance of the MB Way Payment not only as "did its job" but also as "did its job better/worse than the alternatives", which might be the answer to why performance is not a significant predictor in the context of this technology, since there are several other alternative forms of quick cash-less payment that have similar performances. On the contrary, it is possible to suggest that both Self-Service Checkout

and Cashierless Stores have a different performance when compared to the other option of traditional tills, supported by the significance of the construct in both these models. A similar notion is also explored in the interview with Dr. Frederico Santos where he states that there are several different technological options besides MB Way Payment, to achieve the same goal, which might explain why performance is not a significant predictor of the attitude towards this technology.

One of the most important constructs to extract conclusions from is fun. Fun was found to be the strongest predictor of the three technologies in scope. These findings go in line with Dabholkar (1996) that concluded that fun/enjoyment strongly influences service quality, as well as proposed humorous directions and colourful icons to be built into service design. This could be a way for retailers to increment the adoption rate of a technology. Evidently, the three types of technologies in scope all have a margin for the introduction of a fun factor, as each one of them has some degree of emersion into a consumer experience. As the interviewee Dr. Frederico Santos stated, the consumer perceives the waiting time to be less when being entertained by a task, which is what happens in the Self-Service Checkout as opposed to waiting in a normal till. While this might not be entirely perceived as "fun", it is certainly funnier by comparison, when the alternative is a boring wait to be served experience. Similar processes happen during experience with the other two technologies, where there is room for technology to enhance the fun dimension, to an even greater extent than it is already being perceived, as suggest the results for this antecedent belief.

On a similar note, the same interviewee also mentioned the novelty factor of a new and different technology that captivates consumers into trying it, the same idea that Dabholkar (1996) suggests as being part of the fun dimension. Retailers should capitalize as much as possible on this fun and novelty factor to attempt to generate a perception of the new retail experience as entertainment. In sum, the explored topics can be summarized as a suggestion that retailers explore the theme of retailtainment in the process of implementing new technology, as use of different techniques that characterize this type of marketing may enhance the antecedent beliefs that lead consumers to adopt a technology.

The dimension of health safety is a predictor of attitude towards the Self-Service Checkout, while not significant in determining the attitudes towards MBWay Payment and Cashierless Stores. This is particularly relevant given the fact that this variable has never been studied in the context of technology adoption models, and turns out it can be a significant predictor.

The simplest explanation for this scenario would be that there is concern for health safety in a technology that involves physical contact with the machine. For the MBWay Payment and Cashierless Stores health safety concerns are non-existent, meaning that they do not have significant impact when forming an attitude towards these technologies. This may be an indicator that when concern for the health safety is not an issue in, it is loses importance in the consumer's mind.

Another explanation that might arise from these findings is that a clear distinction may be made by customers when choosing between the use of a normal traditional till and a self-service checkout machine where the health benefits and sacrifices become clear, as opposed to what was suggested by

Eng.º Luís Ribas, that MBWay Payment incremental health safety benefit is relatively minor when compared to similar payment technologies such as contactless credit cards. In this sense, added benefit in comparison to the alternatives offered might create a significant antecedent belief of health safety, although further research would be required to prove this explanation.

CHAPTER 7: CONCLUSION

7.1 Main Findings and Conclusions

As proposed in the introduction of this dissertation, this research aims to dive into the minds of consumers and retailers, studying the attitudes and behavioural intentions formed towards the retail technologies of Self-Service Checkout, MBWay Payment and Cashierless Stores, as well as what antecedent beliefs are behind those attitudes.

In the present research, it is possible to conclude that different dimensions are significant in different types of technologies in separate adoption stages. In fact, the results of the research support that attitudes towards different SSTs used for the checkout phase will be separate and distinct from one another. When comparing averages between the scales that attitude towards a technology, MBWay Payment revealed to have the most positive rate, followed by Cashierless Stores and then by Self-Service Checkout, which despite being implemented in Portugal for a longer period of time and being more widely adopted than the Cashierless Stores, has the most negative attitude towards its adoption, which differs from the results in the relevant literature of SST attitude/intention to use model, in which the three studied banking technologies rank perfectly with the more broadly adopted being the one with the most positive attitude and the less widely adopted the one with the least positive attitude (Curran & Meuter, 2005).

Studying the antecedent beliefs that form those attitudes towards adoption, it was found that usefulness, performance, fun and health safety were the significant predictors of the attitude towards Self-Service Checkout; whereas ease of use, risk and fun are the dimensions that predict the attitude towards MB Way payment; and the model results point towards usefulness, as well as performance and fun as the main antecedent beliefs that define the attitude towards the Cashierless Stores.

When comparing the attitude rates with the antecedent beliefs, ease of use and risk (or the lack of it in this case) appear to be differentials in favouring the adoption rate towards MBWay Payment. Another important conclusion states that fun was found to be the strongest predictor of the three technologies in scope, which is in line with the previous literature on consumer evaluations of technology-based self-service options that state that enjoyment has a direct effect in all three of the studied situational conditions (Dabholkar, 1996).

The usefulness and performance were predictors of both attitudes towards Self-Service Checkout and towards Cashierless Stores. Additionally, need for interaction was not significant for any of the three proposed SSTs, which also happened in the study of three banking technologies (Curran & Meuter, 2005).

It is clear that strategies should be implemented by retailers in what concerns the attitude towards the Self-Service Checkout, a technology running for over 15 years that showcases the comparative lowest attitude towards the adoption rate. The strategies should devote particular focus on the dimensions that are significant in its model. It is also clear that fun is an extremely relevant construct

that should be taken into consideration when developing marketing strategies that aim to increase the adoption rate of a certain technology, for example through retailtainment techniques.

7.2 Managerial / Academic Implications

The present study has undoubtfully further showcased that there are antecedent beliefs that need to be considered by companies when adopting a new technology. This is especially true for the managerial context of the grocery store industry which this research explored, as well as the geographical context of Portugal. The results found are of clear importance for large grocery stores that work on the implementation of shopper facing technology, which has been the case of Continente and Pingo Doce, who have been pioneers on this sector. This research took into consideration the inputs from the implementors of the technology it studies and suggested new ways for the retailers to consider that same technology while showcasing what antecedent beliefs are considered important by the consumers, and therefore should also be important for the retailers.

In a more specific scope, it is now clear that different technologies require different approaches, as the dimensions that compose their antecedent beliefs vary, as well as differ depending on the surrounding context. This research demonstrated the need for focused strategies for each specific technology, between Self-Service Checkout, MBWay Payment and Cashierless Stores, and new research should be performed when analysing a different technology.

It is possible to retrieve insights from the present research that managers should consider in the implementation process of a technology. In fact, managers can analyse the knowledge and usage data to determine the state of adoption each one of the technologies is in, and whether their strategy in failing or succeeding. Following these insights, managers can then study which direction they should follow to improve the attitude towards adoption rate and, therefore, the intention to use the technology. For example, it became clear that in the technological context of Portuguese grocery stores, fun is a strong predictor of the attitude towards adoption, which revealed to be true for every technology studied; it is logical, then, to implement strategies such as retailtainment techniques that may generate improved experiences during the use of the technology, which posed as one of the main objectives of the present research.

In addition, managers are able to henceforward predict what will be the probable predictors of the next technological innovation, while also having at their disposal a context-focused model that may assist them in their own consumer surveys. Indeed, both Continente and Pingo Doce have invested in the concept of *lab stores* that focus on testing new technology and capturing the consumers input and reactions. The present model is a valuable aid that can be used for R&D projects or in the testing of other existing technologies.

From an academic point of view, and similarly to the managerial addressed points, this research brought a new and fresh perspective in what the adoption models represent and brought new ideas into the table of antecedent beliefs that should be considered in the existing models, as well as re-studied

previous ones to evaluate its current relevancy. This study, through analysis and comparison with previous models, helps to understand the relevancy of this type of research, further cementing the conclusion that Curran and Meuter (2005) reached that the antecedent beliefs vary depending on the circumstances and on the technology, which this research explored through the focus on a specific situational circumstance different from the one used in the mentioned study, and also three relevant technologies for that context.

7.3 Limitations and Future Research

As the present research was subject to resource constraints, one can understand there are resulting limitations.

Regarding the sample, even though demographically the participants appear to be diversified, the data collection procedure resorted to a method which may fall into a certain group bias, with individuals that represent a group of contacts, in a semi-closed network. As such, it would be suitable to attempt this same study in a completely random sample of the population. In terms of technology, and following this same logic, a limitation stands in a sample size consisting primarily of a population from big cities with access to technology that may otherwise be scarce, for example, in the rural parts of the country.

As another limitation stand the scales that did not return appropriate reliability indicators, particularly the Need for Interaction construct scale. It would be plausible to attempt to reformulate the present model to capture this construct in a significant way, as it would make sense to continue perfecting it.

For future research it would be interesting to study what are differences in antecedent beliefs between consumers in different phases of the adoption process, such as suggested by Dr. Frederico Santos. The interviewee points out the fact that these antecedent beliefs can be formed in the process of trialling with the technology for the first times. This study encapsulates all types of consumers, and it would be interesting to differentiate between one that has already adopted the technology, one that has never tried it, and other customers in separate adoption phases.

It would also be fitting to continue experimenting with different antecedent beliefs that may fit the developed model. Indeed, as the macro-environment of the study changed the required constructs to include others that had not been previously used, it would be optimal to keep updating and analysing the surrounding context to understand what shifts and what could be a new antecedent belief, such as what happened with the health safety construct. It would also be interesting to consider personality traits and social setting, as others have done in the past as well.

Another noteworthy example of future research would be to conduct this same research in different situational contexts, different countries and different cultures, with the changes to the model that would be appropriate for each particular setting.

