Assessing the impact of Self-Service Technology (SST) service quality on customer satisfaction and loyalty: A case in the Maltese retail industry

by

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Abstract

Purpose: The objective of this study is to determine the relevant on-site Self-Service Technology (SST) service quality dimensions from the customers' perspective (primary objective) and to assess whether such perceptions lead to customer satisfaction and loyalty (secondary objective) within the Maltese retail environment.

Methodology: Quantitative online and face-to-face questionnaires were utilised to collect data regarding SST service quality (SSTSQ) dimensions, customer satisfaction and loyalty from the consumers' perspective. This was done by recruiting participants that have interacted with the Self-Checkout Systems (SCS) at Decathlon, the only retail store in Malta that has SCSs.

Findings: The results suggest that all ten tested dimensions were positive and statistically significant dimensions of on-site SSTSQ, some of which had a stronger impact than others. Additionally, a positive and statistically significant correlation was obtained amongst SSTSQ, customer satisfaction and ultimately, loyalty. Finally, evidence also proved customer satisfaction as a mediator of SSTSQ and customer loyalty.

Limitations: The main challenge was the outbreak of the COVID-19 pandemic, resulting in sample size limitations and other difficulties. The sampling technique utilized to select participants for this study also effected the representativeness of the sample.

Implications: This study has important theoretical implications which add value to the current SSTSQ literature. Moreover, this study also offers practical implications, both to the retail store that already adopts self-checkouts (Decathlon), as well as to other retail stores that might consider introducing such technology as part of their operations.

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List of Abbreviations

SST	Self-Service Technology
SCS	Self-Checkout System
SSTSQ	Self-Service Technology Service Quality
TBSS	Technology-Based Self-Service
TAM	Technology Acceptance Model
TR	Technology Readiness
FUN	Functionality
ENJ	Enjoyment
SEC	Security
ASU	Assurance
DES	Design
CON	Convenience
CUS	Customization
CNT	Control
SPE	Speed of Delivery
EMP	Support by Employees
SAT	Customer Satisfaction
LOY	Customer Loyalty
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
SEM	Structural Equation Modelling
IV	Independent Variable
DV	Dependent Variable
MV	Mediating Variable

Chapter 1: Introduction

1.1 Background to the study

Self-Service Technologies (SSTs) enable customers to produce a service without interaction with employees (Meuter, Ostrom, Roundtree and Bitner, 2000). Such types of technologies are being adopted in a variety of industries, including the introduction of Self-Checkout Systems (SCSs) in the retail environment. The latter, although heavily used in numerous countries, have only been recently adopted in Malta.

Given that such on-site SSTs are relatively new, it is crucial for service providers, within the Maltese retail environment, to have an understanding of the dimensions regarding on-site SST service quality (SSTSQ) from the consumers' perspective and determine whether SSTSQ leads to customer satisfaction and loyalty.

1.2 Objectives of the study

The purpose of this study is to identify and determine the relevant SSTSQ dimensions from the customers' perspective (primary objective) and to assess whether such perceptions lead to customer satisfaction and loyalty (secondary objective) within the Maltese retail environment.

1.3 Relevance of the study

This study is aimed at providing relevant practical and theoretical implications, in addition to recognizing and solving any gaps that exist in the current literature.

Firstly, this study is intended to provide important theoretical contributions by revising and possibly enhancing the SSTQUAL framework. The latter, developed by Lin and Hsieh (2011), includes seven dimensions which consumers utilize to assess service quality when interacting

with SSTs. Although widely adopted and validated in numerous industries and countries, the SSTQUAL scale was developed nearly ten years ago and therefore may require revision. Radomir and Nistor (2012, 2014) made an attempt to revise the SSTQUAL scale to better reflect the perspective of Romanian customers regrading SSTSQ within the banking industry context. The authors came up with a revised SSTQUAL framework and presented arguments supporting the refined version. However, the main limitation of this refined scale is that it cannot be generalised, but can only be applicable to one industry, i.e. banking services in Romania. Following the revised version, this study will similarly attempt to construct a more up-to-date scale of the SSTQUAL framework to determine the dimensions of SSTSQ, applicable to the Maltese retail industry.

Furthermore, the main practical and managerial implication of this study is that the research conducted in the Maltese environment can provide valuable insights to Maltese organisations, especially those located in the retail industry (department stores, supermarkets, grocery stores, etc.), to evaluate the possibility of successfully introducing SCSs in their outlets.

Finally, this study intends to deal with three major gaps present in the current SST literature, as explained below:

Firstly, the majority of the studies conducted on SSTs focus on defining attributes that affect consumers' intentions to adopt/use SSTs, based on theories of consumer attitudes. However, fewer studies focus on consumers' perceptions towards the service quality of SSTs. To solve this gap, this study will focus on the latter (GAP 1).

The second gap highlights that most studies that focus on identifying consumers' perceptions towards SSTSQ, emphasise on evaluating service quality of off-site SSTs (e.g. websites). Conversely, fewer studies focus on evaluating customers' service quality perceptions of on-

site SSTs (e.g. self-checkout kiosks). To deal with such gap, this study will concentrate on identifying on-site SSTSQ dimensions from the customers' perspective (GAP 2).

The third and final gap found in the current SST literature is a cultural gap. In general, the few studies that are focused on on-site SSTs have predominantly been conducted in Western counties (mainly in the US), exhibiting cultural factors such as high individualism and low long-term orientation. Such factors are relatively different from Malta, which is characterised by an exceedingly high uncertainty avoidance. Such differences in culture may result in different SSTSQ perceptions among various consumers in different counties. To address such a cultural gap, this study intends to identify the different service quality aspects from on-site SSTs that will emerge from a country that has not yet been investigated. This involves testing various service quality dimensions in a new cultural dimension, i.e. Malta (GAP 3).

1.4 Self-Service Technologies in Malta

In the case of Malta, although there has been a rise in the adoption of SSTs mainly in the banking, hotel and airline industries, the adoption of Self-Checkout Systems (SCSs) in Malta was absent until a few months ago. In fact, a large retail store in Malta, Decathlon, has recently introduced the use of SCSs[1], enabling consumers to use technology in order to scan items themselves, thus requiring increased consumer participation. The introduction of such technology served as highly beneficial for this study to determine the service quality dimensions from the SCS implemented at Decathlon in the Maltese retail industry.

[1] *SCSs at Decathlon in Mata were introduced in October 2019.*

1.5 Thesis Outline

The first chapter has provided an introduction by outlining the main objectives and implications of this study as well as some major gaps within the current SST literature.

Chapter two thoroughly explains existing theoretical literature on the dimensions of on-site SSTSQ and their influence on customer satisfaction and loyalty. This leads to the formulation of the research questions and hypotheses, depicted in this study's proposed model.

The Methodology chapter determines the research approach, design and instrument used for gathering data, consistent with the objectives of this study. Quantitative data was gathered through face-to-face and online questionnaires, using measurement items from previously validated instruments.

Chapter four presents the results, which includes transforming raw quantitative data and presenting it in graphics, tables, and figures by using statistical tools. Analysis of results was conducted through tests of reliability and correlation, together with factor analysis and structural equation modelling.

Findings are discussed in Chapter five and compared to existing literature to determine any similarities and/or differences that might have emerged. Such a chapter also emphasizes on the study's practical and theoretical implications.

Finally, a review of the most crucial results, together with the study constraints and suggestions for future research, can be found in Chapter six.

Chapter 2: Literature Review

2.1 Introduction

This chapter underlines existent literature regarding general SSTs as well as provides a detailed description of empirical research that focused on identifying on-site SSTSQ dimensions from consumers' perspective, conducted in different time periods, industries, and countries. This developed the conceptual framework, outlining this study's research questions and hypotheses, in line with the primary and secondary objectives.

2.2 Self-Service Technologies

SSTs were termed by Meuter, Ostrom, Roundtree and Bitner (2000, p. 50) as "… technological interfaces that enable customers to produce a service independent of direct service employee involvement". Many industries have adopted such technologies to offer their services to customers (Orel and Kara, 2014), including:

Service Industry	Type of SST
Banking	internet banking ATMs
Hotel	self-check in/out
Airline	online check in check in kiosks
Education	distance learning
Automotive	pay at the pump
Restaurants	ordering kiosks
Retail	online purchasing self-scanning

Table 1: SSTs in various industries (Source: Author)

Such SSTs are usually divided into two main categories; machine assisted services (on-site) or electronic services (off-site), both of which are facilitated by using technology (Fitzsimmons, 2003). In fact, Dabholkar and Bagozzi (2002, p. 184) further refer to SSTs as Technology-Based Self-Services (TBSS), including:

> "on-site" options such as touch screens in department stores, information kiosks at hotels, and self-screening in grocery stores and libraries; it also includes "off-site" options such as telephone and on-line banking and shopping on the Internet

The terms 'SSTs' and 'TBSS' have been used interchangeably within various literature, with the former term being recently preferably used (Kelly, Lawlor and Mulvey, 2019).

Among the SSTs mentioned above, Self-Checkout Systems (SCSs) have been commonly adopted within the retail environment in numerous countries, due to their enhanced service perception (Dabholkar, Bobbitt and Lee, 2003). In fact, existing literature highlights various benefits and drawbacks in adopting and using SCSs, outlined in Table 2 below.

Throughout the years, various SST studies have focused on distinct aspects. Meuter *et al.* (2000) and Hsieh (2005) explored the causes of customer dissatisfaction and satisfaction while using SSTs. However, the majority of the existing literature on SSTs focused on identifying factors that impact the consumer intention to utilise or adopt SSTs (Bobbitt and Dabholkar, 2001; Curran, Meuter and Surprenant, 2003; Lee *et al.*, 2010; Blut, Wang and Schoefer, 2016; Ujang *et al.*, 2016), based on theories of consumer attitudes towards SSTs. In fact, as seen in Table 3, research on SSTs mainly focused on identifying elements that impact the consumers' intentions to use/adopt SSTs in their everyday lives. Conversely, fewer studies are directed towards the consumers' perceptions towards SSTSQ. Thus, this study will contribute in identifying the dimensions of SSTSQ from the customers' point of view (GAP 1).

	Service providers	Source
Benefits	Reduction of staff, hence minimizing training costs.	(Dabholkar *et al.*, 2003)
Drawbacks	Quality threats. If the technology is not efficiently accepted by consumers, the firm might face higher costs of keeping staff as well as adopting the SST.	(Kelly *et al.*, 2019) (Lee and Allaway, 2002)
	Customers	**Source**
Benefits	Shorter waiting times, faster service, and perceived security. Intrinsic benefits including enjoyment, independence, and avoidance of service employees (some customers believe they can provide a more precise and efficient service themselves).	(Hsieh, 2005) (Dabholkar *et al.*, 2003; Meuter, Ostrom, Bitner and Roundtree, 2003)
Drawbacks	Higher levels of responsibility and participation in producing the service, leading to higher risks. Other negative psychological outcomes such as humiliation or anxiety.	(Lee *et al.*, 2002) (Meuter *et al.*, 2003)

Table 2: Benefits and Drawbacks of SCSs for service providers and customers (Source: Author)

Theory/Model	Study	Description
Technology Acceptance Model (TAM)	(Davis, 1985) (Davis, Bagozzi and Warshaw, 1989)	Explored the effect of consumer behaviour towards SSTs when consumer attitudes are present.
Technology Readiness (TR) Index	(Parasuraman, 2000)	Measured the willingness of individuals to adopt and use new technology, based on four dimensions, divided into positive (optimism and innovativeness) and negative (discomfort and insecurity) attributes.

Table 3: Theories of consumer attitudes towards SSTs (Source: Author)

2.3 SST Service Quality

Service quality highlights the distinction among the consumers' expectations and judgements as opposed to the actual service received. In other words, it refers to factors that consumers consider while assessing services (Lewis and Booms, 1983). Studies on SSTSQ mainly focus on the interaction of consumers with the service firm either face-to-face or through online interactions.

