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The use of Self-service Technologies (interactive screens) in enhancing the shopping experience in selected South African shopping malls: a consumer/shopper perspective

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Abstract

With the South African consumer market continuously evolving, it is imperative for shopping-mall owners to create more innovative shopping ways to satisfy the needs of the 21st century South African consumers. One of the innovative ways is to provide the use of self-service technologies (SSTs), which reportedly provides consumers positive cognitive, affective, and sensory customer experience benefits. Using SSTs in banks, shopping malls, hotels and other business environments have become a trend as customers do not only enjoy fresh and actionable experiences, they also get service quality, efficiency and entertainment that can be better and consistent than the human services. Despite these benefits, emerging markets such as India and South Africa respectively are slow to adopt SSTs, especially in the shopping mall environment. This study integrated relevant elements of technology acceptance model, diffusion of innovation theory, theory of planned behaviour and the flow theory to examine SST site factors (i.e., user interface, aesthetics and authenticity), the technology-related factors (i.e., relative advantage, complexity, perceived ease of use[PEOU], perceived usefulness [PU]) and consumer factors (i.e., subjective norms, perceived behavioural control, enjoyment and concentration) driving attitudes and behavioural intentions to use SSTs at some selected shopping malls in Johannesburg. The mediating roles of PU, PEOU and attitudes were also tested. Based on proximity to the researcher's resident and malls similarities in size, ranking, and social class (i.e., middle and higher income) and socio-economic profiles of shoppers, the researcher selected three contemporary shopping malls which have been identified as super regional centres. These malls were Mall of Africa, Rosebank and Sandton City malls. Additionally, the malls have installed SSTs like information kiosks or interactive screens.

A quantitative research study was conducted with data collected successfully from 260 respondents and analysed using structural equation modelling with Smart PLS. Sobel's test was used to test mediation. Findings revealed that user-interface and aesthetics and authenticity positively impacted PU and PEOU. The PU and PEOU with relative advantage drove attitudes to adopt SSTs, which with perceived control, subjective norm and enjoyment were positive and significant drivers of behavioural intention to use SSTs. The mediating effects of PU, PEOU and attitudes were significant. Managerially, drivers of shoppers' attitudes and intentions to adopt SSTS are exposed. Theoretically, the study's integrated model enriches the explanation of the acceptance of a technology, that is SST, especially in emerging market and multicultural context.

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CHAPTER 1: INTRODUCTION

1.1 Shopping Environments and the Adoption of Self-service Technologies

The consumption of products and services continues to grow and evolve in the 21st century and may continue to do so with population growth and improved standards of living (Bleischwitz, Welfens & Zhang, 2017). More recently, the African economic growth has been on the rise as it has been noted to be the third fastest growing region in the world and this largely owing to expansive ICT adoption within the services sector, capturing the attention of scholars, corporate executives, and entrepreneurs (Adeleye & Eboagu, 2019). Authors, such as Myovella, Karacuka and Haucap (2020), have also highlighted how digitisation has a significant impact on emerging economies in Sub-Saharan Africa and other regions that have continued to benefit from a steady economic growth over the years. This massive expansion and growth have consequently had an effect in influencing consumer and shopper behaviours over time. This finding was also echoed by the massive growth potential of urbanisation in most African countries which will stimulate more demand for products and services for consumers (Van Noorloos, & Klosterboer, 2018). The projected growth opportunities have therefore presented more optimism for retail and service industries in the region.

South Africa's retail and wholesale industry is one of the largest and most developed on the continent and contributes 40% of South Africa's GDP (Mwamba & Qutieshat, 2021). This is further echoed by Ngewu, (2021) who also noted how the retail sector also employs a significant number of South African population of approximately 21% of the country's population (Aspeling and Mason, 2020). The growth of South Africa's robust retail industry has largely been owed to the rapid urbanisation of the South African population and an increase in the per capita income which has helped large retailers and smaller players to increase their footprint in the country (Das Nair, 2019).

Shopping centres are known to consist of a collection of shops but will continue to evolve to become more central hubs for the communities around them offering other services such as restaurant, banks, laundry, clinics, and other functions (Lu, 2018). In its simplest definition, shopping centres refer to buildings that are made up of several units or shops and are managed as one property (Pitt & Musa, 2009). There are three main configurations of shopping centres

common in emerging and developed economies, namely, shopping malls, open-air centres and hybrid centres.

Shopping malls are the most common configurations of shopping centres in South Africa and tend to be typically enclosed, climate controlled and have on-site parking for the shoppers' convenience. It has been noted that shopping malls tend to have high thresholds of consumers during business hours when compared to other parts or city locations. Open-air centres, on the other hand, are usually laid out in a row format. Variations of the open-air shopping centres are typically L-shaped, U-shaped, Z shaped, cluster and T-shaped. Lastly, hybrid shopping centres tend to combine attributes and characteristics that mirror shopping mall and open-air centres (Jewell, 2016).

With technological advances and attempts to empower customers and reduce operating costs, self-service technologies (SSTs) are being introduced in shopping malls. The SST takes the form of self-scanning devices, mobile wallets, self-service checkouts, artificial intelligence, and automated robots (Sharma, Ueno, & Kingshott, 2021). The use of the SSTs has been widely accepted in the banking sector. Its adoption in the shopping malls and retailing sectors has been slow, despite benefits that can be gained from the perspectives of the retailer and consumers (Ntuli, 2021; Sharma et al., 2021). In South Africa, for example, Ntuli (2021) assesses that the SSTs in the retail sector can improve retailers' efficiency, enrich customers' experiences and improve services. Also worried about the slow uptake of SSTs in the retail sector in South Africa, Ntuli (2021) recommends the studying of SSTs perception and the use of appropriate models and theories to understand hindrances and helpers of SSTs in the retailing sector and from customers' perspective.

Questions are being asked as to whether the use of SSTs are influenced by the SSTs' characteristics, consumer characteristics/traits, customers' perceptions of SSTs and situational factors (Sharma et al., 2021). Theories, such as the Technology Acceptance Model (TAM) (Davis, 1989), Diffusion of Innovation Theory (DOI) (Rogers, 1995), Flow Theory (Csikszentmihalyi, 1985) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991) are being used to study adoption drivers of technologies, such as SSTs. While the TAM, TPB and flow theories provide factors related to consumers and their perceptions, the DOI touches on factors related to the technology characteristics. Whether these theories explain the adoption of SSTs in some selected shopping malls in South Africa, needs examination.

Based on proximity to where the researcher resides and malls similarities in size, ranking, class, and social class (i.e., middle, and higher income) and socio-economic profiles of shoppers, the researcher selected three contemporary shopping malls which have been identified as super regional centres by authors such as Prinsloo (2010, 2013, 2018). These malls are Mall of Africa, Rosebank, and Sandton City malls. These malls have been selected especially as they have installed the information kiosks or interactive screens to date, which makes it easier for their shoppers and the respondents to understand the context of the study as they would have been exposed to these facilities. Furthermore, the selected shopping malls provide a more inclusive variety of shoppers and consumers as these shopping malls can be regarded as places of encounters (Aceska & Heer, 2019). The selected malls attract shoppers of different ethnicities, beliefs, albeit being mostly middle and higher-income earners. These create a well-represented racial middle and higher-income demographic characteristics of Johannesburg shoppers' perceptions on SSTs.

1.2 Problem Statement and Research Question

Authors, such as Foroudi, Gupta, Sivarajah and Broderick (2018) and Gagne et al. (2022) have noted the significance of technological innovation on the customer shopping experience over time. For example, although the social interaction benefits diminish, Gagne et al. (2022) found that the use of SSTs provides consumers with positive cognitive, affective and sensory customer experience benefits. Using self-service devices in banks, shopping malls, hotels and other business environments, has become a trend as customers do not only enjoy fresh and actionable experiences (Liu & Hung, 2022), they also get service quality, efficiency and entertainment that can be better and more consistent than the human services (Lu et al., 2019). Thus, Omni-channel retailers are integrating the advantages of physical stores with the information-rich experience of online shopping and SSTs, especially for continued interaction with retailers, even when the physical stores close (Li, Zhang & Tayi, 2020). Despite these benefits, Kaur and Gupta (2012) and Ntuli (2021) note that emerging markets, such as India and South Africa, respectively, are slow to adopt SSTs, especially in the shopping mall environment.

On studying the helpers and hindrances of the intention to adopt SSTs in the emerging market of India, Kaur and Gupta (2012) found that the usefulness of the technology was found in the

technology acceptance model (TAM). The original TAM, developed by Davis (1989), posits that the behavioural intention to use an innovation is driven by perceived ease of use (PEOU) and perceived usefulness (PU) of the innovation. While researchers like Zaitul (2021) and Vahdat, Alizadeh, Quach and Hamelin (2021) highlight the importance of PEOU and PU in users' attitude, adoption intention regarding technological innovations, these two factors are not the only factors that influence technology adoption or may not fully explain behavioural intention for other technologies, such as SSTs (Vahdat et al., 2021). Rogers' (1995) diffusion of innovation (DOI) theory proposes that other technology factors, such as the complexity and relative advantage of the technology, also can lead to attitudes and behavioural intention to use a technology. Moreover, there are questions about customer experiences that create the perceptions of usefulness and ease of use in the first place. Rendell et al. (2021) assert that the user-interface and aesthetics of an online design generate perceptions of trust. This may create a positive attitude and resultant purchase intention. According to Ray, Bala and Dasgupta (2019), it is authenticity that generates perceived benefits before behavioural intentions are formed. To develop behavioural intentions, the theory of planned behaviour (TPB) suggests that positive attitudes toward the technology have to be formed. Apart from the attitudes, what other factors can generate behaviour intention to use a particular technological innovation?

The socio-psychological theory of planned behaviour (TPB), proposed by Ajzen (1985), and most used to explain technology adoption intentions and behaviour, suggest that behavioural intentions are influenced by attitudes, perceived behavioural control and subjective norms. Thus, while the DOI and TAM propose that PEOU, PU, relative advantage, complexity, etc., drive attitude, which is a strong driver of behavioural intention, TPB and TAM posit that perceived behavioural control, subjective norms, PEOU and PU can directly impact behavioural intention. However, and according to the flow experience theory of Nakamura and Csikszentmihalyi (2009), consumers can still develop behavioural intention even when they do not extrinsically see benefits or perceive some usefulness. Their intrinsic benefits, such as enjoyment and the ability of the technology absorbing their attention in terms of concentration, can also create behavioural intentions. The flow experience, as defined by Csikszentmihalyi (1990, p. 4), is "a state of mind where people tend to get too much involved in an activity (enjoyable) that are unable to keep track of time spent and even their surroundings or environment (concentration)". While Yoon, Jeong, and Rolland's (2015) study in Korea shows that the two flow experience factors (i.e., enjoyment and concentration) do significantly impact behavioural intentions toward the use of mobile instant messaging apps, Dhir, Kaur and

Rajala's (2020) study in Japan did not find a significant impact of the flow experience factors on behavioural intentions. This is an indication that there is no guarantee that a single theory can explain a behaviour in one country and the same in another country. A multi-theoretical approach is needed to holistically explain a behaviour.

Agag, Khashan and El Gayaar (2019) realise the importance of integrating theories to provide greater explanatory power of a model or to better explain a construct. For example, Agag et al. (2019) integrated the Diffusion of Innovation Theory (DOI), Technological Acceptance Model (TAM) and Theory of Planned Behaviour (TPB) to understand the factors that influence the adoption of online gaming and associated purchases. Their integrated model explained up to 68% of attitudes and 73% of the intention to continuously use online games. An addition of the flow experience constructs may further generate a greater explanatory power of behavioural intentions.

1.3 Research Question

Following the above problem statement, this study questions how much the integration of the TAM, TPB, DOI and the Flow theories can explain the behavioural intentions to adopt SSTs amongst South African retail shoppers in their shopping malls?

Sub-questions following from the above are:

i) To what extent do the SST site factors, such as user-interface, aesthetics and authenticity, impact TAM's PEOU and PU?

ii) How much do elements of TAM (i.e., PEOU and PU) and DOI (i.e., relative advantage and complexity) explain behavioural attitudes towards the intention to use SSTs?

iii) In addition to the Theory of Planned Behavior (TPB) factors (behavioural attitudes, subjective norms, and behavioural control) as drivers of behavioural intention (BI), how does concentration and enjoyment (as part of Flow Theory) also impact BI?

iv) Do the TAM, DOI, TPB factors mediate in how site factors impact attitudes and BI?

v) How much does the integration of TAM, DOI, TPB and the Flow theories, explain the BI to use SSTs in selected Johannesburg shopping-malls?

1.4. Objectives of the Study

1.4.1 Primary objective

The primary objective of this study is to integrate relevant elements of TAM, DOI, TPB and the Flow theories to examine the SST site factors (i.e., user interface, aesthetics, and authenticity), the technology-related factors (i.e., relative advantage, complexity, PEOU, PU) social and consumer factors (i.e., subjective norms, perceived behavioural control, enjoyment, and concentration) driving the attitudes and behavioural intentions to use SSTs at some selected shopping malls in Johannesburg.

1.4.2 Secondary objectives

To effectively meet the primary objective, the following secondary objectives are presented:

i) To assess the impact of SST site factors (user-interface, aesthetics, and authenticity) on PEOU and PU.
ii) To assess the impact of PEOU, PU, relative advantage, and complexity on attitudes towards the use of SSTs.
iii) To determine the impact of attitudes, subjective norms, perceived behavioural control, concentration, and enjoyment on behavioural intention to use SSTs.
iv) To test how PEOU and PU mediate in the relationships between user-interface, aesthetics, authenticity, and attitudes and BI.
v) To test the mediating roles of PEOU, PU, relative advantage, complexity, and attitudes in the relationships between user-interface, aesthetics, authenticity and BI.
vi) To develop a conceptual model developed from TAM, DOI, TPB and Flow theories for the explanation of the BI to use SSTs in selected Johannesburg shopping-malls.

1.5 Theories Adopted for the Study

Several theories were reviewed and four identified and proposed in the preceding discussion to examine the extent at which the behavioural intentions to use SSTs by shoppers in selected Johannesburg shopping malls can be explained. The theories identified are below. They are discussed in detail, in chapter 3.

i. Diffusion of innovation (DOI) Theory by Rodgers (1995)
ii. Flow theory (FT) by Csikszentmihalyi (1990)
iii. The theory of planned behaviour (TPB) by Ajzen (1985).
iv. The technology acceptance model (TAM) theory by Davies (1989)

1.5.1 The Diffusion of Innovation Theory

The DOI particularly focuses on how quickly new innovations, products and services are accepted by mainstream consumers from early adopters (Rodgers, 1995). It has been one of the integral theories used to understand the extent to which its five components (relative advantage, compatibility, complexity, trialability and observability drive consumers and even organisations to accept and spread new ideas, process, products and services (Shaw, Eschenbrenbl, & Brand, 2022). Shaw et al. (2022) report that the DOI provides adoption factors that are relatable to consumers of all socio-economic status across the globe and its constructs can easily be studied to understand the adoption of innovations and technology.

Rodgers (2002) highlights that the rate of adoption is influenced by elements, such as the actual innovation, communication channels, time, and the social systems. For the purposes of this study however, the researcher focused on complexity and relative advantage, as they are important in the product-service systems and in the shopping-mall context (Rexfelt & Ornas, 2009). For better comprehension of the DOI theory, the five constructs are briefly described below.

Compatibility: refers to the degree at which innovation is perceived as applicable with existing values, experience, and future adopters.

Complexity: is closely linked to perceived ease of use by Davis (1989), is also an important variable which is likely to either positively or negatively influence the adoption of an innovation, particularly SSTs. It has been widely noted that the greater the complexity, the lower the rate of adoption of an innovation. Seamless usage of an SST or innovation may, however, influence the rate of adoption and repeat usage.

Trialability: refer closely to the degree to which a given innovation is likely to be experimented with on a limited basis. It is important for this variable to be considered when looking to introduce an innovation as the level of trialability may lead to conversion and adoption of an innovation by the target market.

Observability: Is the extent to which an innovation's outcome is noticeable to others. The easier it is to identify the benefits of an innovation, the more likely that other potential adopters will make use of the innovation or consider adopting it. In a study conducted by Zhang, Yu, Yan, and Spil (2015), the significance of perceived value or observability was noted as one of the factors that has slowed down the rate of adoption of an e-appointment service which could be easily substituted with oral communication between the health-care service provider and patients. Key to ensure a potential adoption is providing a unique value proposition that could motivate or influence consumers or potential users to adopt the innovation.

As indicated earlier, the researcher focuses primarily on the Complexity and Relative advantage constructs from the DOI Theory and applies them in the study as these two constructs have been noted to have significant effects in influencing the adoption of new innovations.

1.5.2 Flow Theory

Similar to Moon and Lee (2022), who recognised the influence of Flow in influencing user perceptions on SSTs, the researcher has adopted flow theory as it provides insights on the mental state of operation that consumers have as they make use of SSTs to transact, interact and engage within a shopping mall setting.

Flow has been described as the state at which a person performing an activity is fully immersed in a feeling of energised focus, full involvement, and enjoyment in a process (Nakamura & Csikszentmihalyi, 2014). It has been noted that consumers who engage in flow are more likely to seek the same experience that made them engage in the flow experience and this may consequently lead to purchase intentions (Martins, Costa, Oliveira, Gonçalves & Branco, 2019). This further highlights the significance that flow theory may have in influencing the wide adoption of SSTs by South African shoppers.

For the purposes of this study, the researcher focuses primarily on three constructs from the flow theory, namely, **concentration or focus, perceived control, and enjoyment** as they are more likely to influence attitude and behavioural intention to use an innovation (Wu, Xu & Abdinnour, 2021).

1.5.2.1 Concentration or Focus

Focus or concentration is an important construct that can significantly influence the usage and adoption of an innovation and can also assist in making consumers become more immersed in their shopping activities which can influence their attitude and purchase intentions (Chen, Hsu & Lu, 2018). To understand the feasibility of adopting SSTs and innovations within a shopping experience context, there is a need to ensure that shoppers make use of web and mobile application platforms at flow and with the highest level of attention to derive the most value from the service. Attention on the user interface is paramount in creating an environment that is conducive for consumers to engage and interact with the product offering more effectively.

1.5.2.2 Perceived Control

Perceived control can be best described as the amount of control SST users have over a given process or outcome, based on a given situation (Le, Rao Hill & Troshani, 2022). Perceived control is particularly essential for consumers to be better able to transition into a state of flow, which is essential when making use of an innovation within a shopping mall environment. In flow theory, this has been best described as the ability of one's ability to exert control over situations or events (Ly, Wang, Bhanji & Delgado, 2019).

1.5.2.3 Enjoyment

According to flow theory, enjoyment also has a significant effect in influencing consumers or users of a system to get to a state where they are fully immersed in an activity which brings consumer satisfaction (Wu, Chiu & Chen, 2020). To induce the levels of positive enjoyment, there is a need to ensure that the user interface is easy to navigate, and users can find the innovation (which can be in the form of SSTs or application) to be functional and easy to use. These sentiments have been echoed by authors, such as Davis (1989), who noted how the enjoyment and satisfaction of users is closely associated with perceived ease of use and perceived usefulness of an innovation. It has however been noted that there seems to be a discrepancy in experience when comparing shopping physically in store, versus online shopping or shopping using a web-application (Koufaris, 2002).

1.5.3 Theory of Planned Behaviour

The theory of planned behaviour (TPB) is focused on individual determinants that influence behaviour attitude, subjective norms, and perceived behavioural control (Montano & Kasprzyk, 2015). TPB has been widely noted as an extension of the Theory of Reasoned Action (TRA) and researchers have also noted how the relevant constructs associated with the TRA have all been associated with voluntary actions.

According to Ajzen (1991), behavioural intention is influenced by attitude towards a behaviour, subjective norms, and perception of behavioural control. Understanding the influence that behavioural attitude and subjective norms will have on the adoption of SST, or any innovation, is important as the two constructs are likely to affect or influence the rate of adoption and use of innovations, products or services which can be viewed as the targeted behavioural intention of this study. Authors, such as Demoulin, and Djelassi (2016), have also noted the effect that the theory of planned behaviour has in influencing the adoption and use of SSTs with perceived behavioural control having been noted as a significant contributor in influencing behavioural intention for consumers to make use of these innovations.

1.5.3.1 Behavioural Attitude

Behavioural attitude and its influence on behavioural intention cannot be understated (Maichum, Parichatnon & Peng, 2016). Goldsmith and Bridges (2000) have also noted how positive attitudes are likely to foster flow and increased likelihood of online purchasing. There are two types of behavioural attitudes, namely, affective, and cognitive attitudes (Montano & Kasprzyk, 2015). Affective attitude is closely linked to the extent to which individuals respond to performing a behaviour, based on emotions and arousal (Montano & Kasprzyk, 2015). If the individuals feel that they are more likely to derive satisfaction from using a particular innovation, they will be inclined to have a positive attitude towards the behaviour while a dissatisfied outcome is likely to be associated with a negative attitude, resulting in the non-acceptance (Claudy, Garcia, & O'Driscoll, 2015). Cognitive attitude is primarily based on past experiences while arousal is more likely to be inclined to emotional need-states of the individuals. The researcher will establish the extent at which attitude is likely to influence behavioural intention as well as how enjoyment may influence the intention to adopt SSTs within a shopping mall setting.

Demoulin and Djelassi (2016), who also applied the Theory of Planned Behaviour in understanding the use of SSTs within a retail context, have shown that enjoyment of SSTs may have an influence on the intention to use such innovations for as long as the SSTs' functionality does not compromise the user's time or add complexity within the retail environment for the consumer.

1.6 Constructs adopted based on Theories selected for the study

To effectively understand the factors that influence technological innovation to enhance the shopping experience of consumers in selected Johannesburg malls, the researcher adopted several constructs extracted from existing literature and theories which include DOI Theory (Rogers, 1995), TAM (Davis 1989), Flow Theory (Nakamura, & Csikszentmihalyi 2009), and the Theory of Planned Behaviour (Azjen, 1991). Some of the constructs in these theories have been noted as important elements that tend to influence the adoption of SSTs and other technological innovations. Effectively managing and studying these constructs will therefore go a long way to ensure that relevant innovations, such as SSTs, can be implemented easily in the market.

Over the years, several models have been proposed to determine influences that affect the adoption of technology, including Innovation Diffusion Theory (IDT) by Rodgers (1995), Theory of Planned Behaviour (TPB) by Ajzen and Madden (1986), the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Thong and Xu (2012), to name a few.

The TAM model by Davis (1989) seeks to identify factors that influence or trigger the adoption of technological innovations. Authors such as Park (2009), have highlighted how the use and adoption of different technologies is influenced directly or indirectly by users' behavioural intentions, attitudes, perceived usefulness of the system, as well as perceived ease of use of the system. This was also confirmed by Gao, Krogstie, and Siau (2014), who noted how the TAM model can effectively determine consumers and users' intentions to use web-based innovations and SSTs. To determine consumer perceptions and influences in adoption of SSTs in Johannesburg shopping malls, literature from the MSAM (mobile Service Acceptance Model)

by Gao, Krogstie, and Siau (2014) was also reviewed and considered for the purposes of the study.

Impulsive purchases refer to the subsequent purchasing of a good or service influenced largely by intrinsic and extrinsic motivations. Intrinsic motivations are best described as any internal elements that are evoked by emotion and cognitive thoughts, which influence consumers or prompt them to make purchase decisions, whereas extrinsic motivations are largely influenced by external factors which may include promotions, activations and interactions with personnel and other factors (Suher & Hoyer 2015).

Shopping malls and marketers can leverage what they understand about their shoppers to drive positive unplanned purchasing using information that they obtain through these web-based and SST innovation platforms. This has also been echoed by authors such as Ozer and Gultekin (2015), who have noted how pre-purchase moods tend to positively influence impulse buying. Given that SSTs are meant to facilitate driving consumption and penetration, unplanned purchasing using the mobile web-service is likely to be catalysed if there is considerable positive influence on consumers prior to them making purchase decisions.

To critically analyse and evaluate the extent at which consumer behaviour is altered by emotional and cognitive senses when using SSTs, the researcher has included additional constructs, which are perceived usefulness, perceived ease of use, perceived control, perceived enjoyment, and behavioural intention. These constructs are the focus of the study, and the researcher focuses primarily on these constructs to determine their level of influence in adopting SSTs to enhance consumers shopping experience.

Perceived Enjoyment

Perceived enjoyment can potentially assist in determining customer or consumer's intentions to purchase a product or service using an SST innovation and influence shopper enjoyment and satisfaction. Perceived enjoyment and satisfaction can be elicited by cognitive and emotional elements that come with using web services and mobile applications when interacting with stores (Sirakaya-Turk, Ekinci, & Martin, 2015), especially since shoppers and consumers are then able to easily manage and extract relevant information that they can use as they interact and engage with an SST innovation. This then means that, for shopper enjoyment to be successful, mobile service applications should have the right and relevant content required by

shoppers to assist them in their decision-making process which can go a long way in influencing their intention to use an innovation and potentially lead to universal acceptance and service satisfaction. Bilgihan, Okumus, Nusair, and Bujisic (2014) have emphasised the importance of enjoyment, involvement, and concentration in influencing the wide adoption and acceptance of e-commerce practices by users. Authors such as Aboelmaged, and Gebba (2013), have highlighted the importance of perceived ease of use which can go a long way in fostering technology and innovation acceptance, and this can potentially influence the level of enjoyment.

Concentration/Focus

In a highly contested market, filled with retailers competing for attention, as well as the need to drive consumption and penetration of goods and services, there is even greater pressure for consumers to manage the information they require in the decision-making process (Soto-Acosta, Jose Molina-Castillo, Lopez-Nicolas, & Colomo-Palacios, 2014). This is because concentration levels may negatively influence the consumer's decision-making process due to information clutter and overload during the evaluation of alternatives stage. Orquin and Loose (2013) have highlighted how attending to large amounts of information and data can be challenging in terms of the number of items and fixations that decision-makers need to process before making a decision. This is also echoed by Streicher, Büttner, and Estes (2016), who believe that having a broader scope of attention may have a negative effect, as opposed to a narrower scope of data or information for a user to process.

On the other hand, however, the adoption of web-service and mobile applications can significantly influence consumer behaviour, particularly if consumers derive significant enjoyment from using the application and understand the functionality and convenience that the web applications can bring into their lives.

Concentration has therefore, been confirmed to be a good indicator to show that users are in flow or present when engaging with an innovation to derive a service experience and this is more so if consumers do not cognitively feel that their duration on the SST is being extended involuntarily (Shipps 2013). This has also been echoed by Nakamura and Csikszentmihalyi (2009), who have noted how concentration or focus is closely linked with Flow Theory which is an indicator that reflects experience of complete absorption in the present moment.

Perceived Ease of Use

Perceived Ease of Use (PEOU) is one of the main elements in the TAM model as it is a common predictor used to determine whether an innovation can be used with the least effort (Davis, 1989), and is also not difficult to understand, learn or operate (Kigongo, 2011). Some authors argue that perceived ease of use could improve attitude toward adoption regardless of the usefulness of a product or service at first although the perception of the innovation's usefulness will then develop (Dhingra & Mudgal, 2019). However, within the context of SSTs in shopping malls, there has been growing realisation and need to understand the significance that the perceived ease of use construct will have on the overall attitude and behaviour of consumers.

Perceived Usefulness

Perceived Usefulness can be best described as the level of functionality and effectiveness associated with a technological innovation, as perceived by the user (Davis, 1989). Perceived usefulness has also been widely associated with influencing the acceptance of an innovation by potential adopters. Perceived usefulness may also be closely related to the hedonic value construct within the Consumer Value Model which tends to influence repeat purchase behaviour of consumers or users of a product or innovation when they deem the product to meet their need-states (Chiu, Wang, Fang & Huang 2014).

Relative Advantage

Based on the DOI theory by Rodgers (1995), the researcher has adopted the Relative Advantage construct as it can potentially influence the rate of adoption of innovations. Relative advantage refers to the degree to which an innovation becomes more advantageous or beneficial to the consumer or user, when compared to other products within its class or product range (Roblyer, 2005). As this study is focused on how the introduction of SSTs can help enhance the shopping experience, when compared to more conventional ways of marketing products and services within a shopping mall setting, we will then have a better understanding of the feasibility of the concept in an African context. The study, therefore, also looks to establish the extent of the influence that SSTs have on enhancing the shopping experiences of consumers in the short-term and long-term.

Site Factors: Aesthetics and Authenticity

The role that consumers' perceptions have in influencing their purchase behaviour and human-computer interaction is significant for most consumer electronic and innovation companies (Tzou & Lu, 2009). According to the Media Richness theory, the media's ability to evoke various sensory simulations and multiple cues is the level of richness that the media, platform, or innovation will have for its users. As such, it is essential for us to understand the level at which an innovation is regarded as aesthetically appealing as it may potentially influence the attitudes that users may have and their likelihood to adopt the innovation (Huang & Hsu Liu, 2014). On the other hand, however, authors such as Badger, Kaminsky and Behrend (2014), have also noted how richer media may not necessarily be an effective way of conveying information as interactive elements can also potentially detract focus away from the information that the organisation wishes to relay to intended audiences.

Few studies have shown the influence that aesthetics has on consumers interfacing with a services environment (Lin, 2016). Huang and Hsu Liu (2014) have, however, reiterated the significance of using aesthetics as they assist in "blurring the lines between reality and simulation," of technological innovations which can assist consumers in the decision-making process. Great aesthetics may however, go a long way in influencing consumer behaviour primarily through navigation structure, information content and graphic style. The biggest challenge firms may face however, is ensuring that the quality of these platforms evoke positive consumer behaviour and that consumers may not have negative perceptions as poor user interfaces may drive consumers away from these SST platforms.

Authenticity

As a part of site factors and their influence on the adoption of innovations, it is important to note that the level of authentic shopping experiences that consumers have on SSTs is likely to influence their attitude towards the adoption of these innovations (Huang & Hsu Liu, 2014). In this section, we establish the relationships that authenticity has on variables for the consumers, and these are perceived ease of use and perceived usefulness.

Telepresence has been used to describe the extent at which users are "transported" by a technology or innovation that they are using to a point where they can virtually sense the presence and influence the innovation brings to their well-being (Papagiannidis, Pantano, See-To, Dennis & Bourlakis, 2017). Three main aspects of telepresence have been the ability to

control one's stimulus, the ability to modify stimulus to enhance the level of realism and excitement (using colour, graphics vividness and 3D), authenticity, which is the extent at which the virtual environment mirrors the physical environment.

For the purposes of this study, the researcher focuses primarily on authenticity and its influence on perceived ease of use (PEOU) and perceived usefulness (PU), as well as aesthetics or user interfaces to better understand the impact that these two constructs have on perceived usefulness and perceived ease of use.

1.7 The Conceptual Model and Hypotheses Development

As aforementioned, this study integrated relevant elements of the TAM, DOI, TPB and Flow theories to develop the conceptual model. The model, which is presented in chapter 4 proposes that the user-interface, aesthetics, and authenticity of SSTs in shopping malls can impact PEOU and PU, which with relative advantage and complexity will drive attitudes toward the use of SSTs by shoppers in selected shopping malls in Johannesburg. The attitudes together with subjective norms, perceived behavioural control, enjoyment and concentration will all positively influence the behavioural intentions to use the SSTs. The conceptual model was tested with the research methodology briefly discussed next.

1.7 Research methodology

This section unpacks the research techniques that were adopted to test the conceptual model and hypotheses of this study. It starts with the research paradigm.

1.7.1 Research Paradigm

Since the research questions and objectives were quantitative in nature, a positivism paradigm was adopted to extract objective truth regarding factors which influence shoppers' adoption of SSTs in Johannesburg selected shopping malls. The paradigm asserts that real events can be observed empirically and explained with logical analysis by exploring associations or causal relationships using quantitative approches (Park, Konge & Artino, 2020).

1.7.2 Research Approach and Design

There are two types of research approaches: inductive and deductive approaches. While the inductive approach collects qualitative data from interviews and observations and seeks patterns to develop theories, the deductive approach collects quantitative data to test theories and hypotheses (Saunders, Lewis & Thornhill, 2016). Considering that the current study sought to test a model, theories and hypotheses, a deductive research approach was used.

Out of the three research designs available: qualitative, quantitative, and mixed methods, and considering the deductive approach, a quantitative design is appropriate for this study. Quantitative design, as suggested by Saunders et al. (2016) tests relationships between constructs after collecting data with questionnaire surveys. Unlike a longitudinal study that collects data from the same sample of respondents over a long period of time, and which can be time consuming and costly, this study used a cross-sectional design that collected data from respondents at a particular point in time (Saunders et al., 2016).