Additionally, this developed model or an adjusted one could be for example studied in other retail industries such as fashion and other industries that work with similar shopper facing technologies.

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APPENDICES

Appendix A: Study I – Self-service Checkout

Start of Block: Introduction

Q1.1 *Before starting, please choose the language you are most comfortable with - Portuguese or English*
Antes de iniciar, por favor escolha a língua em que se sente mais confortável - Português ou Inglês

Page Break

Q1.2
Dear participant,
Thank you in advance for being part of this study.
The present survey is part of an academic research project on the adoption of technology in grocery stores, as part of my master thesis in ISCTE Business School.
It will take no more than 7 minutes to complete the survey. Be assured that all the provided answers will be kept anonymous in the strictest confidentiality, and that all data collected will be used solely for the purpose of my dissertation.
Thank you once again for your time.
Let's start!

End of Block: Introduction

Start of Block: Screening Question

Q2.1 Do you currently reside in Portugal?

- ○ No (1)
- ○ Yes (2)

Skip To: End of Survey

End of Block: Screening Question

Start of Block: Technological Context

Q3.1

Please take a moment to read the following description of the technology that will be adressed throughout this survey:

Self-service Checkout is an automated process that enables shoppers to scan, bag, and pay for their purchases without the need for a cashier. It allows the customer to have total control of the checkout process. You can choose to pay by card, or alternatively use a machine that accepts cash.

Page Break

Q3.2 Are you familiar with how the Self-Service Checkout works?

- ○ No (1)
- ○ Yes (2)

Q3.3 Do you know any Supermarket that offers the possibility to use the Self-Service Checkout?

- ○ No (1)
- ○ Yes (2)

Q3.4 Does the Supermarket(s) that you usually go to offers the possibility to use the Self-Service Checkout?

- ○ No (1)
- ○ Yes (2)

Q3.5 Have you ever used the Self-Service Checkout before?

- ○ No (1)
- ○ Yes (2)

Skip To: End of Block If Q3.5 = 1

Page Break

Q3.6 How often do you use the Self-Service Checkout?

- ○ Never use it 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Always use it7 (7)

End of Block: Technological Context

Start of Block: Technological Attributes

Q4.1 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
The Self-Service Checkout is useful for doing my grocery shopping (4)	○	○	○	○	○	○	○
Using the Self-Service Checkout improves the way in which I do my grocery shopping (5)	○	○	○	○	○	○	○
Using the Self-Service Checkout makes doing my grocery shopping easier (6)	○	○	○	○	○	○	○

Page Break

Q4.2 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Learning to use the Self-Service Checkout was / will be easy for me (1)	○	○	○	○	○	○	○
I find the Self-Service Checkout difficult to use (2)	○	○	○	○	○	○	○
It was / will be easy for me to become skillful at using the Self-Service Checkout (3)	○	○	○	○	○	○	○

Page Break

Q4.3 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I enjoy seeing the people who work at my supermarket (1)	○	○	○	○	○	○	○
Personal attention by the people at my supermarket is not important to me (2)	○	○	○	○	○	○	○
The people at my supermarket do things for me that no machine could (3)	○	○	○	○	○	○	○

Page Break

Q4.4 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I feel secure conducting my shopping using the Self-Service Checkout (1)	○	○	○	○	○	○	○
I feel safe conducting my shopping using the Self-Service Checkout (2)	○	○	○	○	○	○	○
I know that the Self-Service Checkout will handle my shopping correctly (3)	○	○	○	○	○	○	○
There is little danger that anything will go wrong when I use the Self-Service Checkout (4)	○	○	○	○	○	○	○

Page Break

Q4.5 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Using the Self-Service Checkout means I will be able to process the payment (1)	○	○	○	○	○	○	○
Using the Self-Service Checkout will result in errors in the payment (2)	○	○	○	○	○	○	○
Using the Self-Service Checkout is something I do not expect to work very well (3)	○	○	○	○	○	○	○
Using the Self-Service Checkout will be reliable (4)	○	○	○	○	○	○	○

Page Break

Q4.6 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Using the Self-Service Checkout will not be interesting (1)	○	○	○	○	○	○	○
Using the Self-Service Checkout will be entertaining (2)	○	○	○	○	○	○	○
Using the Self-Service Checkout will not be fun (3)	○	○	○	○	○	○	○
Using the Self-Service Checkout will be enjoyable (4)	○	○	○	○	○	○	○

Page Break

Q4.7 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I feel my health is secure conducting my shopping using the Self-Service Checkout (1)	○	○	○	○	○	○	○
I feel my health is safe conducting my shopping using the Self-Service Checkout (2)	○	○	○	○	○	○	○
I know that the Self-Service Checkout will be provide me a hygienic experience (3)	○	○	○	○	○	○	○
Regarding my health, there is little danger that anything will go wrong, when I use the Self-Service Checkout (4)	○	○	○	○	○	○	○

Page Break

Q4.8 How good or bad do you feel about using the Self-Service Checkout ?

- ○ Very Bad1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Very Good7 (7)

Q4.9 How pleasant or unpleasant is it to use the Self-Service Checkout?

- ○ Very Unpleasant1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Very Pleasant7 (7)

Q4.10 How much would you say that you like or dislike using the Self-Service Checkout?

- ○ Strongly Dislike1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Strongly Like7 (7)

Q4.11 When you have routine shopping to do, how likely are you to use the Self-Service Checkout?

- ○ Extremely Unlikely1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Extremely Likely7 (7)

End of Block: Technological Attributes

Start of Block: Block 4

Q5.1 You are now in the final stage of the questionnaire!

Q5.2 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)
- ○ Prefer not to say (4)

Q5.3 What is your age?

- ○ <18 (1)
- ○ 18-24 (2)
- ○ 25-34 (3)
- ○ 35-44 (4)
- ○ 45-54 (5)
- ○ 55-64 (6)
- ○ >65 (7)

Q5.4 What is your nationality?

▼ Afghanistan (1) ... Zimbabwe (1357)

Q5.5 What is the highest degree or level of school you have completed?

- ○ Less than high school (1)
- ○ High school or equivalent (2)
- ○ Bachelor's degree (3)
- ○ Master's degree or MBA (4)
- ○ PhD degree (5)

Q5.6 What is your current employment status?

- ○ Full-time worker (1)
- ○ Part-time worker (2)
- ○ Worker currently in lay-off (3)
- ○ Unemployed (4)
- ○ Student (5)
- ○ Retired (6)

Q5.7 What is your marital status?

- ○ Single (1)
- ○ Married or in a Domestic partnership (2)
- ○ Divorced (3)
- ○ Widowed (4)

Q5.8 In what range is your gross personal income per month?

- ○ Less than 500€ (1)
- ○ 500€ – 999€ (2)
- ○ 1000€ – 1499€ (3)
- ○ 1500€ – 1999€ (4)
- ○ 2000€ – 2499€ (5)
- ○ 2500€ – 2999€ (6)
- ○ 3000€ – 3499€ (7)
- ○ 3500€ – 4000€ (8)
- ○ More than 4000€ (9)

End of Block: Block 4

Appendix B: Study II – MBWay Payment

Start of Block: Introduction

Q1.1 *Before starting, please choose the language you are most comfortable with - Portuguese or English*
Antes de iniciar, por favor escolha a língua em que se sente mais confortável - Português ou Inglês

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Page Break

Q1.2
Dear participant,
Thank you in advance for being part of this study.

The present survey is part of an academic research project on the adoption of technology in grocery stores, as part of my master thesis in ISCTE Business School.
It will take no more than 7 minutes to complete the survey. Be assured that all the provided answers will be kept anonymous in the strictest confidentiality, and that all data collected will be used solely for the purpose of my dissertation.
Thank you once again for your time.
Let's start!

End of Block: Introduction

Start of Block: Screening Question

Q2.1 Do you currently reside in Portugal?

- ○ No (1)
- ○ Yes (2)

Skip To: End of Survey

End of Block: Screening Question

Start of Block: Technological Context

Q3.1

Please take a moment to read the following description of the technology that will be adressed throughout this survey:

MB WAY is a MULTIBANCO solution that allows you to, among other features, purchase in physical stores through your smartphone. It allows you to use the app in every supermarket that possesses this technology, through reading a QR Code in the MULTIBANCO terminal provided by the retailer.

Page Break

Q3.2 Are you familiar with how the MB WAY works?

- ○ No (1)
- ○ Yes (2)

Q3.3 Do you know any Supermarket that offers the possibility to use MB WAY?

- ○ No (1)
- ○ Yes (2)

Q3.4 Does the Supermarket(s) that you usually go to offers the possibility to use MB WAY?

- ○ No (1)
- ○ Yes (2)

Q3.5 Have you ever used MB WAY before?

- ○ No (1)
- ○ Yes (2)

Skip To: End of Block If Q3.5 = 1

Page Break

Q3.6 How often do you use MB WAY?