2.3.1 Face-to-face interaction

Traditionally, Parasuraman, Zeithaml and Berry (1988) and Cronin and Taylor (1992) developed the SERVQUAL and SERVPERF scales respectively, addressing service quality arising from a customer-to-employee interaction (Iqbal, Hassan and Habibah, 2018).

2.3.2 Online interaction

A substantial amount of existing literature examined SSTSQ, mostly focusing on online interactions, ie. e-services. For instance, Barnes and Vidgen (2001) expanded the five-dimension SERVQUAL to a seven-dimension WebQual to study the quality of internet sites. Additionally, Yoo and Donthu (2001) constructed a four-component measure to determine the perceived quality of a website used for internet shopping (SITEQUAL):

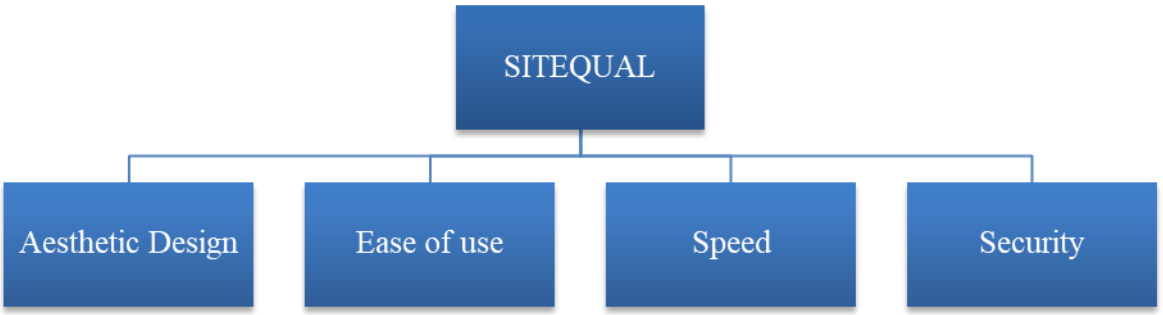


Figure 1: SITEQUAL dimensions (Source: Yoo and Donthu (2001))

Zeithaml, Parasuraman and Malhotra (2002) established 11 elements created to assess the delivery of service quality electronically. The same authors continued to develop the E-S-QUAL scale, involving four quality elements, to assess the service quality presented by online shopping suppliers:

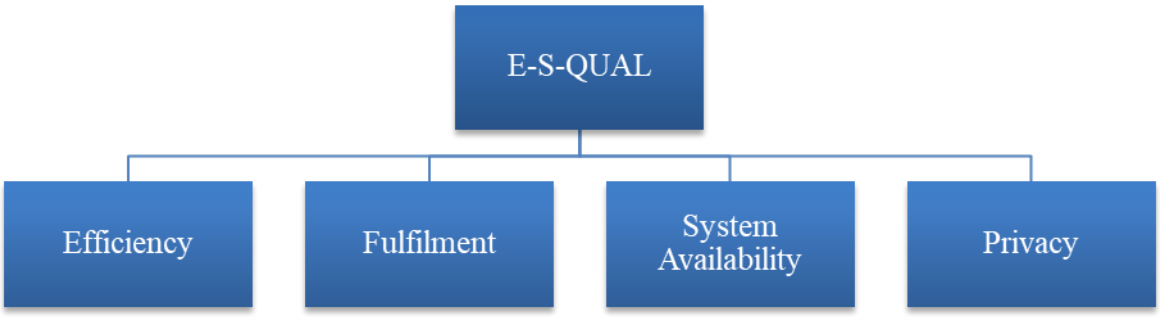


Figure 2: E-S-QUAL dimensions (Source: Parasuraman, Zeithaml and Malhotra (2005))

Bauer, Falk and Hammerschmidt (2006) built a five-dimension transaction process-based measure (eTransQual) to assess the quality of electronic service encounters. Finally, Ding, Hu and Sheng (2011) constructed the e-SELFQUAL to further capture service quality through four elements:

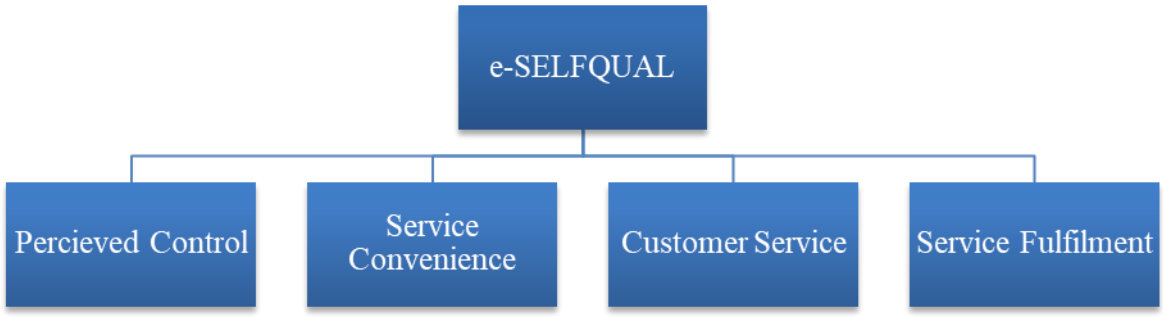


Figure 3: e-SELFQUAL dimensions (Source: Ding, Hu and Sheng (2011))

While a huge amount of research within the service quality area focuses on evaluating service quality derived from face-to-face as well as online interactions with SSTs (off-site), hardly any research is conducted on service quality from SCS interaction (on-site). Hence, this study will be based on identifying service quality dimensions, specifically from on-site SSTs (GAP 2).

2.4 Dimensions of service quality from on-site SSTs

As part of the literature review, an analysis of existent studies that focus on identifying the on-site SSTSQ dimensions, from the customer perspective, has been conducted. The outcomes are portrayed in Table 4.

Study	Dimensions of service quality		Type of on-site SST	Industry	Country
	Significant	Not Significant[2]			
(Dabholkar, 1996)	- Ease of use - Enjoyment - Control	- Speed of delivery - Reliability / Accuracy	Self-ordering kiosks in fast-food restaurants	Retail	US
(Anselmsson, 2001)	- Enjoyment - Reliability - Ease of use - Relationship with service employees - Control		Self-scanning services in a grocery store and in a library	Retail	Sweden
(Anitsal and Paige, 2006)	- Level of support offered by contact employees - Perceived extent of customer participation	- Overall TBSS quality as perceived by customer	Self-checkouts, price checkers and electronic kiosks in grocery stores	Retail	US
(Marzocchi and Zammit, 2006)	- Enjoyment / Hedonic Value - Control		Self-scanning checkouts in a supermarket	Retail	Italy
(Lee, Fairhurst and Lee, 2009)	- Reliability - Personal Interaction - Problem Solving		Self-checkout and information kiosk	Retail	US

[2] *Not significant implies that the dimensions mentioned in such column do not have an impact on consumers' assessment of on-site SSTSQ*

(Ganguli and Roy, 2011)	- Customer Service - Technology security and information quality - Technology convenience - Technology usage easiness and reliability		Technology-based services (ATMs, internet banking, etc.)	Banking	US
(Lin *et al.*, 2011)	- Functionality - Enjoyment - Security / Privacy - Assurance - Design - Convenience - Customization		Various self-service technologies	Various	Taiwan
(Radomir *et al.*, 2012)	- Image - Functionality - Enjoyment - Customization - Security / Privacy	- Assurance - Convenience	Electronic banking services (ATMs, Internet Banking and Mobile Banking)	Banking	Romania
(Lee, Fairhurst and Cho, 2013)	- Time convenience / Speed of delivery - Ease of use - Control - Enjoyment		Self-checkouts	Retail	US
(Orel *et al.*, 2014)	- Functionality - Enjoyment - Assurance - Design - Convenience	- Security / Privacy - Customization	Self-checkout system in a supermarket	Retail	Turkey
(Iqbal *et al.*, 2018)	- Functionality - Enjoyment - Security / Privacy - Assurance - Design - Convenience - Customization		Various self-service technologies	Various	Pakistan

Table 4: Existing literature on the dimensions of on-site SSTSQ (Source: Author)

As observed in Table 4 above, the studies that focused on finding the service quality dimensions of on-site SSTs were conducted in different time periods, performed in a variety of industries situated in the services sector and studied in numerous countries. This raises the issue whether different cultures influence the importance/significance of service quality dimensions.

To understand culture, one can make reference to the well-known and widely adopted work of Hofstede. Hofstede (2001, p. 4) describes culture as the "collective programming of the mind which distinguishes the members of one group or category of people from those of another". Hofstede (2001) proposed five cultural dimensions, which were later extended to six dimensions, that can be used to make predictions on how an individual from a certain country is likely to behave in certain situations (*National Culture - Hofstede Insights*). These cultural dimensions distinguish the diversified cultures found in various countries, and comprise of:

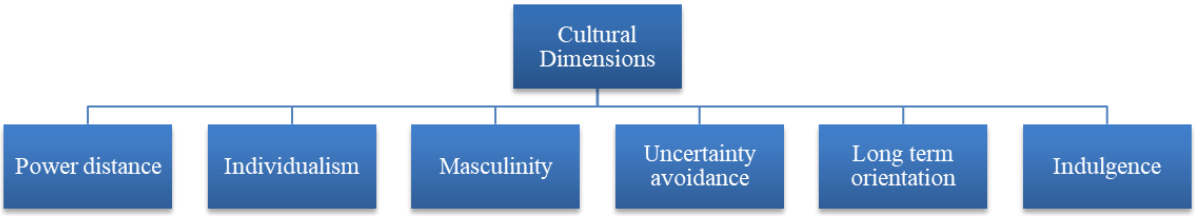


Figure 4: Hofstede cultural dimensions (Source: National Culture - Hofstede Insights)

Hofstede's contributions in identifying cultural dimensions has been extensively criticized, regarding internal validity and the failure to address the individual level disparities of cultural values (Nguyen, Cao and Phan, 2015; Guesalaga, Pierce and Scaraboto, 2016). However, such dimensions have been found "generalizable" to outline the disparities between cultures (Furrer, Liu and Sudharshan, 2000). Therefore, the six dimensions as suggested by Hofstede suffice for this study, since a comparison between countries at a national (rather than at an individual) level is being made.

A variety of studies have been performed to verify whether a relationship is present amongst the above-mentioned dimensions of culture and the consumers' views of service quality (Furrer *et al.*, 2000; Nguyen *et al.*, 2015; Khashkhuu, 2016). Most studies find evidence that service quality perceptions differ between individuals due to differences in cultures.

In fact, Furrer, Liu and Sudharshan (2000), in their research concerning service quality perceptions in retail banking, show that the significance of service quality elements varies between distinct cultures. Furthermore, Donthu and Yoo (1998) concluded that due to a diverse culture, customers differ their service quality perceptions, both overall and for each separate dimension, highlighting cross-cultural variations in expectations of service quality. Although their results were based on individual level cultural orientations, such findings were also generalized to the different countries, concluding that Asian and Latin American countries[3] are expected to have lower service quality expectations than Western countries[4]. Such cultural-specific findings were also highlighted by Tsoukatos (2007), who also concluded that there are still challenges that create the need for potential studies to evaluate the correlation among service quality and culture.