1.7.3 Sampling Design and Process

To determine the ideal sample size required to conduct the quantitative study, the Raosoft sample size calculator was used to determine an ideal sample-size for the research at a 5% level of significance. Based on Johannesburg's population size of about 5,475,000 people as indicated by StatsSA (2020), a sample size of 425 respondents was sufficient to understand consumer perceptions on the adoption and use of SSTs.

Sampling is a systematic and cost-effective way of reducing the data size by extracting a subset of the population which then becomes a representative of the area of study (Cash, Isaksson, Maier & Summers, 2022). Based on previous studies conducted by authors that include El Hedhli, Chebat and Sirgy (2013), who conducted research in two American shopping malls, as well as Mafini and Dhurup (2015), who tested three shopping malls, it can be noted that a sample-size of 425 respondents was ideal for the study which covered not more than three of Johannesburg's main shopping malls.

A convenience non-probability sampling technique was adopted to meet the time and budgetary constraints. Even though a simple random probability sampling method is preferred over convenience sampling because it reduces sampling bias, convenience sampling is ideal in

situations where the targeted sample population is very large with many clusters. A convenience sample enables the collection of large responses with less time and cost (Saunders et al., 2016). Critics of the convenience sampling technique worry that the results may not be generalisable. However, when large convenience data is collected from respondents based on a specific criterion resembling the target population, Asiamah et al. (2022) contend that the results can be generalised to the target population.

1.7.4 Data Collection

To achieve the theoretical and empirical objectives of this study, the researcher made use of both primary and secondary data collection methods, even though with a convenience sampling technique, primary data was collected from targeted respondents to ensure some fair representation of the population or area to be studied as suggested by Asiamah et al. (2022). The questionnaire was distributed to willing respondents and participants above the age of 18 following the university ethics requirements and who have used an SST using a screening question. This was at the selected shopping malls.

Although ethics clearance was obtained from the researcher's university Human Research Ethics Committee with reference number H19/04/30 before the study was conducted, verbal consent was made to responsible authorities at three selected malls before the questionnaire was dispensed to the respondents. Although a mall intercept can be done within a mall and is the ideal method to collect a representative sample of shoppers at a shopping mall (Khan et al., 2021), the intercept was done at the mall's parking spaces, residences and catchment areas around the mall because of the inappropriateness of stopping shoppers' activities for up 15 minutes to collect data. The Covid-19 social distancing regulations did not permit close contacts. Thus, most of data were collected when respondents enter their cars, and the questionnaires were slipped into a slightly opened door window. After completion, they were dropped through the same window for the researcher to immediately collect.

1.7.5 Pilot Study and Research Instruments

A pilot study is a preliminary version and small-scale research conducted prior to a final full-scale study and aids researchers to test the practicality of the research process proposed (Ismail, Kinchin & Edwards, 2018). The researcher therefore gave the questionnaire to thirty (30) respondents and analysed the data using the SPSS statistical software to determine the

reliability and validity of the questionnaire. Based on the data collected and analysed, the questionnaire was then restructured, and a final questionnaire dispensed to respondents invited to participate in the study.

The instrument used to measure the constructs were derived from previously validated scales. For example, authenticity was measured from Algharabat and Dennis' (2010) scale, perceived usefulness, and behavioural intention from Hamari and Koivisto's (2015) scale, behavioural attitude from Chauh et al.'s (2016) scale, subjective norm from Shih and Fang's (2004) scale, relative advantage from Zolkepli and Kamarulzaman's (2015) scale and user-interface from Huang and Liu's (2014) scale. More insights on the research instruments used is discussed in in greater details in Chapter 5.

1.7.5 Data Analysis

Following data collection, questionnaire responses were loaded and coded into an Excel workbook as raw data which was then imported for use into the SmartPLS Statistical tool.

SmartPLS structural equation modelling (PLS-SEM) method was used to analyse data collected from the respondents following Hair et al.'s (2011) suggestion that PLS-SEM better predicts constructs or tests constructs drivers. PLS-SEM also works better with large models having mediators and using small to medium sample sizes.

The data was analysed in two stages: the measurement model and the structural model. The measurement model tested for model fit (SRMR), validity and reliability. The validity was tested with convergent (factor loadings and average variance extracted) and discriminant (inter-construct correlation matrix) validities. Reliability was tested with composite reliability and Cronbach alpha. Confirmatory factor analyses were conducted to obtain factor loadings (Abrahim, Mir, Suhara, Mohamed & Sato, 2019).

The structural model tested the hypotheses and significance was assessed with t-statistics of 2.57 at 99% confidence level, 1.96 at 95% confidence level and 1.65 at 90% confidence level. Significance was also judged from P-values of <0.01 at 99% confidence level, 0.05 at 95% confidence level and 0.09 at 90% confidence level.

1.8 Significance of the Study

The research provides academic literature on SSTs as effective channels for marketers to expose their products and services, as well as provides practical solutions that assist marketers in creating ideal environments for consumers to make informed purchase decisions, with adequate access to information on specific products and services. The study largely contributes to the body of work on Digital and Online Marketing by focusing on SSTs within the retail shopping mall industry and understanding how SST innovations can enhance shopping experiences for consumers.

The research also creates opportunities for future researchers and authors to determine drivers that influence retail outlets to adopt SSTs as effective channels of communication with their consumers from a Johannesburg shopper perspective. This assists SST providers in understanding the retailer's expectations regarding the adoption of SSTs to create innovations that add value to emerging market environments, such as South Africa.

The research contributes towards the existing body of knowledge on SSTs as effective drivers for influencing and enhancing consumer experiences and engagement within a shopping mall environment.

1.9 Ethical Considerations

For data to be collected from Johannesburg shoppers, ethical clearance was obtained from the University of the Witwatersrand Ethics committee. To ensure that data collected is reliable and reflects the true perceptions and views of the respondents, the questionnaire was also not compulsory for respondents. Respondents were therefore voluntarily invited to answer the questionnaire when it was most convenient for them to do so. No data was collected at shopping malls due to time and availability constraints of the consumer and as it might also have warranted further permissions to be made.

For the purposes of this study, the researcher primarily focused on respondents who made use of the following malls based on the state of their infrastructure and accessibility:

- Mall of Africa
- Sandton City and
- Rosebank Mall

A significant percentage of the data collection was conducted with students and staff of University of the Witwatersrand who have access to the shopping malls.

The data collected was strictly used for research purposes only and individual questionnaires were not distributed to any third-party entities. Should potential respondents decide to participate in the study, they would have been advised to give honest and sincere answers and there would not be any negative consequences should they have decided otherwise. A brief synopsis of the research was provided for potential respondents to understand the premise of the study which also enabled them to apply themselves as they answered the questionnaire.

Limitations to the study

Due to time and budget constraints, the researcher conducted the study on only a few selected Johannesburg shopping mall facilities. Based on this, it can be noted that the outcomes of the research may not necessarily apply to all Johannesburg shoppers. This may also make it difficult to apply findings of the research in other cities or towns in South Africa as their influences or key motivating factors to adopt SSTs may not necessarily apply in the environments in which they are based. Key to increasing the levels of applicability of findings for this type of research in other shopping mall environments may involve conducting research in other shopping centres such as regional malls, community shopping centres and others (El Hedhli, Chebat & Sirgy, 2013).

Furthermore, the research did not adequately provide a retailer perspective on how best they could utilise SSTs to interact and engage with their consumers as well as the factors that might have influenced the use and adoption of these innovations as a medium to communicate with their target audience. This may provide an opportunity for future researchers to investigate this aspect of SST adoption.

Demarcation of the study

The subsequent chapters commence with Chapter 2 which primarily discusses the literature review and the theoretical background associated with SST adoption within a retail and shopping mall environment. Chapter 2 also makes reference to developed economies that have successfully implemented SSTs within their shopping mall environments, for the convenience and shopping-experience enhancement of their shoppers. Following this, the researcher then discusses the Theoretical Model Constructs in Chapter 3. Hypothesis Development and Conceptual Framework is then discussed as part of Chapter 4 before going through the Research Design and Methodology section which is Chapter 5. Chapter 6 covers the Data Analysis and Presentation of Results based on data collected to confirm relationships of constructs that have been noted to influence the adoption of SSTs. SmartPLS statistical tool was used to analyse the data. Chapter 7 concludes the study based on the Discussion of Results, Conclusions and Recommendations which are drawn from the study.

CHAPTER 2: LITERATURE REVIEW

Chapter 2 provides a better understanding of the technological innovation landscape that has sprouted within the retail industry in recent times. The researcher also establishes and links the evolving technological landscape with the consumer decision making process which is largely influenced by the various innovations in the market environment. Understanding that consumers' levels of awareness and engagement with products and services is influenced by the various contact points of engagement within the omni-channel, there is a need to understand the various influences consumers have in their paths to purchase. The researcher develops the chapter by starting off with understanding the effect of technology within a retail environment before zoning in to two major innovations which have been widely adopted by many retail environments around the world which include mobile technologies and self-service technologies. The researcher then goes on to explore SSTs and their influence on the consumer decision-making process as well as to elaborate more on the effect this has on the consumer omni-channel environment.

2.1 Technology and its Impact on Consumer Shopping Behaviour

There has been tremendous growth in the influence of the omni-channel on consumer behaviour in recent years, and this has become a prevailing strategy for contemporary retailers with its distinct characteristics of customer involvement and retailer control (Li, Liu, Lim, Goh, Yang & Lee, 2018). Several innovations have since been adopted by retailers and other service providers to facilitate in enhancing the shopping experience. The use of technology, in the form of mobile applications, SSTs and other innovations has helped to foster more consumer-centric strategies that help to drive interaction and engagement with products and services in the market environment.

Grewal, Roggeveen and Nordfält (2017) have noted how the future of retailing is likely to assist customers in making more informed decisions, feel less time pressure and increase their confidence and level of satisfaction when making purchase decisions. Key to ensuring optimum consumer engagement is to ensure retailers understand the convergence of on-line and off-line retailing by creating a balance between consumers' need for touch and making use of technological innovations to obtain information on products and services (Rathee & Rajain, 2019). How information is presented influences our choices which is why SSTs can help

empower customers to adopt visual salience which induces focus and order for consumers to interpret and process information that is shared with them which can help enhance their experience (Orquin, Lahm & Stojić (2021).

According to the push-pull mooring effect, which looks at customer reaction following the adoption of an information system, there is a need to ensure that clear cost-benefit analysis is made to understand the effects of adopting self-service technology within a retail service environment for consumers (Chuang & Lai, 2019). This is because consumers would ideally want to derive as much value from the usage and adoption of SSTs as possible and given that they would want to utilise the channels that provide them with the highest payoff, it becomes imperative to ensure SST adoption benefits outweigh the adoption costs (Zeng, 2016). Significant consumer benefits may also go a long way to instil consumer confidence and foster consumer retainment and loyalty (Li, Liu, Lim, Goh, Yang & Lee, 2018).

Frishammar, Cenamor, Cavalli-Björkman, Hernell and Carlsson (2018) have however, also noted that retailers and shopping mall owners are cautious in not over-committing to new technologies in retail environments as this may have a negative effect on the consumer which may have a ripple effect on the service experience within this environment. It is important to ensure that any new innovations that are introduced are consumer-centric and add value to the consumer or end-user to ensure repetitive usage and innovation success in the market (Choy & Park, 2016).

2.2 Impact of Technology Innovations in the Retail Shopping Sectors of Global Markets

Researchers agree that technological innovations in all business sectors, including the retailing sector and globally foster growth and competitiveness (Albors-Garrigos, 2020; Pantano, Priporas, Foroudi, 2019). A sectoral study conducted in Europe revealed that technological innovations centre around processes, product, marketing, and general organisational innovations (European Union, 2015). In the consumer retail sector like grocery retailing, Albors-Garrigos (2020, p. 1) highlights that innovations happen in areas of “infrastructures such as settings, product arrangement, or information technology”. For example, Pantano et al. (2019) found that interactive technologies that are innovative at some storefronts in New York City attract consumers to the stores, improve the store experience and generate positive word-of-mouth. For fashion retailers, Jin and Chin (2020) found that innovative technologies assist in “handling demand uncertainty, inventory management, and timely responses to the market”.

For shopping malls with smart technologies, such as self-service technologies and artificial intelligence, Ameen, Hosany and Paul (2022) found that depending on the ability to personalise, interface design, trust, consumer peer interaction and relationship commitment, which they consider as dimensions of consumer interactions with smart technologies, impacted mall loyalty of Millennials in the United Kingdom and United Arab Emirates. These mart shopping malls' retail environments cause many consumers to not only be drawn by the functional benefits, but also attracted to the smart services the smart malls provide and the recreational facilities that the malls serve (Calvo-Porral & Lévy-Mangín, 2018; Ameen et al., 2022).

Consumers who make use of shopping malls because of their functional value are likely to be drawn to the additional facilities that render them attractive if they meet their expectations. Mall attractiveness has been largely categorised by leisure, shoppers' satisfaction, aesthetics, promotion, diversity, entrainment services, quality and promotion (Said, Hasmori & Pa'wan, 2020). Prior studies however, noted that occupant variety, the internal environment, and the leisure mix sequentially determine mall attractiveness for the consumers within a shopping environment (Calvo-Porral & Lévy-Mangín, 2018). This makes it essential for mall owners to ensure they manage mall attractiveness adequately. If well managed, this can amplify consumer perceptions of their shopping malls which presents a unique and competitive advantage.

Kushwaha, Ubeja and Chatterjee (2017) also acknowledge the significance of support facilities to influence service experiences in shopping malls. This will go a long way in influencing consumer perceptions of these shopping malls. Support facilities may include wi-fi or data access facilities, technological infrastructure, such as i-beacons (compact wireless sensors that use Bluetooth devices to connect with Bluetooth enabled smartphones to send push notifications and other information), that help to foster interaction and active engagement between shoppers and the retailer within the shopping mall environment (Pei, Liu, Shu, Ou, Wang & Xu, 2020).

Limited research has been directed towards understanding factors that foster mall loyalty unlike customer loyalty which has been covered by (El-Adly and Eid, 2016). Understanding the underlying factors which influence the adoption of SSTs is essential to ensure sustainable growth of these facilities in the long term. According to Ferreira and Paiva (2017), key to

ensuring the successful growth and development of shopping malls lies in the effective management of the following:

i) Innovation and keeping up with the times
ii) Economic environment in which the mall is operating
iii) Relation between retail and urban cycles, as well as
iv) The role of management in fostering sustainable growth and development of these facilities.

Managing innovation within a shopping mall or retail environment is particularly essential as it can determine the relevance and success of any mall environment. Shopping malls based in countries such as the United Arab Emirates (UAE) and the United States of America (USA) have however, increased their levels of activity and growth with the adoption of technological innovations which have helped enhance the service experience of their shoppers.

Epistemic value is an important customer value which largely refers to the perceived utility provided by shopping malls to consumers, as this provides the inspiration to search and explore stores, products and brands that prompt them to make purchases, as well as assist them in keeping up with the latest trends in product and service offerings (El-Adly & Eid, 2016). Shopping malls should therefore ensure that they accommodate consumers' evolving expectations as this can influence their decision-making process and prompt them to engage more with the shopping mall, should they derive a positive customer value from using the shopping mall (Ferreira & Paiva, 2017). El-Adly and Eid (2016) have also noted how mall value may ultimately influence customer satisfaction. Authors such as Wang and Shih, (2009), have highlighted the importance of ensuring that the high-performance expectations of adopters and users of SSTs and Interactive Self-Service Screens ISSS are met, as managing this behavioural intention will then motivate more users to adopt the innovations.

There has been a growing realisation of the importance of shopping malls within service level environments as they can assist in bridging the gap between shoppers and retailers. Within countries like the United States there has been a growing realisation of the oversaturation of shopping-malls in the country, when compared to Europe which has led to some retailers being forced to close overtime but it's important to note that many retailers have still been able to thrive with focus on more unique services becoming the main attraction (Ozturk, Isinkaralar & Kesimoglu, 2021). El-Adly and Eid (2016) realised how shoppers and consumers have evolved to become more value-driven and become loyal to malls that offer more perceived value. Most

consumers also acknowledged how digital technologies save time and improve both the evaluation and acquisition of products and services within a given shopping mall environment (Frishammar, Cenamor, Cavalli-Björkman, Hernell & Carlsson, 2018). By ensuring that consumers retain as much value from using shopping malls as possible, this can help to boost the level of referrals that consumers have to their peers.

Shopping malls that have adapted the use of self-service technologies to enhance their service delivery now provide real-time experiences and consumer recommendations, based on information drawn from their hand-held devices (Frishammar, Cenamor, Cavalli-Björkman, Hernell & Carlsson, 2018). It is however, also important to note that adopting a "one-size-fits-all approach" is not recommended, as confirmed by Frishammar, et al. (2018) who noted how there are so many different facets to consider before implementing an effective digital strategy within any shopping environment. This is reiterated with 44% of respondents in the study conducted by Frishammar, et al. (2018) acknowledging how shopping mall owners have difficulty in coming up with coherent digital marketing strategies that effectively address the market gap. The German retail industry has also had challenges in addressing the need states of consumers, especially as the modern consumers use different channels of communicating and engaging with brands (Heinemann, 2019). Effectively using the SSTs as part of the omni-channel process can help in ensuring that all relevant touchpoints are covered to meet consumer needs effectively.

The sections to follow zone into some of the innovations found in most shopping mall environments which have aided in enhancing the service experience of consumers. The researcher starts by reviewing mobile applications and their general usage in influencing consumer purchase behaviour. Following this, the researcher then covers self-service technologies and self-checkout stores which have further enhanced the path to purchase within an instore setting. Discussions to assess the extent to which SST have been commercialised in the retail environments will then close Chapter 2.

2.3 Key Technological Innovations in Retail Environments

Several technologies have helped influence the global retail environments and these have been widely driven by the growth of Self-service technologies and mobile applications (Ahn & Seo, 2018). The researcher starts by discussing the progression of mobile applications as effective platforms to drive consumer engagement and consumption in retail environments before

discussing the development of Self-service technologies and how they have started to influence the South African consumer. Discussions on barriers to wide adoption of technological innovations within retail environments has also been shared and potential solutions that can help address some of the challenges identified.

2.3.1 Mobile Applications

Mobile phones no longer fulfil just the basic function of texting and calling as they have continued to evolve over the years and contribute more towards creating a more interconnected world (Fox, 2019). According to Ojino & Mich, (2018) about 90% of the time spent on mobile devices is spent on apps, with the rest of the time divided between texts, SMS, calls and contact management. The growth of mobile technology and digital marketing has consequently had a significant effect in transforming the retail environment space and consumer market in recent years (Reinartz, Wiegand & Imschloss, 2019). Đurđević, Labus, Barać, Radenković, & Despotović-Zrakić, (2022) have acknowledged how the use of mobile applications has assisted retailers with a platform to extend communication through push-notifications and promotions on products and services that they offer via Beacon technology, which has helped to influence purchase behaviour and increased consumer engagement with their products and services. This has led to the growing phenomenon of self-service devices which allow for consumer interaction anytime and anywhere and empower the consumer to control engagement between them and the market environment (Gummerus, Lipkin, Dube & Heinonen, 2019).

The introduction of mobile applications that service the retail environment has made it easier for consumers to engage and interact with retailers in a more efficient manner. Kang, Mun and Johnson (2015) realised the significance that came with mobile applications' adoption with close to 87% of the mobile/tablet usage closely linked to online and other purchase-related activities to retailers and other service-providers. Lee, Moon, Kim and Mun (2015) realised how simplicity and interactivity are important constructs that may influence consumer satisfaction which will ultimately lead to innovation adoption. Careful selection of visual aesthetics, as well as navigation within the mobile application can help to influence a positive response from the users (Wu & Li, 2020).

The convenience associated with the use of mobile applications has gone a long way in increasing the level of adoption and use by consumers. This is owing to the seamless access of information through the mobile platform which makes it relatable for the user. The wide

adoption of mobile applications within a shopping mall context has been further ignited by the growing consistency levels of online security which has helped to attract new and repeat usage of such platforms over time (Nilashi, Ibrahim, Mirabi, Ebrahimi & Zare, 2015). Retailers that have embraced mobile applications and having an online presence have been able to sustain and enhance their engagements with their consumers (Shi, Wang, Chen & Zhang, 2020). Daştan and Gürler (2016) have noted how trust and security are essential factors that can influence the adoption of mobile applications and how these elements are more pronounced with mobile payments, where consumers previously used to be reluctant to make use of such platforms.

With the fourth industrial revolution becoming imminent, most mobile technology companies are now taking a lead in contributing to the narrative with mobile companies like Huawei, Samsung and Apple creating more responsive and powerful devices that accommodate contemporary mobile applications for the end-user (Coughlin, 2018). This, coupled with the increase in affordability of some technological innovations, has been particularly crucial in enhancing the user engagement and adoption that consumers have had of technological innovations over the years (Samarthya-Howard & Rogers, 2018).

Martínez-Navarro, Bigné, Guixeres, Alcañiz and Torrecilla (2018) acknowledge how the adoption of technological innovations influences consumer attitudes within a given retail environment, with a positive relationship noted between adoption of virtual reality adoption and shopper attitude on e-retailing experiences.

Other researchers have also been able to explore the influence that flow has in the use of mobile applications as it can be a determinant to understand the perception that consumers will have of using mobile applications within a retail environment. Studies have shown that flow within the web-based environment is not like flow within a mobile application context (Hoffmand & Novak, 2009). It was also noted that making mobile applications easy to use and functional can help increase the consumers' chance to be in a state of flow which can help to generate positive consumer attitudes towards the use and adoption of mobile applications within a retail shopping environment (Chen, Hsu & Lu, 2018).

Despite the growing adoption of mobile applications by shoppers and other mobile application users, there have been several challenges and issues that have come with the adoption of mobile applications for use within retail environments. Firstly, it has been widely noted that most handheld devices have limited screen space which restricts or limits the digital real-estate of

service providers (Wang, Malthouse & Krishnamurthi, 2015). Although proponents may argue that this helps to better manage the information load flowing to the consumers, it also limits the digital exposure that the consumer will have when using such innovations to search for products and services when compared to conventional computers which would typically have bigger screens, making it easier to navigate (Shankar, Venkatesh, Hofacker & Naik, 2010).

Levels of interaction and engagement may be limited and solely based on the accessibility and affordability of data to access applications that enable consumers to make use of such mobile applications (Olivier & Terblanche, 2018). Consequently, the level of scalability of mobile application usage within retail environments will also be largely influenced by the affordability of mobile data which will enable consumers to then transact and interact with the innovation within a South African context. In an article highlighting impediments to mobile shopping and continued usage by Gross (2016), it was noted that m-shopping is still conducted relatively less than online-shopping conducted from a home PC in Germany. Shankar, Venkatesh, Hofacker and Naik (2010) believe that limited trust has influenced the low adoption of mobile commerce by consumers when compared to other alternate mediums, such as personal computers, which has consequently led to resistance to change as noted by Olivier and Terblanche (2018). Furthermore, proponents who advocate against the adoption of using mobile technology in the retail industry believe that traditional ways of shopping are still relevant due to the establishment of rapport that comes with physical stores, as well as the levels of associated security (Paswan & Ganesh, 2015). Authors that include Mehra, Kumar and Raju (2017) have also indicated that consumers will typically make use of brick-and-mortar stores to fulfil their product evaluation needs which suggests how important and relevant these environments are to the consumer.

Another important factor that can influence resistance to change when using and adopting innovations, such as mobile applications, is the level of uncertainty, with a significant number of consumers unable to have sufficient access to information on the trajectory of the innovation at launch (Claudy, Garcia & O'Driscoll, 2015).

Considering the growing impediments of mobile application usage to improving consumer and shopper experiences, it may however, be noted that consumers and technological innovation users will continue to adopt mobile application usage over time if they derive perceived value from the use of such innovations. Perceived value occurs when perceived

benefits outweigh perceived limitations of adopting a product, service, or activity (Hsu & Lin, 2015). There are two primary perceived values which should always be considered by innovative companies to ensure that their innovations create a sustainable value proposition to their target audience and that is perceived hedonic value and perceived utilitarian value.

Simplicity and interactivity can therefore be key to ensuring that the use of mobile applications remain widely accepted by the target market (Lee, Moon, Kim & Mun, 2015). Hsu, Chuang, and Hsu (2014) and Al-Debei, Akroush and Ashouri (2015) have also indicated the importance of trust as an enabling variable that can influence consumer and user perceptions on the adoption of mobile applications.

2.3.2 Self-Service Technologies

Self-service technologies, in the context of interactive screens, are interfaces that allow consumers to be co-creators of products and services with minimum direct employer involvement (Otekhile & Zeleny, 2016). SSTs can vary in terms of interface and purpose with most SSTs used within the retail industry being in the form of store tablets and interactive screens which cater for customer services and customer information, while the self-checkout stations are more for transactional purposes (Heinemann, 2019). Gummerus, Lipkin, Dube and Heinonen (2019) have noted how there has been an increase in the use and adoption of SSTs within the market environment although not much research and academic literature has focused on quantifying self-service technology types. The introduction of SSTs to enhance the shopping experience for consumers creates new opportunities for consumer engagement and interaction with shopping malls. The premise for the adoption of SSTs has been for organisations to co-create value offerings with consumers which benefit both retailers and consumers (Heidenreich, Wittkowski, Handrich & Falk, 2015). SSTs have also been known to evoke more consumer interest as they are more consumer-centric and assist in providing more tailored products and services to service the final consumer.

Several benefits have been associated with the introduction of SSTs. Firstly, the interactive screens are much larger than mobile phones and provide consumers with the opportunity to interact with the innovation more easily because of the adaptable and sizable SST layout, that could help to increase the digital real-estate of the service provider as it allows for better interaction and engagement with the consumer. Moreover, free access to internet and information technology facilities for the public's use, will help alleviate the digital gap problem

between the adopters and non-adopters as the use of these interactive self-service screens will be available to the general public (Masojada, 2019). SSTs will continue to grow over time with the operations previously conducted by dedicated staff and operators now being conducted by the customers (Ahn & Seo 2018). Moreover, proponents who advocate for the adoption of SSTs have also highlighted how SSTs can assist firms with reducing operational and overhead costs by ensuring that consumers are actively involved in value creation for products and services that they seek (Ahn & Seo, 2018).

Technology-based self-service includes touchscreens in department stores, information kiosks at hotels, self-scanning grocery stores and libraries, ATMs, telephone and online banking and shopping on the Internet. Florshein is widely accredited with creating the blueprints for implementing successful self-service technology within the market by allowing its shoppers to search and purchase shoes on the platform which would then be delivered to a specified address. About 600 such stores were implemented by the team in 1985 around the United States and there was a general uptake in sales for products and inspired the growth and development of shopping kiosks which are now widely used in the apparel industries, airports, hotels, banks, grocery stores and fast-food outlets for the shopper's convenience (Inman & Nikolova, 2017).

There are two types of self-service technologies within a retail or shopping mall setting, and these are on-site and off-site. On-site self-service technologies would include most self-checkout facilities within a shopping mall while the rest are largely electronic off-site services which may be acquired via mobile and web-applications (Ueno, Sharma & Kingshott, 2018).

The recent emergence of self-checkout functionalities in different stores in most developed countries has further asserted the influence of technology in altering consumer shopper behaviour within the retail environment (Chang & Chen, 2021). Jalil, Nasir Abdul, and Koay Kian Yeik, (2019) also acknowledges the significance of self-checkout stores on consumer behaviour with a more moderate take on ensuring additional staff is employed and ready to support customers who may face challenges operating self-checkout systems.

Adoption of SSTs will assist retailers in ensuring product-specific content is accessible to consumers who can then make informed purchase decisions. On the part of the retailer, they are better able to make use of Business Intelligence Services which can aid them in extracting key consumer behaviour insights, based on the interaction made using these SST platforms which gives them a competitive advantage in the market (Anica-Popa, Anica-Popa, Rădulescu & Vrincianu, 2021).

Conversely, it has been noted that consumers may not necessarily enjoy making use of SSTs and this may not necessarily increase their loyalty unless there is perceived quality and added benefits that come with the adoption of that innovation (Ueno, Sharma & Kingshott, 2018). This may apply in instances when consumers become co-creators in obtaining a product or service. Although consumers' perceptions may become more favourable with continuous use of the innovation, being a co-creator may provide leeway for human error to be made during the purchase process, which may then potentially result in cognitive dissonance emanating from bad shopping experiences. There has been a general lack of appreciation for SSTs that are introduced without prior notification and introduction to the intended customers which can create frustration particularly if shoppers are not adequately oriented to the facilities which will need to be managed to ensure a general level of acceptance of these innovations (Bulmer, Elms & Moore, 2018).

We can note the significance of SSTs as enablers that assist consumers with sourcing and obtaining the right information to make purchase decisions with limited face to face engagement (Lee & Lee, 2020). To understand the level of active engagement that consumers will have with SSTs during the purchase journey, the researcher has included the decision-making process which helps to give a view of how consumers will then engage with these SST platforms at each of the decision-making stages (in Section 2.3).

2.3.3 The South African Self-Service Technology Retail Environment

Technology readiness, perceived ease of use and perceived usefulness have been known to influence the adoption and usage of mobile self-service applications with a emphasis on ensuring that SSTs are generally easy to use (Smit, Roberts-Lombard & Mpinganjira, 2018). Technological Readiness represents the abilities of users to utilise smart technologies and it is highly important that there is synergy between technological readiness and perceived ease of use and perceived usefulness. South African mobile users are very much active and are considered to have a high technological readiness to adopt mobile payment applications (Wiese & Humbani, 2020). This has therefore justified an increase in the employment of digital transformation centred towards meeting the evolving SA customer behaviour to enrich their experience and also remain competitive in the marketplace (Van Dyk & Van Belle, 2019).

Environmental and contextual factors have also been acknowledged as critical in influencing the adoption of innovations (Orel & Kara, 2014). As such, understanding the context and use-cases at which consumers interact with these innovations is important to ensure that the right content is provided for the intended audience. SSTs may seem more attractive within a relaxed context for most consumers who can then interact with information kiosks easily at their convenience. The same interface may however, not be as attractive for consumers who are on the go which may therefore inhibit compatibility of the innovation in some customer use-case scenarios. We can also note that SSTs customisation may be an issue in some instances as the user generally has limited control over the content made available to them through these platforms (Kim & Yang, 2018).

Applying the SSTs within a South African context, we may note that the environmental factors have a strong influence in the wide adoption of these innovations. Encouraging inclusivity with the introduction of a multi-language SST system can assist in delivering an added service experience for customers Park, Lehto, & Lehto, (2021). Given that SA has 11 official languages, it is essential to understand the demographics within a given area or shopping mall environment to ensure customers are accommodated. For the Johannesburg consumer or shopper, English may seem to be more common given the city's metropolitan demographic, as well as suburban environment (Vertovec, 2015). Further to this, given that Johannesburg contributes to 40% of South Africa's economic activity, there is also a significant youthful population of economically active persons in Johannesburg which makes it easier to implement this information system with English as the official language (Rudolph & Kroll, 2016). This may however not be the same in other parts of Gauteng Province as certain parts of Pretoria may be more inclined towards Afrikaans rather than English or certain parts in KZN where Zulu will be the more widely used language when compared to English.

Masojada, (2019) also acknowledges the access and usage divide associated with retail based SSTs innovations, which often may require internet services and data, can be a barrier to SST adoption particularly given that 36 million of the 60 million population in SA has household earnings below R8000 per month. This gap can however be resolved by encouraging certain platforms to be zero-rated where internet service providers (ISPs) give exemptions on data consumption in specific sites or platforms (Jeitschko, Kim & Yankelevich, 2021). Alternatively making use of self-service screens within a shopping mall environment can also help in bridging the access and usage divide.

2.3.4 Commercialisation of Self-Service Technologies

Globally, it has been estimated that self-service technology will generate about 31 billion dollars and the growth rate of these innovations was noted to be approximately 14% between the period 2015 and 2020 (Kim & Yang, 2018). This is mainly since SSTs' value proposition within the market environment is closely related to service outcomes, such as service quality, customer satisfaction, as well as customer retention which helps to stimulate growth for the retail environment (Kim & Yang, 2018). To date, retail stores such as Topshop and Zara have widely adopted SSTs to enhance the shopping experience of their target market, using interactive kiosks, touchscreen look-books, as well as digital signage (Rese, Schlee & Baier, 2019).