- ○ Never use it 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Always use it7 (7)

End of Block: Technological Context

Start of Block: Technological Attributes

Q4.1 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
MB WAY is useful for doing my grocery shopping (4)	○	○	○	○	○	○	○
Using the MB WAY improves the way in which I do my grocery shopping (5)	○	○	○	○	○	○	○
Using the MB WAY makes doing my grocery shopping easier (6)	○	○	○	○	○	○	○

Page Break

Q4.2 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Learning to use MB WAY was / will be easy for me (1)	○	○	○	○	○	○	○
I find MB WAY difficult to use (2)	○	○	○	○	○	○	○
It was / will be easy for me to become skillful at using MB WAY (3)	○	○	○	○	○	○	○

Page Break

Q4.3 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I enjoy seeing the people who work at my supermarket (1)	○	○	○	○	○	○	○
Personal attention by the people at my supermarket is not important to me (2)	○	○	○	○	○	○	○
The people at my supermarket do things for me that no machine could (3)	○	○	○	○	○	○	○

Page Break

Q4.4 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I feel secure conducting my shopping using MB WAY (1)	○	○	○	○	○	○	○
I feel safe conducting my shopping MB WAY (2)	○	○	○	○	○	○	○
I know that MB WAY will handle my shopping correctly (3)	○	○	○	○	○	○	○
There is little danger that anything will go wrong when I use MB WAY (4)	○	○	○	○	○	○	○

Page Break

Q4.5 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Using MB WAY means I will be able to process the payment (1)	○	○	○	○	○	○	○
Using MB WAY will result in errors in the payment (2)	○	○	○	○	○	○	○
Using MB WAY is something I do not expect to work very well (3)	○	○	○	○	○	○	○
Using MB WAY will be reliable (4)	○	○	○	○	○	○	○

Page Break

Q4.6 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Using MB WAY will not be interesting (1)	○	○	○	○	○	○	○
Using MB WAY will be entertaining (2)	○	○	○	○	○	○	○
Using MB WAY will not be fun (3)	○	○	○	○	○	○	○
Using MB WAY will be enjoyable (4)	○	○	○	○	○	○	○

Page Break

Q4.7 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I feel my health is secure conducting my shopping using MB WAY (1)	○	○	○	○	○	○	○
I feel my health is safe conducting my shopping using MB WAY (2)	○	○	○	○	○	○	○
I know that MB WAY will be provide me a hygienic experience (3)	○	○	○	○	○	○	○
Regarding my health, there is little danger that anything will go wrong, when I use MB WAY (4)	○	○	○	○	○	○	○

Page Break

Q4.8 How good or bad do you feel about using the MB WAY?

- ○ Very Bad1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Very Good7 (7)

Q4.9 How pleasant or unpleasant is it to use MB WAY?

- ○ Very Unpleasant1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Very Pleasant7 (7)

Q4.10 How much would you say that you like or dislike using MB WAY?

- ○ Strongly Dislike1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Strongly Like7 (7)

Q4.11 When you have routine shopping to do, how likely are you to use MB WAY?

- ○ Extremely Unlikely1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Extremely Likely7 (7)

End of Block: Technological Attributes

Start of Block: Block 4

Q5.1 You are now in the final stage of the questionnaire!

Q5.2 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)
- ○ Prefer not to say (4)

Q5.3 What is your age?

- ○ <18 (1)
- ○ 18-24 (2)
- ○ 25-34 (3)
- ○ 35-44 (4)
- ○ 45-54 (5)
- ○ 55-64 (6)
- ○ >65 (7)

Q5.4 What is your nationality?

▼ Afghanistan (1) ... Zimbabwe (1357)

Q5.5 What is the highest degree or level of school you have completed?

- ○ Less than high school (1)
- ○ High school or equivalent (2)
- ○ Bachelor's degree (3)
- ○ Master's degree or MBA (4)
- ○ PhD degree (5)

Q5.6 What is your current employment status?

- ○ Full-time worker (1)
- ○ Part-time worker (2)
- ○ Worker currently in lay-off (3)
- ○ Unemployed (4)
- ○ Student (5)
- ○ Retired (6)

Q5.7 What is your marital status?

- ○ Single (1)
- ○ Married or in a Domestic partnership (2)
- ○ Divorced (3)
- ○ Widowed (4)

Q5.8 In what range is your gross personal income per month?

- ○ Less than 500€ (1)
- ○ 500€ – 999€ (2)
- ○ 1000€ – 1499€ (3)
- ○ 1500€ – 1999€ (4)
- ○ 2000€ – 2499€ (5)
- ○ 2500€ – 2999€ (6)
- ○ 3000€ – 3499€ (7)
- ○ 3500€ – 4000€ (8)
- ○ More than 4000€ (9)

End of Block: Block 4

Appendix C: Study III – Cashierless Stores

Start of Block: Introduction

Q1.1 *Before starting, please choose the language you are most comfortable with - Portuguese or English*
Antes de iniciar, por favor escolha a língua em que se sente mais confortável - Português ou Inglês

---

Page Break

Q1.2
Dear participant,
Thank you in advance for being part of this study.
The present survey is part of an academic research project on the adoption of technology in grocery

stores, as part of my master thesis in ISCTE Business School.

It will take no more than 7 minutes to complete the survey. Be assured that all the provided answers will be kept anonymous in the strictest confidentiality, and that all data collected will be used solely for the purpose of my dissertation.

Thank you once again for your time.

Let's start!

End of Block: Introduction

Start of Block: Screening Question

Q2.1 Do you currently reside in Portugal?

- ○ No (1)
- ○ Yes (2)

Skip To: End of Survey

End of Block: Screening Question

Start of Block: Technological Context

Q3.1

Please take a moment to read the following description of the technology that will be adressed throughout this survey:

Cashierless Store is an automomous store. It results from the combination of several innovative technologies capable of identifying the products that are removed or returned to the shelves. It does

not have a cashier, waiting lines, money or physical cards. The customer enters the stores, runs the QR Code, takes the products, and leaves.

Page Break

Q3.2 Are you familiar with how the Cashierless Store works?

- ○ No (1)
- ○ Yes (2)

Q3.3 Do you know any Supermarket that functions as a Cashierless Store?

- ○ No (1)
- ○ Yes (2)

Q3.4 Does the Supermarket(s) that you usually go to function as a Cashierless Store?

- ○ No (1)
- ○ Yes (2)

Q3.5 Have you ever shopped at a Cashierless Store before?

- ○ No (1)
- ○ Yes (2)

Skip To: End of Block If Q3.5 = 1

Page Break

Q3.6 How often do you go to a Cashierless Store?

- ○ Never use it 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Always use it7 (7)

End of Block: Technological Context

Start of Block: Technological Attributes

Q4.1 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
A Cashierless Store is useful for doing my grocery shopping (4)	○	○	○	○	○	○	○
Going to a Cashierless Store improves the way in which I do my grocery shopping (5)	○	○	○	○	○	○	○
Going to a Cashierless Store makes doing my grocery shopping easier (6)	○	○	○	○	○	○	○

Page Break

Q4.2 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Learning to shop at a Cashierless Store was / will be easy for me (1)	○	○	○	○	○	○	○
I find the Cashierless Store difficult to shop at (2)	○	○	○	○	○	○	○
It was / will be easy for me to become skillful at conducting my shopping at a Cashierless Store (3)	○	○	○	○	○	○	○

Page Break

Q4.3 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I enjoy seeing the people who work at my supermarket (1)	○	○	○	○	○	○	○
Personal attention by the people at my supermarket is not important to me (2)	○	○	○	○	○	○	○
The people at my supermarket do things for me that no machine could (3)	○	○	○	○	○	○	○

Page Break

Q4.4 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I feel secure conducting my shopping in a Cashierless Store (1)	○	○	○	○	○	○	○
I feel safe conducting my shopping in a Cashierless Store (2)	○	○	○	○	○	○	○
I know that a Cashierless Store will handle my shopping correctly (3)	○	○	○	○	○	○	○
There is little danger that anything will go wrong when shopping in a Cashierless Store (4)	○	○	○	○	○	○	○

Page Break

Q4.5 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Shopping in a Cashierless Store means I will be able to process the payment (1)	○	○	○	○	○	○	○
Shopping in a Cashierless Store result in errors in the payment (2)	○	○	○	○	○	○	○
Shopping in a Cashierless Store is something I do not expect to work very well (3)	○	○	○	○	○	○	○
Conducting my shopping in a Cashierless Store will be reliable (4)	○	○	○	○	○	○	○

Page Break

Q4.6 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
Shopping in a Cashierless Store not be interesting (1)	○	○	○	○	○	○	○
Shopping in a Cashierless Store will be entertaining (2)	○	○	○	○	○	○	○
Shopping in a Cashierless Store will not be fun (3)	○	○	○	○	○	○	○
Shopping in a Cashierless Store will be enjoyable (4)	○	○	○	○	○	○	○

Page Break

Q4.7 Please specify your level of agreement with each of the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree)

	Strongly Disagree 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Strongly Agree 7 (7)
I feel my health is secure conducting my shopping in a Cashierless Store (1)	○	○	○	○	○	○	○
I feel my health is safe conducting my shopping in a Cashierless Store (2)	○	○	○	○	○	○	○
I know that a Cashierless Store will be provide me a hygienic experience (3)	○	○	○	○	○	○	○
Regarding my health, there is little danger that anything will go wrong, when shopping in a Cashierless Store (4)	○	○	○	○	○	○	○

Page Break

Q4.8 How good or bad do you feel about shopping in a Cashierless Store?

- ○ Very Bad1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Very Good7 (7)

Q4.9 How pleasant or unpleasant is it to shop in a Cashierless Store?

- ○ Very Unpleasant1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ Very Pleasant7 (7)

Q4.10 How much would you say that you like or dislike shopping in a Cashierless Store?

- Strongly Dislike1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- Strongly Like7 (7)

Q4.11 When you have routine shopping to do, how likely are you to shop in a in a Cashierless Store?

- Extremely Unlikely1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- Extremely Likely7 (7)

End of Block: Technological Attributes

Start of Block: Block 4

Q5.1 You are now in the final stage of the questionnaire!

Q5.2 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)
- ○ Prefer not to say (4)

Q5.3 What is your age?

- ○ <18 (1)
- ○ 18-24 (2)
- ○ 25-34 (3)
- ○ 35-44 (4)
- ○ 45-54 (5)
- ○ 55-64 (6)
- ○ >65 (7)

Q5.4 What is your nationality?

▼ Afghanistan (1) ... Zimbabwe (1357)

Q5.5 What is the highest degree or level of school you have completed?