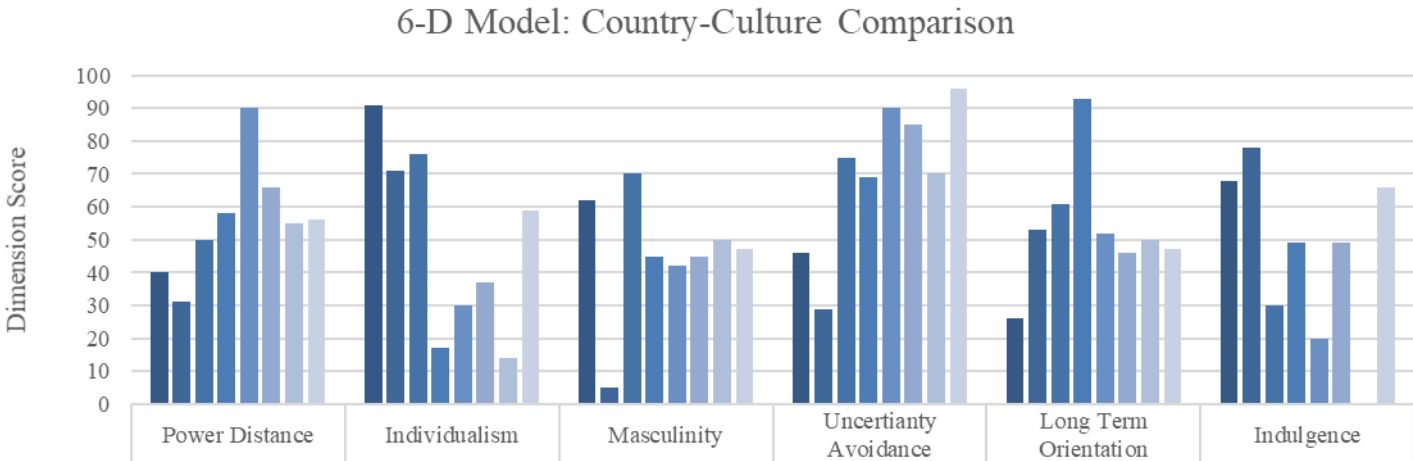
Moreover, as outlined by Fisher and Beatson (2002), earlier research concentrates on interpersonal service encounters, thus, utilising the SERVQUAL scale to asses service quality perceptions. Only a few studies analyse the effects of culture on SSTs. Mulaomerovic and Trappey (2013) focused on how cultural dimensions affect the acceptance of self-scan checkouts in shopping. The study concludes that in Taiwan (a culture with low individualism

[3] *Asian and Latin American countries (such as Taiwan, Malaysia, Japan, and Mexico) are characterised by high power distance and long-term orientation, as well as low individualism and uncertainty avoidance.*

[4] *Western countries (such as Canada, US, and European countries) are characterised by low power distance and long-term orientation, as well as high individualism and uncertainty avoidance.*

and relatively high uncertainty avoidance), "it is expected that a positive attitude toward technology will overcome the social pressure" (Mulaomerovic *et al.*, 2013, p. 495), leading the Taiwanese to accept the implementation of SSTs in stores. However, such findings might differ when analysed in a different cultural context.

Figure 5 below identifies the countries in which studies on the service quality dimensions from on-site SSTs have been conducted, starting from the country which has the highest number of studies (US) up to counties that have not yet been investigated (Malta) (identified in Table 4), and compares such countries using the Country Comparison tool by Hofstede (*Country Comparison - Hofstede Insights*) across the six cultural dimensions:



	Power Distance	Individualism	Masculinity	Uncertainty Avoidance	Long Term Orientation	Indulgence
US	40	91	62	46	26	68
Sweden	31	71	5	29	53	78
Italy	50	76	70	75	61	30
Taiwan	58	17	45	69	93	49
Romania	90	30	42	90	52	20
Turkey	66	37	45	85	46	49
Pakistan	55	14	50	70	50	0
Malta	56	59	47	96	47	66

Figure 5: 6-D Model: Country-Culture Comparison (Source: Country Comparison - Hofstede Insights)

In line with the studies of Donthu and Yoo (1998) and Tsoukatos (2007), Figure 5 shows that:

Country	Characteristics	Description
Western countries (US, Sweden, Italy, and Malta)	Individualised culture	Individuals only care about themselves and their immediate families (Hofstede, 2001).
Eastern & Asian countries (Taiwan, Romania, Turkey, and Pakistan)	Collectivist culture	Individuals are eager to prioritize the goals of a group rather than their personal goals (Donthu *et al.*, 1998), implying a tightly-knit framework in society (Hofstede, 2001).

Table 5: Outcomes of the Country-Culture Comparison (Source: Author)

Extant literature verifies that the main studies that focused on the service quality dimensions of on-site SSTs from the consumer perspective (Table 4) were conducted in the US, characterised by high individualism, followed by indulgence, masculinity, uncertainty avoidance, power distance, and finally, a very low long-term orientation. Such scores are relatively different from Malta, which is mainly characterised by an exceedingly high uncertainty avoidance. Conversely, similar to Malta, the study by Mulaomerovic and Trappey (2013) showed how Taiwan was also characterised by a high uncertainty avoidance dimension. Although this led to increased willingness to accept the implementation of SSTs, such a cultural dimension might actually hinder Maltese individuals to adopt new technologies, due to the high uncomfortability with uncertainty. This implies that consumers in Malta may have different service quality perceptions of SSTs from other consumers in other counties.

This raises the need to address such a cultural gap and identify the different service quality dimensions from on-site SSTs that will emerge from a country that has not yet been investigated. This involves testing the service quality dimensions in the new cultural dimension of Malta, to overcome such a gap (GAP 3).

2.5 Development of Conceptual Framework

2.5.1 Primary Objective

The study's main aim is to utilise previous literature to determine the significant dimensions from the customers' perspective that impact on-site SSTSQ within the Maltese retail environment. The most recent scale to measure SSTSQ, constructed by Lin and Hsieh (2011) and widely known as SSTQUAL, involves 20 items and seven dimensions that customers utilize to assess service quality when interacting with SSTs. The framework and dimensions recommended by Lin and Hsieh (2011) will be evaluated and analysed in further detail below:

2.5.1.1 Functionality

Such dimension relates to the "functional characteristics of SSTs, including responsiveness, reliability, and ease of use" (Lin *et al.,* 2011, p. 198). Existing literature suggests that 'Functionality' is a significant dimension, allowing customers to assess service quality of SSTs (Lin *et al.,* 2011; Radomir *et al.,* 2012; Orel *et al.,* 2014; Iqbal *et al.,* 2018). Thus, this study draws on extant literature to determine whether the dimension of 'Functionality' impacts on-site SSTSQ within the Maltese retail industry.

2.5.1.2 Enjoyment

Refers to the perceptions of fun during the delivery while using a SST (Radomir *et al.,* 2012; Orel *et al.,* 2014), and the extent through which the use of SST results in pleasure and joy for consumers (Gures, Inan and Arslan, 2018), thus is anticipated to result in a positive and significant influence on SSTSQ. For the purpose of this study, testing will be conducted to determine whether the dimension of 'Enjoyment' impacts on-site SSTSQ within the Maltese environment.

2.5.1.3 Security

'Security' includes whether customers perceive SSTs to be safe to use, in terms of infringement, fraud and loss of personal information. In other words, it is related with the personal concerns and trust of consumers towards the SST (Iqbal *et al.*, 2018). Although 'Security' is deemed to be an important dimension in SST studies in numerous industries (Lin *et al.*, 2011; Iqbal *et al.*, 2018), when studied in a particular industry (retail supermarket) and in a specific culture (Turkey), such a dimension proved to be insignificant (Orel *et al.*, 2014). This insignificance might have been due to cultural differences. Hence, such a dimension will be tested to determine the Maltese perception of 'Security' regarding SSTs.

2.5.1.4 Assurance

Is a measure which depicts the confidence of consumers in using the SST according to the competency and reputation of the SST provider (Radomir *et al.*, 2012). The latter study found 'Assurance' to be an insignificant dimension that consumers in Romania use to assess service quality of SSTs. As seen in Figure 5, such a country is characterised by high uncertainty avoidance and low indulgence, implying that Romanian consumers have a tendency to avoid uncertainty (*Country Comparison - Hofstede Insights*). On the other hand, such a dimension was found to be significant in other cultures (e.g. Lin *et al.*, 2011; Orel *et al.*, 2014; Iqbal *et al.*, 2018). This raises the need to test whether 'Assurance' will be a significant service quality dimension within the unique Maltese environment.

2.5.1.5 Design

This element represents the overall design and layout of the technology. It also measures the perception of customers, specifically focusing on the interface, aesthetics and extent of modernism of the SST (Radomir *et al.*, 2012). Most studies conducted in various cultural environments concluded that 'Design' had an influence on the customers' perception of

SSTSQ. Thus, this study will determine whether this dimension is also significant in a Maltese cultural setting.

2.5.1.6 Convenience

Is a measure that determines the extent of convenience and availability of SST usage (Considine and Cormican, 2016), as well as the simplicity of SST accessibility by consumers (Iqbal *et al.*, 2018). Similar to the 'Assurance' dimension, Radomir and Nistor (2012) concluded that 'Convenience' is an insignificant dimension in determining the SSTSQ by Romanian customers. On the contrary, other studies conducted in other cultures (mainly in the US, Taiwan, Turkey and Pakistan) concluded that 'Convenience' is a significant factor that customers perceive when defining SSTSQ (Lin *et al.*, 2011; Orel *et al.*, 2014; Iqbal *et al.*, 2018). Thus, it is essential to determine whether a similar reasoning is adopted by consumers in Malta.

2.5.1.7 Customization

Refers to the extent of SST modification and adjustment to fit the customers' individual needs and preferences and adaptation to customers' historical transactions. In a study specifically focusing on SCSs in the Turkish retail industry, such a dimension was deemed to be insignificant due to the simplicity and short interaction with SCSs, hindering any customization (Orel *et al.*, 2014). However, such a finding significantly differed from the perceptions of Romanian customers, who perceived customization as a "proof of banks' efforts to personalize their SSTs in order to meet customers' requirements" (Radomir *et al.*, 2012, p. 863). This points to potential differences in cultures; hence, this study aims to determine whether 'Customization' impacts on-site SSTSQ within the Maltese retail industry.

The SSTQUAL scale has been validated through numerous tests of reliability and validity in various contexts (Iqbal *et al.*, 2018), being used and applied among numerous studies across different industries, including the banking industry (Shamdasani, Mukherjee and Malhotra, 2008; Radomir and Nistor, 2012), the retail industry (Orel *et al.*, 2014) as well as the airline industry (Gures *et al.*, 2018). Lin and Hsieh (2011) further concluded that 'Design' has the strongest impact on the overall quality perceptions of customers towards SSTs. This was proved by a variety of studies, that found the 'Design' of SSTs to be a substantial service quality dimension (Radomir *et al.*, 2012; Orel *et al.*, 2014; Iqbal *et al.*, 2018). Such a factor was considered to be the most influential since it also affected the behavioural intentions of customers to use the SST. Following the 'Design' dimension, Lin and Hsieh (2011) implied that 'Security', 'Assurance' and 'Functionality' are also vital contributors to the perceptions of customers. Although 'Functionality' was proved to be a significant factor of SSTSQ, both 'Security' and 'Assurance' were proved to be significant in certain studies but insignificant in others (Table 4). This suggests that the importance and significance of SSTSQ dimensions differ between consumers, as well as from one country to another, highlighting cultural differences.

Although the dimensions within the SSTQUAL scale are considered as the most relevant and recent, other dimensions should be accounted for when assessing the dimensions of SSTSQ from the customers' perspective.

2.5.1.8 Control

As portrayed in Table 4 above, Dabholkar (1996) was a primary researcher who constructed a model consisting of five important service quality dimensions on SSTs, specifically focusing on self-ordering kiosks in restaurants (on-site). The study was criticised as it was based on expectations rather than perceptions of SSTSQ, since individuals had not yet experienced SSTs at the time of the study. Furthermore, Dabholkar (1996) concluded that only three of the five proposed dimensions were significant, one of which was the element of 'Control' of SSTs perceived by customers. The latter was proved to be a significant dimension in various other studies conducted in the retail industry (Anselmsson, 2001; Marzocchi and Zammit, 2006; Lee, Fairhurst and Cho, 2013), suggesting that greater perceived control leads to higher customer satisfaction and an enhanced service quality perception. As outlined by Marzocchi and Zammit (2006), service providers should reduce uncertainties and ensure that customers are clearly informed about the use of the self-scanning kiosk, in order to have higher control over the situation. Furthermore, higher service quality also results from the inclusion of controllable features in the SSTs, such as, giving consumers a variety of payment method options (Lee *et al.*, 2013). Thus, together with the seven SSTQUAL dimensions mentioned previously, the element of 'Control' will also be tested in the Maltese environment.