The growth of SSTs has helped to increase the level of connectivity between consumers and retailers as well as foster levels of their engagements (Lee, Chan, Chong & Thadani, 2019). This has seen more retailers slowly adopting these innovations to open new channels of interaction and engagement with their target market, making these innovations highly impactful within retail environments and providing retailers with a competitive advantage over similar entities (Kim & Yang, 2018). Several retailers and organisations have adopted the use of SSTs as these innovations provide them with an opportunity to lower their overhead cost by automating certain aspects of their business model (Wei, Torres & Hua, 2017). Furthermore, the SST innovation adopters are also better able to provide a consistent output of products and services to their customers which can stimulate satisfaction and service experience for customers (Heinemann, 2019).

Pure service-oriented organisations have installed SSTs such as check-in systems, ATMs, and vending machines to enhance the service experience of their consumers while ensuring that they also keep their operational costs low. Given that customer satisfaction is ignited by a great consumer experience, marketers should ensure there is seamless integration of SSTs within the retail environment to support in enhancing this experience and help stimulate purchase intention and influence profitability levels of retailers (Lee, Chan, Chong & Thadani, 2019). Budakova and Dakovski (2019) also indicated the role that SSTs have to play with the focus on information kiosks and the beacon technology which assists in-store navigation towards products and services**.**

Several stakeholders are likely to benefit from the introduction and adoption of SSTs in any ecosystem. Within a cinema environment and movie kiosks, we can note how the adoption of SSTs has helped to enhance operational efficiencies of the businesses with less reliance on the human interface (Collier, Breazeale & White, 2017). On the other hand, employees can benefit as these self-service terminals reduce problems associated with over-staffing and human error which may have adverse effects on the consumer shopping experience. Beacons are presently used to locate objects and help customers navigate in indoor spaces as well as to facilitate advertising and direct selling to consumers, which may help to reduce reliance on personnel in some instances (Budakova & Dakovski, 2019).

Changes are anticipated in the market environment as technological innovation continues to evolve and this is also an expectation for both consumers and retailers who are heavily influenced and shaped by the interactions that they have with their personal devices, as confirmed by Inman and Nikolova (2017) and Heinemann (2019). As such, retailer SST providers should ensure that their innovations are also in line with the shopper continuum and are adaptable to the evolving consumer behaviour for them to be assimilated seamlessly into the intended market or audience and create value.

Public SSTs that include ATMs and interactive screens in shopping malls are located in areas where consumers and mall patrons interact and these innovations create a platform that promotes exposure and visibility of the consumer or end-user (Blut, Wang & Schoefer, 2016). Hygiene factors associated with the adoption of public SSTs have continued to be a challenge for shoppers and consumers which has limited the rate of adoption of SSTs, with consumers more sceptical about the use of these innovations due to the pandemic. Moreover, pandemics that include the Corona virus may inhibit the rate of adoption and use of these public SSTs as this may increase exposure and potential contamination of users making use of such innovations which has greatly increased the levels of technological anxiety and a desire to have more contactless services (Li & Huang 2022). Following the declaration of COVID-19 as a global pandemic (Gates, 2020), more consumers have become more wary and avoid contacting surfaces in public areas as this can increase their risks of infection which can impact the rate of usage and adoption if the right solutions are not implemented.

Despite the commercial success that come with the adoption of SSTs and other associated innovations, there is still pressure to ensure that such innovations are implemented smoothly to mitigate potential job losses and other issues which may include pressure from unions.

Companies, such as Microsoft, Oracle and Google, have made strides to enhance the operational efficiencies of businesses, however very little is known about the implications that come with these business transformations, particularly relating to job losses (Cassard & Hamel, 2018). With the South African economic downturn and an unemployment rate increase from 26%-35% from the time COVID was first recorded in South Africa, in March 2020, (Chitiga-Mabugu, Henseler, Mabugu & Maisonnave, 2021), it is important that mall owners are cautious when implementing SST solutions to mitigate the potential job losses that may come with the roll-out of this exercise, since employees, such as information service desk attendants may be at greater risk of losing their jobs should information kiosks and interactive screens be widely implemented within shopping malls.

As the researcher focuses primarily on SST within a shopping mall environment, section 2.3 covers the consumer decision-making process within an SST environment to better understand the engagement levels of consumers in their paths to purchase. The researcher unpacks each of the components within the decision-making process to discuss the various points of engagement that consumers typically interface.

2.4 The Consumer Decision-making Process within an SST environment

Key to understanding the constantly evolving consumer behaviour is having an appreciation of the decision-making process, which is composed of five key stages that consumers go through prior to making a purchase decision. During the decision-making process, consumers identify the need, gather information required to satisfy the given need, evaluate alternatives, based on options provided and then make purchase decisions based on the information that they have obtained. Gopinath, (2019) however, noted that there are instances when consumers do not necessarily follow the conventional decision-making process, particularly when they are making routine purchases on products or services. This should always be considered by retailers.

2.4.1 Need Recognition and Identification

Need recognition or identification initiates the decision-making process as consumers identify a need or want to be fulfilled by an internal or external stimulus (Voramontri, & Klieb, 2019). These needs are also triggered, once consumers' senses are evoked within a shopping mall (as

internal stimuli) or via retail stores with call-to-action elements that include Point of Purchase (POP) banners (as part of externa stimuli). Lo, Lin and Hsu (2016) shared how impulse buying in brick-and-mortar retail environments is influenced and triggered by promotions and in-store activations within a shopping environment. This impulse purchase behaviour cascades to online shopping environments, where it is estimated that approximately 40% of most online purchases are impulsive (Chan, Cheung & Lee, 2017). Understanding the decision-making process and contextualising it within SST environments is essential as it can influence consumer behaviour for instance at need recognition stage, consumers can be prompted and informed of new arrivals in-store which can stimulate new needs for the consumer (Willems, Smolders, Brengman, Luyten & Schöning, 2017).

Impulsive purchases are defined as the sudden purchases or immediate purchase of a product with no pre-shopping purchase intention (Chan, Cheung & Lee, 2017) and given that more retailers are looking for seamless shopping experiences for their consumers using digital-marketing platforms, this presents an opportunity for SST innovations, such as interactive screens to be integrated into shopping mall environments to assist in the decision-making process for shoppers. A mutual benefit is expected between consumers and retailers with identification and recognition of needs using SST or interactive self-service screens (ISSS) or platforms. Retailers may benefit from an increase in purchase intention as well as rates of consumption and penetration emanating from increased product and brand visibility, as well as exposure and awareness within the shopping mall environment (Graciola, De Toni, Milan & Eberle, 2020). On the other hand, retailers will also benefit from these platforms as they can make it easier for consumers to identify their needs, based on flash advertisements and other forms of content displayed on these media platforms.

2.4.2. Information Search

Following need identification, the information search will then commence, allowing consumers to investigate the products and services they are looking to purchase. According to Rezaei (2015), how consumers make purchases in both on=line and off-line channels is not well understood. Search is an important part of gathering information needed for decision making by consumers (Zhang, Chen & Wei 2016). The use of SST, such as interactive screens, will thus assist consumers in the information search process as they can engage with these innovations for relevant information that they require to make purchase decisions. The use of

SSTs has continued to rise in recent times with the adoption of information kiosks -SSTs are also actively used in library environments to aid in book searches (Kaur & Malhotra, 2018). Retail outlets may mirror these information repository platforms to assist them in making it more convenient for consumers to access relevant information that they may require when making a purchase. This was also confirmed by de Moerloose, Antioco, Lindgreen and Palmer (2005) who have previously noted the significance of information kiosks in assisting with service delivery within a shopping mall setting.

There is a need to understand the human-computer interaction components associated with the SST innovation as they can influence consumers' perceptions on adopting that specific innovation. In a study conducted by Tüzün, Telli and Alır (2016), it was noted that SSTs increased the success rates of agenda-driven consumers within a shopping mall environment who preferred making use of categorised searches when looking for information via SST platforms as opposed to the more generic universal search menu. This also echoed by Van De Sanden, Willems & Brengman, (2019) who also noted the importance of a less complex and and less cluttered user interface to manage the perceptions of the consumers can go a long way in increasing SST adoption in retail environments. It thus is important for SST implementors to ensure that they create convenience for consumers to conduct information search which can help influence their purchase decision when in-store (Grewal, Noble, Roggeveen & Nordfalt, 2020).

2.4.3 Evaluation of Alternatives

Once the information search has been completed, the evaluation of alternatives will then commence with consumers reviewing options, based on information collated. The evaluation of alternatives allows for consumers to process the information that they have an weigh options for consideration between competing products, services and brand (Qazzafi, 2019). SSTs may also assist consumers in making informed decisions as consumers will be in a better position to explore products and services easily using the SSTs to evaluate the best option for consideration (Bani-Hani, Tona & Carlsson, 2018). This also alleviates the issues of information overload and fragmentation that tends to make it difficult for consumers to make informed purchase decisions. It is therefore essential for stakeholders who implement the SSTs to ensure that they make the lives of the target audiences and principal users easier. One way

of doing this is by ensuring that SST implementors amplify the positive emotional and cognitive effects that are associated with using a product or service.

2.4.4 Purchase and Post-Purchase Review

Following the evaluation of alternatives, shoppers and consumers then make purchase decisions based on the information they have and based on the outcome of their shopping experience, they are then able to review their shopping experience. In the 21st century, consumer purchase methods have grown in different facets, based on an increase in consumer channels. A number of purchase methods are available to the consumer across various touch points along the path to purchase and these include brick-and-mortar (in-store purchases) as well as online purchases, which allow for delivery and collection options for the consumers' convenience (Pantano & Priporas, 2016).

Baba, Mohd Shahril & Hanafiah, (2020) suggests that post-purchase behaviour is based on the degree or level at which consumer expectations are met by the actual performance of the product or service that they have purchased an also includes other elements such as effort expectancy, facilitating conditions and hedonic motivations. It is therefore essential for retailers to ensure that products and services that they market to potential consumers deliver on the expected results for the consumer as well as ensuring that the path to purchase is positive for the final consumer. Existing consumers can then become referral points for other new consumers to trial products and services within the self-service platforms which will then help to positively influence consumer behaviour and buying decisions within the decision-making process (Huang and Benyoucef, 2017).

Opportunities exists for retailers to make use of SST to evaluate consumer shopping experiences as this can be relevant input that can help to continuously improve the consumer product and service experience in future within a retailing environment (Djelassi, Diallo & Zielke, 2018). It therefore is essential for SST adoption to ensure that purchase and post-purchase consumer requirements are met with the deployment of these innovations.

The next section focuses on omni-channel retailing and how it links back to the consumer decision-making process, using SST innovation.

2.5 Applying technological innovation in the omni-channel retail industry

The omni-channel retail industry has evolved over the last decade with retailers seeking to increase their competencies to ensure survival in the short to long-term (von Briel, 2018). As indicated, this retail strategy aims at providing seamless interaction and engagement between customers and retailers using various media channels and platforms. The use and adoption of omni-channel platforms has been noted to benefit the industry with increased operational efficiencies, better customer experiences, as well as increased customer loyalty and trust over time (Lapoule & Colla, 2016). The lack of omni-channel adoption has significant opportunity costs for the retail environment as it will lead to a loss of about $472 billion from overstocking items and about $634 billion from understocking products and services (von Briel, 2018).

Authors have also noted that future consumer retail will be more experience-oriented as opposed to being product-oriented which is another reason why 21st century consumers need to adopt the omni-channel retailing system soon. On the other hand, however, the integration of these omni-channels come with their challenges when implementing solutions for the market (von Briel, 2018). This section therefore, presents the relevance of omni-channel retailing and the impact that some of its media have towards the 21st century consumer market.

Omni-channel retailing is widely associated with harnessing the shopper experience as it allows for the constant interaction between the consumer and the retailer using various touchpoints along the shopper continuum. Focus on the adoption of omni-channel retailing should however highlight the importance of ensuring that customer value is consistently met, and this defined value can be in the form of convenience, product information and access, as well as pricing and personalised services (Chopra, 2016). With the adoption of SSTs, more personalised experiences may then come in the form of location-based and targeted marketing of products and services which may, in turn, foster the consumption of products and services.

Pre-tail is best defined as interaction and engagement between consumers and the retailers before consumers physically enter a store and this is typically when they are at the level of information search or need recognition and identification phase. Consumers nowadays have been exposed to the shopper continuum and omni-channel influence in their shopping behaviour with exposure to product and service information on the path to purchase which encompasses pre-tail, retail, and post-tail (Manser Payne, Peltier & Barger, 2017). The pre-tail interaction and engagement with product and service offerings has typically been inspired by social media channels and other web 2.0 technologies which have helped to foster healthy

levels of interaction and engagement between consumers and retail industries. This has resulted in consumers being exposed to new product information, discounts, and promotions, prompting them to act, based on calls to actions involved. Within the shopping mall environment, pre-tail engagement touchpoints may also include interactive screens as SST to highlight a product or service on offer which can also trigger consumers to action.

Retail calls to actions which include on-shelf advertisements and other point of sale material supplied by retailers, as well as post-tail communication in the form of after-service surveys to determine the consumer experience has helped to ensure consistency in engagement between consumers and retailers across the path to purchase. The same consumers are also frequently contacted using SMS and other push notifications to sustain the relationship using Customer Relationship Management systems. All these various interactions and engagements between consumers and retailers have been made possible with the introduction of various digital technologies in the market. As a result, firms and retailers should continue to evolve and innovate in the way they engage with their target market as it will assist them in staying relevant and competitive within the market.

SSTs are one way of fostering the effectiveness of omni-channel retailing within the consumer market as they can assist in providing consumers with the toolkits and channels that can help them in making purchase decisions within the shopping-mall environment (Cai & Lo, 2020). With the implementation of SST within retail environments likely to influence consumer satisfaction (Bradley & LaFleur, 2016), retailers can make use of SSTs as effective media channels to aid in making purchase decisions.

The growth of personalised experiences with the adoption of SSTs may in turn, influence shopper perceptions should they be exposed to retail technologies that assist them in decision making within an omni-channel environment (Inman & Nikolova, 2017).

As an example, beacon technology can help to foster seamless execution in transactions and interactions between shoppers and retailers as it allows for the proximity-based communication and at-shelf advertising to take place in the form of push notifications and app actions (Inman & Nikolova, 2017). Creating such a level of engagement in the path to purchase can potentially influence the conversion rates of actual consumer purchases significantly.

Challenges of SST adoption use within an omni-channel retail environment have been widely linked with managing privacy or perceived anonymity and security of consumers within the retail environments as it may influence the wide adoption of these innovations within the

market (Leung, 2016). Managing the exponential growth of SST innovations that are enablers to omni-channel retailing may also be challenging, given the complexity associated with coping with the information technology (I.T.) infrastructure and systems that allow for more homogeneous and personalised service experiences with the consumers. Moreover, authors have highlighted that the integration of technological innovation within a supply or value chain may be met with mixed reviews by the intended recipients which may erode a firm's competitive advantage, if not well-managed. Furthermore, given the relevance of physical stores, it is worth noting that they cannot be easily substituted within the market environment as they assist in amplifying the shopping sensory experience more, when compared to just having an online presence (Lee, Chan, Chong & Thadani, 2017; von Briel, 2018).

It should however be noted that SSTs are great enablers that can influence shopping experience within an omni-channel environment. Chapter 3 unpacks the theoretical constructs in greater detail to determine the level of relationships amongst variables, based on the model that has been selected for the study.

2.6 Conclusion

Chapter 2 provided context on technological adoption evolving within a service environment with examples coming from developed economies and countries such as the Germany, USA and the United Arab Emirates. The researcher also provided more context on the consumer decision-making process within a purchase environment to better understand the roles and influence that SST may have within segments of the shopper continuum. Chapter 3 unpacks the theoretical models and specific constructs that have been adopted for the study, based on their influence on innovation adoption and their influence in user behaviour and attitude. The theoretical constructs that have been adopted for the purposes of this study include Theory of Planned Behaviour, Diffusion of Innovation Adoption, Flow Theory and the TAM model which are all composed of different constructs. The researcher provides an overview of the constructs in each model before giving focus to those that apply.

CHAPTER 3-THEORETICAL CONSTRUCTS

Chapter 3 provides us with a more focused approach in understanding the theoretical constructs that have been selected by the researcher for the purposes of the study. Further to this, the researcher also identifies underlying theories associated with the constructs that have been selected for application in the study. The researcher has adopted the TAM model constructs by Davis (1989), the Diffusion of Innovation theory by Rogers (1995) and the Theory of Planned Behaviour by Ajzen (1991) as key theories which may influence the adoption of technological innovation in the form of SSTs within a retail environment.

The researcher therefore refers to the theoretical model proposed as a reference guide to determine the influences of various factors on the adoption and usage of SSTs and also provides some of the underlying shortcomings associated with applying the various theories in isolation.

3. Theoretical Background on SST adoption and Acceptance

Section 3.1 to 3.6 provides a more comprehensive understanding of the constructs that influence SST adoption in greater detail, as proposed by the researcher.

3.1 External (site-factors) and their influence on SST adoption

According to Davis (1989), given that Perceived Ease of Use and Perceived Usefulness are key determinants in influencing innovation adoption, external variables are equally essential as they influence the perceived usefulness (PU) and perceived ease of use (PEOU) constructs. Venkatesh and Davis (2000) were two authors who introduced external variables as important determinants in influencing perceived ease of use and perceived usefulness of SST innovations. According to Scherer, Siddiq and Tondeur (2019), external variables, in the form of computer self-efficacy, facilitating conditions and subjective norms play a significant role in influencing perceived ease of use and perceived usefulness of technological innovations. While self-efficacy has been widely accepted as an essential external variable in influencing perceived ease of use and perceived usefulness (Abdullah, Ward & Ahmed, 2016), there is a need to better understand other facilitating conditions which may further influence PEOU and PU in the long term. Facilitating conditions of technological innovation may vary from general aesthetics and the authenticity of such innovations.

Facilitating conditions or site variables, which form part of external variables may also be extracted from usability attributes identified by Zaharias and Poylymenakou (2009). Based on the study, constructs that include Visual Design, Content Quality, Learning Support, System Navigation, Ease of Access, System Learnability, were identified as key factors that may influence the Perceived Ease of Use and Perceived Usefulness of a learning management system.

The researcher identified Aesthetics, which is a part of visual design, to be a possible influence on PEOU and Perceived Usefulness. Findings from authors, such as Binyamin, Rutter, and Smith (2019), have shown that aesthetics may not necessarily influence perceived ease of use and perceived usefulness, as students (as an example) rely on their cognitive ability to influence their PEOU and PU when using school learning management systems and not the appearance of the innovation or application. This was also similar to findings from Han, Forbes and Schaefer (2019), who also believed that there was no direct link between creativity functionality and aesthetics. Understanding that visual design and authenticity may apply within a more relaxed or casual environment, their influence on innovation adoption is likely to be significant in some instances (Dacko, 2017). The researcher therefore sought to understand if the visual design or aesthetics may possibly influence usage of an innovation within a more relaxed shopping mall environment, with users who have varied cognitive ability, based on their backgrounds.

Authenticity has been identified as a key external variable within the context of influencing Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) when adopting SSTs in shopping mall environments by the researcher. This is especially given how the authenticity may influence active engagement with innovation users in a casual environment and is also a great way to understand whether the virtual environment provides the adequate experience to the user consciously or unconsciously (Mishan, 2017).

3.1.1 Aesthetic Influences on SSTs

The researcher identified the importance of external variables in influencing the user's perceptions towards SST adoption with the primary focus given to aesthetics and authenticity. Aesthetics, in the context of innovation and SST interfaces, has grown in importance, and generally refers to the user experience which includes classical definitions attributed to "clean, asymmetrical and pleasant characteristics" associated with an innovation (Thielsch, Scharfen, Masoudi & Reuter, 2019). This is consistent with authors such as Benn, Webb, Chang and Reidy (2015) who noted the importance of layout in influencing usage and how users interact with SSTs and other innovations. Sung and Yun (2010) also realised how aesthetics plays a significant role in influencing repeat usage and the general adoption of entertainment and information platforms.

Thielsch, Scharfen, Masoudi and Reuter (2019) further confirmed the importance of aesthetics in human-computer interaction and its role in influencing perceptions and attitudes of SST users. The authors have also seen the importance of creating simulations as effective ways for shoppers to look for products and services within a shopping environment, as opposed to solely relying on live searches for products and services. By applying the simulation functionality within a self-service technology interface, this may positively influence the end-users' subjective perceptions on the adoption of these innovations. Tuch, Roth, Hornbaek, Opwis and Bargas-Avila (2012) realised the influence that affective interest evoked on aesthetics and how this can stimulate the adoption and usage of SST innovation, by altering the moods of the user. This is consistent with findings by Turetken, Ondracek and Jsselsteijn (2019) who discovered how creating aesthetically appealing SST interfaces also stimulate the interest and attention of users.

It is important to note that aesthetics do not necessarily influence the end-user performance when using a given innovation or interactive screen, as indicated by Thielsch, Scharfen, Masoudi and Reuter (2019) in their study to understand the significance of this variable on innovation adoption. Goto, Shigemoto and Ishida (2019) also shared the same sentiments on how aesthetic newness is not always related to the consumer's evaluation of the functional aspect of an innovation or product, suggesting that the aesthetic may be a complementary feature to a product. Given that not much information exists around the influences of aesthetics towards perceived usefulness of SSTs as indicated by Coursaris and van Osch (2016), more

interest has been drawn to fully understand the importance of aesthetics and understanding its true influence on innovation within a shopping mall environment.

3.1.2 Effects of Authenticity on SSTs

The 3D authenticity construct seeks to simulate a real product online and hinges on the principle that a 3D product and experience should be a direct representation of the offline experience and can positively predict a simulated experience (Wu, Joo, Sina, Song & Whang, 2021). Key to ensuring that the 3D product authenticity is validated, lies in the levels of interactivity, vividness, and 3D authenticity which will influence the visual experience. According to Sina & Wu, (2019), use of 3D interfaces produces higher flow and patronage intention to use technologies than the 2 D interfaces. Papagiannidis, Pantano, See-To, Dennis and Bourlakis (2017) noted how immersion and engagement with highly authentic 3D visuals is linked to greater enjoyment which will subsequently lead to a greater purchase intention by consumers. De Vries, Jager, Tijssen and Zandstra (2018) also noted how the degree of authenticity in visuals may influence the perception and attitude that consumers or users will have of the environment and the innovations that they use.

Understanding the influence that authenticity has on perceived usefulness and perceived ease of use in the context of SST is however not an often researched topic. Algharabat and Dennis (2010), as an example, failed to establish the relationship between authenticity and its influence on perceived usefulness and perceived ease of use of an innovation which has provided the researcher with the opportunity to further investigate the relationships of these variables.

3.2 Perceived Usefulness

According to Uta (2015), Perceived Usefulness (PU) can be defined as the extent to which an SST can enhance the user's performance whilst Perceived Ease of Use (PEOU) is more inclined towards the ease of operation of an SST innovation, as indicated by Rose and Forgarty (2006). TAM is based on two behavioural beliefs that influence intention and this is perceived usefulness and perceived ease of use. According to Davis (1989), perceived usefulness is the degree to which an individual believes that adopting an innovation can enhance their performance in a job. Findings by Mutahar, Daud, Thurasamy, Isaac and Abdulsalam (2018) have suggested that perceived usefulness tends to influence intention to make use of technological innovation, suggesting its importance in influencing attitude towards the adoption of SST within the market. This finding has also been confirmed by Demoulin and

Djelassi (2016), who rate the influence of perceived usefulness on behavioural intention and adoption of retail technological innovation, as well as Park, Ha and Jeong (2020) who understand the significance that the variable has on SST adoption.

3.3 Perceived Ease of Use

According to Davis (1989), Perceived Ease of Use (PEOU) suggests that using an innovation will be free of effort. It has been widely noted that perceived ease of use influences behavioural intention and attitude towards the use of technological innovations, with most users and consumers having adopted these innovations when they realise the convenience and ease of use associated with an innovation. Based on research conducted by Sung and Yun (2010), perceived enjoyment (which includes aesthetics, flow, and social presence as key sub-components), has a significant influence on PEOU of an innovation. The aesthetic variable was selected by the researcher as Sung and Yun (2010) noted the significance that the variable has on perceived enjoyment when using an innovation.

Demoulin and Djelassi (2016) have however, noted that influences of behavioural intention are widely varied and can include behavioural control and perceived usefulness as main drivers for adoption and usage of SSTs before the perceived ease of use and enjoyment variables. Some of the key antecedents of perceived ease of use include technological anxiety, behavioural control, and societal anxiety. According to Jahanmir, Silva, Gomes and Gonçalves (2020), technological anxiety and skill capacity have a significant influence in determining the perceived ease of use and future adoption of SSTs, as initially confirmed by Gelbrich and Sattler (2014). Societal control and influence can be largely linked to the extent to which an individual believes they should use a system based on the perspective of important others who they believe make use of an innovation (Chen & Aklikokou, 2020). This may suggest the innovation's relative ease of use. The researcher unpacks this variable further in the research.

3.4 Introduction to Diffusion of Innovation Theory Constructs

Rogers (1995) proposed the Diffusion of Innovation Theory to understand the variables that influence innovation adoption levels and technology within a given environment and these included relative advantage, compatibility, complexity, trialability and observability.

Based on the five constructs, the researcher selected relative advantage and complexity as key constructs that may influence the user experience within the DOI theory model, as indicated by Rand, Nelsen, Kotz and Henderson (2018), who noted how the variables would influence intention to use e-textbooks in a previous study. The same authors did note that trialability and observability had very little effect on the wide use of e-textbooks and consumption of a given innovation by the sampled population. Tongnamtiang and Leelasantitham (2019) have also indicated how complexity and relative advantage are the main contributors in influencing the diffusion of innovation within any organisation. This was also reinforced in earlier studies which sought to understand the influence of DOI constructs on technological adoption where it was noted that compatibility, complexity, and relative advantage play a greater role in influencing user behaviour when compared to the other two constructs, namely, observability and trialability (Weigel, Hazen, Cegielski & Hall, 2014). Min, So and Jeong's (2019) study also reviewed the role of DOI constructs in helping us understand technological innovation adoption by looking at how the DOI constructs, in turn, influence PU and PEOU when using the Uber mobile application.

Vargo,Akaka & Wieland, (2020) suggest a more inclusive and integrated way of studying innovation and diffusion which is one of the reasons why additional theories have been considered as part of the study to fully understand the influence factors that influence SST adoption. The researcher has seen an opportunity to determine the influence that relative advantage and complexity will have on attitude, which is a mediating variable to SST adoption within a shopping mall environment.

3.4.1 Relative Advantage

Findings from the study by Rogers (2003) revealed the high importance of relative advantage in influencing the behavioural intention of users of an innovation. Relative advantage is defined as the benefits associated with the adoption of an innovation which may include greater efficiencies, economic benefits, and status association (Magotra, Sharma & Sharma, 2019). Previous studies, which include consumer application adoption of the Uber web application by Min and Jeong (2019), and another study conducted to understand consumers' intention to use SSTs by Tongnamtiang and Leelasantitham (2019), both specifically looked at understanding the relationships between Complexity and Relative Advantage on Perceived

Ease of Use and Perceived Usefulness, without much focus on the effect that Complexity and Relative Advantage will have on the overall attitude towards SSTs.

According to Chan, Fang and Li (2019), the relative advantage construct is composed of convenience, trust, and efficacy of information source. Within the context of SSTs, relative advantage is particularly critical as it influences attitude and behavioural intention of the user interfacing with the SST innovation within a mall environment. To ensure consumer attitudes are positive, there is a need to have a positive relative advantage for the consumer using SSTs and these may include ensuring that channel convenience, trust and efficacy of information acquisition is held in high regard by consumers in shopping mall environment settings.

3.4.2 Complexity

Complexity is a construct that has a significant influence on the rate of technological innovation and adoption, with a negative relationship inferred between complexity and innovation adoption, according to Rodgers (2003). Complexity may be best described as the degree to which an innovation is regarded as difficult to make use of and this is likely to deter users from utilising the innovation (Al-Rahmi, Yahaya, Aldraiweesh, Alamri, Aljarboa, Alturki & Aljeraiwi, 2019). Several innovations and SSTs have unfortunately failed in the market due to the degree of complexity that they have, resulting in lack of adoption by the end users who are likely to have technological anxiety if they do not have sufficient information and the tools required to operate a self-service technology (Leng & Wee, 2017).

It is important to note that although it is widely perceived that complexity may influence behavioural intention when using an innovation, there are instances when this relationship may not be significant with not much influence expected between complexity in the behavioural intention to use solar panel systems (as an example), as solar panels do not require much cognitive effort when using them (Kapoor & Dwivedi, 2020). When we juxtapose this with the SST within a shopping mall environment, there is a need to understand the level of perceived complexity that the innovation will have towards consumers within the Johannesburg environment. The complexity construct is inversely proportional to technological acceptance and user attitude, suggesting that there is a need to produce less complex innovations which may in turn, enhance users' attitude towards using these innovations (Min, So & Jeong, 2019).

3.4.3 Limitations of the Diffusion of Innovation Theory (DOI)

Conversely, it is also important for researchers to understand the limitations that come with DOI theory which enable us to further explore additional constructs that influence the wide adoption of self-service screens within a shopping mall environment. Firstly, Lyytinen and Damsgaard (2001) have realised that DOI assumes homogeneous factors have an influence on the adoption of innovations which is not necessarily true, considering that other factors which include business context, other behavioural theories and access to technology play an equal role in influencing the wide adoption of SSTs.

Furthermore, DOI assumes the adoption of an innovation is influenced primarily by users looking to derive the maximum level of utility from using an innovation which may not always be the case, as some consumers or users may be motivated by existing market trends and consumer behaviour to use shopping-mall SSTs (MacVaugh & Schiavone, 2010).

Another important finding has been to note that DOI assumes all innovations have the same diffusion of innovation attributes, which is not an accurate representation for most innovations, for example, we cannot necessarily use the same innovation metrics to measure DOI attributes for a television as we would for a SST within a shopping mall environment (Lyytinen & Damsgaard, 2001). As this is the case, the researcher extracted more specific constructs that applied within an SST context and adopted additional constructs from additional theories.

3.5 Theory of Planned Behaviour and influence on SST Adoption

The Theory of Planned Behaviour primarily focuses on the variables that influence and affect the behaviour of the decision-maker or user of an innovation (Weigel, Hazen, Cegielski & Hall, 2014). Azjen and Fishbein (1975) introduced the Theory of Reasoned Action which was later modified with the perceived Behavioural Control construct, which further highlighted the significance of involuntary actions on user behaviour when making use of an innovation, as indicated by Weigel, Hazen, Cegielski and Hall (2014) and Seth, Coffie, Richard and Stephen (2019). The researcher has therefore seen the need to integrate the Theory of Planned Behaviour construct to better understand the level of interaction, engagement and reactions associated with making use of technological innovations.

3.5.1 Behavioural Attitude

According to Azjen's (1991) theory of planned behaviour, an individual's behavioural attitude, behavioural control and subjective norms influence the behavioural intention of innovation users. Attitude is largely defined as the positive and negative evaluation associated with performing a behaviour (Roos & Hahn, 2019). In a study to determine the influence of attitude on in-app purchases, it was noted that there was an increase in the usage and interactions with in-app advertisements when consumers have a positive attitude towards the adoption of these innovations (Cheung & To, 2017). Several authors have applied attitude within the context of their research, to understand behavioural intention influence on the use of SSTs, as well as to understand factors that may influence a negative or positive relationship when adopting these SST innovations.

Lee and Lyu (2016) have noted the significance that human interaction has in influencing consumer attitude when adopting SSTs within a retail environment, with a high need for human interface or interaction likely to create a negative attitude in adopting SSTs. This is also further reinforced by Demoulin and Djelassi (2016), who also realised the influence of technological anxiety on user attitude and adoption of an innovation.

The researcher establishes the relationships between antecedents of attitude on the construct which assist in helping to understand how attitude influences the behavioural intention to use SSTs within a shopping mall environment.

3.5.2 Behavioural Control

As behavioural control is an essential element within the Theory of Planned Behaviour (TPB), it is important that mall owners understand the influence that behavioural control has on consumer and user attitude towards the use and adoption of SSTs. Perceived Behavioural Control looks at the extent at which a decision-maker or user of a system is confident in performing a particular action, using a given innovation or tool (Weigel, Hazen, Cegielski & Hall, 2014). Based on the perceived behavioural control, users are more likely to then adopt relevant innovations, which basically would refer to the behavioural intention to fulfil a particular action.