- ○ Less than high school (1)
- ○ High school or equivalent (2)
- ○ Bachelor's degree (3)
- ○ Master's degree or MBA (4)
- ○ PhD degree (5)

Q5.6 What is your current employment status?

- ○ Full-time worker (1)
- ○ Part-time worker (2)
- ○ Worker currently in lay-off (3)
- ○ Unemployed (4)
- ○ Student (5)
- ○ Retired (6)

Q5.7 What is your marital status?

- ○ Single (1)
- ○ Married or in a Domestic partnership (2)
- ○ Divorced (3)
- ○ Widowed (4)

Q5.8 In what range is your gross personal income per month?

- ○ Less than 500€ (1)
- ○ 500€ – 999€ (2)
- ○ 1000€ – 1499€ (3)
- ○ 1500€ – 1999€ (4)
- ○ 2000€ – 2499€ (5)
- ○ 2500€ – 2999€ (6)
- ○ 3000€ – 3499€ (7)
- ○ 3500€ – 4000€ (8)
- ○ More than 4000€ (9)

End of Block: Block 4

Appendix D: Study I – Self-service Checkout | Sample characterization (n=92)

Frequency Statistics				
Variable	**Value**	**Frequency**	**Percentage**	**Cumulative**
Country of residence	Portugal	92	100,0%	-
Gender	Male	36	39,1%	39,1%
	Female	56	60,9%	100,0%
Age	Under 18	0	0,0%	0,0%
	18-24	16	17,4%	17,4%
	25-34	10	10,9%	28,3%
	35-44	17	18,5%	46,7%
	45-54	28	30,4%	77,2%
	55-64	16	17,4%	94,6%
	65 and older	5	5,4%	100,0%
Nationality	Brazilian	1	1,1%	-

	French	2	2,2%	-
	Portuguese	88	95,7%	-
	Timorese	1	1,1%	-
Education	Less than high school	17	18,5%	18,5%
	High school or equivalent	21	22,8%	41,3%
	Bachelor's degree	36	39,1%	80,4%
	Master's degree or MBA	12	13,0%	93,5%
	PhD degree	6	6,5%	100,0%
Employment status	Full-time worker	66	71,7%	-
	Part-time worker	4	4,3%	-
	Unemployed	4	4,3%	-
	Student	12	13,0%	-
	Retired	6	6,5%	-
Marital status	Single	25	27,2%	-
	Married or Domestic partnership	49	53,3%	-
	Divorced	16	17,4%	-
	Widowed	2	2,2%	-
Gross income per month	Less than 500€	10	10,9%	10,9%
	500€ – 999€	19	20,7%	31,5%
	1000€ - 1499€	20	21,7%	53,3%
	1500€ – 1999€	17	18,5%	71,7%
	2000€ - 2499€	8	8,7%	80,4%
	2500€ – 2999€	2	2,2%	82,6%
	3000€ – 3499€	4	4,3%	87,0%
	3500€ – 4000€	6	6,5%	93,5%
	More than 4000€	6	6,5%	100,0%

Appendix E: Study II – MBway Payment | Sample characterization (n=86)

Frequency Statistics				
Variable	**Value**	**Frequency**	**Percentage**	**Cumulative**
Country of residence	Portugal	86	100,0%	-
Gender	Male	38	44,2%	44,2%
	Female	48	55,8%	100,0%
Age	Under 18	0	0,0%	0,0%

	18-24	13	15,1%	15,1%
	25-34	18	20,9%	36,0%
	35-44	16	18,6%	54,7%
	45-54	25	29,1%	83,7%
	55-64	7	8,1%	91,9%
	65 and older	7	8,1%	100,0%
Nationality	Panamanian	1	1,2%	-
	Portuguese	84	97,7%	-
	Spanish	1	1,2%	-
Education	Less than high school	6	7,0%	7,0%
	High school or equivalent	17	19,8%	26,7%
	Bachelor's degree	32	37,2%	64,0%
	Master's degree or MBA	28	32,6%	96,5%
	PhD degree	3	3,5%	100,0%
Employment status	Full-time worker	65	75,6%	-
	Part-time worker	4	4,7%	-
	Unemployed	1	1,2%	-
	Student	11	12,8%	-
	Retired	5	5,8%	-
Marital status	Single	35	40,7%	-
	Married or Domestic partnership	37	43,0%	-
	Divorced	10	11,6%	-
	Widowed	4	4,7%	-
Gross income per month	Less than 500€	10	11,6%	11,6%
	500€ – 999€	13	15,1%	26,7%
	1000€ - 1499€	27	31,4%	58,1%
	1500€ – 1999€	13	15,1%	73,3%
	2000€ - 2499€	3	3,5%	76,7%
	2500€ – 2999€	5	5,8%	82,6%
	3000€ – 3499€	5	5,8%	88,4%
	3500€ – 4000€	1	1,2%	89,5%
	More than 4000€	9	10,5%	100,0%

Appendix F: Study III– Cashierless Stores | Sample characterization (n=91)

Frequency Statistics				
Variable	**Value**	**Frequency**	**Percentage**	**Cumulative**
Country of residence	Portugal	91	100,0%	-
Gender	Male	41	45,1%	45,1%
	Female	50	54,9%	100,0%
Age	Under 18	1	1,1%	1,1%
	18-24	14	15,4%	16,5%
	25-34	19	20,9%	37,4%
	35-44	10	11,0%	48,4%
	45-54	22	24,2%	72,5%
	55-64	19	20,9%	93,4%
	65 and older	6	6,6%	100,0%
Nationality	Brazilian	1	1,1%	-
	Canadian	1	1,1%	-
	German	2	2,2%	-
	Italian	3	3,3%	-
	Portuguese	79	86,9%	-
	Spanish	2	2,2%	-
	Timorese	1	1,1%	-
	Turkish	2	2,2%	-
Education	Less than high school	10	11,0%	11,0%
	High school or equivalent	27	29,7%	40,7%
	Bachelor's degree	27	29,7%	70,3%
	Master's degree or MBA	24	26,4%	96,7%
	PhD degree	3	3,3%	100,0%
Employment status	Full-time worker	61	67,0%	-
	Part-time worker	7	7,7%	-
	Unemployed	4	4,4%	-
	Student	14	15,4%	-
	Retired	5	5,5%	-
Marital status	Single	39	42,9%	-
	Married or Domestic partnership	42	46,2%	-
	Divorced	9	9,9%	-
	Widowed	1	1,1%	-
Gross income	Less than 500€	14	15,4%	15,4%

per month	500€ – 999€	18	19,8%	35,2%
	1000€ - 1499€	18	19,8%	54,9%
	1500€ – 1999€	7	7,7%	62,6%
	2000€ - 2499€	5	5,5%	68,1%
	2500€ – 2999€	13	14,3%	82,4%
	3000€ – 3499€	5	5,5%	87,9%
	3500€ – 4000€	4	4,4%	92,3%
	More than 4000€	7	7,7%	100,0%