2.5.1.9 Speed of Delivery

Another element that proved to have a sufficiently strong impact on SSTSQ from the customers' perspective, includes the dimension of 'Speed of Delivery'. The latter, otherwise known as 'Time Convenience', refers to the time taken for consumers to conduct the service at the SCS. Although such a factor proved to be an irrelevant service quality dimension by Dabholkar (1996), it resulted as a significant dimension in the study conducted by Lee, Fairhurst and Cho (2013) in the US retail industry, implying that overall service quality could be improved by service providers through a faster delivery of service. Although both studies

were performed in the same industry (retail) and country (US), there is a relative time discrepancy, which might imply a change in the cultural dimensions within US consumers. Hence, the dimension of faster 'Speed of Delivery' will also be tested in the different cultural context (Malta) to determine whether such a dimension has an effect on the perceived SSTSQ by local consumers.

2.5.1.10 Support by Employees

Finally, Anselmsson (2001) and Anitsal and Paige (2006) highlighted that a significant service quality dimension from the customers' viewpoint is the level of support offered by service employees, resulting from the respective relationship with contact employees. This refers to the extent that consumers view employees as helpful, knowledgeable and an inspiration for confidence. Such dimension was found to have the strongest influence especially in the grocery retail stores, while using TBSS options such as price checkers, self-checkouts and electronic kiosks (Anitsal *et al.*, 2006). Furthermore, the latter study highlighted that retailers should hire the right employees who are customer oriented and can be trained effectively. The 'Support by Employees' can thus be an extremely prominent factor which leads to SSTSQ, hence, will be tested to determine whether such a dimension impacts on-site SSTSQ within the Maltese retail industry.

2.5.2 Secondary Objective

The secondary goal of this study is to assess whether SSTSQ leads to customer satisfaction and loyalty within the Maltese retail environment. This can be done by identifying the direct relation between SSTSQ, customer satisfaction, and loyalty, together with the indirect (mediating) effect of customer satisfaction on SSTSQ and customer loyalty.

2.5.2.1 SSTSQ and customer satisfaction

Customer satisfaction, as described by Oliver (1997), is a "pleasurable fulfilment" experienced by customers when the performance of an organisations' products/services, meets or exceeds their expectations (Farris, Bendle, Pfeifer and Reibstein, 2010). To improve productivity and enhance customer satisfaction, organisations are increasingly adopting new technologies, such as SSTs (Meuter, Ostrom, Bitner and Roundtree, 2003; Orel *et al.*, 2014; Demoulin and Djelassi, 2016; Iqbal *et al.*, 2018).

Existent literature highlights a direct and positive correlation among customer satisfaction and SSTSQ (Lin and Hsieh, 2006; Orel *et al.*, 2014; Iqbal *et al.*, 2018), while other studies suggest that service quality is a solid predictor of customer satisfaction (Cronin *et al.*, 1992). Hence, the hypothesis of a positive correlation among SSTSQ and satisfaction will be tested to determine whether such a relationship holds in the Maltese retail industry:

Hypothesis 1 (H1): SSTSQ is directly and positively related to customer satisfaction.

2.5.2.2 SSTSQ and customer loyalty

Pi and Huang (2011) define customer loyalty as the repurchasing of products/services from an organisation by the same consumer. This reflects a favourable image of the company in the mindset of consumers, leading to positive recommendations of the product/service to others.

Similar to customer satisfaction, existing literature suggests a direct, significant and positive relation among SSTSQ and customer loyalty (Cronin *et al.*, 1992; Yang and Peterson, 2004; Ganguli and Roy, 2011; Orel *et al.*, 2014; Iqbal *et al.*, 2018). Furthermore, Lee, Fairhurst and Lee (2009) demonstrate how SSTSQ impacts consumers' retail patronage intentions. This forms another hypothesis of this study, aimed at evaluating whether a direct and positive relationship exists amongst SSTSQ and loyalty in the Maltese retail environment:

Hypothesis 2 (H2): SSTSQ is directly and positively related to customer loyalty.

2.5.2.3 Customer satisfaction and customer loyalty

Finally, literature on the link among satisfaction and loyalty provides various evidence. Some studies argue that satisfaction is not enough to create loyal consumers in a market which is extremely competitive, implying that the correlation amongst customer satisfaction and loyalty might alter subject to market competition. Thus, satisfied consumers may switch suppliers if better alternatives are available but will continue their purchases from the same supplier if no competition is present (Tam, 2004).

Other studies propose a direct and positive link among satisfaction and loyalty (Djajanto, Nimran, Kumadji and Kertahadi, 2014; Orel *et al.*, 2014). In fact, Marzocchi *et al.* (2006) concluded that satisfaction with self-checkouts had a positive influence on the patronage of buyers towards the shop. In view of this, it can be concluded that highly satisfied consumers

have a higher tendency to repurchase the product/service (Tam, 2004) and exhibit commitment towards the organisation (Cho and Fiorito, 2010). This forms the third hypothesis of this study, suggesting a direct, significant, and positive correlation between both elements:

Hypothesis 3 (H3): Customer satisfaction is directly and positively related to customer loyalty.

In contrast, while certain studies provide evidence which supports the direct relation amongst customer satisfaction and loyalty, other researchers revealed a more complex relationship. Caruana (2002) suggested that customer satisfaction had a mediating position among service quality and loyalty. Likewise, Orel *et al.* (2014) concluded that SSTSQ positively influences customer loyalty indirectly through satisfaction. Iqbal, Hassan, Sharif and Habibah (2017) proved the partial mediation of satisfaction, mediating the link amongst corporate image, service quality, and loyalty. More recently, Iqbal *et al.* (2018) indicated that satisfaction partly mediated the link among SSTSQ and loyalty. The above arguments formed the final hypothesis, suggesting that the effects of SSTSQ and customer loyalty will be mediated by customer satisfaction:

Hypothesis 4 (H4): Customer satisfaction mediates the relationship between SSTSQ and customer loyalty.

2.6 Research Question formation

Based on previous literature and studies conducted, the main research question to be addressed by this study to satisfy the primary objective is:

Research Question 1 (RQ1): Which dimensions impact on-site SSTSQ in the Maltese retail environment?

To answer such a research question, both the seven SSTQUAL dimensions and other three dimensions that emerged from the literature will be tested. All ten dimensions will be analysed to discover whether they significantly impact the service quality level when customers interact with on-site SSTs in a different cultural context, characterised by high avoidance to uncertainty and low long-term perspective, i.e. the Maltese retail industry.

Additionally, to satisfy the secondary objective, the below research question will be addressed:

Research question 2 (RQ2): What are the direct and indirect relationships between SSTSQ, customer satisfaction and customer loyalty in the Maltese retail industry?

To answer RQ2, all four hypotheses mentioned above will be tested to determine if a statistically significant relation is present among SSTSQ, satisfaction and loyalty.

2.7 Proposed model

The model that is proposed for this study is as follows:

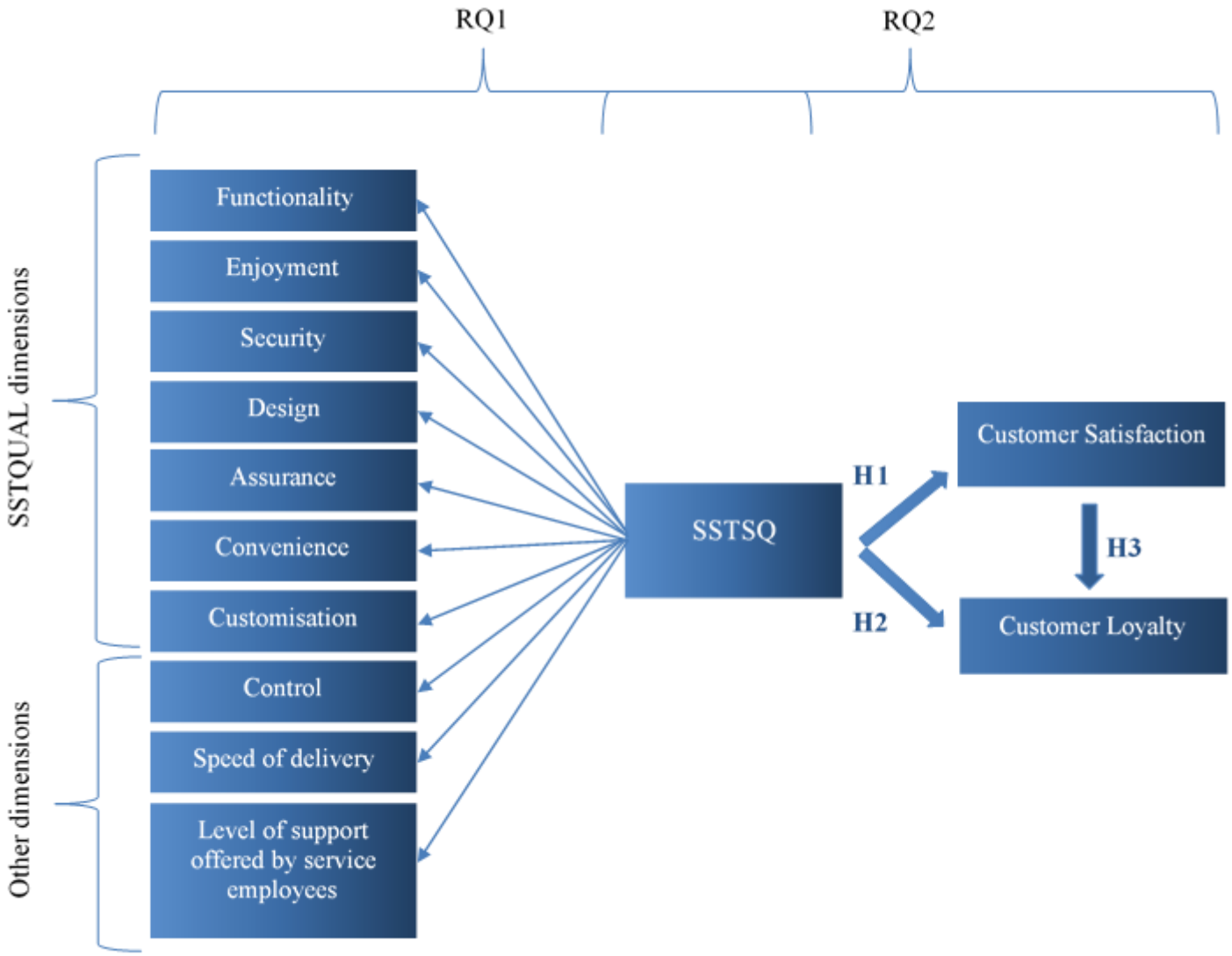


Figure 6: Proposed Model (Source: Author)

2.8 Chapter Summary

After conducting a comprehensive review of empirical studies that exist within the current SST literature, two research questions and four hypotheses were constructed to satisfy the primary and secondary objectives. In reaching the primary objective, from previous literature, this study identified ten dimensions that might impact on-site SSTSQ from the perspective of consumers within the Maltese retail industry. With regards to the secondary objective, four hypotheses will be tested to verify the direct impacts of SSTSQ, satisfaction and loyalty, along with the mediating position of customer satisfaction.

Chapter 3: Methodology

3.1 Introduction

The next chapter illustrates the reasons for adopting the specific research philosophy, approach, design, and instrument as to gather evidence to satisfy the research questions and hypotheses. Furthermore, included in this chapter is an explanation of the results and adaptations derived from the pilot study, together with the data collection and sample selection techniques utilised. Finally, ethical issues are also discussed.