Several antecedents to behavioural control have been identified by Azjen (1991). However, for the purpose of this study, self-efficacy, personal responsiveness, and SST compatibility have been specifically selected as they can influence the level of behavioural control for SSTs within a shopping mall environment. Self-efficacy looks at whether a user has sufficient resources required to evoke a level of control when using an SST, personal responsiveness assists in ensuring that an organisation's employees are well equipped to manage an SST and compatibility looks at the relevance of the SST within the user's context (Demoulin & Djelassi, 2016). When users of an SST have a positive level of behavioural control, the propensity and intention to adopt the innovation will increase substantially. Within the Johannesburg and greater South African environment, we can note that there is a high literacy and education level which is an enabler in creating self-efficacy that will then stimulate the levels of behavioural control of SST users within the shopping mall environments (McKeever, 2017).

Responsiveness looks at how potential users of a system would perceive their environment as being fully equipped with the right tools and facilities that will influence their adoption and usage of a particular system whereas SST compatibility looks at whether a product or service is well suited to adequately serve the needs of the final user satisfactorily (McKeever, 2017). By ensuring that both responsiveness and general compatibility are high, this may influence the general perceived behavioural control that shoppers will have when making use of a given system.

3.5.3 Subjective Norms

According to the Theory of Planned Behaviour, subjective norms look at how individuals are influenced by social pressures and people they hold in high regard to act or behave within an environment (Chu & Chen, 2016). This is fairly similar to the definition provided by Alnaser, Ghani and Rahi (2017) who noted individuals are put in a position to perform a certain behaviour which they may not be fully interested in performing. Understanding the influence of subjective norms is important as it can determine behavioural intention in the adoption of SSTs (Chu and Chen, 2016). Within a technological and innovation environment, it is important to comprehend the role that subjective norms have in increasing behavioural intention to make use of innovations, as people conform to behavioural standards and societal

pressure as they make use of these innovations (Hua & Wang, 2019). Subjective norms have a significant influence on the use of social media platforms, as noted by Lu, Zhou and Wang (2009) and this may have grown further in recent times due to the growing behaviour of influencers within social media communities which has further evoked more popularity. Research on the use of ticket payment systems suggests that there is an inclination towards the general adoption of SST innovation, based on subjective norms to which the consumer is exposed (Darmayanti, Soewarno & Isnalita, 2018).

Subjective norms is a construct that is heavily influenced by the context of the users within an environment. This construct is noted to be more prominent in masculine cultures where functionality is a great determinant in the use and adoption of SSTs when compared to other environments which may otherwise have more focus and inclination towards aesthetics (Blut, Wang & Schoefer, 2016). This may therefore incentivise more users to make use of SSTs within a given environment, particularly as they are able to derive the value, they require from a given innovation. Cultural backgrounds that are more collective in nature tend to have a higher propensity to subjective norms when compared to more individualistic environments (Sreen, Purbey & Sadarangani, 2018). Given that South Africa is largely collective in nature (with the spirit of Ubuntu quite prevalent), the researcher was then interested in understanding how subjective norms have an influence on SSTs usage within a shopping mall environment.

3.5.4 Limitations of Theory of Planned Behaviour in innovation adoption

It is important to note that the Theory of Planned Behaviour is not the only determinant that can influence the intention to use an innovation and further to that, intentions have been noted to be poor predictors of behaviour to an extent which suggests that there are a few limitations that exist with regards to the theory of planned behaviour (Ajzen, 2011). The theory of planned behaviour assumes a linear trajectory in decision-making which may not necessarily be influenced by time. Further to this, the timeframe between intention and behavioural action is not well defined as it also has the potential of not happening.

The theory of planned behaviour also fails to account for economic conditions and the backgrounds to which the end-users are subjected, which may then influence how they respond and interact with innovations, such as the SSTs. Furthermore, it is important to ensure that the user's enjoyment is also considered when using an innovation as it may ultimately influence the levels of engagement that they will have with the innovation. Consequently, we can note

that the theory may not be used in isolation when trying to establish the factors that influence the adoption of SSTs.

3.6 Flow Theory and its influence on self-service technology adoption

Flow Theory is closely related to enjoyment, satisfaction immersion and the intention to engage in activities that require full concentration (Csikszentmihalyi, 1990). Flow is also known to create devotion, enjoyment, and absorption (Huang, Cheng, Wong, Chiu, Lee & Teng, 2018). Flow theory can be best defined as the enjoyable experience conducted through concentration when conducting specific tasks continuously, owing to the positive feedback received from performing the given task (Csikszentmihalyi, 1997). It can also be defined as the complete absorption in the present moment (Nakamura & Csikszentmihalyi, 2009). This further highlights the importance of mental states in influencing the individuals' behaviour and attitude when working with innovation, which has influenced the researcher to investigate this relationship within the context of SSTs in shopping mall environments (Huang, Cheng, Wong, Chiu, Lee & Teng, 2018).

Flow has been widely studied in various contexts that include virtual reality, on-line shopping, virtual world environments, web environments and e-commerce (Ahmad & Abdulkarim, 2019). Previous authors such as Zhou (2013), as well as Kim and Ko (2019), have indicated the influence of flow variables on the adoption of mobile television and other media platforms, in general, as flow has a significant influence on the adoption of SST and behavioural intention to use these technological innovations. Authors such as Obadă (2013), have realised the significance of creating opportunities and environments that allow for consumers to experience a level of flow.

Flow theory literature typically covers enjoyment and concentration variables as it is widely noted that individuals are likely to be more accepting of innovations if they derive high levels of enjoyment in their usage, which further shows how the flow theory model can predict behaviour and intention (Atombo, Wu, Zhang & Wemegah, 2017). This was also confirmed in previous research by Obadă (2013), who noted how Flow theory is ultimately measured by the Concentration and Enjoyment variables.

3.6.1 Enjoyment

Enjoyment can be best defined as the extent to which an activity of using a particular system is perceived as satisfying (Demoulin & Djelassi, 2016). Perceived interactivity from the

adoption and usage of SSTs has been known to influence the emotional satisfaction and experience of users, thereby stimulating enjoyment and intention to re-use these innovations, within a Korean fashion retail environment (Kim & Yang, 2018). Enjoyment of SSTs is desired by individuals, which can then influence the innovation adoption, particularly if they influence the overall experience of the consumer (Gures, Inan & Arslan, 2018). Virtual reality, as an example, has been largely accepted by consumers due to the 3D environment creation that induces an enjoyable experience for the consumers, which has been linked more towards recreational purposes than functionality, based on the study conducted to understand the adoption of virtual reality devices (Lee, Kim & Choi, 2019). These findings are also consistent with discoveries by Huang, Pham, Wong, Chiu, Yang and Teng (2018), who realised how enjoyment has been particularly important in influencing the level of flow in users making use of exergames. Contextualising enjoyment within an SST environment is critical in influencing the adoption and use of these innovations within shopping mall environments (Demoulin & Djelassi, 2016). Enjoyment does not only increase the wide adoption and intention to use SSTs (Venkatesh, Thong, & Xu, 2012), but it can also influence shoppers and users to otherwise forego interactions with direct shopping attendants and personnel to actively engage with these SST innovations.

3.6.2 Concentration

Concentration can be defined as the level at which a user or consumer is immersed in an activity without providing much room for distractions as they work on a given activity or system (Ozkara, Ozmen, & Kim, 2017). Akbari, Rezvani, Shahriari, Zúñiga and Pouladian (2020) suggest that concentration is a state of mind when a person's concentration is centralised on an action. Ozkara, Ozmen and Kim (2017) further posit that concentration could assist retailers in ensuring that there is better engagement and elaborate intention to use innovations. The study however looked at online purchase intentions and not necessarily for the purposes of obtaining relevant information required by consumers in their paths to purchase. The researcher therefore noted a need to understand whether concentration would be an enabler for intention to use SSTs within a shopping mall environment, given that there is a positive relationship anticipated between concentration and intention to use an innovation.

3.6.3 Shortcomings of Flow Theory with Self-Service Technology Adoption

Flow Theory is certainly an enabler in determining innovation adoption and intention to use these innovations. Given how flow theory is a complex construct which attempts to integrate motivation, personality, and subjective experience (Choi, Kim & Kim, 2007), there are a few shortcomings that come with the application and adoption of Flow Theory within a study. Unfortunately Flow Theory fails to factor in external variables which are influential in promoting the adoption of SST (Choi, Kim & Kim, 2007). There is a significant need to incorporate other theoretical constructs in determining the intention to use a technological innovation such as the Theory of Planned Behaviour constructs, which include perceived control, behavioural attitude, and subjective norms, as these variables have an influence on user attitudes and behaviour towards SST adoption. There is also a need to ensure that the use and adoption of flow theory does not imply that the undivided attention is applied by users of SSTs as it may be misleading to assume that undivided attention will be necessarily required when using SST facilities within shopping malls, given the level of traffic and disruption that is associated with these environments. Therefore, the requirement for undivided attention when using SSTs that comes with Flow Theory, may induce a negative effect to the desired functional purpose the product intends to serve (Buzady & Marer, 2016).

Flow theory is closely linked to full absorption and immersion in doing an activity, which may not be sustainable, given that some activities may require a more spatial or an episodic learning approach to reduce the strain on the user. Based on this, it becomes critical to acknowledge that Flow theory may not necessarily apply in instances where not much attention or concentration is required by the end-user of an innovation. The researcher however sought to establish the extent of the influence of Flow Theory on the adoption of SST innovations within a shopping mall environment, based on these conditions.

3.7 Conclusion

The researcher was able to provide key insights on the theoretical background of the research. Four main theories were adapted for the study, namely, TAM, DOI, Theory of Planned Behavior and Flow Theory, as they have close links to technological adoption. From the selected theories, the researcher was able to identify specific constructs that have been identified as key drivers to influence the adoption of technological innovation. Chapter 4

provides us with a proposed conceptual framework and hypothesis required to fully understand the relationship between variables that influence SST adoption.

CHAPTER 4 HYPOTHESIS DEVELOPMENT, CONCEPTUAL FRAMEWORK

4.1 Introduction.

The previous Chapter discussed the Theoretical Constructs at length and highlighted the importance of understanding their importance towards the adoption of technological innovations within the modern retail environment. The researcher discussed the importance of External-site Variables elements that include Aesthetics and Authenticity and their influence on SST adoption, with particular focus on PEOU and PU. The influence of variables that underpin TAM, DOI Theory, Theory of Planned Behaviour and Flow Theory were also discussed in greater detail.

Alam, Omar, Ariffin and Hashim (2018) have suggested an integrated conceptual model that confirms key factors that influence adoption of SSTs. To create an integrated conceptual model that effectively measures factors that influence SST adoption within the shopping environment, this chapter suggests the relationships between key drivers that influence these SST adoptions in Johannesburg shopping-malls. The drivers are sourced from underlying theories and models identified to influence adoption of technological innovations. Hypotheses are then postulated based on the relationships identified for further exploration.

4.2 Frameworks underpinning the Study and Model

In conceptualising the model of the study, the researcher adopted the TAM model (Davis,1989), the DOI (Rogers, 1995), the TPB (Ajzen, 1991), the Flow Theory (Csikszentmihalyi, 1990). The TPB was born out of trying to understand the influence of attitude towards influencing a particular behaviour by Ajzen and Fishbein (1980). TAM used the TRA and Theory of Planned Behaviour (TPB) as a basis to understand the influence of technology adoption by users using Perceived Ease of Use and Perceived Usefulness as key drivers that can influence the attitude directly and behavioural intention indirectly (Alagoz & Hekimoglu, 2012).

Conceptual Model

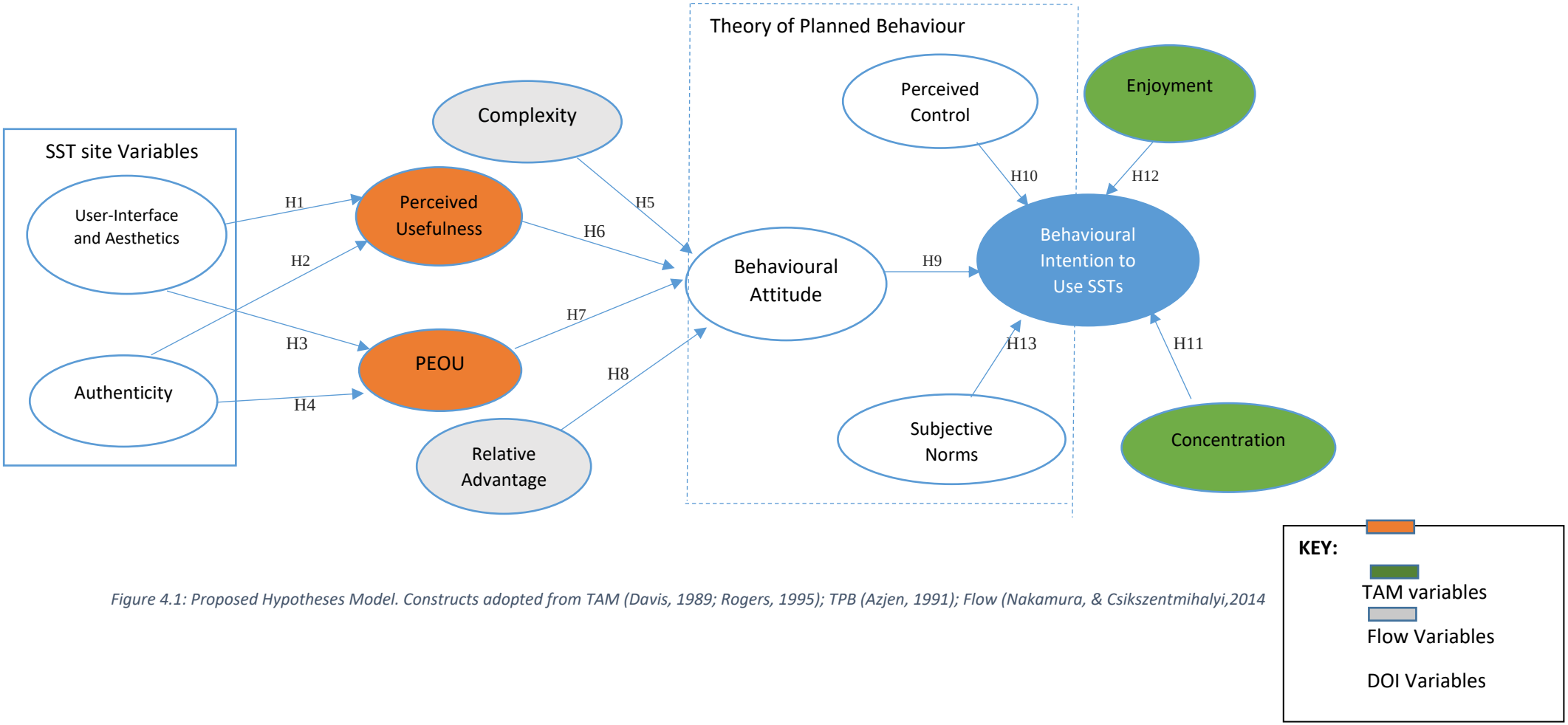

Figure 4.1: Proposed Hypotheses Model. Constructs adopted from TAM (Davis, 1989; Rogers, 1995); TPB (Azjen, 1991); Flow (Nakamura, & Csikszentmihalyi,2014

4.3 Proposed Hypotheses

Based on the conceptual model above, the following hypotheses have been formulated for the study:

4.3.1 The relationship between User-Interface/Aesthetics and Perceived Usefulness within a shopping-mall environment

As alluded in Chapter 3, perceived usefulness is likely to influence the attitude levels of technological innovation users, and in this context SSTs within a shopping mall setting which is closely linked to findings by (Davis, 1989). This is consistent with findings by Demoulin and Djelassi (2016), who also confirm that the relationship between intention to use and both PEOU and PU have been discussed in different contexts and is well understood. However, not much information has been presented to determine the influence that aesthetics and ergonomics may have on the perceived usefulness of self-service technologies and innovations (Cyr, Head & Ivanov. 2006; (Coursaris & van Osch, 2016) and especially within a Johannesburg shopping mall setting. Aesthetics is known to indirectly influence the intention to use an innovation and although much is known about the hedonic influence that aesthetics of innovations has on consumers, there is limited studies that highlight usage intentions and functional value aesthetics provides for the consumer (Wu, Chiu & Chen, 2020).

Chen & Chang, (2018) acknowledges the significance of information and media richness quality in influencing consumer behaviour intention and decision quality users of technological innovation which is why it becomes imperative to understand the relationship that aesthetics will have on perceived usefulness within the context of SST as consumers exposure to these innovations may influence their consumer behaviour within the mall setting.

Based on the brief discussion, the following hypothesis is proposed:

H1: A significant positive relationship exists between User Interface/Aesthetics and Perceived Usefulness within an SST employed in shopping malls

4.3.2 The relationship between Authenticity and Perceived Usefulness

Authenticity is the degree at which a virtual environment tends to mirror the real or physical environment and has been noted as a characteristic or variable under perceived presence

(Altarteer & Charissis, 2019). Consumers and users of an innovation are likely to associate high levels of authenticity with perceived usefulness of an innovation. Within a Self-Service Technology setting, it may be imperative to understand the level of perceived authenticity that an innovation may have as it may potentially influence perceived usefulness of the given innovation. The greater the level of authenticity, the more likely users will perceive the innovation as adaptable for their use and provide functional benefits. Based on this, the following hypothesis is postulated:

H2: There is a positive relationship between Authenticity and perceived usefulness

4.3.3 The relationship between User Interface and Perceived Ease of Use

As most researchers tend to follow functional benefits of SST adoption and not look at the hedonic aspects (Park, Ha & Jeong, 2020), there was need to fully understand the influence of these hedonic factors, such as Aesthetics, on consumer usage and adoption of SSTs. Aesthetics play a significant role in attracting consumer engagement, however the influence of aesthetics on PEOU of SSTs within a mall environment is not fully defined and known. The researcher has noted that although aesthetics generally influences behavioural intention, simplicity-another dimension of aesthetics plays a significant role in influencing the perceived ease of use of an innovation (Lazard, Watkins, Mackert, Xie, Stephens, & Shalev, 2015). The researcher used this study to determine the extent of the relationship between aesthetics and PEOU of SST innovations relationship. The proposed hypotheses is therefore as follows:

3: There is a positive relationship between User Interface/Aesthetics and Perceived Ease of Use

4.3.4 The relationship between Authenticity and PEOU

Similarly, the researcher also sought to establish the relationship that authenticity may have in influencing perceived ease of use of a given SST. Authenticity has been closely linked to corresponding textual content or corresponding content reliability for products that are shared on social shopping communities as it can increase the desire for consumers to engage with a product or service that is available for sale (Jin, Chen & Zhou, 2022). Authors such as Featherman, Valacich, and Wells (2006), have noted that there is a relationship between authenticity and perceived ease of use of an innovation although not much research has been

conducted to confirm the relationship between authenticity and PEOU. Chang, Hsu and Chen (2021) have however, highlighted the significance of authenticity and social presence within the context of watching virtual team games online and the significant association that this has on PEOU of such innovations. The researcher therefore used this study to obtain empirical evidence on the extent of the association between authenticity and PEOU when using SSTs within a shopping mall environment. Based on this, the following hypothesis is proposed:

H4: There is a positive relationship between authenticity and perceived ease of use

4.3.5 The relationship between complexity and behavioural attitude to use SST within a shopping mall environment.

According to Rodgers (1995), understanding the complexity of an innovation may go a long way in influencing the rate of its adoption by users and assist in determining their general behaviour and attitude towards innovations. Previous studies have shown the influence of complexity on PEOU and PU which then impacted the behavioural attitude to use innovations (Min, So & Jeong, 2019), but not much research has been undertaken to fully understand whether complexity can in fact, influence behavioural attitude to adopt an SST. The researcher has looked to establish the relationship between these two variables. It can be assumed that the more complex a SST may be, the more negative the user's behavioural attitude (Marikyan, Papagiannidis & Alamanos, 2020).The proposed hypothesis to test the relationship between complexity and BA is therefore:

H5: There is a positive relationship between complexity associated with using an SST and behavioural attitude

4.3.6 The relationship between PU and BA when using SSTs within a shopping-mall environment

According to Davis (1989), perceived usefulness is a major determinant that influences innovation acceptance. This finding has also been re-iterated by authors such as Agudo-Peregrina, Hernández-García, and Pascual-Miguel, (2014) as well as Elkaseh, Wong, and Fung (2016), who have noted the significance of perceived usefulness in influencing behavioural intention and attitude to use an innovation. Reza, Bahrin, Iskandar, Azhari and Ram (2020) were also able to acknowledge the significance of PU and PEOU on overall consumer attitude when making use of SSTs within a shopping environment in Malaysia. However, as the context and setting is not entirely similar, there has been a need to understand the influence that PU has

on Consumer Attitude within a Johannesburg shopping environment. The proposed hypothesis is therefore as follows:

H6: There is a positive relationship between perceived usefulness and behavioural attitude when making use of SSTs.

4.3.7 The relationship between PEOU and Behavioural Attitude to use SSTs

Perceived Ease of Use, much like perceived usefulness, has also had a significant influence on the behavioural intention to use innovations, as confirmed by Elkaseh, Wong and Fung (2016). This is consistent with findings from Park, Ha and Jeong (2020), who realised the significance of PEOU on Behavioural attitude to use SST within a fashion retail environment. Not much research has investigated the influence that perceived ease of use of an innovation will have on the behavioural attitude of shopping mall users although this may go a long way in influencing wide adoption of the innovation potentially, driven by positive attitudes emanating from perceived ease of use. The proposed hypothesis to test the relationship between PEOU and BA is as follows:

H7: There is a positive relationship between Perceived Ease of Use and behavioural attitude when making use of SSTs

4.3.8 The relationship between Relative Advantage and Behavioural Attitude

Relative advantage can be best defined as the attributes or features which act as delighters or attractions that make a product or service stand-out relative to others within its range (Sujata, Roy, Thakkar, Banik, Arora & Parashar, 2015). According to Sinha and Verma (2018), it has been noted that relative advantage associated with the adoption of drones has led to a positive attitude in potential users who have been exposed to this kind of innovation. Relative advantage was also identified as a significant factor in influencing the adoption and usage of SST in the form of vending machines by Tongnamtiang and Leelasantitham (2019). The researcher was therefore looking to determine the relationship between RA and BA within the context of SST in shopping-malls as well given the relationship is validated within the context of internet banking, an alternative self-service innovation (Min, So & Jeong, 2021). The researcher sought to understand whether there is a positive relationship between relative-advantage and behavioural attitude of shoppers when making use of such innovations as it can go a long way in influencing consumer shopping behaviour. The hypothesis below has been postulated:

H8: There is a positive relationship between Relative Advantage and Behavioural Attitude

4.3.9 The relationship between Behavioural Attitude and Behavioural Intention

The role of behavioural attitude on behavioural intention to use SSTs cannot be understated as positive or negative attitudes may influence the intention to use an innovation (Xia, 2020). Consequently, it becomes essential for manufacturers of innovations to ensure that the innovations they create have a positive effect on the target user's attitude as it may go a long way in influencing potential adoption. Conversely, a negative attitude derived from using an SST may also have a negative influence on behavioural intention to use such an innovation. Although authors such as Selvakumar and Raghavan (2017), have highlighted the importance of a positive attitudes in influencing a purchase-decision, not much research has been conducted to establish the relationship that attitude may have in influencing the usage of SSTs within a shopping mall setting. Prior findings have however, noted the influence that attitude has on influencing behavioural intentions to use an innovation with a positive relationship anticipated between the two constructs (Rivera, Gregory & Cobos, 2015; Claudy, Garcia & O'Driscoll, 2015). The researcher therefore postulated the following hypothesis:

H9: There is a positive relationship between behavioural attitude and behavioural intention to use SSTs.

4.3.10 The relationship between Perceived Control and Behavioural Intention to SSTs

Perceived Control is largely considered a great predictor of adopting SSTs (Barua, Aimin & Hongyi, 2018). The study however sought to understand the influence that Perceived Control has on Perceived reliability to use SSTs which reflected as a positive relationship. Another study by Lien, Hsu, Shang and Wang (2021) also highlighted how perceived control influences the intention to use SST by air passengers using Fast air travel services in Taiwan.

Studying the relationship within a shopping-mall context will assist in understanding the degree at which perceived control may help in influencing consumers and users of an innovation to interact with SSTs within a shopping-mall environment. Perceived control was added as an additional construct to the TPB to account for factors outside of individual control

that may affect intentions and behaviours of users of a given product or service (Montano and Kasprzyk, 2015). The following hypothesis was therefore drawn up:

H10: There is a positive relationship between perceived control and behavioural intention to use SSTs within a shopping mall setting

4.3.11 The relationship between Concentration and Behavioural Intention to use SSTs

Concentration, a component of flow experience, has been known to influence behavioural intention to use SST within airline environments (Moon & Lee, 2022). Not much research has been put to fully understand how concentration and components of flow theory can influence behavioural intention to use SSTs although studies have looked to understand how concentration and states of flow can influence the purchase intention of smartphone users (Martins, Costa, Oliveira, Gonçalves & Branco, 2019). The researcher therefore sought to understand the relationship that concentration has in influencing behavioural intention to use SSTs. The hypothesis is therefore postulated below:

H11: There is a positive relationship between concentration and behavioural intention to use SSTs

4.3.12 The relationship between Enjoyment and Behavioural Intention to Use SSTs

Improving the functional and experiential components of an SST, such as enhancing levels of enjoyment will ultimately lead to an increased intention to make use of innovation such as Information Kiosks (Van De Sanden, Willems & Brengman, 2022). Perceived enjoyment is also known to evoke behavioural intention to adopt SSTs (indirectly) for older US consumers through service quality and perceived risk which is why the researcher sought to understand the influence of this variable on behavioural intention to make use of SSTs within a shopping mall environment in Johannesburg with specific focus on emerging economies. The researcher therefore proposes the following hypothesis:

H12: There is a positive relationship between enjoyment and behavioural intention to use SSTs

4.3.13 The relationship between Subjective Norms and Behavioural Intention to use SSTs

Subjective norms refer to how customers are influenced by perceptions of significant references in their lives that include family and friends and this construct is known to influence behavioural intention to adopt SSTs, particularly online streaming services (Bhatt, 2021). Subjective norms have also been well tested within the banking environment where there is a general adaptation of SST within banking environments (Magotra, Sharma & Sharma, 2019). However, there is a need to understand the influence of Subjective norms within a shopping-mall environment as it may also influence user intention to adopt and make use of these innovations.

The researcher therefore sought to understand the relationship between the two variables and has postulated the following hypothesis:

.**H13: There is a positive relationship between subjective norms and behavioural intention to use SSTs**

CHAPTER 5: RESEARCH DESIGN AND METHODOLOGY

Chapter 3 gave a comprehensive discussion on the theoretical constructs which may influence the adoption of SST within a shopping mall environment. The researcher formulated several hypotheses in chapter 4 to determine the influence of the various constructs on usage and adoption of SSTs in retail environments. Chapter 5 discusses the research design and methodology that was adopted by the researcher to gather the data required to determine factors that influence the adoption of these innovations. The researcher provides the background on methodologies that can be used by researchers, then focuses on the preferred and selected research design and methodologies adopted for the study, to determine the extent of the influence of various factors on the adoption of SST in Johannesburg shopping malls.

5.1 Research Paradigm: The Positivism Paradigm

Research paradigms are known to guide researchers on how they can experience and interpret the world around them (Kankam, 2019). These research paradigms guide scientific discoveries through their assumptions and principles (Park, Konge & Artino 2020). According to Kankam, (2019), research paradigms are particularly essential when studying human behaviour as they can assist in increasing credibility and generalisability of the study. There are four main paradigms that can be used when conducting research and these are Positivism, Interpretivism, Pragmatism and Post-positivism (Kankam, 2019).

According to Kaboub (2008), the positivism paradigm is widely noted as a truth-seeking paradigm. The positivism paradigm seeks to uncover objective reality and is closely aligned with the hypothetico-deductive model of science which builds on theory from literature that then builds to testable hypotheses when conducting a quantitative study (Park, Konge & Artino, 2020).

For the purposes of this study, the Positivism paradigm was adopted as its underlying philosophy is aligned with the hypothetico-deductive model of science that builds on verifying a hypothesis (Park, Konge & Artino 2020). Adopting the Positivism paradigm would therefore be most appropriate as the researcher sought to understand the effect various constructs have on SSTs within a shopping mall environment. Further to this, the generalised research results associated with the quantitative study provided a platform for more statistical reliance on the

accuracy of results and generalisation which allows for the application of results in different contexts (Alharahsheh & Pius, 2020).

5.2 Research Design

Quantitative and qualitative research methods are the two methodologies widely used when conducting research. Taguchi (2018) highlighted the merit in conducting Mixed Methods research designs, which integrate both qualitative and quantitative research, as it provides a more comprehensive analysis in addressing a research problem. Richards, Bazeley, Borglin, Craig, Emsley, Frost and Montgomery (2019) further highlighted the importance of integrating quantitative and qualitative research methods in adding rigour, complete analysis and ensuring results credibility are amplified on a wider scale.

One of the biggest limitations has been that conducting mixed methods can be a lengthy process and more involving when it comes to data collection and analysis, which may at times be difficult to integrate given differences in epistemological and philosophical frameworks (Dawadi, Shrestha & Giri, 2021). To understand the influence of SST on consumer behaviour within a shopping environment, the quantitative research method was adopted for the study and explained further in section 5.2.1. Questionnaires were therefore distributed to Johannesburg respondents who have access to some of the selected Johannesburg malls which target similar consumer-tiers or LSM segments, as well as have inherently similar characteristics.

Table 5.1: A summary of Quantitative and Qualitative Research Approaches

Below is a summary of Quantitative and Qualitative Research Approaches

Orientation	**Quantitative**	**Qualitative**
Common purpose	-Test hypotheses or specific research questions	-Discover ideas and insights
Data collection method and testing approach	-Structured response categories -Measure and test	-Unstructured response categories -Observe and interpret
Researcher independence	-Uninvolved observer -Results are objective	-Intimately involved - Results are subjective
Samples	-Large samples to produce generalisable results	-Small samples
Research approach most often used	-Descriptive	-Exploratory

Theory in relation to research	-Deductive -Empirical testing of theory	-Inductive -Generation of theory from data
Research philosophy/orientation	-Positivism	-Interpretivist

Table 5.1: A summary of Quantitative and Qualitative Research Approaches Sources: Adapted from Bryman *et al.* (2014:31); Zikmund and Babin (2010:133)

The research is also inclined to the positivism paradigm and this paradigm is discussed further in the chapter to follow. The researcher has provided a brief background on the two research methods that have been interpreted into the study for better comprehension and has also provided further context and understanding on how they would apply in the study.

5.2.1 Qualitative Research

Qualitative research is predominantly used to understand human experiences and situations as well as human beliefs and values (Kalu & Bwalya, 2017). Journals, textbooks, newspaper articles and several other sources are used to collate relevant information required to conduct research effectively. Technological innovation has increasingly made it easier for researchers to access relevant and on-demand information on the subject matter that they are looking to investigate through web-based services, such as Google (Johnston, 2017). Qualitative studies may also involve understanding the behaviour of selected respondents through conducting interviews to determine their perceptions on particular subjects of interest (Bellenger, Ballenger, Goldstucker, Bernhard & Goldstucker, 2011).

As qualitative research follows a more naturalistic approach, the researcher typically observes, interviews, summarises, describes, analyses, and interprets phenomena in their real dimension to better understand and describe events and phenomena (Basias & Pollalis, 2018).

Qualitative research is highly regarded as it stimulates and facilitates the build-up of research in new areas, particularly when applied within an innovation context (Basias, Themistocleous & Morabito 2015). Another advantage associated with secondary qualitative research is that information gathering is relatively quick, cheap and provides a more flexible approach to data gathering when compared to quantitative research which maybe inflexible since it is implemented with specific questionnaires and research sample size (Basias & Pollalis, 2018).

However, although secondary qualitative research may be relatively cheap and less time consuming when compared to quantitative research methods, there are a number of disadvantages that make qualitative research less reliable and desirable to adopt when conducting research. Some of the data and information obtained from qualitative studies may be outdated and irrelevant to most research as the data may have been specifically collected for a particular purpose which may make it difficult to apply or contextualise in more specific research. As information obtained from qualitative studies may not be as reliable, this may consequently affect the credibility of the research.