Appendix G: Study I – Self-service Checkout | Reliability Analysis

Usefulness

Reliability Statistics

Cronbach's Alpha	N of Items
,888	3

Ease of use

Reliability Statistics

Cronbach's Alpha	N of Items
,681	3

Need for interaction

Reliability Statistics

Cronbach's Alpha	N of Items
,640	3

Risk

Reliability Statistics

Cronbach's Alpha	N of Items
,891	4

Performance

Reliability Statistics

Cronbach's Alpha	N of Items
,820	4

Fun

Reliability Statistics

Cronbach's Alpha	N of Items
,813	3

Health safety

Reliability Statistics

Cronbach's Alpha	N of Items
,896	4

Attitude towards the adoption

Reliability Statistics

Cronbach's Alpha	N of Items
,938	3

Appendix H: Study II – MBway Payment | Reliability Analysis

Usefulness

Reliability Statistics

Cronbach's Alpha	N of Items
,975	3

Ease of use

Reliability Statistics

Cronbach's Alpha	N of Items
,711	3

Need for interaction

Reliability Statistics

Cronbach's Alpha	N of Items
,599	3

Risk

Reliability Statistics

Cronbach's Alpha	N of Items
,941	4

Performance

Reliability Statistics

Cronbach's Alpha	N of Items
,801	4

Fun

Reliability Statistics

Cronbach's Alpha	N of Items
,789	4

Health safety

Reliability Statistics

Cronbach's Alpha	N of Items
,789	4

Attitude towards the adoption

Reliability Statistics

Cronbach's Alpha	N of Items
,950	3

Appendix I: Study III– Cashierless Stores | Reliability Analysis

Usefulness

Reliability Statistics

Cronbach's Alpha	N of Items
,929	3

Ease of use

Reliability Statistics

Cronbach's Alpha	N of Items
,759	3

Need for interaction

Reliability Statistics

Cronbach's Alpha	N of Items
,686	3

Risk

Reliability Statistics

Cronbach's Alpha	N of Items
,905	4

Performance

Reliability Statistics

Cronbach's Alpha	N of Items
,866	4

Fun

Reliability Statistics

Cronbach's Alpha	N of Items
,703	4

Health safety

Reliability Statistics

Cronbach's Alpha	N of Items
,906	4

Attitude towards the adoption

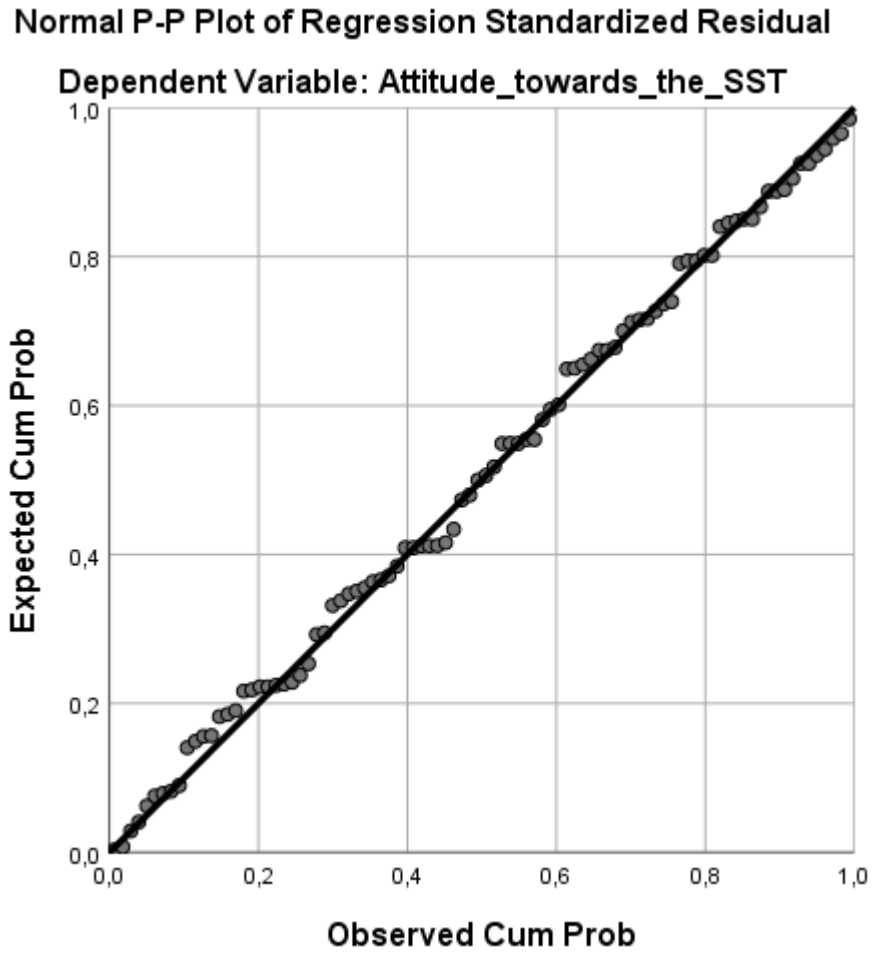
Reliability Statistics

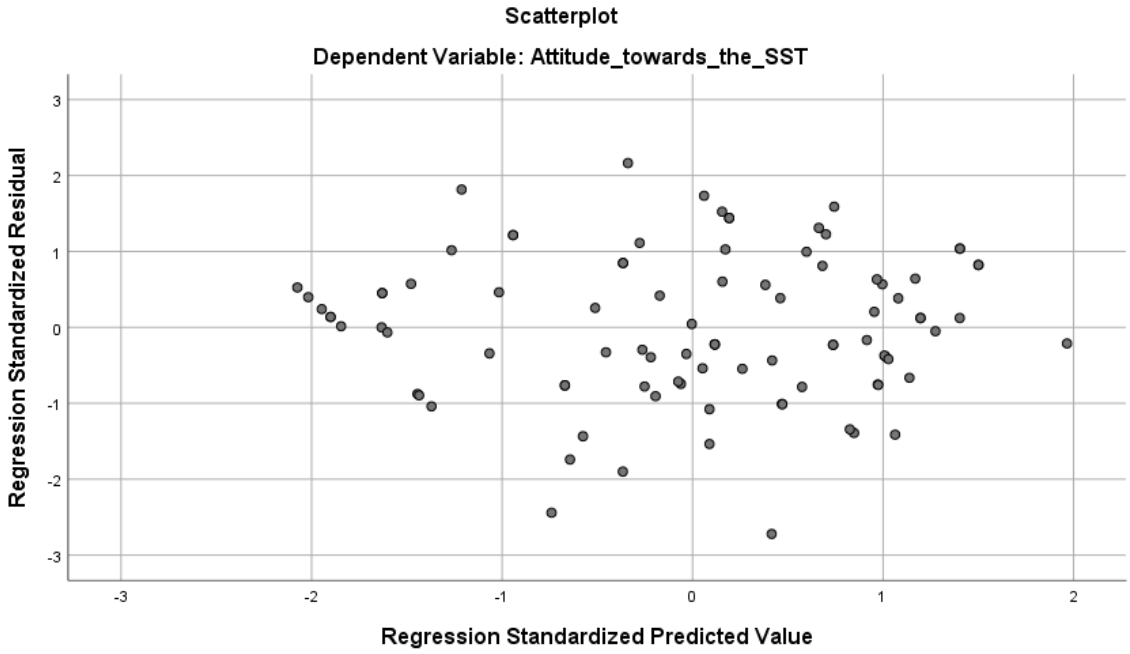
Cronbach's Alpha	N of Items
,931	3

Appendix J: Study I – Self-service Checkout | Antecedent Beliefs' Analysis

Correlations

		Attitude_towards_the_SST	Usefulness	Ease_of_use	Need_for_interaction	Risk	Performance	Fun	Health_Safety
Pearson Correlation	Attitude_towards_the_SST	1,000	,599	-,199	,417	,812	,781	,816	,751
	Usefulness	,599	1,000	-,071	,299	,503	,374	,640	,353
	Ease_of_use	-,199	-,071	1,000	-,726	-,280	-,150	-,275	-,237
	Need_for_interaction	,417	,299	-,726	1,000	,500	,389	,473	,385
	Risk	,812	,503	-,280	,500	1,000	,762	,746	,707
	Performance	,781	,374	-,150	,389	,762	1,000	,626	,698
	Fun	,816	,640	-,275	,473	,746	,626	1,000	,568
	Health_Safety	,751	,353	-,237	,385	,707	,698	,568	1,000
Sig. (1-tailed)	Attitude_towards_the_SST	.	,000	,028	,000	,000	,000	,000	,000
	Usefulness	,000	.	,249	,002	,000	,000	,000	,000
	Ease_of_use	,028	,249	.	,000	,003	,077	,004	,012
	Need_for_interaction	,000	,002	,000	.	,000	,000	,000	,000
	Risk	,000	,000	,003	,000	.	,000	,000	,000
	Performance	,000	,000	,077	,000	,000	.	,000	,000
	Fun	,000	,000	,004	,000	,000	,000	.	,000
	Health_Safety	,000	,000	,012	,000	,000	,000	,000	.
N	Attitude_towards_the_SST	92	92	92	92	92	92	92	92
	Usefulness	92	92	92	92	92	92	92	92
	Ease_of_use	92	92	92	92	92	92	92	92
	Need_for_interaction	92	92	92	92	92	92	92	92
	Risk	92	92	92	92	92	92	92	92
	Performance	92	92	92	92	92	92	92	92
	Fun	92	92	92	92	92	92	92	92
	Health_Safety	92	92	92	92	92	92	92	92


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Attitude_towards_the_SST
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0


Scatterplot
Dependent Variable: Attitude_towards_the_SST
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	,6176	7,1547	3,9746	1,61803	92
Std. Predicted Value	-2,075	1,965	,000	1,000	92
Standard Error of Predicted Value	,100	,404	,208	,054	92
Adjusted Predicted Value	,5854	7,1801	3,9760	1,61798	92
Residual	-1,97990	1,57458	,00000	,69913	92
Std. Residual	-2,721	2,164	,000	,961	92
Stud. Residual	-2,807	2,395	-,001	1,010	92
Deleted Residual	-2,10737	1,92964	-,00137	,77436	92
Stud. Deleted Residual	-2,931	2,467	-,002	1,023	92
Mahal. Distance	,738	27,019	6,924	4,198	92
Cook's Distance	,000	,162	,014	,025	92
Centered Leverage Value	,008	,297	,076	,046	92

a. Dependent Variable: Attitude_towards_the_SST

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,918[a]	,843	,830	,72767	,843	64,275	7	84	,000

a. Predictors: (Constant), Health_Safety, Ease_of_use, Usefulness, Performance, Fun, Need_for_interaction, Risk

b. Dependent Variable: Attitude_towards_the_SST

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	238,240	7	34,034	64,275	,000[b]
	Residual	44,479	84	,530		
	Total	282,719	91			

a. Dependent Variable: Attitude_towards_the_SST

b. Predictors: (Constant), Health_Safety, Ease_of_use, Usefulness, Performance, Fun, Need_for_interaction, Risk

Coefficients[a]