3.2 Research Philosophy

Research philosophy describes a "system of beliefs and assumptions about the development of knowledge" (Saunders, Lewis and Thornhill, 2016, p. 124). This includes ideas of how knowledge on a certain phenomenon should be gathered, examined and employed. Easterby-Smith, Thorpe and Jackson (2012) implied that the main philosophical debate involves distinguishing between two main research philosophies:

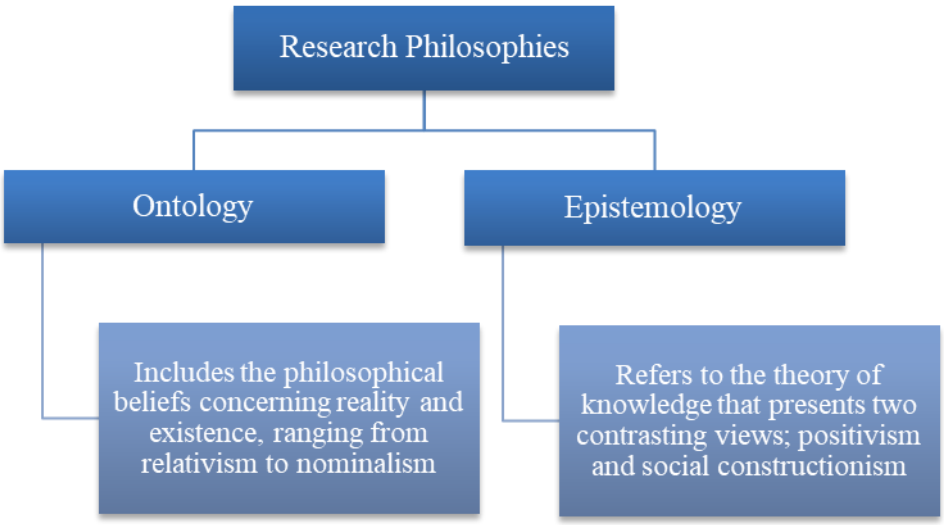


Figure 7: Research Philosophies (Source: Easterby-Smith et al. (2012))

From an epistemological standpoint, this study undertook a positivist approach. Unlike the other extreme of social constructionism, in a positivist approach, reality is objective and external, while the viewer is impartial from the study. This also involved the use of objective methods to locate causality between variables, consistent with the research questions and hypotheses of this study.

3.3 Research Approach

The approach to research can vary between two extremes: inductive and deductive approaches (Saunders *et al.*, 2016). The former aims to establish simplifications that are universal, to explain patterns. This involves carrying out observations on patterns, collecting data and finally generating a theory on such patterns. Thus, inductive reasoning is used when a gap exists between the conclusion, based on observations, and the premises observed.

Conversely, a deductive approach is used to explain patterns by utilising existing theory and deriving logical conclusions from a set of premises (Saunders *et al.*, 2016). To put it simply, deductive is reasoning used to test existing theories/hypotheses and conclude whether they are accepted or rejected. This study took a deductive approach, which involved utilising statistical techniques to test and validate existing theories and hypothesis regarding SSTSQ and their influence on satisfaction and loyalty.

3.4 Research Design and Instrument

A primary research design was adopted to collect data directly from participants. This is because there was no readily available secondary data on the relevant on-site SSTSQ dimensions that impact consumers in the Maltese retail industry and their influence on customer satisfaction and loyalty. Various primary research methods exist, including both qualitative (observations, in-depth interviews, case study research, etc.) and quantitative (questionnaires, experiments, etc.) research methods (Saunders *et al.*, 2016).

Within this study, a quantitative research approach was adopted. The latter is usually analysed though statistical approaches and presents outcomes in numerical and graphical formats. The decision to undertake such approach was to be able to test and confirm theories and assumptions with regards to SSTSQ and its relation to customer satisfaction and loyalty within the Maltese retail environment. Additionally, this involved undertaking a more objective approach and drawing conclusions that describe correlations and relationships.

Saunders *et al.* (2016) described how a quantitative approach is utilised for descriptive and explanatory research types, rather than exploratory research types, as below:

	Exploratory	**Descriptive**	**Explanatory**
Nature	Assesses phenomena under a different perspective to discover new insights	Accurate reporting of phenomena, circumstances, or people	Creates fundamental correlations between variables
Objective	To determine the nature of a problem and the method of solution	To identify and describe the variability in different phenomena as well as explain and validate findings	To examine and explain relationships to understand the correlation between variables
Approach	Qualitative	Quantitative	Qualitative and/or Quantitative

Table 6: Research types (Source: Saunders et al. (2016))

This study's research questions and hypotheses are comparable to an explanatory approach, which aims to identify relationships and correlations between the:

- Independent Variables (IV) – SCS service quality dimensions
- Mediating Variable (MV) – Customer Satisfaction
- Dependent Variable (DV) – Customer loyalty

To achieve such correlations, the instrument utilised for collecting data was a questionnaire since, compared to other data collection methods, it was the most suitable to satisfy the goals of this study. Although questionnaires pose risks of providing dishonest answers and unanswered questions, the advantages outweigh the disadvantages, including the fact that they are inexpensive and affordable, provide quick results, and allow relatively easy analysis of results and visualisations (Saunders *et al.*, 2016). Such a questionnaire was created on a web-based programme (i.e. Google Forms), making it easier to construct the questions and simpler for the respondents to answer.

3.5 Measurement

All measurement items used within the questionnaire were adapted from previously validated instruments, from studies that were incorporated in the literature review. Additionally, Marketing Scales (marketingscales.com), the world's largest repository of scales, was also used to verify such previously constructed questions. This was done to ensure that precise, reliable, and valid measurement items were applied, as well as to identify the best quantitative measures to be used in this study. Finally, Marketing Scales was also used to find a scale which could not be found within the literature. All items were then modified accordingly, to accurately portray the context of retail SCSs situated in Malta at Decathlon as well as to attain answers to the two research questions and respective hypotheses. Almost all questions used in the questionnaire were close-ended statements that were short and easy for participants to understand. Administering such types of questions made it feasible to carry out quantitative interpretations.

The questionnaire primarily introduced participants to the study by describing the objectives and the reasons for collecting data. This was followed by a consent form, which required participants to tick that they agree with their rights and responsibilities, thus consenting their participation. After giving consent, a recruitment screener question was presented in the form of a dichotomous question, asking whether participants have ever made use of the SCS at Decathlon in Malta. Only respondents that selected the 'yes' option were allowed to continue answering the questionnaire. Those participants that selected the 'no' option were immediately directed to the end of the questionnaire. Such question acted a screening process prior to initiating the questionnaire, to only capture individuals who have made use of SCS at Decathlon in Malta. To make it easier for participants to remember what a SCS is, a visual of the SCS at Decathlon was also provided to participants when required.

Following the welcoming paragraph, the consent form and the screening question, the original questionnaire was divided mainly into four sections. A summarised version can be seen below:

Construct	Items	Format	Adapted
Section 1: Self-Checkout System service quality			
Functionality	5	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Enjoyment	4	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Security/Privacy	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Assurance	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Design	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Convenience	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Customization	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Control	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lee *et al.*, 2013)
Speed of Delivery	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lee *et al.*, 2013)
Level of support offered by service employees	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	Marketing Scales scale titled as 'Service Quality (Employees)'[5]
Section 2: Customer Satisfaction			
Customer Satisfaction	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Iqbal *et al.*, 2018)
Section 3: Customer Loyalty			
Customer Loyalty	5	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Cronin, Brady and Hult, 2000)

[5] *The scale found on Marketing Scales titled as 'Service Quality (Employees)' was used to measure the customer's belief that employees inspire confidence and are helpful.*

Section 4: Demographic and Behavioural Information			
Gender	2	Multiple choice question with “Female” and “Male” options	
Age	5	Multiple choice question with “18-25”, “26-35”, “36-45”, “46-55” and “56+” options	
Education Level	3	Multiple choice question with “Primary”, “Secondary” and “Tertiary and above” options	
Frequency of using Self-Checkout at Decathlon	5	Multiple choice question with “Always”, “Frequently”, “Sometimes”, “Rarely” and “First Time” options	

Table 7: Original Questionnaire Sections (Source: Author)

The dimensions within Sections one/two/three were ranked on a five-point Likert scale. Such a scale was preferred (as opposed to a seven/nine-point Likert scale) to make it easier for participants to distinguish between the values and also to encourage respondents to continue answering the questions. Moreover, there is little point in gathering data for large response categories if they will be eventually combined in the analysis (Saunders *et al.*, 2016). Finally, respondents were more likely to answer to a smaller rating, thus, enhancing the response rate and making the questionnaire completion faster and more efficient.

3.6 Pilot Study

Prior to finalising the final questionnaire, it was pre-tested through a pilot study to review the internal reliability, validity, and consistency of the scales. This was done by estimating the Cronbach's Alpha, as well as to determine any challenges faced by respondents while responding the questionnaire. The pilot study was performed online, by sending the questionnaire to a sample of ten individuals who had previously interacted with the SCSs at Decathlon. Although the chosen participants for the pilot study were known, their response and feedback were anonymous. The findings are found in Table 8 below:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.826	.852	37

Table 8: Reliability Statistics (Source: SPSS)

The above statistics indicate a Cronbach's Alpha value of 0.826. Such value reflects strong internal reliability and validity of the scales, which was expected, given that the scales used within the questionnaire were constructed from existing validated scales. This also implied that there was no need to undertake drastic changes within the questionnaire.

Apart from measuring internal consistency, feedback from the ten pilot study participants was also collected through another short Google Forms questionnaire by asking feedback questions adapted from Bell and Waters (2014), listed in the below table:

Feedback Questions
How long did it take you to complete the questionnaire?
Were the instructions clear?
Were the questions clear?
Which, if any, questions were unclear? (write N/A if all questions were clear)
Was the layout of the questionnaire clear?
Was the layout of the questionnaire attractive?
Please write any other comments or suggestions that might help in improving the questionnaire.

Table 9: Pilot Study Feedback Questions (Source: Bell et al. (2014))

The outcomes from the feedback form suggested that the majority of participants completed the questionnaire in 15 minutes or less, while 20% took more than 15 minutes to complete it. Furthermore, 90% of the participants found that both the instructions and questions were clear. With regards to clarity, the following questions were outlined as unclear (refer to Appendix B(ii) for the whole questions):

- 'Functionality' Q5
- 'Customization' Q1, Q2, Q3
- 'Enjoyment' Q4
- 'Support by Employees' Q2

All the participants found the layout of the questionnaire clear and attractive. Finally, when asked to write any other suggestions, several comments and recommendations were proposed.

After considering the Cronbach's Alpha value as well as the comments and feedback obtained from the Pilot Study, it was decided to undertake certain changes within the original questionnaire. Table 10 presents a brief outline of the main changes that were undertaken. A full report of the reasons and justifications for such changes is outlined in Appendix A.