5.2.2 Quantitative Research

Quantitative research involves the use of structured data that can be presented numerically for further statistical analysis by researchers to problem solve (Goertzen, 2017). The researcher adopted the quantitative research methodology as it is one of the most effective ways of gathering and analyzing large amounts of data and can ensure that data analysis and results synthesized are not subject to personal feelings which may potentially skew the results when trying to determine objective truth (Basias & Pollalis, 2018). Furthermore, the quantitative research can help ensure that objective reality principles are applied which helps to ensure that the researcher is fairly detached in influencing the outcome based on the responses from the questionnaire distributed to respondents (Bloomfield & Fisher, 2019). Mohajan, (2020) acknowledge that adopting quantitative research design can help to extrapolate findings or results and apply them back across a study population group for as long as the selection process is well designed, and sample is a good representation of the study population.

Technological and self-service adoption has continued to grow with firms finding new ways of enhancing the customer experience while customers continue to get exposure on how innovations apply within their realm of reality (Lowe, Dwivedi & d'Alessandro, 2019). As innovation perceptions continue to evolve, researchers should then seek to obtain more updated information that applies to the evolving perceptions of innovations within our environment as there is no direct certainty associated with the conceptions that have been put for consideration (Basias & Pollalis, 2018). Key to understanding these key factors that influence adoption of SSTs lies in identifying key variables that influence SST adoption and conducting hypothesis

tests to better understand the relationships amongst these variables, which further highlights the significance of quantitative research design for the study (Mohajan, 2020).

Although quantitative research is widely appreciated as an effective tool for large data collection, analysis and interpretation, several limitations are also linked with making use of this research methodology. Firstly, quantitative research is relatively more expensive and tends to be more resource intensive as it requires a large array of resources and respondents for it to be effectively implemented in a study (Queirós, Faria & Almeida, 2017). Further to this, the reliability of the data is based on the accuracy and interpretation of the questionnaire by the respondents, which is why it is important to ensure a pilot study is implemented in the study. Goertzen (2017) also noted how quantitative research data also fails to capture the emotion of the respondents and how they think, which makes it difficult to predict and interpret user and consumer behaviour accurately. This sentiment has also been shared by Queirós, Faria and Almeida (2017) who have noted the significance of emotion in user and consumer behaviour.

5.3 Pilot Study

A pilot study is a preliminary investigation that is conducted to evaluate the feasibility of conducting particular research and how best this can be done (In, 2017). These studies may therefore provide a basis for a researcher to make more informed decisions on whether to pursue a given study or not.

A pilot study was conducted to determine the level of reliability and validity of the self-administered questionnaire that was used as the research instrument for the quantitative study. The target respondents were Johannesburg shoppers who have access to Tier 1 shopping-malls, such as Rosebank, Sandton City and Mall of Africa. Potential respondents were invited to participate voluntarily, and the researcher also took note of questions that respondents found ambiguous to edit the questionnaire and make it more comprehensible.

After all the data for the 30 respondents who volunteered to answer the questionnaire was coded into an Excel spreadsheet, the data was then imported into SPSS statistical software for further analysis to determine whether the research questionnaire was reliable and valid. The Cronbach alpha is a measure of internal consistency, and it is particularly important when conducting a pilot study (Tavakol & Dennick, 2011). The scales for a given variable are considered as valid if the Cronbach-Alpha in above 0.7. Most of the constructs that were tested in the pilot study

had great validity and reliability as the Cronbach Alphas were above 0.7, suggesting a high level of reliability.

The researcher made editions and modifications to the questionnaire in some areas where the respondents failed to understand, which proved to be beneficial as the researcher obtained a more reliable and valid research instrument that was then distributed to a larger sample of potential Johannesburg consumers and shoppers.

5.4 Data Collection and Design

To have a better understanding of the consumer's perception of SSTs within shopping malls, the researcher created a 5-point Likert scale questionnaire that essentially tests consumer perceptions on the factors that influence SST adoption. The sample size was determined using the Raosoft statistical tool to better understand the sample size required for the study, based on the Johannesburg population and was approximately 425 respondents**.** The researcher adopted convenience sampling on Johannesburg residents, who are exposed to Tier 1 malls that include Rosebank, Sandton City and Mall of Africa. Convenience sampling can be defined as enrolling participants who fit a study criterion to participate in the study based on prevailing attributes or conditions (Emerson, 2021). This sampling method is also quite useful when studying potential hypothesis linked to study objectives (Stratton, 2021). Convenience sampling is also simplistic and not costly given that respondents self-select if they wish to participate in the study when the researcher announces the study (Lines, Burdick, Dewez, Aldridge, Neal-Williams, Walker & Taylor, 2022). The researcher would then go to areas of convenience and announce the study for willing respondents to self-select and participate in the study on self-service technology adoption.

While Bhardwaj, (2019) do acknowledge the risk of sampling error associated and lack of generalisability with using convenience sampling, there are ways of effectively managing this during a study and one of which can be drawing a number of samples to obtain the right population effect size (Mehta, Rice, Winter, Spence, Edwards & Candelaria-Oquendo, 2019).

All data was then collected, based on the questionnaire that was distributed at places of convenience. The researcher ensured that all potential respondents were invited to participate in the study voluntarily and there were no negative consequences associated with not participating in the study or completing the questionnaire by potential respondents. To allow

for generalisability and reduce response-bias in data collected, the researcher ensured the sample-size considered to participate was big enough as suggested by Asiamah et al. (2022). Information collated for the purposes of this research was strictly used for the study and would not be further distributed to another third party or sold commercially for further analysis and interpretation outside of this research study.

Following data collation, the researcher then input the data into an Excel workbook which was then a dataset that was used for statistical analysis. Descriptive statistics and inferential statistics were considered in understanding the relationships between constructs and the researcher made use of SmartPLS to further analyse the dataset created due to the limited sample-size that was used for the study as indicated by Purwanto, Asbari, Santoso, Haque and Nurjaya, (2020) as well as (Purwanto, Asbari, Santoso, Sunarsi & Ilham, 2021)

5.4.1 Longitudinal and Cross-Sectional Design

Longitudinal and cross-sectional data design are two methods that are commonly used by researchers to collect scientific data. Longitudinal design has also been supported by Noblin & Sears, (2021) who believe that a longitudinal data design is an effective way of conducting a quantitative study as it may also be used to assess the consistency of data collected overtime. Cross-sectional design, on the other hand, is widely regarded as static as it involves researchers collecting data to investigate a particular subject of interest at one point in time and this is most preferred if the researcher has limited resources but would like to understand the cause-effect relationship between given variables (Spector, 2019).

5.4.2 Longitudinal Research Design

Longitudinal research design is widely recommended for on-going research on investigations in order to evaluate a before-and-after attitude of the same respondents. This research design is highly effective when the researcher needs to make a follow-up interview. The longitudinal data design argues that there is likely to be a change in variability between or amongst constructs over a time period (Noblin & Sears, 2021). A more concise definition of longitudinal research is that it is a study of change in at least one of the variables in each model and at least three observations are made to the model (Ployhart & Vandenberg, 2010).

5.4.3 Cross-Sectional Design

With cross-sectional design, all the variables and relationships are set in static form by default to understand the relationship between variables (Spector, 2019). Most cross-sectional research is conducted to assess the prevalence of an outcome of interest for a given population at a particular point in time. Cross-sectional research tends to be relatively more affordable than longitudinal research as it is less resource constrained and is once-off, unlike longitudinal research which is on-going and may require the researcher to make more than three observations of the same variable (Noblin & Sears, 2021). The researcher therefore adopted a cross-sectional design to determine the perception of Johannesburg consumers regarding the use and adoption of SST innovations. The research design was selected as it is relatively cheap and convenient, given the budget and time constraints that the researcher had as well as the fact that it allowed the researcher to understand SSTs within a shopping mall environment.

5.5 Sample Selection

To obtain a valid sample for the study, the researcher made use of Raosoft to come up with a sample size estimate that would determine the number of potential respondents required to answer the questionnaire. At 5% level of significance, it was established that an approximate sample size of 425 respondents was required to participate in the study after having established that close to five million South Africans live within the Johannesburg area.

5.5.1 Primary Data Collection Instrument

The questionnaire that was used in the study was divided into two sections. Section A was primarily meant to collect the demographic information of the respondents who participated in the survey whilst Section B focused on the proposed model that included constructs from Diffusion of Innovation Theory (DOI), Theory of Planned Behaviour (TPB) and Technological Acceptance Model (TAM) and Flow Theory.

5.5.2 Format of the Questionnaire-Section A:

As mentioned earlier, this section was primarily centred on collecting demographic information of Johannesburg consumers and shoppers who make use of SST in selected shopping malls to

determine the distribution of the population sample. The section was composed of close-ended questions that quantified the total number of respondents who participated in the study, as well as, verified whether the questionnaire was able to target the intended respondents that the researcher needed for the research.

5.5.3 Format of the Questionnaire-Section B:

This section was composed of the various factors and elements that influence consumer decisions to make use of SST within a shopping mall environment. Several constructs were used to assess shopper perceptions of SST adoption and the format of this section was in the form of a 5-point Likert scale closed-ended questions. 1 Represented Strongly Disagree whilst 5 represented Strongly Agree. An example of the type of questions asked to respondents has been provided below. In this instance, the variable primarily focused on understanding the role of authenticity in influencing PEOU and PU associated with SST adoption.

Strongly Disagree → **Strongly agree**					
1) Using SSTs creates a product experience like the one I would have when shopping in a store	1	2	3	4	5
2) Using SSTs lets me feel like I am actively browsing with products and services within a real store (i.e., virtual affordance)	1	2	3	4	5
3) Making use of SSTs makes me feel like I am interfacing directly with sales personnel within a store-setting	1	2	3	4	5
4) Level of clarity and closeness to reality is important to me when interacting with SSTs and interactive screens	1	2	3	4	5
5) I am more likely to enjoy using an SST if the level of clarity is closer to the real product in-store	1	2	3	4	5

5.6 Ethical Considerations

The Researcher obtained an ethics clearance certificate from the University of the Witwatersrand Ethics committee to ensure the research instrument meets the expectations and regulation standards for quantitative research. To ensure that data collected was reliable and reflects the true perceptions and views of the respondents, the questionnaire was not made compulsory for participation. Respondents were however, voluntarily invited to answer the questionnaire by the researcher when it became convenient for them to do so. The data collected was strictly used for research purposes only and individual respondents who participated in the

study were advised to share honest and sincere answers to questions, with no negative consequences that would come with answering otherwise.

5.7 Pilot Study Findings

Construct Reliability and Validity

The researcher conducted a pilot study to understand the level of reliability and validity of the research instruments selected. The researcher managed to obtain a sample size of 30 Johannesburg residents to participate in the pilot study as well as share their feedback on the exercise, as suggested by In (2017), who also confirmed that generally, at least 30 respondents or subjects are required when reflecting on the procedures required to conduct a study or validate the process. Research instruments selected for use in this study were extracted from the results from the pilot study that have indicated that the majority of the constructs selected have a high reliability level with Cronbach Alpha figures ranging from 0.739 to 0.916. Behavioural attitude and Behavioural intention Cronbach alphas were recorded as 0.881 and 0.916 respectively, suggesting that the research instruments adopted to measure these two research constructs had a high level of internal consistency. Moreover, the Average Variance Extracted was above 0.5 which suggests that the research instruments adopted served their desired purpose.

Constructs with the least scores were Enjoyment, Authenticity and Complexity, having Cronbach alpha scores of 0.658, 0.562 and 0.473, respectively. Enjoyment was noted to have an average Cronbach alpha score which further justified why the researcher decided to keep the research instruments selected to measure the research instruments corresponding, although complexity and authenticity both had a significantly lower Cronbach alpha. This was further confirmed by the average variance extracted of 0.351, 0.360 and 0.414 which suggested that the research instruments applied may not have completely measured the constructs intended for measurement as the ideal average variance extracted should be greater than 0.5, according to Shook, Ketchen, Hult and Kacmar (2004), Ab Hamid, Sami and Sidek (2017) and Chung, Ko Joung, and Kim (2018). The researcher therefore sought to further analyse the research instruments relating to the identified constructs to identify and eliminate research questions with low factor loadings. The diagrams and table below serve to illustrate the initial results from the pilot study.

Table 5.2 Pilot Study Construct Reliability and Validity Results

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
Authenticity	**0.562**	**0.571**	0.726	**0.360**
Behavioural Attitude	0.881	0.884	0.914	0.681
Behavioural Intention	0.916	0.92	0.94	0.798
Complexity	**-0.081**	**0.400**	**0.229**	**0.263**
Concentration	0.739	0.758	0.810	**0.471**
Enjoyment	**0.658**	**0.387**	0.712	**0.351**
PEOU	0.878	0.958	0.910	0.676
Perceived Control	0.760	0.917	0.838	0.572
Perceived Usefulness	0.860	0.910	0.898	0.641
Relative Advantage	0.878	0.903	0.910	0.669
Subjective Norms	0.824	0.845	0.878	0.596
UI	0.763	0.808	0.836	0.511

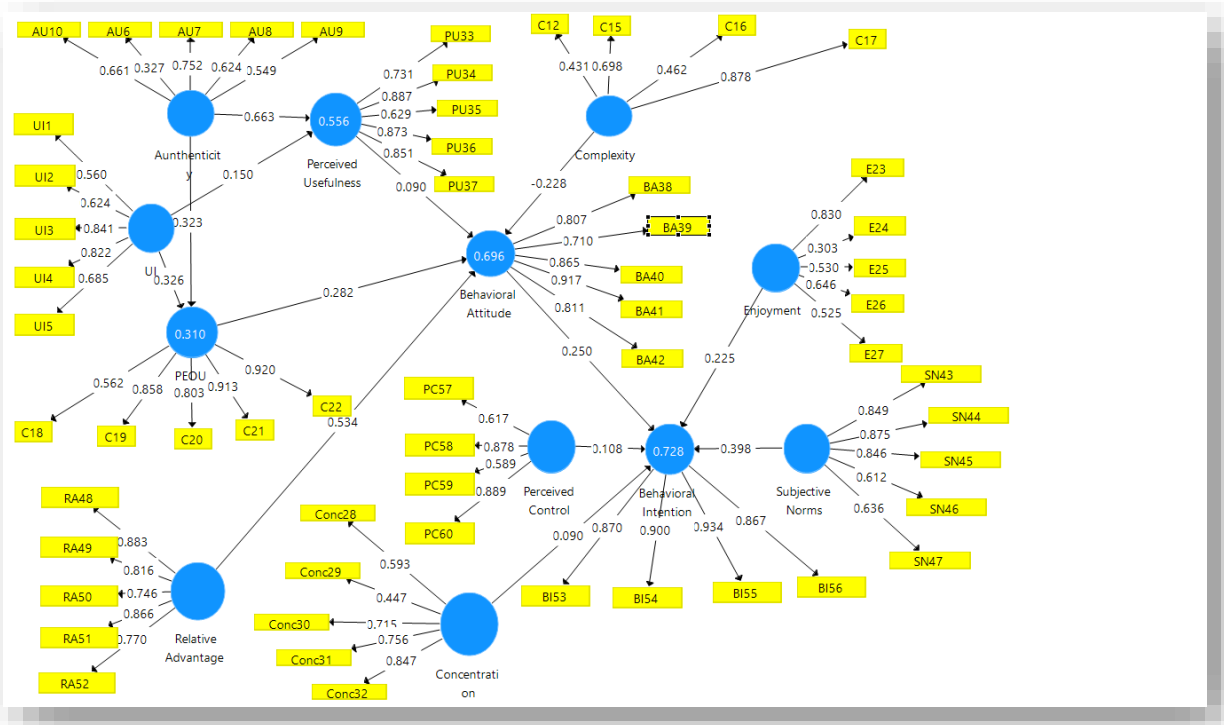

Figure 5.1: Pilot-Study measurement and structural model results

Table 5.3 Pilot-Study Discriminant Validity Findings

	Authenticity	Behavioural Attitude	Behavioural Intention	Complexity	Concentration	Enjoyment	PEOU	Perceived Control	Perceived Usefulness	Relative Advantage	Subjective Norms	UI
Authenticity	0.600											
Behavioural Attitude	0.411	0.825										
Behavioural Intention	0.532	0.751	0.893									
Complexity	-0.126	-0.293	0.147	0.644								
Concentration	0.533	0.670	0.577	-0.380	0.686							
Enjoyment	0.514	0.566	0.581	-0.024	0.391	0.592						
PEOU	0.477	0.587	0.520	-0.063	0.427	0.566	0.822					
Perceived Control	0.221	0.537	0.575	-0.300	0.369	0.375	0.663	0.757				
Perceived Usefulness	0.734	0.668	0.781	-0.174	0.708	0.497	0.376	0.277	0.800			
Relative Advantage	0.584	0.756	0.822	-0.060	0.532	0.477	0.480	0.356	0.811	0.818		
Subjective Norms	0.511	0.641	0.741	-0.359	0.482	0.358	0.523	0.542	0.588	0.611	0.772	
UI	0.471	0.490	0.407	-0.091	0.565	0.380	0.478	0.164	0.462	0.448	0.370	0.715

Table 5.1: Pilot-Study Discriminant Validity Findings

On complexity, three questions were removed by the researcher as they had very low factor loadings which ultimately affected the Cronbach alpha. Following the update, the Average Variance Extracted was improved to 0.563, which then confirmed the validity of the research instruments and reliability was also enhanced to 0.601 which is relatively more acceptable for the construct, as confirmed by Kennedy, Kemp, Ridout, Yarnitsky, and Rice (2016), who also considers a Cronbach alpha of 0.6 and higher as fair.

The Authenticity construct was also analysed by the researcher who then improved the research instrument adopted for the study by eliminating research instruments with low factor loadings to ensure reliability and validity are at an acceptable level. Two questions were therefore eliminated on this construct which has subsequently increased the reliability and validity levels to 0.792 and 0.695 respectively. Removing one question from the Enjoyment construct further improved the Cronbach Alpha of this construct to 0.706 while the Variance extracted remained competitive at 0.411. A table summary detailing the updated Reliability and Validity scores is provided below.

Table 5.4 Final Reliability and Validity Scores using updated questionnaire

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
Behavioural Intention	0.916	0.922	0.940	0.798
Behavioural Attitude	0.881	0.885	0.913	0.680
PEOU	0.878	0.975	0.910	0.674
Relative Advantage	0.878	0.903	0.910	0.669
Perceived Usefulness	0.860	0.916	0.896	0.638
Subjective Norms	0.824	0.845	0.878	0.596
Authenticity	0.792	0.967	0.870	0.695
UI	0.763	0.809	0.836	0.511
Perceived Control	0.760	0.918	0.838	0.572
Concentration	0.739	0.758	0.810	**0.471**
Enjoyment	0.706	**0.311**	0.718	**0.411**
Complexity	**0.601**	**0.662**	0.789	0.563

Table 5.2: Final Reliability and Validity Scores using updated questionnaire

The researcher therefore updated the questionnaire structure based on the results from the pilot study to ensure that the research questionnaire adopted for the study had good levels of reliability and validity.

5.8. Conclusion

Chapter allowed the researcher to describe the research design and methodology adopted in detail. The Positivism paradigm was selected as it seeks to understand objective reality and as such, this also made the research predominantly a quantitative study where relevant data associated was collated from respondents via a questionnaire that was distributed to respondents around Johannesburg. Cross-sectional design was selected by the researcher to ensure that the study was conducted within a short time to better understand relationships amongst constructs.

A pilot study was conducted to determine the level of reliability and validity of the research instruments that had been adopted in the study using 30 respondents. Although most questions within the research instruments were generally reliable and valid, a few constructs were noted to have a Cronbach-Alpha of less than 0.7 and had a low Average Weighted Variance (of less than 0.4 or 0.5) which made the constructs score very low on reliability and validity. The researcher therefore adjusted the relevant research instruments to ensure that they had acceptable reliability and validity scores that then allowed for the full research to be conducted thereafter. Ethical considerations were considered prior to inviting willing respondents to participate in the study and this was done through the Witwatersrand Ethical Committee.

CHAPTER 6: DATA ANALYSIS AND PRESENTATION OF RESULTS

6.1 Introduction

The preceding chapter covered the research design and methodology of the study. A detailed description of the sample selection and composition, structure of the questionnaire, as well as data collection and statistical analysis was provided. The current chapter reports on the analysis and presentation of the empirical findings of the study's pilot and main survey. This chapter provides the statistical analysis and results obtained from the data collected on factors that influence SST within shopping mall environments. An overview is given of the descriptive statistics, an analysis of the reliability and validity of the measurement instruments is made, an overview of the model fit is provided, and a path modelling analysis is also conducted and presented.

6.2 Descriptive Statistics

After checking for missing values and outliers, a total number of 260 questionnaires were completed out of the initial sample of 425. A response rate of 61.17 per cent was therefore confirmed after a further 19 questionnaire responses were omitted as they were unusable with several questions left unanswered. The low response rate may be attributed to limited availability of potential respondents to answer, as well as COVID-19, which has made it difficult to find respondents in areas of convenience, as well as to participate more freely without the risk of infection.

6.2.1 Demographic characteristics, shopping area and use of SST

Age and sex are some of the key data segments in demographic theory and form a significant part of the biographical information of a given population sample (Randall & Coast, 2016). The information obtained is presented by means of tables. Section A of the questionnaire provided an understanding of the demographic information of respondents who participated in the study. It also

measured whether and which type of SST that respondents have used and where they frequently shop. The demographic information is presented in Table 6.1:

6.2.2 Demographic Profile summary

Table 6.1: Sample Demographic Characteristics (Summarised SPSS output)

Gender	**Frequency**	**Percentage**
Male	130	50%
Female	130	50%
Total	**260**	**100%**
Age distribution of the respondents	**Frequency**	**Percentage**
18 to 24 years	198	76.2%
25 to 34 years	51	19.6%
35 to 44 years	9	3.5%
45 to 54 years	2	0.8%
60 years and above	0	0
Total	**260**	**100%**
Occupation	**Frequency**	**Percentage**
Student	86.2	86.2%
Professional	30	11.5%
Unemployed	6	2.3%
Total	**260**	**100%**
SST usage e.g., ATMs, Self-Service Movie Terminals, etc.	**Frequency**	**Percentage**
Yes	253	97.3%
No	7	2.7%
Total	**260**	**100%**
Which shopping Mall do you use most?	**Frequency**	**Percentage**
None	21	8.1%
Rosebank	153	58.8%
Sandton	17	6.5%
Mall of Africa	26	10%
Other	43	16.5%
Total	**260**	**100%**

Use of Self-Service Screens within a shopping mall setting	Frequency	Percentage
Yes	210	80.8%
No	50	19.2%
Total	**260**	**100%**

The demographic statistics in Table 6.1 shows that majority (95.8%) were Generation Y made of 76.2% young adult students (18-24 years old) and 19.6% adult professional Generation Y (25-34 years old). Generation Y, born between 1982 to 2002 (Duh, Yu & Ni, 2021), have high need for independence, information, and electronics (Rita et al., 2019). With these qualities there would have an affinity towards self-service technology (SST) for shopping. Having 95.8% being Generation Y participating in this study, it was natural that most of them according to Table 6.1 were students (82.2%) and professionals (11.5%) (Duh et al., 2021). Up to 97.3% of the respondents have used SST such as ATMs and those in movies and shops. Specifically, up to 80.9% of the respondents have used SST in shopping mall context and were qualified to participate in this study.

6.3 Constructs Means and Standard Deviations

The constructs' items were measured through respondents' agreement or disagreement for each item or statement measuring the constructs. Mean values were computed as the measures of central tendency for the items. Since the constructs were measured with a five-point Likert scale, it means that mean values of 2.5 is a neutral response and those above 2.5 are indicative of respondents' agreement to the statements. Standard deviation values were computed to measure the variance of responses for each construct as standard deviation can assist in measuring the level of dispersion (Ueda, Spence & Okajima, 2020). Wood, Harms, Lowman and DeSimone (2017) indicate that the relationship between the mean and the standard deviation is that a small estimated standard deviation (SD) denotes that respondents' responses were consistent and that the response distributions lay close to the mean, whilst a larger standard deviation may imply that some respondents may not be answering questions in full. Moreover, the standard deviation value "should be less than 1 but generally a standard deviation score of less than 2 is also acceptable as

it is an indication of no outliers" (Do & Cetin, 2018). Tables 6.2.1 to 6.2.12 provides the constructs' means and standard deviations.

Table 6.2: (User-Interface

User-Interface Item	Mean	Std. Deviation
UI1: I would prefer working with SSTs provided they display attractive products on screen	3.98	0.966
UI2: I like how SSTs such as ATMs and parking systems look	3.75	1.013
UI3: I would prefer SSTs to be entertaining and animated to increase my levels of engagement and interaction.	3.90	1.043
UI4: Finding the SST system site engaging, and energizing is important to me.	4.48	0.774
UI5: Layout of a SST is likely to influence my interest to using the innovation	4.56	0.725
Overall Mean for User-interface	**4.13**	**0.904**

Based on feedback presented by respondents from the questionnaire, there was a general agreement that User interface (UI) does influence user adoption of self-service screens. The highest scores noted were based on how respondents' interest in using SST was based on layout (UI5) with a mean score of 4.56, with users confirming their desire to have a better layout of content as a key driver that would influence them to make use of an SST. Respondents also valued the importance of having an engaging and stimulating SST with (UI4) having a score of 4.48. No outliers were noted on the research instruments used to measure this construct as the standard deviation was below two (2). The highest standard deviation for this construct was noted as 1.043 whilst the lowest standard deviation was 0.725 which suggests that the data points are clustered around the mean. The overall mean of 4.13 and standard deviation of 0.904 for user-interface in Table 6.2., it can be concluded that there was a general agreement to the statements that measured user interface by the respondents who participated in the study

Table 6.3: Authenticity

Authenticity	**Mean**	**Std. Deviation**
AU6: Using SSTs creates a product experience like the one I would have when shopping in a store	3.04	1.192
AU7 Using SSTs lets me feel like I am actively browsing with products and services within a real-store (i.e. virtual affordance)	3.24	1.163
AU8 Making use of SSTs makes me feel like I am interfacing directly with Sales personnel within a store-setting	2.90	1.177
AU9 Level of clarity and closeness to reality is important to me when interacting with SSTs and interactive screens	3.90	1.048
AU10 I am more likely to enjoy using an SST if the level of clarity is closer to the real product in-store	4.05	1.029
Overall Mean for Authenticity	**3,426**	**1,12**

Based on respondents' results on Authenticity, most respondents were neutral on the importance of authenticity in the use or adoption of SST. Item AU10 had the highest mean score which indicates that most respondents believed they would engage with SST within shopping mall environments if the level of clarity mirrors the real product in-store. Most respondents did not however, believe that interfacing with SSTs made them feel like they are directly interfacing with sales personnel within a store setting as Item AU8 had the lowest mean of 2.90. In this instance, the lowest standard deviation was 1.029 and the highest standard deviation was 1.048 which suggests that the standard deviation was clustered around the mean. Overall mean for authenticity is 3.426 and overall standard deviation is 1.12.

Table 6.4: Complexity

Complexity	Mean	Std. Deviation
C11 SSTs are easy to operate, and Internet banking is important to me.	3.44	1.227
C12 I will not use a self-service station if I find it confusing or too complex to understand.	3.80	1.040
C13 I find the terminology associated with many self-service innovations confusing.	3.71	1.072
C14 I am likely to recommend self-service machines to my friends if I enjoy the experience of using them.	3.50	1.232
Overall Mean for Complexity	**3.61**	**1.14**

The results in Table 6.4 suggest that respondents agree that the SST is complex with an overall mean of 3.61. Most respondents seem to agree that they are likely not to use SSTs if they find the innovations confusing as reflective of the mean-score of 3.8. Item C11, which scored the lowest mean on the complexity construct, reveals that most respondents agreed on the importance of easy-to-use SSTs within a shopping environment with a mean score of 3.44 and standard deviation value of 1.227. Given that the standard deviations for the lowest and highest research questions were between 1.040 and 1.227, we can deduce that the data points are clustered from the mean and there are no outliers as the standard deviation is not greater than 2.

Table 6.5: Perceived Ease of Use

Perceived Ease of Use	Mean	Std. Deviation
PEOU15 I am likely to find it easy for me to adopt a new self-service innovation to enhance my shopping experience.	3.90	0.947
PEOU16 I am likely to find it easy to interact with self-service technologies	3.97	0.860
PEOU17 SSTs and interactive screens are generally easy to use for me	3.97	0.984
PEOU18 Using SSTs and interactive screens in shopping-malls is self-explaining	3.74	1.027
PEOU19 Learning to use SSTs and interactive screens is simple for me	3.89	1.058
Overall Average for PEOU	**3.89**	**0.975**

The results in Table 6.5 reveals that respondents agree that there is perceived ease of use when making use of SST within a shopping mall environment with an overall mean of 3.89. The lowest mean score was for Item PEOU18 regarding how self-service screen usage in a mall environment is self-explanatory which most respondents found agreeable with a mean score of 3.74. The highest mean score noted was regarding most respondents agreeing that they are likely to find using SSTs easy to use with a mean score of 3.97. The data points collated for this research instrument all have a standard deviation of less than 2, suggesting that the points are clustered close to the mean.

Table 6.6: Enjoyment

Enjoyment	**Mean**	**Std. Deviation**
E20 When I use SSTs, I look forward to an exciting and fulfilling service experience	3.54	1.121
E21 I am likely to find the use of SSTs in the shopping centers to be interesting	3.45	0.996
E22 I am likely to derive high levels of excitement from making use of SSTs to enhance my shopping experience.	3.34	1.103
E23 I enjoy shopping for its own sake and not because that I need to purchase something.	3.06	1.453
Overall Average for Enjoyment	**3.35**	**1.168**

With an overall mean of 3.35, Table 6.6 shows that the respondents fairly agree to enjoying the use of SST. Respondents' need to obtain a fulfilling and exciting service experience was identified to have the highest mean on the enjoyment construct with a mean score of 3.54 for Item E22. The lowest mean score identified was for Item E23 with consumers generally agreeing that they enjoy shopping for its own sake and not because they intend purchasing something which further suggests the importance of creating a fulfilling service experience.

Table 6.7: Concentration

Concentration	**Mean**	**Std. Deviation**
CONC24 During Online Shopping, I tend to be absorbed immensely in the activity	3.42	1.105
CONC25 My attention is likely to focused on the activity I will be working on when I use SSTs	3.63	0.977

CONC26 SSTs will require my undivided attention and concentration when I am making use of them in the mall	3.43	1.130
CONC27 I enjoy being deeply engrossed when using technology products	3.26	1.074
CONC28 I do not enjoy getting disturbed while using SST or interactive screens	3.31	1.230
Overall Average for Concentration	**3.41**	**1.103**

The concentration construct also had highly favourable scores of agreements with an overall score of 3.41. This suggests that respondents focus on activities that they are busy with when they use self-service technologies as they are likely to be in a state of immersion which is indicated by the mean score of 3.63 and a standard deviation of 0.977. On the other hand, the lowest mean score was for item (Conce 27) with respondents agreeing that they generally enjoy being engrossed in activities that involve technology products with mean score of 3.26 and standard deviation of 1.074.

Table 6.8: Perceived Usefulness

Perceived Usefulness	**Mean**	**Std. Deviation**
PU29 Using SSTs makes it easier for me to make informed purchase decisions within a shopping-mall setting	3.53	1.034
PU30 Using SSTs enables me to accomplish more when I am shopping	3.51	1.004
PU31 I become more interested in using an innovation if it is able to provide me with the right products and service information I require.	3.99	.986
PU32 I feel more efficient and effective when I use SSTs in shopping-malls to assist me in making purchases	3.61	1.054
PU33 I find SSTs useful	4.00	0.979
Overall Mean Perceived Usefulness	**3.73**	**1.018**

With an overall mean of 3.73 in Table 6.8, it indicates that respondents who participated in the study generally found the SSTs to be useful. For example, item PU33 which has a large mean score of 4 and a standard deviation of 0.979 shows agreement that the respondents find the SSTs useful. Item (PU30) was noted to have the lowest mean score on the construct with a mean score of 3.51 and a standard deviation of 1.004.