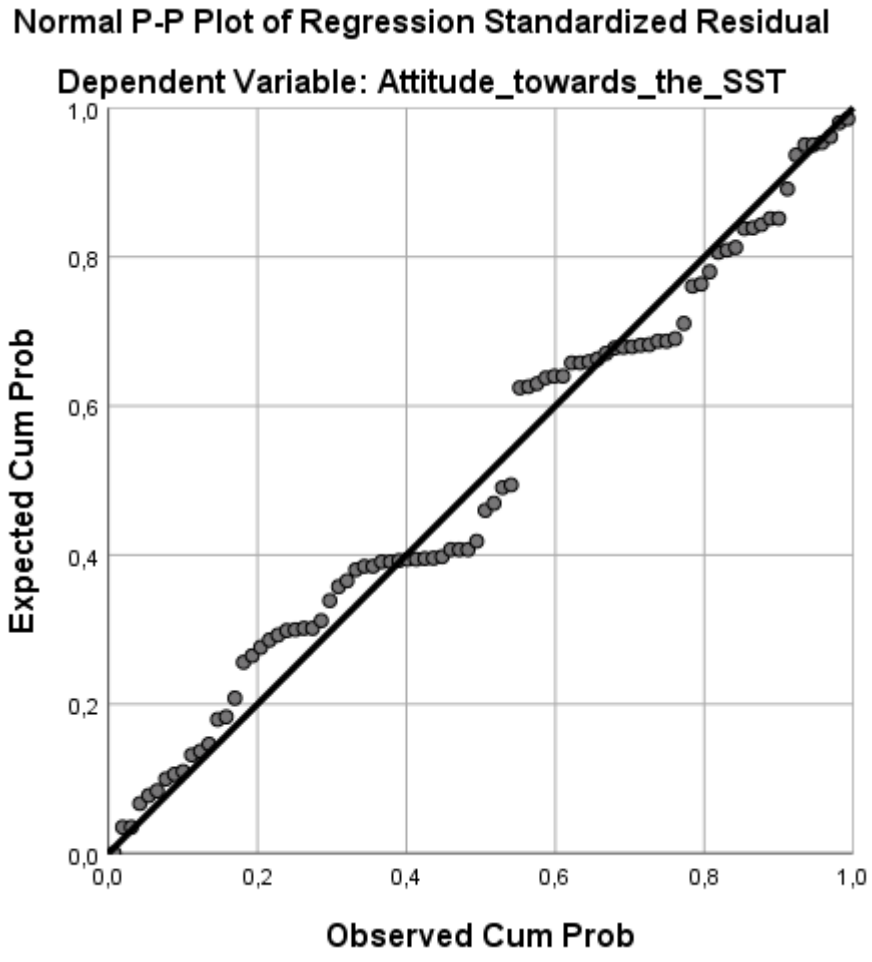
		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,509	,634		-,803	,424					
	Usefulness	,132	,056	,137	2,374	,020	,599	,251	,103	,559	1,787
	Ease_of_use	,012	,094	,009	,130	,897	-,199	,014	,006	,430	2,328
	Need_for_interaction	-,057	,088	-,047	-,655	,514	,417	-,071	-,028	,359	2,786
	Risk	,138	,081	,145	1,703	,092	,812	,183	,074	,260	3,850
	Performance	,248	,074	,246	3,357	,001	,781	,344	,145	,348	2,872
	Fun	,349	,076	,348	4,617	,000	,816	,450	,200	,329	3,040
	Health_Safety	,256	,067	,250	3,816	,000	,751	,384	,165	,435	2,300

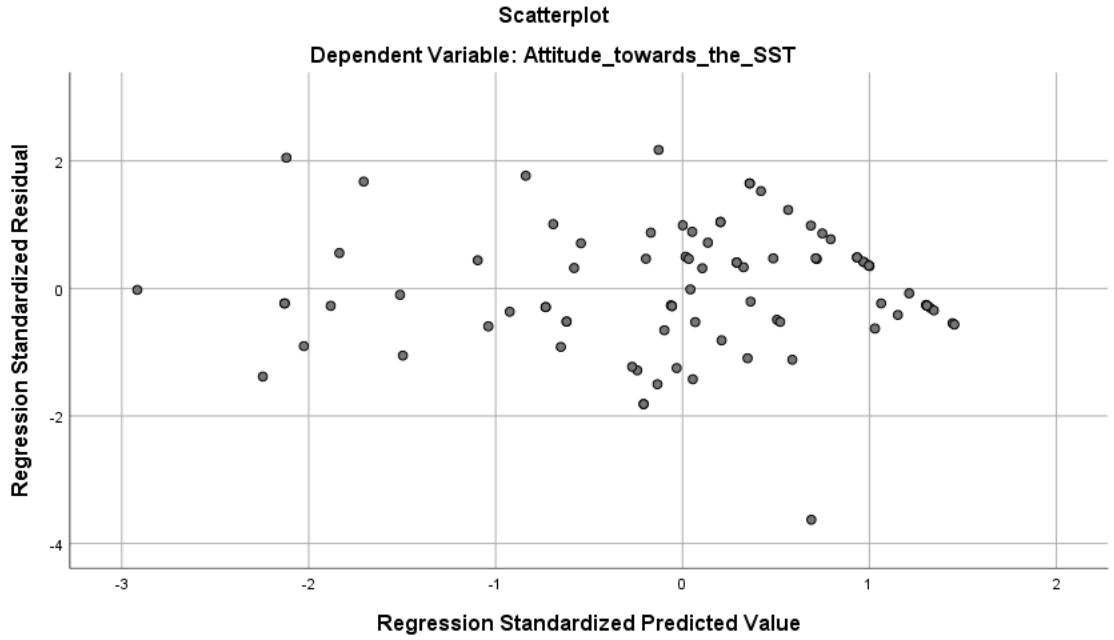
a. Dependent Variable: Attitude_towards_the_SST

Appendix K: Study II – MBway Payment | Antecedent Beliefs' Analysis

Correlations

		Attitude_towards_the_SST	Usefulness	Ease_of_use	Need_for_interaction	Risk	Performance	Fun	Health_Safety
Pearson Correlation	Attitude_towards_the_SST	1,000	,721	,658	,126	,828	,679	,778	,634
	Usefulness	,721	1,000	,523	,041	,695	,495	,659	,460
	Ease_of_use	,658	,523	1,000	-,004	,615	,734	,437	,526
	Need_for_interaction	,126	,041	-,004	1,000	,218	,209	,054	,190
	Risk	,828	,695	,615	,218	1,000	,752	,679	,663
	Performance	,679	,495	,734	,209	,752	1,000	,534	,559
	Fun	,778	,659	,437	,054	,679	,534	1,000	,459
	Health_Safety	,634	,460	,526	,190	,663	,559	,459	1,000
Sig. (1-tailed)	Attitude_towards_the_SST	.	,000	,000	,125	,000	,000	,000	,000
	Usefulness	,000	.	,000	,353	,000	,000	,000	,000
	Ease_of_use	,000	,000	.	,486	,000	,000	,000	,000
	Need_for_interaction	,125	,353	,486	.	,022	,027	,311	,040
	Risk	,000	,000	,000	,022	.	,000	,000	,000
	Performance	,000	,000	,000	,027	,000	.	,000	,000
	Fun	,000	,000	,000	,311	,000	,000	.	,000
	Health_Safety	,000	,000	,000	,040	,000	,000	,000	.
N	Attitude_towards_the_SST	86	86	86	86	86	86	86	86
	Usefulness	86	86	86	86	86	86	86	86
	Ease_of_use	86	86	86	86	86	86	86	86
	Need_for_interaction	86	86	86	86	86	86	86	86
	Risk	86	86	86	86	86	86	86	86
	Performance	86	86	86	86	86	86	86	86
	Fun	86	86	86	86	86	86	86	86
	Health_Safety	86	86	86	86	86	86	86	86





Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,0173	7,4090	5,2829	1,46232	86
Std. Predicted Value	-2,917	1,454	,000	1,000	86
Standard Error of Predicted Value	,116	,374	,213	,057	86
Adjusted Predicted Value	1,0237	7,4345	5,2793	1,46451	86
Residual	-2,62348	1,57134	,00000	,69281	86
Std. Residual	-3,627	2,173	,000	,958	86
Stud. Residual	-3,789	2,273	,002	1,011	86
Deleted Residual	-2,86277	1,73705	,00369	,77293	86
Stud. Deleted Residual	-4,168	2,337	-,001	1,036	86
Mahal. Distance	1,203	21,802	6,919	4,362	86
Cook's Distance	,000	,179	,015	,031	86
Centered Leverage Value	,014	,256	,081	,051	86

a. Dependent Variable: Attitude_towards_the_SST

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,904[a]	,817	,800	,72323	,817	49,643	7	78	,000

a. Predictors: (Constant), Health_Safety, Need_for_interaction, Fun, Ease_of_use, Usefulness, Performance, Risk

b. Dependent Variable: Attitude_towards_the_SST

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	181,761	7	25,966	49,643	,000[b]
	Residual	40,798	78	,523		
	Total	222,559	85			

a. Dependent Variable: Attitude_towards_the_SST

b. Predictors: (Constant), Health_Safety, Need_for_interaction, Fun, Ease_of_use, Usefulness, Performance, Risk

Coefficients[a]

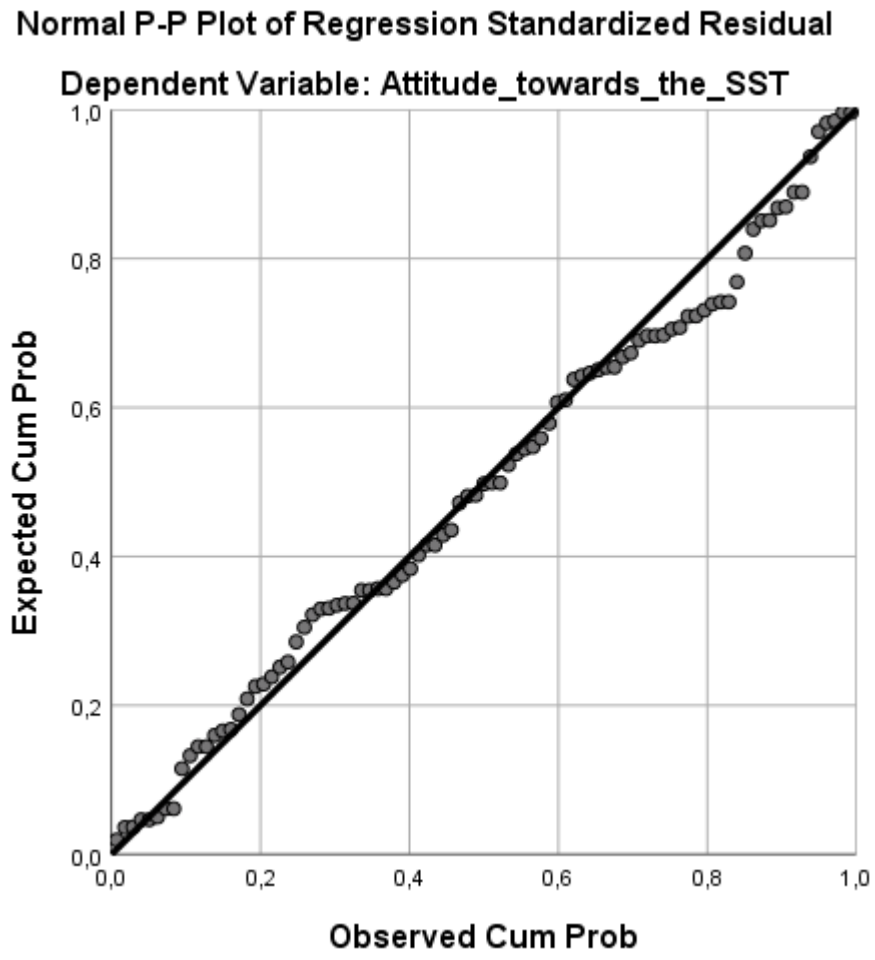
Model		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,734	,430		-1,709	,091					
	Usefulness	,098	,062	,118	1,576	,119	,721	,176	,076	,420	2,381
	Ease_of_use	,228	,086	,206	2,641	,010	,658	,287	,128	,388	2,580
	Need_for_interaction	,021	,065	,017	,326	,745	,126	,037	,016	,859	1,164
	Risk	,308	,095	,327	3,247	,002	,828	,345	,157	,232	4,308
	Performance	-,032	,105	-,028	-,308	,759	,679	-,035	-,015	,293	3,417
	Fun	,438	,088	,355	4,962	,000	,778	,490	,241	,460	2,176
	Health_Safety	,111	,071	,104	1,568	,121	,634	,175	,076	,531	1,882