Section	Original Question	Revised Question
Section 1: Functionality	Q5: "Each service item of the Self-Checkout System at Decathlon is error-free"	"The Self-Checkout System at Decathlon is error-free"
Section 1: Convenience	Q1: "The Self-Checkout System at Decathlon has operating hours convenient to me"	Eliminated
Section 1: Control	Q1: "I feel free to use the Self-Checkout System at Decathlon"	Eliminated
Section 1: Level of support offered by service employees	Q2: "The behaviour of employees at Decathlon instil confidence in me to use the Self-Checkout System"	"The behaviour of employees at Decathlon makes me feel confident to use the Self-Checkout System"
Section 2: Customer Satisfaction	Q3: "The Self-Checkout System at Decathlon is close to my idea (how I thought it would be)"	"The Self-Checkout System at Decathlon meets my expectations"
Section 3: Customer Loyalty	Q2: "I would recommend the Self-Checkout System at Decathlon to any of my friends"	"I would recommend the Self-Checkout System at Decathlon to others"
Section 3: Customer Loyalty	Q3: "If I need to use again, I will come to the Self-Checkout System at Decathlon"	Eliminated

Table 10: Post-Pilot Study questionnaire changes (Source: Author)

The below table summarises the main sections within the revised and finalised questionnaire:

Construct	Items	Format	Adapted
Section 1: Self-Checkout System service quality			
Functionality	5	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Enjoyment	4	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Security/Privacy	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Assurance	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Design	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)

Convenience	1	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Customization	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lin *et al.*, 2011)
Control	2	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lee *et al.*, 2013)
Speed of Delivery	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Lee *et al.*, 2013)
Level of support offered by service employees	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	Marketing Scales scale titled as "Service Quality (Employees)"
Section 2: Customer Satisfaction			
Customer Satisfaction	3	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Iqbal *et al.*, 2018)
Section 3: Customer Loyalty			
Customer Loyalty	4	5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree"	(Cronin *et al.*, 2000)
Section 4: Additional Comments			
Additional Comments	1	Open-ended statement: "Kindly write any additional comments relating to your experience in using the Self-Checkout System at Decathlon"	
Section 4: Demographic and Behavioural Information			
Gender	3	Multiple choice question with "Female", "Male" and "Other" options	
Age	5	Multiple choice question with "18-25", "26-35", "36-45", "46-55" and "56+" options	
Education Level	3	Multiple choice question with "Primary", "Secondary" and "Tertiary and above" options	
Frequency of using Self-Checkout at Decathlon	5	Multiple choice question with "Always", "Frequently", "Sometimes", "Rarely" and "First Time" options	

Table 11: Revised & Finalised Questionnaire Sections (Source: Author)

3.7 Data Collection

Following the procedure of refining and finalizing the questionnaire, it was distributed both through online methods (a link for the final online questionnaire is in Appendix B(i)) as well as through face-to-face interaction (a copy of the final face-to-face questionnaire is in Appendix B(ii)).

3.7.1 Online Questionnaire

Given the outbreak of the COVID-19 pandemic, data collection from participants was primarily done through an online questionnaire constructed through Google Forms. Although the first preference was of conducting face-to-face questionnaires to capture the perspectives of consumers exactly after utilising the SCS at Decathlon, the outbreak of the COVID-19 pandemic during the period of data collection made it impossible to conduct face-to-face questionnaires, presenting a huge limitation.

Such a questionnaire was therefore distributed through a social media platform through a link, specifically on Facebook. Facebook was chosen over all other social media platforms since over 80% of the Maltese population are active on this channel (Hootsuite, 2020). Although this resulted in sample size limitations, it was the only solution given such an uncontrollable and challenging situation.

A thorough online search of the pages and groups that individuals with interests such as ‘sportswear’, ‘sports equipment’, ‘Decathlon’, etc. usually follow/like, was conducted. This was done to try and capture individuals who have likely used the SCS at Decathlon, thus, sharing the online questionnaire on Facebook groups such as; ‘The Grid’, ‘Running Malta’, ‘Sportivi’, ‘Sports Malta’, ‘Fitness Forum Malta’, ‘Bazeline – sports and leisure’, ‘SPR Malta’, ‘Basketball in Malta’, ‘Dancers in Malta’, ‘Diet Malta’, and ‘Rubs fashion health, beauty, and fitness’. Furthermore, the online questionnaire was also shared with sports related influencers

and personal trainers, including prominent personalities such as Gayle Cutajar, Leanne Barolo, Denise Kim Gafa, Claire Aguis Ordway, etc.

Online data collection was conducted for two consecutive weeks, between 23rd May until 5th June 2020, resulting in a total of 128 responses, 18 of which answered that they did not interact with the SCS at Decathlon in Malta, hence were eliminated from the study.

3.7.2 Face-to-Face Questionnaire

The easing of certain restrictive COVID-19 measurements, specifically the re-opening of non-essential shops such as Decathlon, made it possible but still challenging to conduct face-to-face questionnaires to capture the perspectives of consumers exactly after utilising the SCS at Decathlon. The online questionnaire was thus slightly modified and printed. Customers who completed their shopping utilising the SCS at Decathlon were approached at a safe distance (in line with the social distancing COVID-19 restrictions) and asked to take part in the study. In this way, it was ensured that the selected individuals for the study undoubtably made use of the SCS at Decathlon. Individuals who agreed to participate were advised that the study was completely anonymous and voluntary. They were also given the opportunity to either fill the questionnaire themselves or with the help of the researcher, to make sure that the participants felt comfortable in responding the questions in order to reflect an honest and realistic data collection process.

In this case, data collection was conducted during various weekdays and time periods to capture a better representation of Decathlon consumers, between the 9th and 15th of June 2020. A total of 156 face-to-face questionnaires were collected, six of which were incomplete, hence, were eliminated from the study.

3.8 Population and Sample Size

This study's targeted population included individuals who are 18 years old or over, currently living in Malta, and have made use of the SCS at Decathlon in Malta at least once.

To select this study's sample, although a quantitative approach was implemented, a non-probability sampling method was adopted, more explicitly a purposive/judgemental sampling method. In this sampling technique, the researcher relies on personal judgements when selecting population members to contribute to the questionnaire. Table 12 below outlines the use of such a sampling technique for each data collection method used within this study:

Data Collection Method	Purposive/Judgemental Sampling Method
Online Questionnaire	Only individuals who formed part of certain fitness/healthy lifestyle/training/sport groups were approached to answer the online questionnaire.
Face-to-face Questionnaire	Only individuals who have used the SCS at Decathlon were approached to answer the printed questionnaire.

Table 12: Purposive/Judgemental Sampling Method (Source: Author)

Such sampling technique was chosen due to lack of statistical information concerning the population of self-checkout users in Malta. The benefits of purposive sampling include cost and time advantages as well as it is the only suitable method available to reach the goals of the study. However, this might lead to errors in judgement, biases, and the inability to generalise research findings (Saunders *et al.,* 2016, p. 301).

Excluding irrelevant online questionnaire responses and incomplete face-to-face questionnaire responses, 260 complete questionnaires were considered valid for data analysis. Based on previous studies conducted on SSTSQ dimensions and their influence on customer satisfaction and loyalty in other countries (Lee *et al.*, 2013; Orel *et al.*, 2014; Iqbal *et al.*, 2018) as well as taking into account the population of Malta, such a sample size was considered to be adequate to provide reliable results.

3.9 Data Analysis

The figure below outlines the process undertaken after data collection and prior to data analysis:

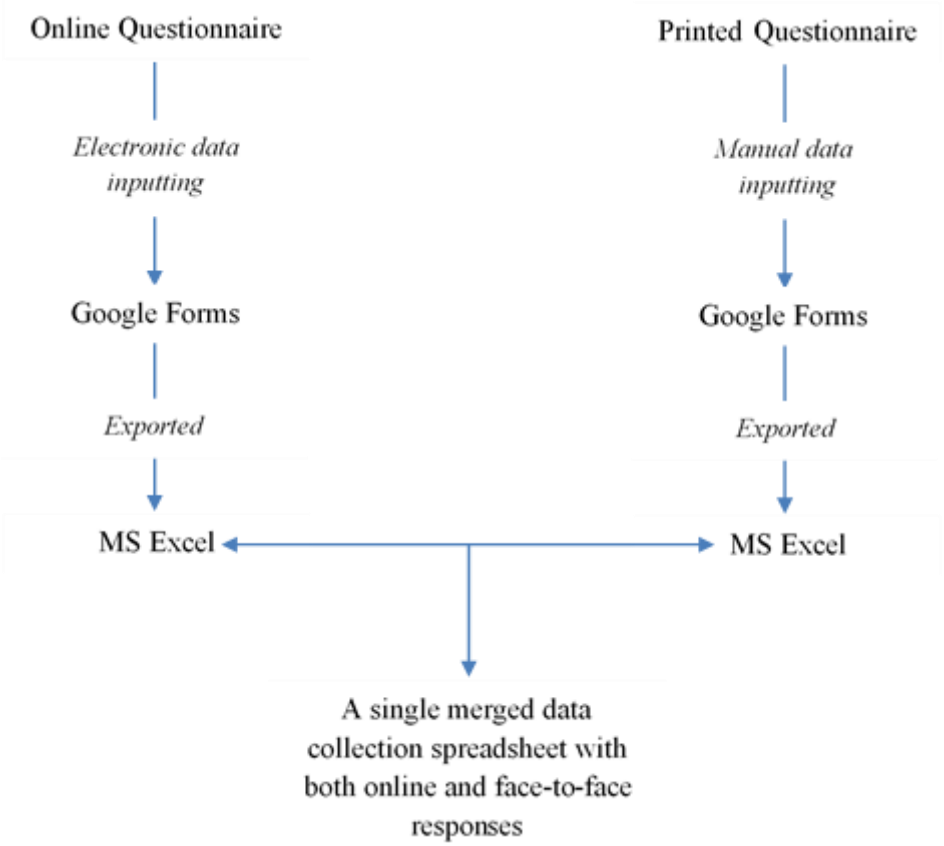


Figure 8: Post-data collection and Pre-data analysis process (Source: Author)

Analysis of such data was done through various software tools, including the below:

Software Tools	**Data Analysis**
MS Excel	for quantitative analysis of descriptive statistics
IBM SPSS 26	for quantitative analysis of descriptive and inferential statistics
IBM SPSS Amos 26	for quantitative analysis of inferential statistics

Table 13: Data Analysis Packages (Source: Author)

Further details are explained in the Results chapter that follows.

3.10 Ethical Considerations

Throughout the data collection process, ethical concerns were treated with serious concern. Firstly, it was ensured that the data collected from participants remained confidential. Secondly, such individuals were given the opportunity to stop answering the questionnaire at any point. Furthermore, the goals of the study were clearly communicated to respondents to understand the reason of their participation. In fact, apart from the welcoming paragraph explaining the study's objectives, respondents were given a Participant Information Sheet, which comprised of further information regarding their rights and responsibilities as well as ethical considerations (a copy of the Participant Information Sheet is in Appendix C(i)). Finally, the management team at Decathlon were entirely informed about the objectives of this study prior to the data collection process (a copy of the Decathlon Information Sheet & Consent Form is in Appendix C(ii)).

3.11 Chapter Summary

This chapter commenced by emphasising how this study undertook a positivist and deductive research approach, highlighting the quantitative nature of this study. The pilot study results suggested minor changes within the questionnaire. The final questionnaire was conducted both online and through face-to-face interaction. This chapter also emphasised on the target population characteristics and highlighted the use of a purposive/judgemental sampling technique to choose this study's sample. The final section within this chapter highlighted that ethical issues were treated with serious concern, through clear communication with participants and the organisation understudy (i.e. Decathlon).

Chapter 4: Results and Analysis

4.1 Introduction

This chapter outlines the outcomes achieved after data collection. The initial sections describe the transformation of raw quantitative data into graphs, tables, and figures, to be able to obtain a description of the sample, as well as to conduct other tests, including reliability analysis, normality tests as well as correlation analysis. Furthermore, confirmatory factor analysis and structural equation modelling were also conducted to verify the model fit and satisfy the research questions and hypotheses of this study accordingly.