Table 6.9: Behavioural Attitude

Table 6.9: Descriptive statistical analysis (Behavioral Attitude)	Mean	Std. Deviation
BA34 I like to make use of SSTs when using shopping in a mall	3.28	1.180
BA35 I find making use of SSTs when shopping as something that is easy to do	3.64	1.058
BA36 All things considered; I find SSTs to be a good idea	4.06	0.940
BA37 I find making use of SSTs to enhance my shopping experience to be favorable	3.70	1.052
BA38 I find the adoption of SSTs to be a positive direction of improving our shopping malls	4.01	0.976
Overall Mean for Behavioral Attitude	**3.74**	**1.038**

Respondents' feedback on behavioural attitude was generally agreeable with an overall mean of 3.74. Like other constructs, there were no outliers based on the data points collated with the standard deviation also below 2. Item (BA36) had the highest mean score of 4.06 with respondents generally agreeing that SSTs are a good idea. Conversely, Item (BA34) had the lowest mean score of 3.28 with neutral sentiments from respondents' preference to shop using SST within shopping mall environments.

Table 6.10: Subjective Norm

Subjective Norm	Mean	Std. Deviation
SN39 People important to me would think that using SSTs would be a wise idea	3.58	1.121
SN40 Most people important to me would think I should use SSTs to enhance my shopping experience	3.44	1.073
SN41 My family would think that that adopting SSTs in a shopping-mall setting would be a wise idea	3.41	1.147
SN42 Generally, I like to do what my family and friends think I should do	2.69	1.349
SN43I think people who are important to me make use of SST within a shopping-mall environment	3.38	1.117
Overall Mean for Subjective Norms	**3.30**	**1.160**

Table 6.10 shows that there was fair agreement that the input of significant others are important in the use of SSTs. The standard deviation range for subjective norms was relatively fair as it was between 1.073 and 1.121. The highest mean score recorded was for item (SN39) with a mean score of 3.58 and standard deviation of 1.121 with general sentiments that people who are important to the respondents found the value in making use of SSTs. The lowest mean score was 2.69 for Item (SN 42) with respondents disagreeing that they prefer doing what their families and friends recommend that they do within a SST environment.

Table 6.11: Relative Advantage

Relative Advantage	**Mean**	**Std. Deviation**
RA44 Using SSTs within a shopping-mall setting will help increase my levels of productivity	3.70	1.056
RA45 I believe that self-service technologies will be more convenient for me when doing online-shopping	4.05	0.864
RA46 I believe that self-service fuel stations will greatly help to enhance the quality of my day	3.62	1.071
RA47 I am comfortable using self-service innovations to cut down costs and inconveniences	3.93	1.061
RA48 I am motivated to make use of a self-service innovation, provided there is sufficient training, and it improves my current purchase process	3.97	1.063
Overall Mean for Relative Advantage	**3.85**	**1.023**

With an overall mean score of 3.85 in Table 6.11, there was agreement that respondents receive some benefits from using SSTs. Item (RA45) had the highest mean score of 4.05 with the majority of the respondents agreeing that SST would be more convenient for them when they were within shopping mall environments. On the other hand, Item (RA46) had the lowest mean score of 3.62 with a standard deviation of 1.071. Based on the standard deviation range between 0.864 and 1.071, we can however note that the data points identified were clustered close to the mean, suggesting that there were no outliers that had been identified.

Table 6.12: Behavioural Intention

Behavioural Intention	Mean	Std. Deviation
BI44 Using SSTs within a shopping-mall setting will help increase my levels of productivity	4.05	0.997
BI45 I believe that self-service technologies will be more convenient for me when doing online-shopping	3.92	1.016
BI46 I believe that self-service fuel stations will greatly help to enhance the quality of my day	3.78	1.041
BI47 I am comfortable using self-service innovations to cut down costs and inconveniences	3.70	1.029
Overall Mean for Behavioral Intention	**3.86**	**1.020**

With an overall mean score of 3.86 in Table 6.12, it suggests respondents agree to be having a behavioural intention to use SSTs. The highest mean score is item (BI44) which suggest that using SSTs within a shopping mall environment increases productivity levels for respondents as they are able to search and obtain relevant information from these innovations when required. Item (BI47) however had a lower mean score of 3.7 although respondents generally agreed that they are more likely to make use of SSTs if they are given sufficient training, that they require to operate these innovations. The standard deviation range for Behavioural Intention was between 0.997 and 1.041 which is a good indicator to suggest that the data points were also very close to the mean and there were no outliers as no research instrument had a standard deviation value greater than 2.

Table 6.13: Perceived Control

Perceived Control	Mean	Std. Deviation
PC48 I will be able to operate an Interactive-Screen	4.12	0.868
PC49 I have the resources that will help me to use interactive screens	3.99	0.928
PC50 I have the knowledge and skill sets required to make use of interactive screens	4.06	0.920
PC51 I can use SSTs or interactive screens whenever I engage with them	4.14	0.819
Overall Mean for Perceived Control	**4.08**	**0.884**

Table 6.13 shows that respondents agree they are comfortable with making use of SST within a shopping mall environment with most question items having a score above 4. Item (PC51) had the greatest mean score of 4.14 with most respondents confident in their use of SST within shopping malls when they engage with them. The standard deviation for this research instrument was 0.819. Item (PC49) had the lowest mean score of 3.99 which was high with respondents in general agreement that they have sufficient resources and reference points for them to make use of SSTs within shopping mall environments. The standard deviation range for this construct was between 0.868 and 0.928 which was a good indicator to suggest that the data points were close to the mean.

6.4 Measurement of Reliability and Validity

The measurement model is instrumental in measuring reliability, validity, and model fit. To ensure data integrity, the researcher analysed the 260 responses to determine the levels of reliability and validity of the data. The reliability was measured with Cronbach alpha and composite reliability while the validity was measured with average variance extracted (AVE) and factor loadings (for convergent validity) and correlation matrix using the Fornell-Larcker criterion (for discriminant validity). The results are in Table 6.14.

6.4.1 Reliability Results

The reliability figures in Table 6.14 shows that the Cronbach alpha values range between 0.704 to 0.956, meaning that construct reliability was achieved. This is supported by the composite reliability figures that ranges between 0.813 to 0.978. These figures meet Moalemi, Kavosi, Beige, Deghan, Karimi and Parvizi's (2018) recommendation of an index that is greater than 0.7 and which represents sufficient internal consistency of constructs. Results from the study indicated that all constructs passed the reliability test with the lowest score on reliability being Authenticity with a Cronbach alpha of 0.704. Complexity (0.956), Perceived Control (0.89), Perceived Ease of Use (0.874) and Behavioural Attitude (0.838) had some of the highest Cronbach alpha scores. Composite reliability (CR) and average variance extracted (AVE) for each construct were computed using the formula proposed by Fornell and Lacker (1981) with the following formula:

Formulae:

$CR\eta = (\Sigma\lambda yi)^2 / [(\Sigma\lambda yi)^2 + (\Sigma\varepsilon i)]$

Where:

$CR\eta$ = Composite reliability

$(\Sigma\lambda yi)^2$ = Square the sum of the factor loadings ($\Sigma\varepsilon i$) = Sum of error variances.

$V\eta = \Sigma\lambda yi2 / (\Sigma\lambda yi2+\Sigma\varepsilon i$

Where:

AVE = summation of the squared of factor loadings / {(summation of the squared of factor loadings) + (summation of error variances)}

Table 6.14: Reliability and Validity Table

	Constructs' items	Factor Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
	AU10	0,572				
	AU6	0,748				
	AU7	0,803				
	AU8	0,658				
Authenticity	AU9	0,593	0.704	0.715	0.809	0.463
	BA34	0,729				
	BA35	0,764				
	BA36	0,773				
Behavioural	BA37	0,816				
attitude	BA38	0,813	0.838	0.838	0.885	0.608
	BI49	0,820				
Behavioural	BI50	0,846				
intention to use	BI51	0,826				
SSTs	BI52	0,800	0.841	0.843	0.894	0.678
	C11	0.972				
Complexity	C14	0.985	0.956	1.029	0.978	0.957
	CONC24	0,769				
	CONC25	0,700				
	CONC26	0,663				
	CONC27	0,732				
Concentration	CONC28	0,536	0.722	0.76	0.813	0.469
	E20	0,805				
	E21	0,853				
Enjoyment	E22	0,874	0.802	0.835	0.882	0.713
	PC53	0,843				
	PC54	0,892				
	PC55	0,864				
Perceived control	PC56	0,871	0.89	0.895	0.924	0.752
	PEOU15	0,760				
	PEOU16	0,832				
	PEOU17	0,870				
Perceived ease of	PEOU18	0,791				
use	PEOU19	0,822	0.874	0.879	0.909	0.666
	PU29	0,738				
	PU30	0,762				
	PU31	0,766				
Perceived	PU32	0,782				
usefulness	PU33	0,772	0.822	0.824	0.875	0.584
	RA44	0,789				
	RA45	0,791				
	RA46	0,765				
Relative	RA47	0,764				
advantage	RA48	0,782	0.838	0.842	0.885	0.606
	SN39	0,800				
	SN40	0,797				
	SN41	0,759				
	SN42	0,515				
Subjective norms	SN43	0,770	0.789	0.823	0.853	0.542
	UI2	0,831				

User-interface and Aesthetics	UI3	0,874	0.824	0.825	0.895	0.74
	UI1	0,874				

The Reliability and Validity table above provides a more comprehensive view of results that were obtained based on 260 respondents who managed to complete their questionnaire in full. Results obtained include the Cronbach-Alpha, the Composite Reliability tests and the Average Variance Extracted.

6.4.2 Validity results

The Average Variance Extracted (AVE) that tests convergent validity is a measure of the amount of variance that is captured by a construct in relation to measurement errors (dos Santos & Cirillo, 2021). The AVE values in Table 6.14 are between 0.463 and 0.957, which are all within acceptable range according to Rezaei, Salimi, Momeni and Mostafaeipour (2018). Fornell and Larcker (1981) confirm that AVE values just below 0.5 are acceptable if the Composite Reliability Values are above 0.6 as is the case in Table 6.14 making the convergent validity adequate.

Table 6.15: Inter-construct Correlation Matrix Measuring Discriminant Validity using the Fornell-Larcker (1981) Criterion method

	AU	BA	BI	C	CONC	E	PC	PEOU	PU	RA	SN	UI
Authenticity (AU)	0,681											
Behavioural attitude (BA)	0,519	0,780										
Behavioural intention to use SSTs(BI)	0,381	0,574	0,823									
Complexity (C)	0,132	0,132	0,101	0,978								
Concentration (CONC)	0,344	0,394	0,335	0,479	0,685							
Enjoyment €	0,490	0,497	0,427	0,214	0,434	0,844						
Perceived control (PC)	0,274	0,470	0,497	0,047	0,175	0,237	0,867					
Perceived ease of use (PEOU)	0,412	0,628	0,471	0,024	0,236	0,381	0,581	0,816				
Perceived usefulness (PU)	0,411	0,714	0,524	0,142	0,430	0,472	0,392	0,509	0,764			
Relative advantage (RA)	0,391	0,667	0,642	0,157	0,374	0,418	0,547	0,537	0,642	0,778		
Subjective norms (SN)	0,360	0,494	0,445	0,088	0,225	0,356	0,197	0,270	0,417	0,356	0,736	
User-interface and Aesthetics (UI)	0,341	0,573	0,417	0,048	0,197	0,357	0,560	0,942	0,467	0,473	0,224	0,860

Discriminate validity is another way of testing validity and it is largely based on correlation of two measures after measurement error has been considered between two latent constructs. To obtain

discriminant validity, the correlation coefficients is supposed to be less than 1 (Rönkkö & Cho, 2020). The discriminant validity figures are in Table 6.15. Based on the inter-construct correlation matrix provided in Table 6.15, all paired latent variables are less than 1.0 which confirms discriminant validity between variables multicollinearity (Obite, Olewuezi, Ugwuanyim & Bartholomew, 2020).

6.4.3 Model Fit

When the PLS-SEM method is used to test a conceptual model the Standardised Root Mean Squared Error (SRMR) and d _ ULS are indices used to test model fit. SRMR is best defined as the absolute measure of fit and it is typically seen as the difference between the observed correlation and the predicted correlation with a value of 0, indicating a perfect fit and anything less than 0.08 considered a good fit (Shi, Maydeu-Olivares & Rosseel, 2020). d_ULS is an exact measure of the overall fit of the model (Ariza-Montes, Leal-Rodríguez, Ramírez-Sobrino & Molina-Sánchez, 2019). Based on Table 6.5, there was a good fit as the saturated value for the SRMR was less than 0.08 at 0.077 which suggests that the data and model used were relevant for the study. Model fit is also examined from the rms Theta which assesses the degree to which outer model residuals correlate Alshurideh, Kurdi, AlHamad, Salloum, Alkurdi, Dehghan & Masa'deh, (2021), and the rms Theta model is supposed to be < 0.12 however in this instance the RMS_theta value is 0.133 which can still be regarded as acceptable or better-fit as it is close to 0 as shown in Table 6.16.

Table 6.16 Model Fit Figures

	Saturated Model	**Estimated Model**
SRMR	0,077	0,096
d_ULS	7,854	12,311
rms Theta	0.133	

Average Variance Extracted is a measure of the amount of variance that is captured by a construct in relation to measurement errors (dos Santos & Cirillo, 2021). The AVE estimates in Table 6.3 reflected that the overall amount of variance in the indicators was accounted for by the latent constructs. Most AVE values were above the acceptable value of 0.5 (Rezaei, Salimi, Momeni & Mostafaeipour, 2018).

AVE scores for Authenticity were fairly low with a recording of 0.463, although authors such as Gambo, Said and Ismail (2016) have validated AVE scores above 0.4 which has also been found to be acceptable in much earlier studies with Fornell and Larcker (1981) also finding the AVE acceptable, especially if the Composite Reliability (CR)is greater than 0.6. The range of values for AVE was confirmed to be between 0.463 (Authenticity) and 0.957 (Complexity). These results provided evidence for acceptable levels of research scale reliability.

6.4.4 Multicollinearity Analysis

The sets of predictor variables should be examined for collinearity (Sukendro, Habibi, Khaeruddin, Indrayana, Syahruddin, Makadada & Hakim, 2020). According to Gwelo (2019) multicollinearity can be a problem as it undermines the statistical significance of predictor or independent variables. Generally, an acceptable value of multicollinearity is less than 5 (Neufeld & Malin, 2020). Based on Table 6.17 (below) we can note that collinearity does not emerge as an issue in the study given VIF values are less than 3 (Hair, Risher, Sarstedt, Ringle, 2019). We can note from the table below that Behavioural Attitude has a role as a predictor of behavioural intention (VIF = 1,954), Authenticity is a predictor of perceived Ease of Use and perceived usefulness (VIF= 1,132) and VIF = 1,132), respectively. Complexity is also noted as a predictor of Behavioural Attitude (VIF = 1,037) and Concentration is a predictor of Behavioural Intention to use SSTs (VIF= 1,300). Enjoyment is a predictor of Behavioural intention to use SST (VIF =1,488) and Perceived Control also is another predictor of Behavioural intention to use SSTs with (VIF =1,287). Perceived Ease of Use and Perceived Usefulness both are predictor variables to Behavioural intention to use SSTs with (VIF =1,515) and (VIF = 1,830) respectively. It can also be noted that Relative Advantage is a predictor variable influencing Behavioural Attitudes towards adoption of SSTs with (VIF = 1,919). Subjective Norms is a predictor variable of Behavioural Intention to use SSTs (VIF = 1,355). Lastly Aesthetics is a predictor variable towards Perceived Ease of Use and Perceived Usefulness which have a similar (VIF = 1,132).

Table 6.17 Collinearity (VIF Values)

	Authenticity	Behavioural attitude	Behavioural intention	Complexity	Concentration	Enjoyment	Perceived control	Perceived ease of use	Perceived usefulness	Relative advantage	Subjective norms	User-interface and Aesthetics
Authenticity								1,132	1,132			
Behavioural attitude			1,954									
Behavioural intention to use SSTs												
Complexity		1,037										
Concentration			1,300									
Enjoyment			1,488									
Perceived control			1,287									
Perceived ease of use		1,515										
Perceived usefulness		1,830										
Relative advantage		1,919										
Subjective norms			1,355									
User-interface and Aesthetics								1,132	1,132			

6.4.5 Common Method Bias

Common Method Bias is when there is an inflated relationship between two constructs (Garger, Jacques, Gastle, & Connolly, 2019). Common Method Bias can often happen when conducting research using a questionnaire that is often long and requires a lot of cognitive effort resulting in incorrect considerations about the scales and distortion of reliability and validity of results (Rodríguez-Ardura & Meseguer-Artola, 2020). To reduce misinterpretation, careful construction of research instruments was made with testing conducted through a pilot-study before scaling the data collection on additional respondents. Rodríguez-Ardura & Meseguer-Artola, (2020) also acknowledge the significance of careful construction of research instruments in helping reduce common bias in the study. Using Smart PLS, one can confirm whether a study has Common Method bias with latent variables above 0.9 confirming that there is a Common Method Bias in a study (Garger, Jacques, Gastle, & Connolly, 2019). In this instance, all constructs had latent values less than 0.9 which confirm that there was no Common Method Bias that affected the study.

Table 6.18 Latent Variable Correlations

	Authenticity	Behavioural attitude	Behavioural intention to use SSTs	Complexity	Concentration	Enjoyment	Perceived control	Perceived ease of use	Perceived usefulness	Relative advantage	Subjective norms	User-interface and Aesthetics
Authenticity	1,000	0,519	0,381	0,132	0,344	0,490	0,274	0,412	0,411	0,391	0,360	0,341
Behavioural attitude	0,519	1,000	0,574	0,132	0,394	0,497	0,470	0,628	0,714	0,667	0,494	0,573
Behavioural intention to use SSTs	0,381	0,574	1,000	0,101	0,335	0,427	0,497	0,471	0,524	0,642	0,445	0,417
Complexity	0,132	0,132	0,101	1,000	0,479	0,214	0,047	0,024	0,142	0,157	0,088	0,048
Concentration	0,344	0,394	0,335	0,479	1,000	0,434	0,175	0,236	0,430	0,374	0,225	0,197
Enjoyment	0,490	0,497	0,427	0,214	0,434	1,000	0,237	0,381	0,472	0,418	0,356	0,357
Perceived control	0,274	0,470	0,497	0,047	0,175	0,237	1,000	0,581	0,392	0,547	0,197	0,560
Perceived ease of use	0,412	0,628	0,471	0,024	0,236	0,381	0,581	1,000	0,509	0,537	0,270	0,942
Perceived usefulness	0,411	0,714	0,524	0,142	0,430	0,472	0,392	0,509	1,000	0,642	0,417	0,467
Relative advantage	0,391	0,667	0,642	0,157	0,374	0,418	0,547	0,537	0,642	1,000	0,356	0,473
Subjective norms	0,360	0,494	0,445	0,088	0,225	0,356	0,197	0,270	0,417	0,356	1,000	0,224
User-interface and Aesthetics	0,341	0,573	0,417	0,048	0,197	0,357	0,560	0,942	0,467	0,473	0,224	1,000

6.5 The Structural Model Results

After ascertaining the measurement model, a structural model can then be conducted. Also called a path model, it is a theory driven data or multivariate statistical analysis technique that is used to analyse structural relationships about causal relations among latent variables (Mueller & Hancock, 2019). Significant relationships are assessed with t-statistics of 2.57 at 99% confidence level, 1.96 at 95% confidence level and 1.65 at 90% confidence level. Significance is also judged from P-values of <0.01 at 99% confidence level, 0.05 at 95% confidence level and 0.09 at 90% confidence level. The results of testing the hypothesis relationships are in Table 6.19

Table 6.19 Hypotheses Testing Results

	Original Sample (O)	**Sample Mean (M)**	**T Statistics**	**P-Values**
H1: User-interface and Aesthetics -> Perceived usefulness	0.369	0.367	5.361	0.000
H2: Authenticity -> Perceived usefulness	0.285	0.294	4.835	0.000
H3: User-interface and Aesthetics -> Perceived ease of use	0.906	0.905	35.025	0.000
H4: Authenticity -> Perceived ease of use	0.103	0.106	3.3	0.001
H5: Complexity -> Behavioural attitude	0.029	0.032	0.729	0.466
H6: Perceived usefulness -> Behavioural attitude	0.404	0.401	5.908	0.000
H7: Perceived ease of use -> Behavioural attitude	0.289	0.287	5.632	0.000
H8: Relative advantage -> Behavioural attitude	0.247	0.253	4.253	0.000
H9: Behavioural attitude -> Behavioural intention to use SSTs	0.233	0.228	3.694	0.000
H10: Perceived control -> Behavioural intention to use SSTs	0.301	0.296	4.245	0.000
H11: Concentration -> Behavioural intention to use SSTs	0.088	0.093	1.402	0.162
H12: Enjoyment -> Behavioural intention to use SSTs	0.129	0.136	2.405	0.017
H13: Subjective norms -> Behavioural intention to use SSTs	0.205	0.21	3.287	0.001

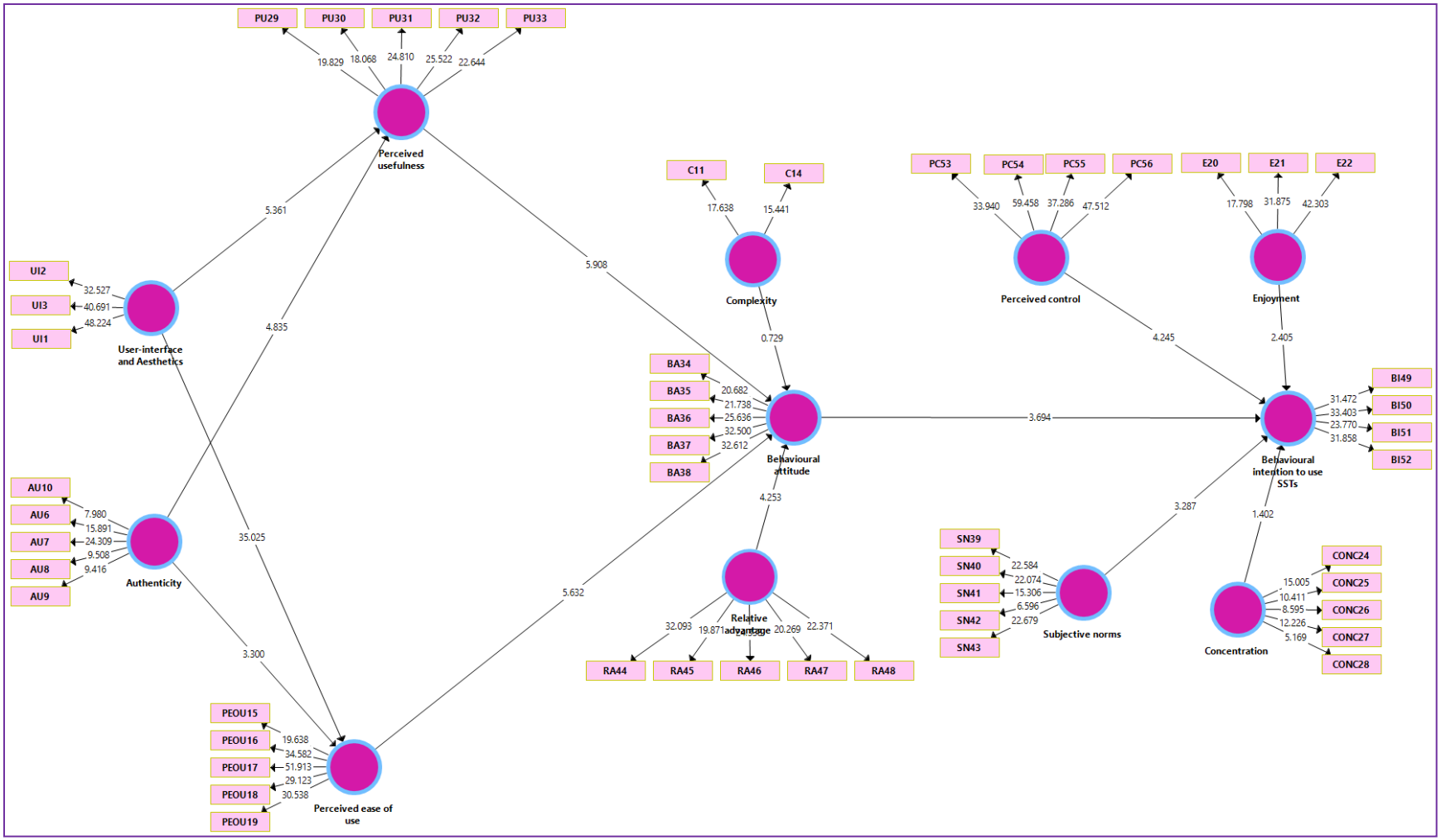

Figure 6.1: Measurement and structural model results

Hypotheses 1 and 2: H1 and H2: User-interface and aesthetics and authenticity will positively impact percieved usefulness

The results presented in Table 6.19 reveals that user-interface and authenticity both posively influence perceived usefulness with ($\beta = 0.369$, $p < 0.01$) and ($\beta = 0.285$, $p < 0.01$) respectively. HI and H2 are therefore supported. These mean that as shoppers' aesthetic and pleasant experiences with a SST increase, and they find the technolgy to be authentic, their perception of its usefulness also increase.

Hypotheses 3 and 4: User-interface and aesthetics and authenticity will positively impact percieved ease of use

Based on the results in Table 6.19 and with ($\beta = 0.906$, $p < 0.01$) and ($\beta = 0.103$, $p < 0.01$), H3 and H4 was supported and confirming that perceived usefulness of the SST is indeed positively influenced by user-interface/aesthetic and authenticity. This means that to the extent that user-interface/aesthetic and authenticity increase, shoppers will find the SST in shopping malls to be easy to use.

Hypotheses 5, 6, 7, and 8: Complexity, perceived usefulness, perceived ease of use and relative advatage will positively impact the behavioral attitude towards the use of SST.

With the exception of complexity (H5) ($\beta = 0.029$, *ns*), perceived usefulness and ease of use and relative advantage impacted behavioural attitude positively with ($\beta = 0.404$, $p < 0.01$), ($\beta = 0.289$, $p < 0.01$) and ($\beta = 0.247$, $p < 0.01$) respectively. H6, H7, and H8 were therefore supported and meaning that shoppers attitudes towards the use of SST will increase when there are perceptions of usefulness, ease of use and relative advantage they get from the technology.

Hypotheses 9, 10, 11, 12 and 13: Behavioural attitude, perceived control, concentration, enjoyment, and subjective norms will positively influence behavioural intentions to use SST

According to Table 6.19 and with the exception of concentration (H11) ($\beta = 0.088$, *ns*), behavioural attitude ($\beta = 0.233$, $p < 0.01$), perceived control ($\beta = 0.301$, $p < 0.01$), enjoyment ($\beta = 0.129$, $p < 0.01$), and subjective norms ($\beta = 0.205$, $p < 0.01$) all positively and significantly impacted behavioural intentions of mall shoppers to use SST. Therefore, H9, H10, H12, and H13 are supported.

6.6 Mediation Effect of Behavioural Attitude (H14, H15 and H16) (Sobel's Test)

Mediation variables can be best defined when having a third variable (mediator) between some predictors and outcome variables (Yay, 2017). For this study, three mediation analyses were done: 1) to assess the mediating roles of perceived use and ease of use in the relationships between authenticity, user-interface and behavioural attitude (H14); 2) to assess the mediating effects of perceived usefulness, perceived ease of use in the relationships between user-interface, authenticity and behavioural attitude (H15); 3) the mediating effect of behavioural attitude in the relationships between complexity, perceived usefulness, perceived ease of use, relative advatage and behavioural intentions (H16). These were done using Sobel's test. The Sobel's test uses the product of coefficients and are automatically calculated by the SmartPLS. The results are presented in the Table 6.20.

Table 6.20: Mediation Effect of Behavioural Attitude

Hypothesis	**Path**	**Std *Beta***	***Std Error***	***T* Statistics**	***P* Values**	**Decision**
H14	AU -> PE0U -> BA	0.030	.052	3.617	<.001	Supported
	UI -> PE0U -> BA	0.262	.007	11.629	<.001	Supported
	AU -> PU -> BA	0.115	.018	5.480	<.001	Supported
	UI -> PU -> BA	0.149	.012	7.328	<.001	Supported
H15	UI → PU →BA→BI	0.085	0.035	4.260	<0.01	Supported
	UI→PEOU→BA→BI	0.023	0.108	2.906	<0.01	Supported
	AU→PU→BA→BI	0.027	0.064	3.518	<0.01	Supported
	AU→PEOU→BA→BI	0.007	0.203	2.682	<0.01	Supported
H16	RA→BA→BI	0.058	0.048	3.831	<0.01	Supported
	C→BA→BI	0.007	0.180	2.704	<0.01	Supported
	PU→BA→BI	0.094	.029	3.905	<.001	Supported

The results in Table 6.20 shows that for H14, H15 and H16, the mediating effects were all significant with t-values greater than 2.57 and with P-values of <0.01.

Mediation effects may change the statistical significance of some relationships whilst some remain the same. From the direct and indirect relationships as shown in Tables 6.19 and 6.20, and except for complexity that was previously insignificant, all other indirect relationships remained

significant. However, there were notable reduction in the *beta* value, and this indicates the existence of a partial mediation.

The Sobel's Test tends to be criticised, however. The distribution of the indirect effect (authenticity → perceived use of ease → behavioural attitude → behavioural intention to use SSTs) tends to be asymmetric (skewed, unless the means are much larger than the standard deviations) (Mackinnon *et al*., 2002). This asymmetry affects the applicability of Sobel's Test when working with small sample sizes, since normality will be noted when working with large sample sizes of the indirect effects. This may result in producing the *p*-value which is not a correct estimate of the true value hence the bootstrapping approach may be the appropriate. It is vital to note the magnitude of the indirect effects, the variance accounted for (VAF) as propounded by (Hair *et al.*, 2017). Hair *et al*., (2017) suggested that VAF > 80% indicates full mediation, 20%≤ VAF ≤ 80% partial mediation and VAF < 20% indicates no mediation. The formula for VAF helps to know how the independent variables contributes in explaining the variation in the dependant variable through the mediator. VAF formula was used:

$$\text{VAF} = \frac{\text{Indirect Effects}}{\text{Total Effects}}$$

Table 6.21: **Variance Accounted For**

Path	**VAR**	**Ranking**
AU -> PE0U -> BA	0.203	partial mediation
UI -> PE0U -> BA	0.451	partial mediation
AU -> PU -> BA	0.352	partial mediation
UI -> PU -> BA	0.386	partial mediation
UI → PU →BA→BI	0.470	partial mediation
UI → PEOU →BA→BI	0.227	partial mediation
AU→PU→BA→BI	0.443	partial mediation
AU→PEOU→BA→BI	0.200	partial mediation
RA→BA→BI	0.491	partial mediation
CI→BA→BI	0.500	partial mediation
PU→BA→BI	0.302	partial mediation

From the results displayed in Table 6.21 it can be concluded that there were partial mediating roles, since all the VAF values were greater than 20%, but lower than 80% Hassan, Shamsudin, Hasim, Mustapha, Buang & Wahab, (2020), therefore all the situations can be ranked as partial mediation. Furthermore, the T-statistic for the variables identified were all greater than 2 which further justifies the relationship as indicated previously.

6.7 Conclusion

Chapter 6 covered a detailed data analysis and presentation of the research in greater detail. The researcher was able to analyse the dataset based on 260 respondents out of a possible 425 who had been invited to participate in the questionnaire. Based on the feedback from the research, it was confirmed that most of the relationships between variables selected in the study had positive significant relationships, as reflected in Table 6.8. User interface was noted to have a significantly high effect in influencing PEOU on using SSTs within a shopping mall environment with a T-statistic value of 35.025. Two notable constructs were confirmed to have insignificant relationships, and these are Complexity (C) and its influence on Attitude (A) which had a p-value of 0.466, which is not significant. Another insignificant relationship was Concentration (CONC) and its influence on Behavioural intention (BI) which had a p-value of 0.162 and therefore suggested that there is no relation between the two variables.

Behavioural Attitude was noted as a partial mediation variable between every construct that influences behavioural intention to use SSTs within the shopping-mall environment with partial mediation being confirmed for most constructs that influence the Behavioural Intention to make use of these technological innovations. Although Complexity was noted to have an insignificant influence on Behavioural Attitude (BA), there was a notable partial mediation of Behavioural Attitude in influencing the relationship between Complexity and Behavioural intention to use SSTs, suggesting the need to ensure behavioural attitude is kept positive to influence Behavioural Intention. Understanding underlying factors that influence Behavioural Attitude to use SST is essential as positive influence will subsequently lead behavioural intention to use these innovations within a shopping-mall environment space.