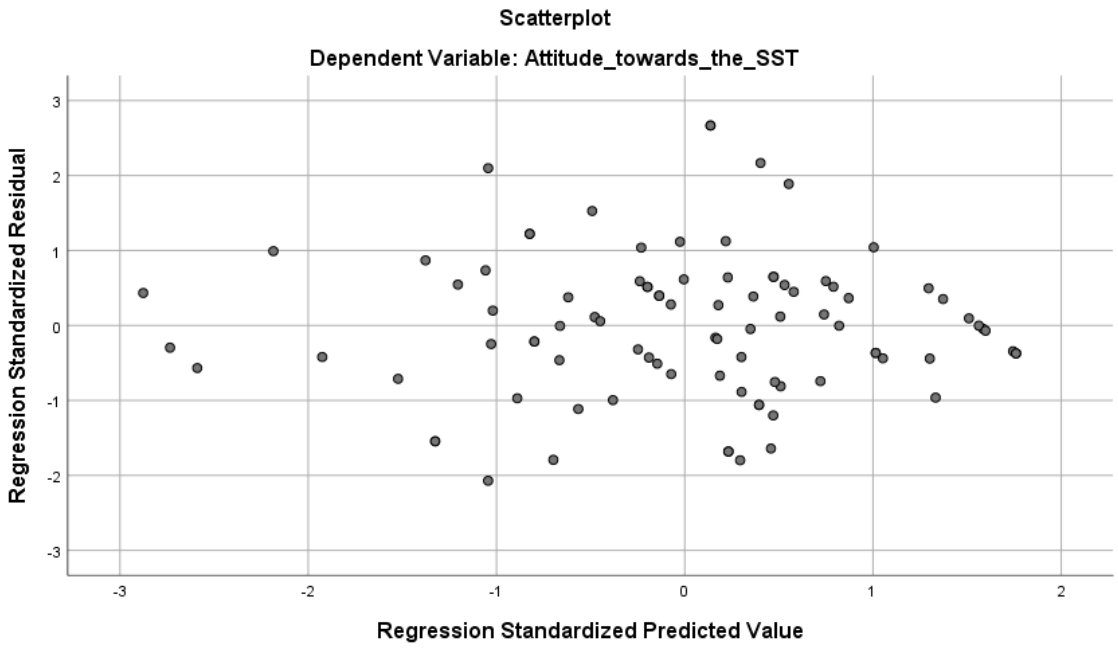
a. Dependent Variable: Attitude_towards_the_SST

Appendix L: Study III– Cashierless Stores | Antecedent Beliefs' Analysis

Correlations

		Attitude_towards_the_SST	Usefulness	Ease_of_use	Need_for_interaction	Risk	Performance	Fun	Health_Safety
Pearson Correlation	Attitude_towards_the_SST	1,000	,529	,598	,453	,731	,721	,791	,694
	Usefulness	,529	1,000	,370	,130	,293	,199	,579	,310
	Ease_of_use	,598	,370	1,000	,190	,670	,615	,544	,486
	Need_for_interaction	,453	,130	,190	1,000	,395	,434	,446	,441
	Risk	,731	,293	,670	,395	1,000	,866	,529	,688
	Performance	,721	,199	,615	,434	,866	1,000	,536	,663
	Fun	,791	,579	,544	,446	,529	,536	1,000	,594
	Health_Safety	,694	,310	,486	,441	,688	,663	,594	1,000
Sig. (1-tailed)	Attitude_towards_the_SST	.	,000	,000	,000	,000	,000	,000	,000
	Usefulness	,000	.	,000	,110	,002	,029	,000	,001
	Ease_of_use	,000	,000	.	,036	,000	,000	,000	,000
	Need_for_interaction	,000	,110	,036	.	,000	,000	,000	,000
	Risk	,000	,002	,000	,000	.	,000	,000	,000
	Performance	,000	,029	,000	,000	,000	.	,000	,000
	Fun	,000	,000	,000	,000	,000	,000	.	,000
	Health_Safety	,000	,001	,000	,000	,000	,000	,000	.
N	Attitude_towards_the_SST	91	91	91	91	91	91	91	91
	Usefulness	91	91	91	91	91	91	91	91
	Ease_of_use	91	91	91	91	91	91	91	91
	Need_for_interaction	91	91	91	91	91	91	91	91
	Risk	91	91	91	91	91	91	91	91
	Performance	91	91	91	91	91	91	91	91
	Fun	91	91	91	91	91	91	91	91
	Health_Safety	91	91	91	91	91	91	91	91


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Attitude_towards_the_SST
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0


Scatterplot
Dependent Variable: Attitude_towards_the_SST
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,0211	7,2684	4,8974	1,34745	91
Std. Predicted Value	-2,877	1,760	,000	1,000	91
Standard Error of Predicted Value	,111	,361	,205	,059	91
Adjusted Predicted Value	,9529	7,2867	4,9013	1,34458	91
Residual	-1,48999	1,91851	,00000	,69098	91
Std. Residual	-2,071	2,666	,000	,960	91
Stud. Residual	-2,393	2,805	-,002	1,013	91
Deleted Residual	-1,99010	2,12325	-,00390	,77050	91
Stud. Deleted Residual	-2,465	2,930	,000	1,030	91
Mahal. Distance	1,163	21,628	6,923	4,589	91
Cook's Distance	,000	,240	,015	,033	91
Centered Leverage Value	,013	,240	,077	,051	91

a. Dependent Variable: Attitude_towards_the_SST

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,890[a]	,792	,774	,71953	,792	45,089	7	83	,000

a. Predictors: (Constant), Health_Safety, Usefulness, Need_for_interaction, Ease_of_use, Performance, Fun, Risk

b. Dependent Variable: Attitude_towards_the_SST

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	163,405	7	23,344	45,089	,000[b]
	Residual	42,971	83	,518		
	Total	206,376	90			

a. Dependent Variable: Attitude_towards_the_SST

b. Predictors: (Constant), Health_Safety, Usefulness, Need_for_interaction, Ease_of_use, Performance, Fun, Risk

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,391	,352		-1,112	,269					
	Usefulness	,149	,060	,159	2,473	,015	,529	,262	,124	,604	1,656
	Ease_of_use	-,005	,074	-,005	-,063	,950	,598	-,007	-,003	,468	2,135
	Need_for_interaction	,035	,064	,033	,545	,587	,453	,060	,027	,687	1,456
	Risk	,178	,103	,196	1,733	,087	,731	,187	,087	,196	5,093
	Performance	,198	,098	,217	2,023	,046	,721	,217	,101	,218	4,584
	Fun	,457	,093	,397	4,887	,000	,791	,473	,245	,381	2,625
	Health_Safety	,102	,066	,118	1,556	,123	,694	,168	,078	,435	2,297

a. Dependent Variable: Attitude_towards_the_SST

Appendix M: Study I– Self-Service Checkout | Usage and Knowledge

Statistics

		Are you familiar with how the Self-Service Checkout works?	Do you know any Supermarket that offers the possibility to use the Self-Service Checkout?	Does the Supermarket (s) that you usually go to offers the possibility to use the Self-Service Checkout?	Have you ever used the Self-Service Checkout before?	How often do you use the Self-Service Checkout?
N	Valid	92	92	92	92	69
	Missing	0	0	0	0	23

Are you familiar with how the Self-Service Checkout works?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	27	29.3	29.3	29.3
	Yes	65	70.7	70.7	100.0
	Total	92	100.0	100.0	

Do you know any Supermarket that offers the possibility to use the Self-Service Checkout?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	10	10.9	10.9	10.9
	Yes	82	89.1	89.1	100.0
	Total	92	100.0	100.0	

Does the Supermarket(s) that you usually go to offers the possibility to use the Self-Service Checkout?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	45	48.9	48.9	48.9
	Yes	47	51.1	51.1	100.0
	Total	92	100.0	100.0	

Have you ever used the Self-Service Checkout before?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	23	25.0	25.0	25.0
	Yes	69	75.0	75.0	100.0
	Total	92	100.0	100.0	