4.2 Data Transformations

Before analysing the data, the questionnaire results were imported from MS Excel onto IBM SPSS 26, where the below transformations were conducted:

Name	Measure	Values	
Questionnaire items	Scale	Strongly Disagree Disagree Neutral Agree Strongly Agree	0 1 2 3 4
Gender	Nominal	Male Female Other	1 2 3
Age	Ordinal	18-25 26-35 36-45 46-55 56+	1 2 3 4 5
Education Level	Ordinal	Primary Secondary Tertiary and above	1 2 3
Frequency of SCS usage	Ordinal	Always Frequently Sometimes Rarely First Time	1 2 3 4 5

Table 14: SPSS transformations (Source: Author)

4.3 Sample Description

From the 260 respondents in this study that utilised the SCS at Decathlon in Malta, 61.54% were Female and 38.08% were Male. Furthermore, 34.62% of respondents were aged between 18-25 years old, followed by the 26-35 and 36-45-year-old age groups, with 27.69% and 20.77% respectively. Additionally, the majority (86.93%) of participants had a tertiary educational level or higher. Finally, with regards to the frequency of SCS usage by Maltese consumers, more than 30% of the respondents stated that they always use the SCS when shopping at Decathlon, while 25.38% of the respondents stated that it was their first time. An outline of the sample characteristics of the respondents who contributed to this study, as well as pie charts for the demographic and behavioural information, can be seen below:

Characteristics	Frequency	Percentage (%)
Gender		
Male	99	38.1
Female	160	61.5
Other	1	0.4
Age		
18 - 25	90	34.6
26 - 35	72	27.7
36 - 45	54	20.8
46 - 55	36	13.8
56+	8	3.1
Education Level		
Primary	2	0.8
Secondary	32	12.3
Tertiary and above	226	86.9
Frequency of SCS usage		
Always	79	30.4
Frequently	58	22.3
Sometimes	47	18.1
Rarely	10	3.8
First Time	66	25.4

Table 15: Sample Characteristics (Source: Author)

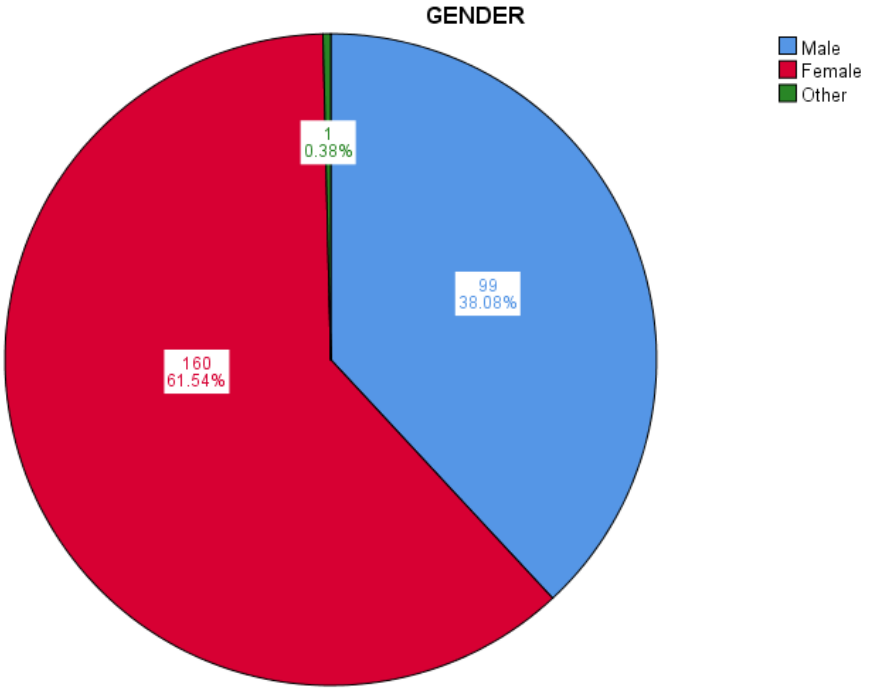


Figure 9: Pie chart – Gender (Source: SPSS)

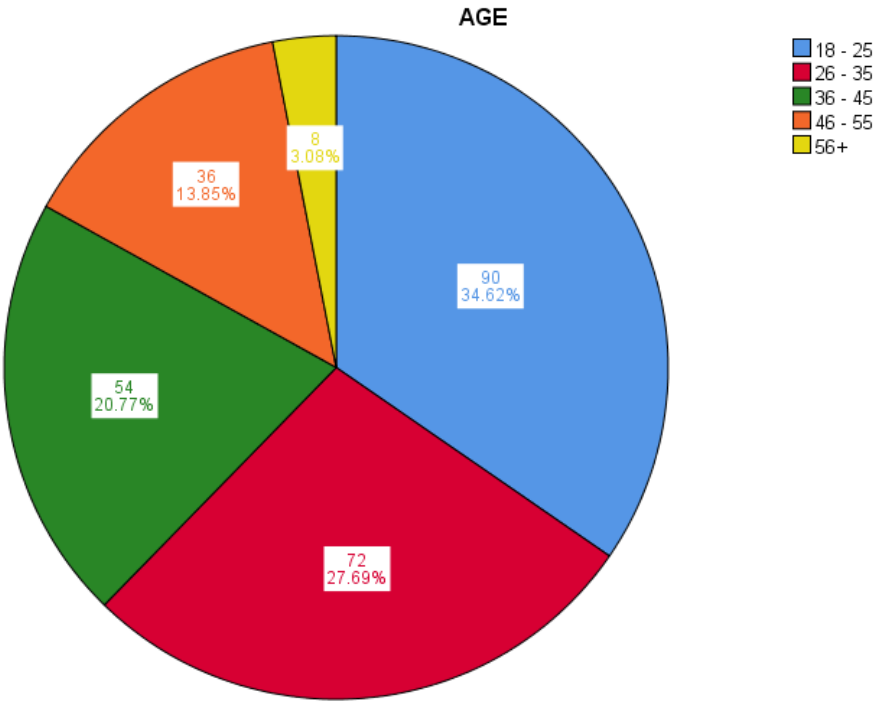


Figure 10: Pie chart – Age (Source: SPSS)

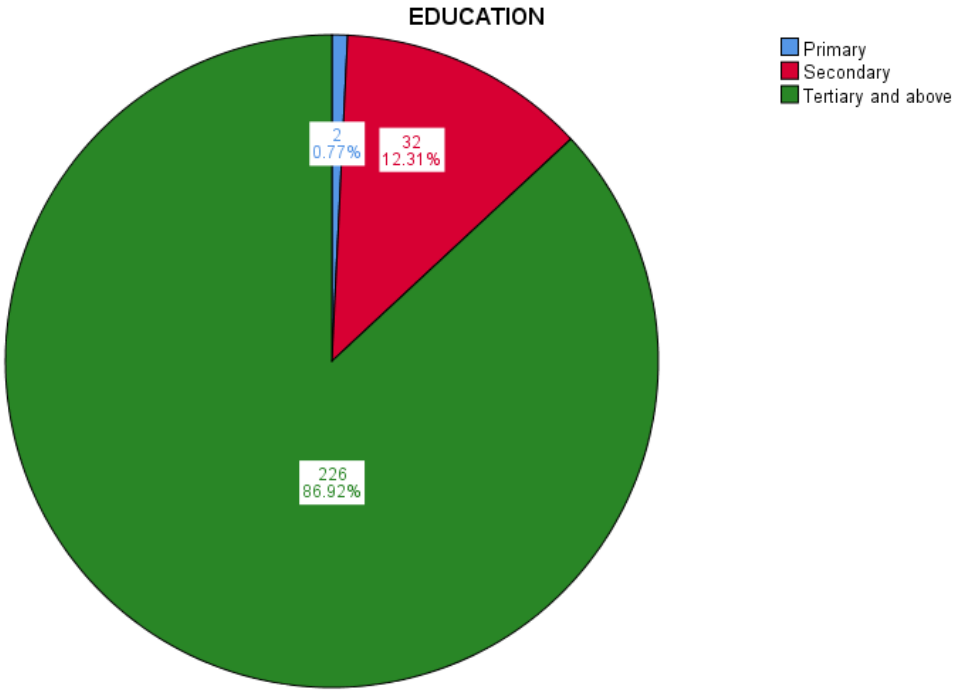


Figure 11: Pie chart - Education Level (Source: SPSS)

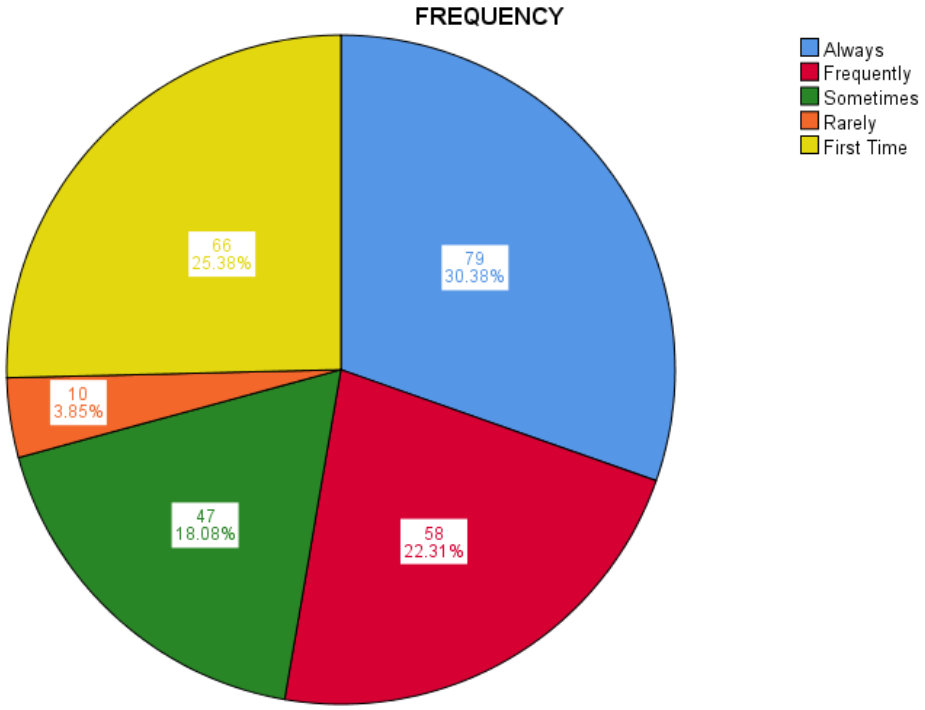


Figure 12: Pie chart - Frequency of SCS usage (Source: SPSS)

4.4 Reliability Analysis

Initially, reliability analysis was carried out to define the dependability of each measurement scale used within this study, since each measure must constantly reflect the measurement construct (Field, 2017). Cronbach's Alpha is considered as the most common reliability measure, denoted by α. The latter was developed by Cronbach (1951), who indicated that if numerous factors (i.e. subscales) exist, then reliability analysis should be conducted on each individual subscale. In other words, α should not be used as a measure of 'unidimensionality', hence it will not be calculated for the overall questionnaire but rather for each individual dimension in this study.

Furthermore, Field (2017) presented several viewpoints regarding the appropriate cut-off points for the value of α to confirm scale reliability. For instance, Kline (1999) suggested that the cut-off point depends on the constructs being measured, but usually falls between the values of 0.7 and 0.8. Others implied that using "any cutoff value is shortsighted" (Schmitt, 1996, p. 351).

After running the reliability analysis on all 12 different subscales (ten SSTSQ dimensions, customer satisfaction and loyalty) within this study, the outcomes are as below:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.851	.865	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
FUN1	12.53	8.111	.768	.690	.799
FUN2	12.71	8.167	.695	.513	.814
FUN3	12.78	7.817	.635	.425	.828
FUN4	12.58	7.773	.785	.717	.791
FUN5	13.44	7.768	.515	.270	.873

Table 16: Reliability Analysis – Functionality Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.809	.818	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ENJ1	9.12	4.504	.632	.501	.761
ENJ2	8.95	4.426	.685	.535	.741
ENJ3	9.77	3.999	.626	.402	.762
ENJ4	9.41	3.879	.598	.393	.782

Table 17: Reliability Analysis - Enjoyment Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.549	.557	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SEC1	2.63	.922	.386	.149	.
SEC2	3.25	.613	.386	.149	.

Table 18: Reliability Analysis - Security Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.831	.832	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ASU1	3.11	.640	.713	.508	.
ASU2	3.09	.745	.713	.508	.

Table 19: Reliability Analysis - Assurance Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.759	.765	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
DES1	3.29	.517	.620	.384	.
DES2	2.92	.723	.620	.384	.

Table 20: Reliability Analysis - Design Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.850	.852	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CUS1	5.00	2.668	.709	.537	.801
CUS2	5.08	2.627	.782	.616	.735
CUS3	5.40	2.605	.674	.471	.838

Table 21: Reliability Analysis - Customization Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.769	.774	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CNT1	3.36	.524	.631	.398	.
CNT2	3.16	.705	.631	.398	.