CHAPTER 7: DISCUSSION OF RESULTS, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

Chapter 6 gave a detailed and full analysis of data collated on the research with most of the data analysis conducted using SmartPLS, for inferential statistics and SPSS, for descriptive statistics. The researcher was able to identify key constructs that play a significant role in influencing consumer behaviour to make use of SST within a shopping mall environment. While there was generally a positive influence and relationships noted between variables based on hypotheses tested, results also revealed that complexity does not significantly influence behavioural attitude to adapt SST within a shopping-mall environment and concentration does not necessarily influence behavioural intention to make use of SSTs as the researcher failed to reject the two hypothesis tests.

Chapter 7 starts with a consolidated summary of the research objectives and research techniques adopted in the study. Following this, theoretical suggestions and concluding discussions are then provided based on findings. Concluding Discussions based on empirical studies are then discussed and based on this, the researcher then provides some of the key recommendations using the results that have been interpreted. Limitations of the research are also shared and opportunities for future research suggested to further increase the body of knowledge around SST adoption, which continues to develop and become more incorporated in our daily lives and activities. Thereafter, concluding remarks are made on the research.

Recapitulation of study objectives

Secondary objectives which were postulated for the study were as follows:

i) To assess the impact of SST site factors (user-interface, aesthetics, and authenticity) on PEOU and PU.

ii) To assess the impact of PEOU, PU, relative advantage, and complexity on attitudes towards the use of SSTs.

iii) To determine the impact of attitudes, subjective norms, perceived behavioural control, concentration, and enjoyment on behavioural intention to use SSTs.

iv) To develop and empirically test a conceptual model developed from TAM, DOI, TPB and Flow theories for the explanation of the BI to use SSTs in selected Johannesburg shopping malls

To achieve the postulated secondary objectives, the following research methods and analyses were used.

Research Methods and Analyses Techniques used to achieve study objectives

Chapter 5 covered the Research Design and Methodology at length. Rooted in a positivism paradigm, the researcher was able to make use of quantitative methods to collate and analyse data and report the findings based on the results. Respondents were invited to participate in a self-administered questionnaire which used validated measuring scales. Using Cronbach alpha and composite reliability tests, as well as correlation matrix and factor loadings to determine the reliability and validity of the research scale used, the researcher was able to ensure the research scales and instrument met the acceptable reliability and validity thresholds.

The respondents who participated in the study comprised shoppers based around Johannesburg between the ages of 18 and 55 years. Convenience sampling was adopted in inviting respondents to participate in answering the questionnaire. A total number of 260 respondents participated in this study, resulting in a response rate of 61.1%. The relatively lower than anticipated response rate was largely owing to Covid 19 lockdown measures that affected the easy collation of results between 2020 and 2021. The researcher was able to proceed with the research given the 61.1% response rate as increasing the response rate would normally lengthen the study (fielding period) and can create other measurement problems which may affect the quality of the study (Hendra & Hill, 2019).

Based on the collation of data and analysis of results the presentation of results was then shared in Chapter 6 which gave a more detailed insight on respondents who participated. From the study, it was noted that 86.2% of the respondents were students while 11.5% were employed persons. The unemployed persons constituted 2% of the total study sample of 260 respondents who participated in the study. 58.8% of respondents made use of Rosebank Mall which was followed by 16.5% who used “Other” Johannesburg shopping malls. Respondents who used Mall of Africa constituted 10% while Sandton shoppers represented 6.5% of the respondents to this study. An important aspect to note is that 97.3% of respondents have at least made use

of SSTs which shows the great degree of familiarity that many consumers have of these innovations. From the Structural Equation Modelling (SEM) conducted on the responses, it can be confirmed that 11 hypothesised relationships were accepted while two of the relationships were rejected. These results are discussed further with implications in the second part of section 6.2 after the discussion on the Conceptual Model which is then followed by the theoretical framework discussion.

7.2 Theoretical suggestions from literature review

The Literature Review in Chapter 2 gave a detailed understanding of the technological environment to which consumers are now exposed within retail and shopping mall facilities with primary case studies being sourced from developed economies that include the Middle East, Europe and America. As consumer shopping behaviour has been widely shaped and influenced by technology, it becomes imperative for shopping mall owners and retailers to ensure they incorporate these new innovations within the path to purchase to increase the level of exposure of their product and services within the consumer decision-making process. By creating these unique experiences and points of interaction, this can help to influence consumers within their shopper journeys and decision-making process as consumers are able to identify their needs, search for products and services and evaluate alternatives using these SST innovations.

Objective 1 sought to examine how much SST site factors such as user-interface, aesthetics and authenticity impact PEOU and PU. The study identified and discussed the influence of site factors (Aesthetics and Authenticity) on Perceived Ease of Use and Perceived Usefulness to use with SST in shopping environments in greater detail which contributed to the existing body of knowledge on site factors that can influence Perceived Ease of Use and Perceived Usefulness. Sections 3.1, 3.2 and 3.3 highlighted the significance of Aesthetics or User Interfaces and Authenticity as key drivers that influence human-computer interaction and user perceptions with Thiersch, Scharfen, Masoudi and Reuter (2019) further confirming the significance of Aesthetics on perceptions and attitudes of SST users on Perceived Ease of Use specifically. Simplicity, a dimension of Aesthetics has been identified as one key variable that can influence Perceived Ease of Use, as confirmed by Lazard, Watkins, Mackert, Xie, Stephens, and Shalev (2015) and Lee, Moon, Kim and Mun (2015). By ensuring that content displayed on SSTs is kept simple for ease of navigation, this can further stimulate the levels of engagement and interactivity that shoppers have with SSTs. Priority should then ensure that

careful selection of visual aesthetics is made prior to launching or deploying these SSTs as this can ultimately influence the level of response of users as indicated by Wu and Li (2020) in Section 2.3.1 of the literature review. Based on the above, we can note and conclude that the literature review aspects of **secondary objective 1** were achieved.

Academically, the current study contributes to the existing body of knowledge on understanding the relationship between self-service technologies and their influence on consumers in both developed and emerging economies, such as South African consumers, particularly when they are within a shopping mall environment (see Chapter 2.2, 2.3 and 2.4). The study also specifically helps to understand factors that influence behavioural attitude which include Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Relative Advantage (RA) (Chapter 3 and Chapter 4) which was confirmed as Secondary Objective 2. The objective was to understand the influence of PEOU, PU, Relative Advantage and Complexity on Behavioural Attitude when adopting SSTs. This is further elaborated in section, 4.3.6 and 4.3.7 with Reza, Bahrin, Iskandar, Azhari and Ram (2020) who expanded further on the significance of PEOU and PU on overall shopper behavioural attitude when using SSTs within a mall environment. Section 4.3.8 highlighted the significance of Relative Advantage on Behavioural attitudes to use SSTs as confirmed by Tongnamtiang and Leelasantitham (2019). From the literature study, one has an even better understanding of the factors that influence Behavioural Intention to use SSTs which include Subjective Norms (SN), Behavioural Attitude (BA), Perceived Control (PC) and Enjoyment (E). Understanding the factors that will influence the behavioural attitude of SST adoption will greatly help mall owners and occupants to focus on the key enablers that can positively influence behavioural attitude, which can subsequently influence intention to use SST adoption and a positive consumer shopping experience.

Based on the above, it can be concluded that **secondary Objective 2** was achieved. The researcher was able to assess the impact of Perceived Ease of Use (PEOU), Perceived Usefulness (PU) and Relative Advantage (RA) on Behavioural Attitudes (BA) to use SSTs which were positive. Based on the findings in Chapter 4 and Chapter 6, it was confirmed that Behavioural attitude is influenced by Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Relative Advantage (RA) which then influenced Behavioural Intention (BI) to use SSTs.

Objective 3 focused on determining the impacts of behavioural attitudes, subjective norms, behavioural control, concentration, and enjoyment towards behavioural intention to use SSTs. Based on existing literature and as discussed in section 3.5.1, key to increasing usage intention and adoption of SSTs lies primarily on positive shopper or user attitude (Cheung & To, 2017). Perceived Behavioural Control was also noted to influence behavioural intention to use SSTs with shopper understanding of the SSTs likely to stimulate higher levels of behavioural control amongst users which then increases the propensity to use these innovations (McKeever, 2017). This was further confirmed by Lien, Hsu, Shang and Wang (2021) who confirmed the influence of Perceived Control on Behavioural Intention to use SSTs.

Based on Flow Theory discussions, Concentration had been initially noted as a key predictor in influencing the usage and adoption of SSTs as it increases the level of engagement and interactivity that shoppers or SST users will have with the innovation (Ozkara, Ozmen & Kim, 2017), as discussed in Section 3.6.2. This was further suggested in section 4.3.11 with authors such as Moon and Lee (2022) suggesting the significance of concentration in influencing behavioural intention to use SSTs. On the other hand, there were some findings that also suggested that Concentration may not necessarily influence positive intention to use SSTs as creating an environment that fosters undivided attention when using SSTs may not be practical for users and can deter them from using these innovations (Buzady & Marer, 2016), as suggested in section 3.6.3.

Enjoyment was noted to have a significant influence on intention to use SSTs as it stimulates an environment of flow with users interfacing with a given innovation (Huang, Pham, Wong, Chiu, Yang & Teng, 2018). According to Van De Sanden, Willems and Brengman (2022), increasing the experiential components of SSTs, such as increasing enjoyment levels, will ultimately influence the desire and intention to use the SSTs (see section 4.3.12).

Based on the above, it can be concluded that literature review aspects of **Objective 3** were achieved as the researcher was able to determine the impact of attitude, subjective norms, perceived behavioural control and enjoyment on behavioural intention to use SSTs.

The researcher was able to effectively integrate constructs from four underlying theories which have a significant influence on the adoption of SSTs by Johannesburg shoppers within a shopping mall environment. The constructs that were adopted were sourced from Technology Acceptance Model (TAM) (Davis, 1989), Diffusion of Innovation Theory (DOI) (Rogers, 1995), Flow Theory (Csikszentmihalyi, 1985) and Theory of Planned Behaviour (TPB) (Ajzen,

1991). The research further proposes and supports that the influence on innovation adoption is multifaceted with several constructs having a significant influence in altering consumer behaviour which has ultimately led to the adoption of these SST innovations.

As discussed in Section 4.1, authors such as Alam, Omar, Ariffin and Hashim (2018) have also realised the importance of integrating theoretical models as it helps in validating the influence of various constructs in technology adoption using an holistic approach and not in isolation as focusing on individual models does not give a clear picture on findings, resulting in TAM, TPB and DOI constructs being integrated in a study to determine the adoption of similar SSTs. This was also recommended by Sharif and Naghavi (2021), who also highly recommended the importance of integrating TPB, FT and TAM as they have an influence on cognitive and emotional aspects on consumer behaviour and the adoption of SST innovations within a self-service technology environment.

Based on the above, it can be concluded that **secondary objective 4** was achieved from a theoretical background perspective. The objective was looking at establishing the framework that can be used to adopt SST. Based on the empirical study conducted, a model was created that includes several theories which include the Technological Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Diffusion of Innovation (DOI) Theory and Flow Theory (FT). The final Framework was then presented in Chapter 4.2 which integrated constructs from the four key models selected for the study. Based on the model that was created, relationships between variables were then proposed in Chapter 4.3. The results of the empirical study are discussed in greater detail in Chapter 7.3 below.

7.3 Theoretical conclusion of the study

The research contributes significantly to understanding factors that influence the adoption of SST within shopping mall environments for consumers, which is presently not fully understood within emerging markets, as discussed in Section 1.1.2 (Mukerjee, 2020). This is further highlighted and discussed in Chapter 2 which covers some of the key aspects that have contributed to the successful implementation of SSTs within developed countries as reflected in Section 2.2. The research provides a new dimension of service experience that allows shopping mall owners to have an even greater shopping mall patronage from their customer base which drives the right threshold and footprint that boosts volume sales and growth in value

of these shopping-malls. Identifying key drivers such as Behavioural Attitude, PEOU and PU which influence service experience through the usage of these SSTs in shopping mall environments will be good enablers for shopping mall owners to increase their levels of engagement with customers. Key to enhancing the service experience of SSTs will be tied to enhancing the level of functionality that users have from making use of SST within a mall environment. It becomes essential for information displayed on these SSTs to be updated and relevant to the target consumes who use these SSTs for them to derive the right value from these innovations which will influence a positive attitude.

With shopping malls becoming more and more similar in their service offerings, propositions, facilities and stores, marketers are challenged with the need to provide innovative solutions that will assist in "breaking the clutter" and increasing the competitive advantage that a mall has over other similar facilities within a given catchment area. Shopping malls around Johannesburg can then utilise key insights from the study to ensure factors that are important to consumers and that influence the adoption of SSTs are adequately covered such as Perceived Ease of Use (PEOU), Perceived Usefulness (PU) Aesthetics (UI) and Authenticity (AU) as they will ultimately influence Behavioural Attitude and Behavioural Intention to use these innovations. To evaluate SST performance and identify ways of enhancing service experiences, surveys can be used to draw consumer feedback on their experiences as they engage with these SST innovations. These surveys can specifically look at the key factors that influence usage intention of SSTs which will then assist marketers and shopping mall owners to target the focus areas that may require attention, based on the consumer feedback.

The research also provides key insights on the significant influence of SSTs within the shopper's path to purchase and instils the importance of ensuring that SSTs will need to be incorporated as a significant touchpoint that can influence the consumer decision-making process, given that these SSTs are great information repositories for consumers. Using these platforms to advertise and market product and service offerings can help increase exposure that consumers have to the products and services and can influence their decision-making. As discussed in Chapter 1 and Chapter 2, the convenience that comes with integrating SST within a shopping environment is significant. SSTs can also be better integrated within the path to purchase by creating a connection between these innovations and mobile-based applications which will further enhance the shopping experience, as was the case with the introduction of

the Mall, mApp, which was launched with an intention to make indoor navigation easier within a mall for the consumer (Korde, Batavia, Gajera, Gandhi & Mody, 2021). Opportunities for incorporating beacon technology to allow consumers to be notified of products and services of interest while they navigate within the mall can greatly help consumers to maximise the value they can derive from these SST innovations, as well as increase the level of interactivity and engagements which can stimulate demand for products and services offered in the mall environment.

7.4 Concluding discussions based on empirical study

Several findings of the study were discovered based on the analysis of results that were collated and presented in Chapter 6. In this section, the findings are discussed in relation to the current body of knowledge, as related to the **achievement of secondary objective 4** aligned to the proposed framework proposed in the previous secondary objective, before concluding with a main finding, implications and suggestions.

Discussion related to:

H1: The relationship between User-Interface/Aesthetics and Perceived Usefulness within a shopping mall environment

There is a general realisation that technological innovation adoption within a shopping mall environment is multifaceted while ensuring that relevant and key variables (User Interface, Perceived Usefulness, Perceived Ease of Use, and Behavioural Attitude) are considered to ensure sufficient utilisation of SSTs is essential. Evident from the empirical findings in Chapter 6, usage and adoption of SSTs is likely to be much greater if the Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that shoppers have of these innovations are quite high. Antecedents to these two variables should then be considered and in this instance, given that User Interface (UI) has a significant impact on Perceived Ease of Use (PEOU), it will be important that mall owners ensure that the SSTs are updated with the best UI that meets the needs of consumers as it can potentially influence consumer behaviour and attitude which can subsequently drive intention to use.

Results from Table 6.8 confirmed the significant positive relationship between User Interface (UI) and PU ($p<0.01$) which further suggests that the aesthetics of an SST is important as it

influences the users' perception on such innovations. This was also confirmed in a study that revealed that user interfaces do influence perceptions and attitudes of SST users by several authors (Thielsch, Scharfen, Masoudi & Reuter 2019; Xie, Wu and Yow 2021) who realised the influence that UI had on the adoption of digital services by the older population who derive utility from these innovations, as discussed in Section 3.1.

Main finding 1: User interface and aesthetics positively influence perceived usefulness in SST

Conclusion:

Therefore, User Interface (UI) does have a significant effect on the perceived functionality of SSTs which then becomes important for mall owners and occupants or retailers to ensure they find effective ways of making the User Interfaces simple and easy to navigate as it will give the impression that the SSTs are useful for the end-user. Effective content management and display can also make it easier for shoppers to then make use of these innovations and this can be implemented in various ways, including compartmentalisation, or grouping of information which can aid the user experience.

Implication: Shopping mall owners should therefore ensure that the SST design interface makes it easy for the shoppers to utilise as this can increase the perceived functional benefit that consumers will have while interacting with the SST. User interface attributes that include simplicity, ease of navigation and general user friendliness are essential in enhancing customer experience particularly when it comes to functionality and general perceived usefulness (Ugwuanyi, Uduji & Oraedu, 2021) (see section 6.4.2). This was further supported by findings from Bigne (2021), who also acknowledged the influence of aesthetics on both PU and PEOU adopting augmented reality (AR) based SSTs. On the contrary, authors such as Han, Forbes and Schaefer (2019) (see also section 3.1) highlighted how there is no direct link between creativity, functionality and aesthetics in the general design of chairs, as an example, which may suggest that the relationship between UI and PU may apply within the technological and innovation space where authors such as Kim and Park (2019) have realised the significance of this relationship in wearable-technology environments (see also Chapter 3 and Chapter 4).

Recommendation:

To ensure the User Interface (UI) creates a significant impact on Perceived Usefulness, there is a need to clearly identify the most significant factors that make SSTs aesthetically appealing. These may include the layout and screen navigation aspects which should make it easier for users to navigate around, based on their Consumer Decision Making stage. A shopper who is currently in the Information Search stage would want a screen that is easy to navigate and has the right level of compartments to navigate and search for the desired product and services. Future research can look at significant UI antecedents by age-group as this may influence levels of perceived functionality, for example, the younger demographic may appreciate a different form of aesthetics and display of information when compared with the older demographic.

Discussion related to:

H2: There is a positive relationship between Authenticity and perceived usefulness

Main finding 2: Authenticity has a significant influence on Perceived Usefulness of SSTs

Conclusion:

Results from Table 6.8 confirmed that authenticity does have a significant influence on Perceived Usefulness or functionality of SSTs. The greater the visual cues and perceived clarity that come with a given SST, the more likely shoppers are likely to interact with these innovations as they sense that they will be in a position to derive the best value from these SSTs. Conversely, if the SSTs screens do not display authentic images, shoppers are likely to be sceptical when utilising these innovations as they might assume that the innovations are unreliable.

Implications:

Shopping mall owners and occupants are challenged to ensure they commission SSTs that have great screen resolution and display content that is relatable to the target market to increase their level of trust on these innovations which may ultimately lead to more reliance on these innovations to obtain the relevant information they require.

Recommendation: Based on the analysis of results, it was confirmed that authenticity does have a positive influence on Perceived Usefulness of SST innovation withing a shopping environment. This is further supported by Pelet, Durrieu and Lick (2020), who note how perceived authenticity determines both pleasure and usage intention in the online retailing of

wines. Visual cues do play a significant role for shoppers within a mall environment and especially with SST environments, where it is generally expected that iconic cues resemble a given product or object (Becker, Wiegand & Reinartz, 2019). Authenticity tends to play a primary role in influencing SST functionality for consumers as they are more likely to perceive a product to be useful or functional if what is shown on screen appears closer to what it should be. Mall owners are therefore challenged to ensure they increase levels of perceived functionality of SSTs by amplifying the authenticity levels of SSTs which may increase the propensity to use these SSTs.

Discussion related to:

H3: There is a positive relationship between User Interface/Aesthetics and Perceived Ease of Use

Conclusion

Much like Hypothesis 1, which confirmed a positive relationship between the user interface and Perceived Usefulness, the relationship between UI and PEOU was noted as positive as well, with results showing ($\beta = 0.906$, $p < 0.01$). Several implications can be considered by shopping mall owners to drive general Perceived Ease of Use of SST using UI.

Implication

A simplistic layout of the SST screen can greatly help to enhance PEOU for shoppers. Given the digital real-estate that comes with most SSTs, designing the navigation panes should be easy to implement. Ensuring the right application of UI within an SST in shopping environments is important as failure to do so may create elements of cognitive dissonance with the shopping experience. In Indonesia, SSTs were installed in shopping malls recently, but were not well received due to poor UI which made these innovations confusing for the consumers and affected their shopping experience consequently (Kusumawati, Muslim & Nugroho, 2020).

Recommendations

The significant influence of User-Interface on Perceived Ease of use suggests that mall owners and occupants, particularly retailers, need to increase the level of clarity and curation of content displayed on these screens to ensure that shoppers can easily interact and engage with these

innovations. Understanding the audiences' needs will greatly help to ensure that the right content, layout, and orientation is made to capture consumer needs within their different stages of decision-making process. An additional demonstration video can also help to increase the levels of interactivity and perceived ease of use when using these SSTs and this can be in the form of in-picture demonstration videos that then guide shoppers when they engage with the SST to search for specific information.

Discussion related to:

H4: There is a positive relationship between Authenticity and perceived ease of use

Conclusion

Much like Hypothesis 2 which confirmed the positive relationship between AU and PU, we can confirm that AU had a positive effect on PEOU as the p-value was less than 0.05. As indicated in Chapter 3, the state of immersion that is amplified with the use of an authentic SST can create perceptions of ease of use on the user which can significantly influence the adoption of these innovations.

Implications

Marketers and mall owners may therefore need to ensure that they increase the level of authenticity of SST which will greatly help to influence the adoption of these innovations, and this can be done by enhancing the 3D effects as visuals play a great deal in legitimising selling propositions to the customer.

Recommendation

Understanding that antecedents of authenticity may vary, based on consumer preferences and target audiences; there is a general need to ensure that mall owners and occupants have a clear understanding of the drivers of authenticity which would have a significant influence on the perceived ease of use of SSTs within shopping mall environments. An example is if screen resolution is deemed as one of the highest influencers in determining authenticity, there will be a need to ensure the graphics and screen resolutions of the SST are high enough to match the standards of shoppers.

Discussion related to:

H5: There is a positive relationship between complexity associated with using an SST and behavioural attitude

Conclusion:

Based on the results of the study (in Section 6.5), there was no significant relationship between Complexity and Behavioural Attitude to use SSTs with the result showing ($\beta = 0.466$, $p < 0.01$).

Implication

This suggests that Complexity does not play a significant role in influencing Behavioural Attitude to use SSTs within shopping mall environments. Based on this, shopping mall owners and occupants can put more focus on Perceived Ease of Use (PEOU), Perceived Usefulness and Relative Advantage (RA) as they have a more positive effect in influencing a positive Behavioural Attitude on shoppers to utilise SST within mall environments.

Recommendation

Based on the results and confirmation that Complexity does not have a significant influence on Behavioural Attitude to use SSTs, the construct is not considered on the SST Adoption model. Shopping mall owners and occupants are encouraged to focus on the key factors identified that have a significant influence on the adoption and usage of SSTs.

Discussion related to:

H6: There is a positive relationship between perceived usefulness and behavioural attitude when making use of SSTs.

Conclusion

PU has a significant role on BA to use SST within a shopping mall environment. With functionality being at the core of influencing customer attitudes, it becomes very important to ensure that the value proposition of SST yields a positive feeling towards the use and adoption of these innovations (Kazancoglu & Yarimoglu, 2018).

Implications

Offering pragmatic effects of SST can enhance the shopping experience for shoppers as they can derive the most value from these innovations and this can be done by tapping into new and existing marketing insights to better understand consumer needs within different catchment areas (Park, Ha & Jeong, 2020). As an example, while some shoppers may want to use SSTs to get directions for shopping outlets they look to visit, other shoppers may be more inclined

towards accessing promotions of interest to them and would want to use these SSTs to derive this functional benefit.

Recommendations

Mall Owners and occupants should then ensure a thorough understanding of consumer behaviour and functional needs assessments are conducted to ensure that the right value or functional propositions are identified and can be met using these SSTs. Future researchers can consider exploring functional benefits associated with SST utilisation in greater detail as this will determine the layout and content of these SSTs.

H7: There is a positive relationship between Perceived Ease of Use and behavioural attitude when making use of SSTs

Conclusion

Much Like Perceived Usefulness (PU), we can note that the significance of PEOU on Behavioural Attitude (BA) in the study is high as both PU and PEOU are antecedents of BA (Bigne, 2021) and, given the importance of BA in influencing SST adoption, SSTs should be consumer centric which will make it easier for technology adoption.

Implication

Therefore, given the role that the Perceived Ease of Use (PEOU) has on influencing Behavioural Attitude, there is a need to identify antecedents of Perceived Ease of Use which can go a long way in influencing positive Behavioural Attitude to adopt SST. Some of the key antecedents identified with Perceived Ease of Use have been Authenticity and User Interface which both had a significant impact on influencing Perceived Ease of Use, as discussed in Chapter 4 and Chapter 6 section 6.6.3.

Recommendation

To incentivise usage of SST, demonstration videos can be displayed on-screen as quick guides and additional support may be made readily available to assist in ensuring that there is a full understanding on how to make use of these technological innovations, particularly for the older demographic where storytelling has great benefits for the users (Alexandrakis, Chorianopoulos & Tselios, 2020). Further to this, there is also a need to ensure that great user interface

techniques are implemented to reduce navigation problems and positive engagement between shoppers and SSTs in retail environments.

H8: There is a positive relationship between Relative Advantage and Behavioural Attitude

Conclusion:

Results from the study indicated that we accept a positive relationship between RA and Behavioural Attitude with a p-value of 0.01 as indicated in Chapter 5. This is consistent with a study by Jiang, Wang and Yuen (2021) who suggested that intention to use similar innovations is influenced by mediation effects of Behavioural Attitudes between RA and intention to use augmented reality hopping applications.

Implication

Understanding the key attributes that give relative advantages of SST innovations will help influence the adoption of SSTs within a mall environment. Dynamic information access that comes with using SST will be an enabler for consumers as they can source information they require on demand and based on their preferences, which is a great information source, unlike static signage or posts. Using SSTs will make the path to purchase for consumers more enjoyable and interactive which can then influence positive attitudes towards the use of these SSTs. Leveraging on trust and efficacy to influence RA perceptions on SSTs will require marketers and shopping-mall owners to constantly update information displayed on these SSTs for the convenience and access of the shoppers (Liu & Hung, 2021).

Recommendation

Shopping mall owners and occupants will need to amplify key benefits that come with the use of SST which, can benefit consumer attitude positively. By clearly outlining the value proposition and impact that SST has on shopper purchasing behaviour, this may contribute to the wide adoption and increase the positive attitude that shoppers will have with this innovation adoption. An example amplify the availability of updated information that shoppers may find helpful in the form of dynamic advertisements and extend the opportunity to continue interacting with these SSTs using smartphones with access being made via QR Codes.

H9: There is a positive relationship between behavioural attitude and behavioural intention to use SSTs

Conclusion

As indicated in section 6.6.3, BA has a significant impact towards Behavioural Intention to use SSTs with a T-statistic value of 3.694 which further illustrates the significance of this relationship. This has subsequently led to the researcher understanding the influences of BA as they can then have an impact towards increasing the intention to make use of SSTs within a shopping mall environment.

Given that Behavioural Attitude has significant influences on Behavioural intention, there is a need to ensure consumers have positive attitudes towards SST innovations. The influence of BA on BI to use SST was reflected by the result showing that ($\beta = 0.233$, $p < 0.01$). Results from Chapter 6 indicated that key contributors for a positive Behavioural Attitude are Relative advantage, Perceived usefulness and Perceived Ease of Use which then influence the consumers engagement with SST innovations within a shopping-mall. Based on the T-statistics of 3.694, this further backs the importance of Behavioural Attitude on Behavioural intention to use SSTs.

Implication

Referring to the theoretical model, we can note that there is a need for marketers and mall owners and occupants to consider factors that include PEOU and PU which will have significant impacts on BA for shoppers. Ensuring that users make use of SSTs without applying significant effort and deriving maximum value on these innovations will greatly influence appreciation and adoption of these SSTs. Content curation should be tailored to increase repeat usage of SST innovations within malls with the intention to maximise value co-creation with customers and this can also be based on Artificial Intelligence systems to provide more personalised product and service offerings for customers (Chen, Guo, Gao, & Liang, 2021). An example would be providing suggestions and advertising elements to customers based on

their search profile preference and seasonal demands such as highlighting winter specials on the SST platform as we approach the winter period

Recommendation

Mall owners and occupants need to fully understand and predict Behavioural Attitude of the shoppers they intend to serve to increase the chances of Behavioural Intentions to use SSTs. Given that Complexity does not influence Behavioural Attitude in using SSTs more focus needs to be made on ensuring that Perceived Usefulness, Perceived Ease of Use and Relative Advantage aspects of the SSTs are positive enough to influence a positive Behavioural Attitude. As such retailers, mall owners and occupants should consider amplifying the benefits, functional value and ease of use that comes with utilising the SSTs using call-to-action messages that invite shoppers to interact or engage with these systems. Highlighting the functional value and convenience of obtaining information through these SST stations can greatly influence the intention to use the products and services. In areas where these SSTs are generally unknown, integrated marketing communication activities can increase the exposure and familiarity that shoppers will then have of the service and if they realise the relative advantage they will get, they are more likely to try and use these innovations

H10: There is a positive relationship between perceived control and behavioural intention to use SSTs within a Shopping Mall setting

Conclusion

Based on the acceptance of Perceived Control on Behavioural intention to use SSTs, we can establish that levels of PC will play a significant role in influencing consumer behaviour given ($\beta = 0.301$, $p < 0.01$). This is further confirmed by Ajzen (2020), who also confirmed Perceived Behavioural Control as a determinant of behavioural intention to do a given activity, which in this instance, is making use of SSTs. Understanding the internal and external factors that influence behavioural control go a long way in aiding a positive behavioural control towards SSTs which can then lead to wide adoption.

Implication

Shopping mall owners can influence positive perceived control of shopping-mall SSTs by reducing barriers to adoption of these SSTs by making the facilities easily accessible and ensuring that the surfaces are clean enough for shoppers to make use of, particularly during these COVID times which will help to reduce technology anxiety, as discussed in Section 2.3.4.

Given that most of these innovations are based in areas with a more youthful and educated demographic, it would make it easy for shoppers to make use of the technology as they can derive much needed utility from the adoption of these innovations. Inherently, shoppers prefer having control when making use of new innovations and this can be largely based on the compatibility of these SSTs with the shoppers which will normally be linked to ensuring the language and digital real-estate is fit for purpose.

Recommendation

Empowering the shopper will help increase the perceived behavioural control that shoppers have when interacting with shopping malls SSTs. To ensure barriers to entry are well managed, shopping mall owners may consider adding alternative languages on the screen to allow for shoppers to select the language of their choice. In South Africa where there are 11 official languages, there will be an opportunity to consider covering at least three of the most common languages per province to allow for easier adoption and access. Displaying SST information in a well categorised and balanced manner can also increase the confidence and perceived control that shoppers will have of these innovations, as discussed in Section 6.6.3. Further to this, mall owners can also make screens more responsive to hand gestures to reduce the level of contact between shoppers and these SSTs which can reduce contamination of diseases such as Covid 19.

H11: There is a positive relationship between Concentration and behavioural intention to use SSTs

Conclusion

Results from the study suggested that there is no significant influence that concentration has on behavioural intention to use SST innovations with ($\beta = 0.088$, $p > 0.01$).

Implication

Based on this, shopping mall owners will not need to make use of concentration as a major driver to influence Behavioural intention but can consider putting their focus on other more significant factors that can influence Behavioural intention which include BA, SN, PC and Enjoyment. This also further suggests that concentration is not necessarily essential when using

SST innovations which makes the innovations much easier to use within a busy environment such as a shopping-mall.

Recommendation

Given that concentration is not a key driver to influence behavioural intention to use SSTs within a shopping mall environment, it then becomes easier for shopping mall owners to use their discretion when it comes to placement of these SST innovations in mall environments. Placement of SSTs in areas with a large threshold of shoppers will increase the level of usage without necessarily affecting shopper concentration levels in the process.

H12: There is a positive relationship between Enjoyment and behavioural intention to use SSTs

Conclusion

Enjoyment plays a significant role in influencing behavioural intention for using SSTs within a shopping mall environment. This is further reflected by the result of ($\beta = 0.129$, $p < 0.01$). This is further backed by Chao (2019), who also acknowledges the influence of enjoyment towards the adoption of different information systems such as mobile learning platforms.

Implication

Effective ways of ensuring enjoyment levels are high will mean that shopping mall owners giving focus towards developing an effective service experience plan for consumers and one way of doing this is focusing on the design aspects of the innovation which include eye-catching screen display and sensitive screen display (Park, Lehto & Lehto, 2021). Creating new service experiences through SSTs will help to increase the levels of pleasure and enjoyment that consumers may have of these innovations, as indicated by the pleasure that came with the usage of Virtual Reality innovations (Lee, Kim & Choi, 2019).