How often do you use the Self-Service Checkout?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never use it 1	2	2.2	2.9	2.9
	2	19	20.7	27.5	30.4
	3	22	23.9	31.9	62.3
	4	11	12.0	15.9	78.3
	5	7	7.6	10.1	88.4
	6	5	5.4	7.2	95.7
	Always use it7	3	3.3	4.3	100.0
	Total	69	75.0	100.0	
Missing	System	23	25.0		
Total		92	100.0		

Appendix N: Study II – MBWay Payment | Usage and Knowledge

Statistics

		Are you familiar with how MB WAY works?	Do you know any Supermarket that offers the possibility to use MB WAY?	Does the Supermarket (s) that you usually go to offers the possibility to use MB WAY?	Have you ever used MB WAY before?	How often do you use MB WAY?
N	Valid	86	86	86	86	53
	Missing	0	0	0	0	33

Are you familiar with how MB WAY works?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	22	25.6	25.6	25.6
	Yes	64	74.4	74.4	100.0
	Total	86	100.0	100.0	

Do you know any Supermarket that offers the possibility to use MB WAY?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	16	18.6	18.6	18.6
	Yes	70	81.4	81.4	100.0
	Total	86	100.0	100.0	

Does the Supermarket(s) that you usually go to offers the possibility to use MB WAY?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	20	23.3	23.3	23.3
	Yes	66	76.7	76.7	100.0
	Total	86	100.0	100.0	

Have you ever used MB WAY before?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	33	38.4	38.4	38.4
	Yes	53	61.6	61.6	100.0
	Total	86	100.0	100.0	

How often do you use MB WAY?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	5	5.8	9.4	9.4
	3	4	4.7	7.5	17.0
	4	7	8.1	13.2	30.2
	5	22	25.6	41.5	71.7
	6	8	9.3	15.1	86.8
	Always use it7	7	8.1	13.2	100.0
	Total	53	61.6	100.0	
Missing	System	33	38.4		
Total		86	100.0		

Appendix O: Study III– Cashierless Stores | Usage and Knowledge

Statistics

		Are you familiar with how the Cashierless Store works?	Do you know any Supermarket that functions as a Cashierless Store?	Does the Supermarket (s) that you usually go to function as a Cashierless Store?	Have you ever shopped at Cashierless Store before?	How often do you go to a Cashierless Store?
N	Valid	91	91	91	91	12
	Missing	0	0	0	0	79

Are you familiar with how the Cashierless Store works?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	56	61.5	61.5	61.5
	Yes	35	38.5	38.5	100.0
	Total	91	100.0	100.0	

Do you know any Supermarket that functions as a Cashierless Store?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	70	76.9	76.9	76.9
	Yes	21	23.1	23.1	100.0
	Total	91	100.0	100.0	

Does the Supermarket(s) that you usually go to function as a Cashierless Store?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	87	95.6	95.6	95.6
	Yes	4	4.4	4.4	100.0
	Total	91	100.0	100.0	

Have you ever shopped at Cashierless Store before?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	79	86.8	86.8	86.8
	Yes	12	13.2	13.2	100.0
	Total	91	100.0	100.0	

How often do you go to a Cashierless Store?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never use it 1	1	1.1	8.3	8.3
	2	6	6.6	50.0	58.3
	3	2	2.2	16.7	75.0
	5	2	2.2	16.7	91.7
	6	1	1.1	8.3	100.0
	Total	12	13.2	100.0	
Missing	System	79	86.8		
Total		91	100.0		

Appendix P: Paired Samples Correlations

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Attitude_towards_the_SSCO & Attitude_towards_the_MBWP	86	,350	,001
Pair 2	Attitude_towards_the_SSCO & Attitude_towards_the_CLS	91	,209	,047
Pair 3	Attitude_towards_the_MBWP & Attitude_towards_the_CLS	86	,340	,001

Appendix Q: Attitude Means

Descriptive Statistics

	N	Mean
Attitude_towards_the_SSCO	92	3,9746
Attitude_towards_the_MBWP	86	5,2829
Attitude_towards_the_CLS	91	4,8974
Valid N (listwise)	86	

Appendix R: Study I– Cashierless Stores | Behavioural Intention to use the SST

Correlations

		Behavioural_Intention_to_use_the_SST	Attitude_towards_the_SST
Pearson Correlation	Behavioural_Intention_to_use_the_SST	1,000	,786
	Attitude_towards_the_SST	,786	1,000
Sig. (1-tailed)	Behavioural_Intention_to_use_the_SST	.	,000
	Attitude_towards_the_SST	,000	.
N	Behavioural_Intention_to_use_the_SST	92	92
	Attitude_towards_the_SST	92	92

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,786[a]	,619	,614	1,276	,619	145,919	1	90	,000

a. Predictors: (Constant), Attitude_towards_the_SST

b. Dependent Variable: Behavioural_Intention_to_use_the_SST

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	237,637	1	237,637	145,919	,000[b]
	Residual	146,570	90	1,629		
	Total	384,207	91			

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

b. Predictors: (Constant), Attitude_towards_the_SST

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,416	,330		-1,261	,211					
	Attitude_towards_the_SST	,917	,076	,786	12,080	,000	,786	,786	,786	1,000	1,000

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	,50	6,00	3,23	1,616	92
Std. Predicted Value	-1,688	1,716	,000	1,000	92
Standard Error of Predicted Value	,133	,265	,183	,046	92
Adjusted Predicted Value	,48	5,96	3,22	1,615	92
Residual	-3,780	2,137	,000	1,269	92
Std. Residual	-2,962	1,675	,000	,994	92
Stud. Residual	-2,993	1,685	,002	1,004	92
Deleted Residual	-3,861	2,164	,004	1,293	92
Stud. Deleted Residual	-3,137	1,703	-,002	1,015	92
Mahal. Distance	,000	2,946	,989	1,010	92
Cook's Distance	,000	,096	,009	,013	92
Centered Leverage Value	,000	,032	,011	,011	92

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

Appendix S: Study II– MBWay Payment | Behavioural Intention to use the SST

Correlations

		Behavioural_Intention_to_use_the_SST	Attitude_towards_the_SST
Pearson Correlation	Behavioural_Intention_to_use_the_SST	1,000	,703
	Attitude_towards_the_SST	,703	1,000
Sig. (1-tailed)	Behavioural_Intention_to_use_the_SST	.	,000
	Attitude_towards_the_SST	,000	.
N	Behavioural_Intention_to_use_the_SST	86	86
	Attitude_towards_the_SST	86	86

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,703[a]	,494	,488	1,538	,494	82,019	1	84	,000

a. Predictors: (Constant), Attitude_towards_the_SST

b. Dependent Variable: Behavioural_Intention_to_use_the_SST

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	194,074	1	194,074	82,019	,000[b]
	Residual	198,763	84	2,366		
	Total	392,837	85			

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

b. Predictors: (Constant), Attitude_towards_the_SST

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-1,050	,569		-1,843	,069					
	Attitude_towards_the_SST	,934	,103	,703	9,056	,000	,703	,703	,703	1,000	1,000

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,12	5,49	3,88	1,511	86
Std. Predicted Value	-2,647	1,061	,000	1,000	86
Standard Error of Predicted Value	,166	,472	,226	,062	86
Adjusted Predicted Value	-,23	5,55	3,88	1,517	86
Residual	-3,242	4,626	,000	1,529	86
Std. Residual	-2,108	3,007	,000	,994	86
Stud. Residual	-2,121	3,043	,001	1,004	86
Deleted Residual	-3,282	4,736	,004	1,560	86
Stud. Deleted Residual	-2,167	3,207	,002	1,015	86
Mahal. Distance	,001	7,006	,988	1,318	86
Cook's Distance	,000	,111	,010	,014	86
Centered Leverage Value	,000	,082	,012	,016	86

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

Appendix T: Study III– Cashierless Stores | Behavioural Intention to use the SST

Correlations

		Behavioural_Intention_to_use_the_SST	Attitude_towards_the_SST
Pearson Correlation	Behavioural_Intention_to_use_the_SST	1,000	,735
	Attitude_towards_the_SST	,735	1,000
Sig. (1-tailed)	Behavioural_Intention_to_use_the_SST	.	,000
	Attitude_towards_the_SST	,000	.
N	Behavioural_Intention_to_use_the_SST	91	91
	Attitude_towards_the_SST	91	91

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,735[a]	,541	,536	1,486	,541	104,820	1	89	,000

a. Predictors: (Constant), Attitude_towards_the_SST

b. Dependent Variable: Behavioural_Intention_to_use_the_SST

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	231,526	1	231,526	104,820	,000[b]
	Residual	196,584	89	2,209		
	Total	428,110	90			

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

b. Predictors: (Constant), Attitude_towards_the_SST

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-1,088	,530		-2,053	,043					
	Attitude_towards_the_SST	1,059	,103	,735	10,238	,000	,735	,735	,735	1,000	1,000

a. Dependent Variable: Behavioural_Intention_to_use_the_SST

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,03	6,33	4,10	1,604	91
Std. Predicted Value	-2,574	1,388	,000	1,000	91
Standard Error of Predicted Value	,156	,432	,211	,064	91
Adjusted Predicted Value	-,12	6,50	4,10	1,613	91
Residual	-5,326	2,439	,000	1,478	91
Std. Residual	-3,584	1,641	,000	,994	91
Stud. Residual	-3,643	1,651	,000	1,005	91
Deleted Residual	-5,504	2,469	,000	1,509	91
Stud. Deleted Residual	-3,927	1,668	-,006	1,023	91
Mahal. Distance	,005	6,624	,989	1,366	91
Cook's Distance	,000	,222	,010	,025	91
Centered Leverage Value	,000	,074	,011	,015	91

a. Dependent Variable: Behavioural_Intention_to_use_the_SST