Recommendation

Smart services experiences can be increased by allowing for other devices to also interact with the SSTs which will enable more active engagement when using the SST within a shopping mall environment (Kabadayi, Ali, Choi Joosten & Lu, 2019). By allowing other smart devices to connect with SSTs, this may create a closer service experience between consumers and these innovation technologies. An easy way to create this form of interaction is using i-Beacon

technologies or QR codes that will have redeemable vouchers on advertisements that can be redeemed in specified stores. This can thus help retailers or occupants to understand the levels of interactivity that SSTs have in driving traffic to their stores for given products and services.

H13: There is a positive relationship between subjective norms and behavioural intention to use SSTs

Conclusion

Results from the study of ($\beta = 0.205$, $p < 0.01$) reflected a positive relationship between SN and BI to use SSTs within a shopping-mall environment. The finding is consistent with similar findings from Buabeng-Andoh (2018), who realised how behavioural intention is influenced by subjective norms, with students more likely to adopt e-learning based on peer behaviour towards the innovation. This is however not consistent with findings by Ho, Wu, Lee and Pham (2020) who noted that Subjective Norms (SN) does not necessarily influence technology adoption. Kamble, Gunasekaran and Arha (2019) also found the relationship between subjective norms and behavioural intention to use an innovation such as block chain technology usage in supply chain negligible, based on results from the study. Analysing the difference in population samples, we realise that younger Generation-Z tend to be influenced more by their peers and the society around them to make use of certain innovations unlike much older demographics which is probably the reason why Subjective Norms influences behavioural intention to use SSTs in Johannesburg shoppers who are largely a youthful population

Implication

Marketers, shopping mall owners and occupants can leverage referrals and influencers to use these shopping-malls SSTs which can help to increase the levels of interactivity that shoppers have with these innovations. and increase their intention to use and adopt these SSTs.

Recommendation

Opportunities lie in increasing the use of influencers and endorsements from lifestyle personalities to drive and influence the level of interactivity that shoppers have with SSTs as shoppers may become more interested in these innovations. Further to this, there is a need to understand the influence that Subjective Norms have on the older demographic as they may not be easily influenced by societal norms and conditioning to make use of SSTs. As such,

alternative ways of engagement are required to increase the behavioural intention of the older demographic to use these SSTs.

7.5 Mediation Effects and their influence on Behavioural Intention to use SSTs

Based on the mediation effects identified in the study, the outcome reflected partial mediation between variables which has several implications. Results confirmed that Behavioural Attitude partially mediates the relationship between User Interface, Perceived Usefulness and Behavioural Intention to use these SSTs, as well as User Interface, Perceived Ease of Use and Behavioural Intention to use SSTs.

Conclusion:

Based on this, there is a need to ensure shopping mall owners and occupants understand how and why consumers make use of SSTs and fully comprehend their satisfaction levels as well as complaints when making use of these innovations in shopping mall environments. By ensuring that behavioural attitudes of shoppers are considered when implementing SSTs, this can help to increase positive attitudes associated with their adoption which can positively influence intention to use these innovations.

Implication:

This could help identify new ways of enhancing the service experience and further influence behavioural intention to use these SSTs. Strategies to influence behavioural intention to use SSTs can be based on behavioural attitudes' mediation effects.

Recommendation:

To understand consumer insights around functionality and general attitude towards these innovations, shopping mall owners can make use of surveys which help identify user attitudes and perceptions towards these services, based on the user experiences they have. Main finding 14 will be particularly useful for systems designers and content creators to be better placed to create material that will adequately influence positive shopper attitudes and their desire to make use of these innovations.

7.6 Overall implication of the study

The consolidated implication of the study confirms that the factors that influence the adoption and usage of SST within shopping mall environments is multi-faceted. Understanding the key drivers that influence the adoption of these innovations will however, increase the behavioural intention to use these SST within a shopping environment. Key drivers that influence the adoption of SSTs have been noted to be Perceived Ease of Use (PEOU), Perceived Usefulness (PU), User interface (UI), Behavioural Attitude (BA) and Subjective Norms (SN). Understanding the key drivers that influence PEOU and PU, as an example, which are UI and AU, can then allow marketers and shopping mall managers to focus on driving SST adoption by ensuring that aspects relating to look and feel, as well as authenticity are considered when introducing these innovations to Johannesburg consumers. Shim, Han and Ha (2020) also realised how consumers experiences will accumulate which gives consumers a higher perception of assurance about functionality and performance when engaging with SSTs over time.

Factors that influence shopper behaviour and that shape or influence behavioural attitude have a significant influence on SST adoption within shopping mall environments. As such, shopping mall owners and retailers will need to ensure they fully understand and measure shopper attitudes towards these innovations as it can influence the intention to use these SSTs. By being aware of factors that can influence behavioural attitude positively and negatively, retailers and shopping mall owners can then create strategies that will improve shopper perception of SSTs which can eventually lead to their usage and wide adoption.

Given that complexity and concentration do not significantly influence intention to use SSTs within shopping mall environments, this then gives shopping mall owners more focus on key drivers that will ultimately affect the change that they seek within shoppers' path to purchase which have been discussed in greater detail earlier in the Chapter.

7.7 Limitations of the study and suggestions for future research

Findings of the study will help enhance the body of knowledge and literature to understand factors that influence the adoption of SSTs within retail environments, given the massive

relevance that these interactive screens now have within the shopping environment. The study however focused on a limited demographic which is the Johannesburg consumers, and although the study had a balance in gender that participated in the study (about 50% male and 50% female), the general sample age group mostly constituted the youthful population with 76.2% of the respondents being between the ages of 18 and 24. The results of the study may therefore not be generalised and applied to the older demographic as perceptions of SSTs may not be similar to the younger generation's perceptions. An opportunity lies in understanding the influence of retail SSTs on the older demographic for the study to be more applicable in other emerging economies and areas that have more balanced age groups and populations which also compose Generation X.

The study did not completely zone in on the applicability of SST environment in more specific retail and service environments that include fast-food, where consumers can now order their food via SST innovations without interacting with the desk teller. Future studies should consider exploring the influence of fast-food SST on consumer-behaviour within a South African context given that more and more fast-food outlets have started introducing these facilities for the convenient of consumers.

Determining the influence of Self-Service Technologies on consumer behaviour within a shopping mall environment was a consumer-centric study which was focused mainly on understanding the influence of these innovations within the context of consumers. The study therefore did not adequately cover the impact of SST to mall owner and staff who interact with the shoppers to determine how using these innovations affects their operations. Understanding the influence of shopping-mall SSTs on shopping-mall staff will be of high significance, in further improving the service experience within these shopping mall environments as they can provide support to the consumer's shopping journey as well as provide more effective platforms from which to source key consumer insights. Moreover, shopping-mall staff can aid consumers in having better SST experiences when they interact with these facilities and are able to attend to enquiries raised by shoppers which can improve the perceived ease of use. Understanding the usage and adoption of SST for shopping mall staff will also help to better map out the enablers that can improve these innovations, as well as identify potential inhibitors to be addressed. Over time, staff members can then become great ambassadors for these

platforms which may influence consumers to consider using these innovations for their convenience.

Although there is a lot of literature focused on the use of mobile technology in enhancing service delivery in various contexts, not much research has been conducted in understanding the applicability of these innovations within emerging markets and the South African context. Given that the path to purchase gives consumers significant exposure to various touchpoints, there is also the need to fully understand the collaboration associated with using SST and mobile/web-based applications in greater detail within a South Africa context. With consumer behaviour having been further influenced or altered by the COVID19 pandemic, more consumers prefer contactless surfaces and personal devices to obtain information and can be reluctant to make use of SST innovations as it increases exposure to COVID 19 infections (Li and Huang, 2022) section 2.3.4. The influence of mobile technology on shopper behaviour should therefore be considered within a path to purchase and can be covered more in future research studies.

7.8 Confirmed Model for SST adoption

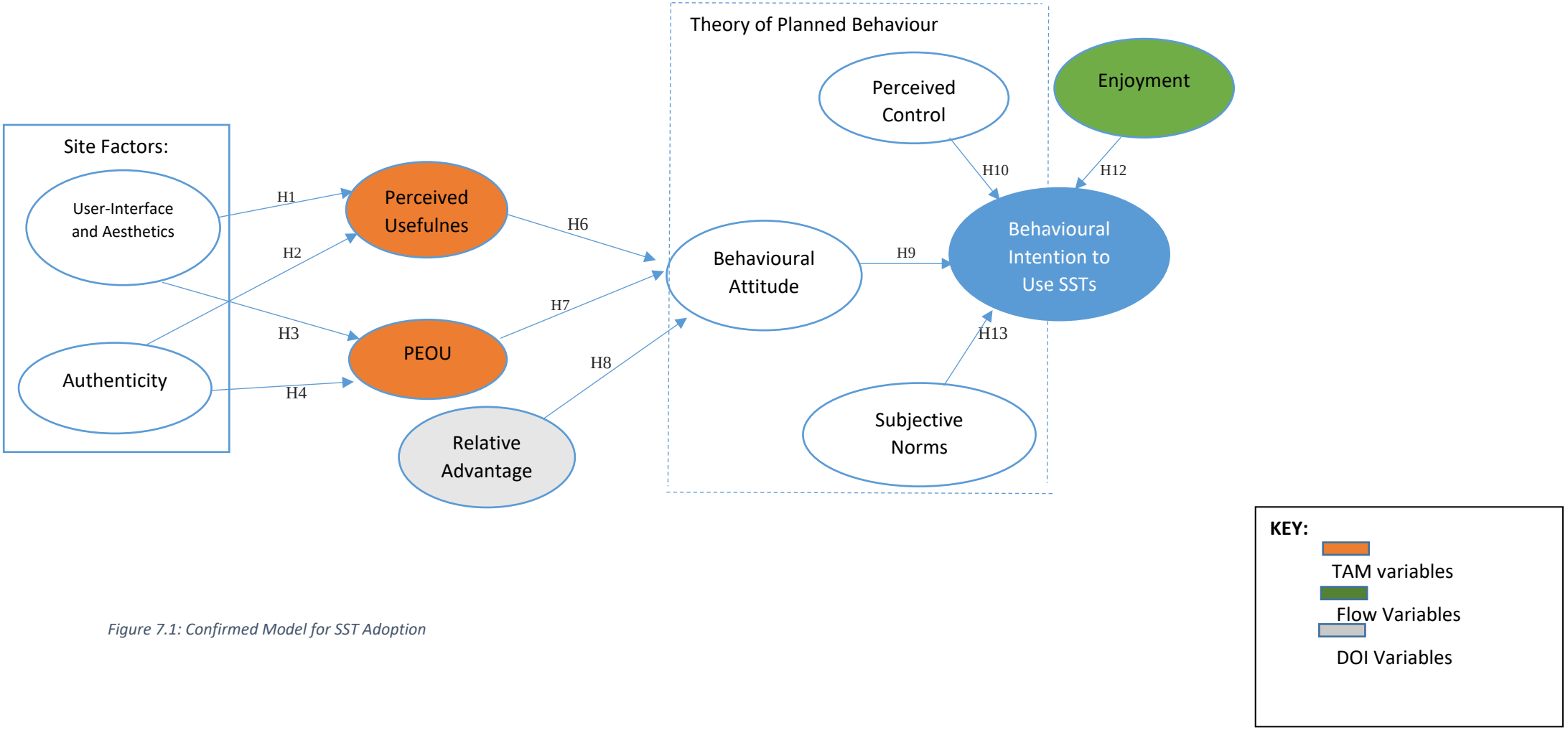

Figure 7.1: Confirmed Model for SST Adoption

Based on the results discussed in Chapter 6 section 6.6.3, as well as concluding discussions in Section 7.3 and Section 7.4, the model above is confirmed as the consolidated framework that influences the usage and adoption of SST innovation within shopping mall environments. Two constructs, Complexity and Concentration, were removed from the model as two hypotheses (H5 and H11) that contained these two constructs were not significant.

7.9 Overall conclusion of the study

SSTs continue to increase in popularity within the retail shopping environments in most emerging economies as these innovations are good information repositories and important touch points to foster interaction between consumers and retailers within the path to purchase. It has therefore become imperative to understand the factors or influences that drive shoppers to use these innovations, as well as understand their impact on shopper service experiences. The study was largely motivated by the need to determine key factors which can enhance the behavioural intention to use SSTs within shopping mall environments to equip retailers, systems designers, marketers and shopping mall owners with the significant factors that will drive the right level of engagement with consumers.

The factors that influence Behavioural Attitude to adopt SST and the Behavioural Intention to adopt are very important to fully understand SST adoption within a mall environment. The study revealed that except for Concentration, shoppers' Behavioural Attitude, Perceived Control, Enjoyment and Subjective norms all significantly influenced Behavioural Intentions (BI) of malls shoppers to use SSTs. Behavioural Attitude for consumers will increase if they derive Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Relative Advantage (RA) from using SSTs.

Although several factors were widely identified as enablers to increase the wide adoption and usage of SSTs, it is important to note that consumer behaviour, interaction and engagement is also significantly affected by the COVID19 pandemic. Most consumers are then less susceptible to using public facilities and areas with a lot of contacts as that increases their exposure to contracting diseases, such as COVID19. The integration of mobile technology through these SSTs can help to bridge the gap that has been created by the COVID19 pandemic as shoppers can still make use of these SST touch-points and complement their engagement using mobile applications such as mApp application, which has allowed shoppers to be able to utilise the map features to navigate towards their desired stores. Shoppers are able to extend

the functionality of the SST screens by scanning a QR code which redirects them to the mobile application to source the relevant product and services information that they require.

Based on the above, it can be concluded that the **primary objective of the study** was achieved. The primary objective of the study was to examine the SST site factors (i.e., user interface, aesthetics, and authenticity), the technology-related factors (i.e., relative advantage, complexity, PEOU, PU), social and consumer factors (i.e., subjective norms, perceived behavioural control, enjoyment, and concentration) driving the attitudes and behavioural intentions to use SSTs in selected shopping malls in Johannesburg. Discussion and Conclusions relating to this was discussed in greater detail in sections 7.2, 7.3 and 7.4. Key to ensuring optimum service experiences is ensuring that mall owners effectively implement SST that add functional value and are easy to use for shoppers, as evidenced in the SEM where high scores were noted for Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) as important factors that can influence Behavioural Attitude (BA) which in turn, influences Behavioural Intention (BI) to use SSTs. Through effective content curation that makes it easier for shoppers to process and make use of SST information, shoppers are likely to derive positive Behavioural Attitudes and benefit from the implementation of these SST innovations through their usage and adoption within shopping mall environments.

My greatest desire is that shopping mall owners, and occupants can enhance the shopping mall experience of shoppers using SSTs as media for interaction and engagements with shoppers. To effectively implement these SST innovations and ensure optimum adoption and usage by shoppers, the SST adoption model will assist shopping mall owners and occupants to understand the key drivers that can increase the level of usage and interactivity that shoppers have with these SST which will increase the behavioural intention to use these innovations and repeat usage in the long-term.

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Appendix A: Ethics Clearence

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Uta

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H19/04/30**
PROJECT TITLE	The use of self-service technologies (interactive screens) in enhancing the shopping experience in selected South African shopping malls: A consumer/shopper perspective
INVESTIGATOR(S)	Mr L Uta
SCHOOL/DEPARTMENT	Economic and Business Science/
DATE CONSIDERED	26 April 2019
DECISION OF THE COMMITTEE	Approved
EXPIRY DATE	14 August 2022

DATE 15 August 2019 **CHAIRPERSON** _____
(Professor J Knight)

cc: Supervisor : Dr N Chiliya

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

_____ _____/_____/_____
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix B:Questionnaire

University of the Witwatersrand, Johannesburg

Title of Research Project: The use of Self-Service Technologies (interactive screens) in enhancing the shopping experience in selected South African shopping malls (A consumer/shopper perspective)

University of the Witwatersrand, Johannesburg

Title of Research Project: The use of Self-service Technologies (interactive screens) in enhancing the shopping experience in selected South African shopping malls (A consumer/shopper perspective)

Name of principal researcher: Lloyd Uta
Department/research group address: Faculty of Commerce, Law and Management (Marketing)
Telephone: 079 406 0419/079 8766392
Email: kudzanai.uta@gmail.com
Nature of Research: Quantitative Research
Participant's involvement: Respondent (To fill up the questionnaire)

Research Supervisor- Prof HB Klopper
- Tel- 0823361044
-Email- hb@davinci.ac.za

What's involved? The participant is required to fill-in the questionnaire
Risks: No risks involved
Benefits: No benefits

I acknowledge the following:

- I agree to participate in this research project.
- I am over 18 years if age
- I have read this consent form and the information it contains and had the opportunity to ask questions about them.
- I agree to my responses being used for education and research on condition that my privacy is respected, subject to the following:
    - I understand that my personal details may be used in aggregate form only, so that I will not be personally identifiable.
    - I understand that I am under no obligation to take part in this project.
    - I understand I have the right to withdraw from this project at any stage.

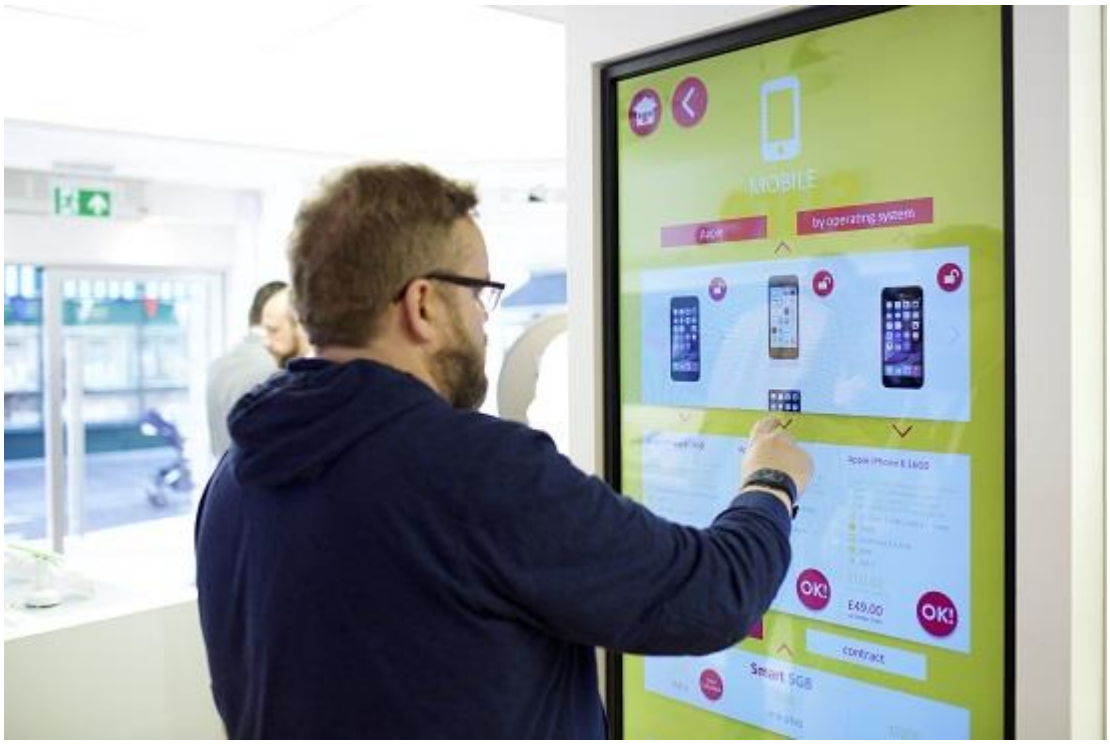
Signature of Participant: _____

Signature of researcher (Lloyd Uta):

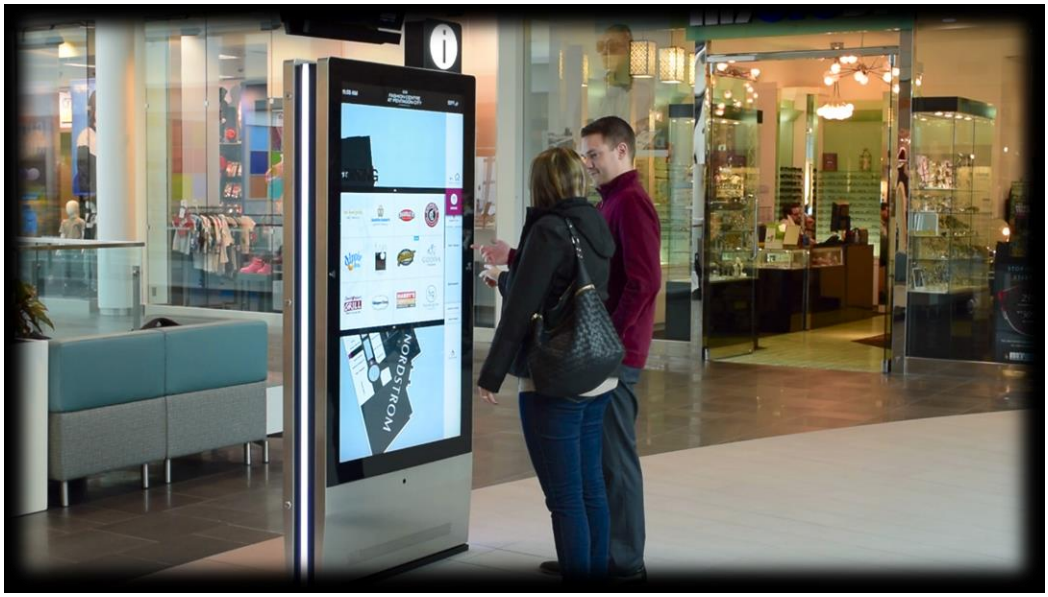
About self-service Screens

Self-Service Technologies such as interactive screens allow shoppers and consumers to navigate, select as well as search for content that they require within a shopping-mall setting easily. Consumers can use these facilities to search for directions, product and service availability as well as other advertisement information. In most recent times, these innovations have continued to sprout in South Africa's shopping-malls particularly in Johannesburg and we anticipate more to be installed for the consumers' convenience overtime. This questionnaire seeks to understand some of the factors which may influence the wide adoption of these innovations by South African consumers. Examples of these Self-Service Technologies (SSTs) have been provided below for your information:

Insert A: A shopper interacting with a Self-Service Technology or Interactive Screen within a shopping mall setting.



Insert B: Consumers using an interactive-screen to search for information in a shopping-mall


NORDSTROM

SECTION A

1) What is your gender? Male Female

2) How old are you? Please select the age that you are in in the spaces provided below:

Age	mark (X)
18-24	
25-34	
35-44	
45-54	
55-64	
65 and over	

3) Do you shop online? Yes No

4) Have you ever used a self-service technology such as ATMs, Self-Service Movie Terminals? Yes No

5) Which Joburg Shopping-Mall do you use the most (select one)?

Age	mark (X)
None	
Rosebank	
Sandton	
Mall of Africa	
Other? (Please specify)	

6) Have you ever used Self-service Service Screens within a shopping mall setting?

Yes	No

7) Please Select your current Occupation	mark (X)
Student	
Professional	
Unemployed	
Pensioner	

8) Kindly select the frequency at which you make use of online-shopping platforms:

Usage rate	mark (X)
Minimal user (Visit online platforms less than once a week)	
Average user (Visit online platforms once or twice a week)	
Frequent user (visit Online Shopping Applications 2-3 times a week)	
Heavy user (visit Online Shopping Applications more than 3 times a week)	

For Section B, please indicate your perception towards the adoption of self-service technologies and interactive screens. Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4= agree, or 5 strongly agree)

SECTION B

Questions 1-5: The following questions are focused on your perception of User Interfaces when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

1. User Interface Aesthetics

Strongly Disagree → **Strongly agree**					
6) I would prefer working with SSTs provided they display attractive products on screen	1	2	3	4	5
7) I like how SSTs such as ATMs and Parking systems look	1	2	3	4	5
8) I would prefer SSTs to be entertaining and animated to increase my levels of engagement and interaction.	1	2	3	4	5
9) Finding the SST system site engaging, and energizing is important to me.	1	2	3	4	5
10) Layout of a SST is likely to influence my interest to using the innovation	1	2	3	4	5

2. Authenticity:

Questions 6-10: The following questions are focused on your perception authenticity when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

Strongly Disagree → **Strongly agree**					
11) Using SSTs creates a product experience like the one I would have when shopping in a store	1	2	3	4	5
12) Using SSTs lets me feel like I am actively browsing with products and services within a real-store (i.e. virtual affordance)	1	2	3	4	5
13) Making use of SSTs makes me feel like I am interfacing directly with Sales personnel within a store-setting	1	2	3	4	5
14) Level of clarity and closeness to reality is important to me when interacting with SSTs and interactive screens	1	2	3	4	5
15) I am more likely to enjoy using an SST if the level of clarity is closer to the real product in-store	1	2	3	4	5

Questions 11-17: The following questions are focused on your perception of complexity when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

3. Complexity

Question **Response**

Strongly disagree →					**Strongly agree**
16) SSTs are easy to operate, and Internet banking is important to me.					
17) I will not use a self-service station if I find it confusing or too complex to understand.	1	2	3	4	5
18) I find the terminology associated with many self-service innovations confusing.					
19) I am likely to recommend self-service machines to my friends if I enjoy the experience of using them.	1	2	3	4	5

Questions 18-22: The following questions are focused on your perception of perceived ease of use when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

4. Perceived Ease of Use

Strongly Disagree →					**Strongly agree**
20) I am likely to find it easy for me to adopt a new self-service innovation to enhance my shopping experience.	1	2	3	4	5
21) I am likely to find it easy to interact with self-service technologies	1	2	3	4	5
22) SSTs and interactive screens are generally easy to use for me	1	2	3	4	5
23) Using SSTs and interactive screens in shopping-malls is self-explaining	1	2	3	4	5
24) Learning to use SSTs and interactive screens is simple for me	1	2	3	4	5

Questions 23-27: The following questions are focused on your perception of enjoyment when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree).

5. Enjoyment

Question **Response**

Strongly disagree → Strongly agree					
25) When I use SSTs, I look forward to an exciting and fulfilling service experience	1	2	3	4	5
26) I am likely to find the use of SSTs in the shopping centers to be interesting	1	2	3	4	
27) I am likely to derive high levels of excitement from making use of SSTs to enhance my shopping experience.	1	2	3	4	5
28) I enjoy shopping for its own sake and not because that I need to purchase something.	1	2	3	4	5

Questions 28-32: The following questions are focused on your perception of concentration when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

6. Concentration

Strongly Disagree → Strongly agree					
29) During Online Shopping, I tend to be absorbed immensely in the activity	1	2	3	4	5
30) My attention is likely to focused on the activity I will be working on when I use SSTs	1	2	3	4	5
31) SSTs will require my undivided attention and concentration when I am making use of them in the mall	1	2	3	4	5
32) I enjoy being deeply engrossed when using technology products	1	2	3	4	5
33) I do not enjoy getting disturbed while using SST or interactive screens	1	2	3	4	5

Questions 33-38: The following questions are focused on your perception of perceived usefulness when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

7. Perceived Usefulness

Strongly Disagree → Strongly agree					
34) Using SSTs makes it easier for me to make informed purchase decisions within a shopping-mall setting	1	2	3	4	5
35) Using SSTs enables me to accomplish more when I am shopping	1	2	3	4	5
36) I become more interested in using an innovation if it is able to provide me with the right products and service information I require.	1	2	3	4	5
37) I feel more efficient and effective when I use SSTs in shopping-malls to assist me in making purchases	1	2	3	4	5
38) I find SSTs useful	1	2	3	4	5

Questions 38-43: The following questions are focused on your perception of behavioral attitude when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

8. Behavioral Attitude

Strongly Disagree → Strongly agree					
39) I like to make use of SSTs when using shopping in a mall	1	2	3	4	5
40) I find making use of SSTs when shopping as something that is easy to do	1	2	3	4	5
41) All things considered, I find SSTs to be a good idea	1	2	3	4	5
42) I find making use of SSTs to enhance my shopping experience to be favorable	1	2	3	4	5
43) I find the adoption of SSTs to be a positive direction of improving our shopping malls	1	2	3	4	5

Questions 44-48: The following questions are focused on your perception of subjective-norms when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

9. Subjective Norms:

Strongly Disagree →					Strongly agree
44) People important to me would think that using SSTs would be a wise idea	1	2	3	4	5
45) Most people important to me would think I should use SSTs to enhance my shopping experience	1	2	3	4	5
46) My family would think that that adopting SSTs in a shopping-mall setting would be a wise idea	1	2	3	4	5
47) Generally, I like to do what my family and friends think I should do	1	2	3	4	5
48) I think people who are important to me make use of SST within a shopping-mall environment	1	2	3	4	5

Questions 48-52: The following questions are focused on your perception of relative advantage when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

10. Relative Advantage

Strongly disagree →					Strongly agree
49) Using SSTs within a shopping-mall setting will help increase my levels of productivity	1	2	3	4	5
50) I believe that self-service technologies will be more convenient for me when doing online-shopping	1	2	3	4	5
51) I believe that self-service fuel stations will greatly help to enhance the quality of my day	1	2	3	4	5
52) I am comfortable using self-service innovations to cut down costs and inconveniences	1	2	3	4	5
53) I am motivated to make use of a self-service innovation, provided there is sufficient training and it improves my current purchase process	1	2	3	4	5

Questions 53-56: The following questions are focused on your perception of behavioral intention when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

11. **Behavioral Intention to Use SSTs**

Strongly disagree →					**Strongly agree**
54) I predict that I will keep using SSTs more in the future at least as much as I have used it lately.	1	2	3	4	5
55) I predict that I will use SSTs more frequently rather than less frequently.	1	2	3	4	5
56) It is likely that I will use SSTs more often rather than less often during the next couple months.	1	2	3	4	5
57) I intend to use SSTs at least as often within the next 3 months as I have previously used	1	2	3	4	5
	1	2	3	4	5

Questions 57-61: The following questions are focused on your perception of perceived control when using SSTs and other innovations within a shopping-mall setting.

Please Circle the response that best describes your level of agreement to each statement. (1=strongly disagree 2=disagree, 3=neutral 4=agree, or 5 =agree)

12. <u>Perceived Control</u>

Strongly disagree →					**Strongly agree**
58) I will be able to operate an Interactive-Screen	1	2	3	4	5
59) I have the resources that will help me to use interactive screens	1	2	3	4	5
60) I have the knowledge and skill sets required to make use of interactive screens	1	2	3	4	5
61) I can use SSTs or interactive screens whenever I engage with them	1	2	3	4	5
	1	2	3	4	5

Thank You!

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Uta

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H19/04/30**
PROJECT TITLE	The use of self-service technologies (interactive screens) in enhancing the shopping experience in selected South African shopping malls: A consumer/shopper perspective
INVESTIGATOR(S)	Mr L Uta
SCHOOL/DEPARTMENT	Economic and Business Science/
DATE CONSIDERED	26 April 2019
DECISION OF THE COMMITTEE	Approved
EXPIRY DATE	14 August 2022

DATE 15 August 2019 **CHAIRPERSON** _____
(Professor J Knight)

cc: Supervisor : Dr N Chiliya

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

_____ _____/_____/_____
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix C: Confirmation of Proofreading

This serves to confirm that I have proofread this research report and have made the necessary corrections, suggestions, and emendations:

The use of Self-service Technologies (interactive screens) in enhancing the shopping experience in selected South African shopping malls: a consumer/shopper perspective

by

Lloyd Uta

I have been proofreading articles, Honours, Masters and Doctoral dissertations, research reports and theses for the past 14+ years for, *inter alia*, the following institutions: University of the Witwatersrand; GIBS; University of Cape Town; Milpark; Mancosa; University of KwaZuluNatal; University of Johannesburg; Unisa; Tshwane University of Technology; Stellenbosch; Henley Business School, Regenesys, University of Pretoria, University of Zululand, the Da Vinci Institute and, more recently, the Stadio Group.

I have also undertaken proofreading for publishers, such as Oxford University Press, Knowledge Resources and Juta & Company, companies, institutions, and non-governmental organisations.

I have a major in English, and excellent knowledge of Afrikaans.

Jennifer Croll

BA(Wits); H.Dip.Lib. (UCT); B.Tech.(LIS), B.Inf.Sc.(Hons)(Unisa); MM(Research), MM(Strategic Marketing)(Wits).

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Date: 3rd July 2022

Appendix D: Turnitin

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Lloyd Uta

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