Table 22: Reliability Analysis - Control Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.924	.925	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SPE1	7.05	1.650	.821	.674	.910
SPE2	7.10	1.601	.860	.747	.878
SPE3	7.02	1.725	.857	.741	.882

Table 23: Reliability Analysis - Speed of Delivery Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.829	.839	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
EMP1	5.47	2.744	.708	.545	.751
EMP2	5.38	2.645	.746	.581	.715
EMP3	5.89	2.300	.639	.412	.837

Table 24: Reliability Analysis – Support by Employees Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.845	.863	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SAT1	6.09	2.938	.781	.731	.741
SAT2	6.18	2.676	.794	.742	.711
SAT3	6.69	2.455	.614	.379	.917

Table 25: Reliability Analysis - Customer Satisfaction Subscale (Source: SPSS)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.901	.905	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LOY1	10.37	4.165	.795	.667	.868
LOY2	10.46	3.956	.841	.747	.851
LOY3	10.54	3.871	.773	.649	.874
LOY4	10.55	3.785	.726	.539	.896

Table 26: Reliability Analysis - Customer Loyalty Subscale (Source: SPSS)

The figures in the 'Corrected Item-Total Correlation' column for every item in each subscale were more than 0.3, implying that all items correlate well with the overall scale, reflecting internal consistency (Field, 2017).

Additionally, the statistics in the 'Cronbach's Alpha if Item Deleted' column suggest a change in α if such item was deleted (Field, 2017). In this case, there were a few instances (circled in black in Tables 16, 24, and 25 above) where the value of α if the item was removed is greater than the Cronbach's Alpha itself (FUN5, EMP3, SAT3). Although this situation may require deleting such items, it was taken into consideration that the items are based on existing and previously validated scales, so all items were kept.

The table below outlines of the reliability coefficients for each scale dimension:

Scale Dimension	Number of items	Reliability Coefficients (Cronbach's α)	Reliability Level (Kline, 1999)
Functionality	5	0.851	High
Enjoyment	4	0.809	High
Security/Privacy	2	0.549	Low
Assurance	2	0.831	High
Design	2	0.759	Relatively High
Convenience	1	- [6]	-
Customization	3	0.850	High
Control	2	0.769	Relatively High
Speed of Delivery	3	0.924	High
Support by Employees	3	0.829	High
Customer Satisfaction	3	0.845	High
Customer Loyalty	4	0. 901	High

Table 27: Reliability Coefficients (Source: Author)

Almost all Cronbach's Alpha values fell in the region between 0.7 and 0.8 or higher, indicating good reliability (Kline, 1999), with the exception of the 'Security' subscale.

[6] *Given that the 'Convenience' subscale only had one item (CON1), it was not possible to find the Cronbach's Alpha value.*

4.5 Descriptive Statistics

Since the Likert scale data collected for this study includes five categories (from Strongly Disagree to Strongly Agree), it can be assumed to be continuous without harming any of the analysis (Norman, 2010; Sullivan and Artino, 2013). Although the debate between treating Likert data as ordinal or interval is still on-going, the assumption of treating the scale as an interval scale is heavily supported by numerous researchers (e.g. Pell, 2005; Carifio and Perla, 2007, 2008; Harpe, 2015). This implies that, as suggested by Likert (1932), the distance between ratings was considered to be equal.

The above assumption enables calculations such as the measures of location. The latter is also known as the measure of central tendency, and involves computing the:

- Mean (average)
- Median (middle score)
- Mode (most frequently occurring score)

Computing the mean for Likert scale questions creates a problem, given that the numbers in a Likert scale are a way of ranking responses. Thus, a more constructive way to approach Likert data is by calculating the median and mode values for each item. However, given that the size of this study's sample is relatively large enough as highlighted by Field (2017), all three metrices provided valuable results that coincided together.

4.5.1 Responses and analysis of SCS service quality dimensions

Table 30 portrays the descriptive analysis statistics for the SSTSQ items. It evidently shows that the below items had the lowest and highest mean/median/mode values:

Items with the lowest mean/median/mode values	
CUS3	"The Self-Checkout System at Decathlon has features that are personalized for me"
EMP3	"Employees at Decathlon give me individual attention while I am using the Self-Checkout System"
FUN5	"The Self-Checkout System at Decathlon is error-free"
Items with the highest mean/median/mode values	
FUN4	"I can get my service done smoothly with the Self-Checkout System at Decathlon"
CON1	"It is easy and convenient to reach the Self-Checkout System at Decathlon"
ENJ2	"I feel good being able to use the Self-Checkout System at Decathlon"
FUN1	"I can get my service done with the Self-Checkout System at Decathlon in a short time"
SPE2	"Using the Self-Checkout System at Decathlon makes my shopping less time consuming"
SPE1	"The Self-Checkout System at Decathlon allows me to save time when shopping"
SPE3	"Using the Self-Checkout System at Decathlon is a convenient way to shop"
Key: Functionality (FUN: FUN1/FUN4/FUN5), Enjoyment (ENJ: ENJ2), Convenience (CON: CON1), Customisation (CUS: CUS3), Speed of Delivery (SPE: SPE1/SPE2/SPE3), Support by Employees (EMP: EMP3)	

Table 28: Items with the lowest/highest mean/median/mode values (Source: Author)

The above implies that the majority of participants disagreed that the SCS at Decathlon has personalised features (CUS) and that the employees give individual attention while using the SCS (EMP). Furthermore, although most participants disagreed that the SCS at Decathlon is error-free, they agreed that by using the SCS at Decathlon, they can perform their service smoothly and in a short time (FUN). Additionally, participants agreed that it is simple and accessible to use the SCS (CON) and that they feel good when using it (ENJ). Finally, there seemed to be high agreement with the 'Speed of Delivery' (SPE) items, implying that most participants agreed that using the SCS saves time and is convenient.

All the SCS service quality items had distribution values of ‘skewness’ and ‘kurtosis’ different from zero. They also had an associated standard error, indicating deviation from normality. Most values were negatively skewed, indicating a cluster of frequent scores towards the higher end (Field, 2017), with the exception of ENJ3 and CUS3 items, which were positively skewed (score pile-up to the left side of the distribution). Furthermore, the majority of items had a positive kurtosis distribution, indicating a heavily tailed distribution (many scores in the tails) which is pointy, known as leptokurtic distribution. In contrast, items such as FUN5, ENJ3, SEC1, DES1, CUS3, EMP1 and EMP3 had a distribution with negative kurtosis which is flatter than normal, known as platykurtic distribution. Some examples are shown below:

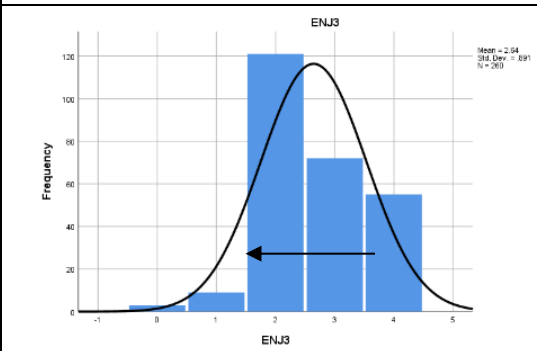
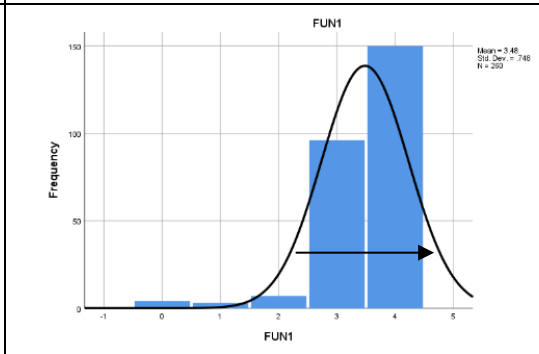
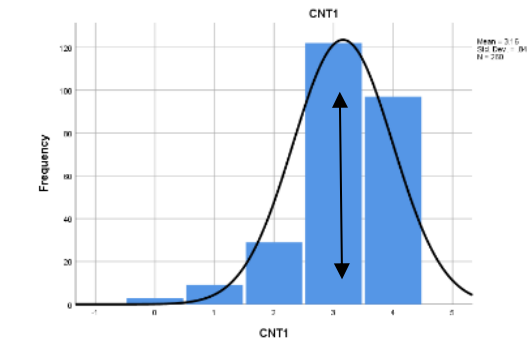
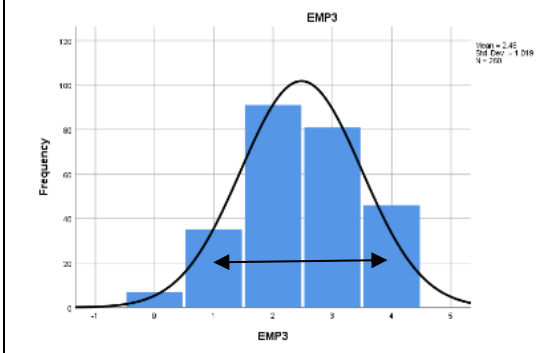
	Positive	Negative
Skewness		
Kurtosis		

Table 29: Positive/Negative Skewness and Kurtosis for SSTSQ items (Source: Author)

Statistics

		FUN1	FUN2	FUN3	FUN4	FUN5	ENJ1	ENJ2	ENJ3	ENJ4	SEC1	SEC2	ASU1	ASU2	DES1	DES2	CON1	CUS1	CUS2	CUS3
N	Valid	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3.48	3.30	3.23	3.43	2.57	3.30	3.47	2.64	3.01	3.25	2.63	3.09	3.11	2.92	3.29	3.46	2.74	2.67	2.34
Median		4.00	3.00	3.00	4.00	2.00	3.00	4.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	3.00	3.00	2.00
Mode		4	4	4	4	2	4	4	2	3	3	2	3	3	3	3	4	3	3	2
Std. Deviation		.748	.792	.922	.804	1.061	.737	.721	.891	.950	.783	.960	.863	.800	.850	.719	.682	.888	.852	.935
Variance		.559	.628	.850	.647	1.126	.543	.520	.794	.903	.613	.922	.745	.640	.723	.517	.466	.788	.725	.873
Skewness		-2.110	-1.200	-1.458	-1.957	-.271	-1.007	-1.715	.075	-.967	-1.201	-.142	-.789	-.797	-.452	-1.067	-1.770	-.495	-.243	.163
Std. Error of Skewness		.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151	.151
Kurtosis		6.439	1.819	2.291	5.139	-.413	1.715	4.671	-.403	.744	2.377	-.477	.411	1.126	-.205	2.305	5.946	.218	.027	-.099
Std. Error of Kurtosis		.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301	.301
Range		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Minimum		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Percentiles	25	3.00	3.00	3.00	3.00	2.00	3.00	3.00	2.00	3.00	3.00	2.00	3.00	3.00	2.00	3.00	3.00	2.00	2.00	2.00
	50	4.00	3.00	3.00	4.00	2.00	3.00	4.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	3.00	3.00	2.00
	75	4.00	4.00	4.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	3.00

		CNT1	CNT2	SPE1	SPE2	SPE3	EMP1	EMP2	EMP3
N	Valid	260	260	260	260	260	260	260	260
	Missing	0	0	0	0	0	0	0	0
Mean		3.16	3.36	3.53	3.49	3.57	2.90	2.99	2.48
Median		3.00	3.00	4.00	4.00	4.00	3.00	3.00	2.00
Mode		3	3	4	4	4	3	3	2
Std. Deviation		.840	.724	.694	.695	.645	.813	.822	1.019
Variance		.705	.524	.482	.482	.417	.662	.676	1.038
Skewness		-1.134	-1.585	-1.996	-1.561	-1.896	-.248	-.483	-.202
Std. Error of Skewness		.151	.151	.151	.151	.151	.151	.151	.151
Kurtosis		1.693	4.643	6.275	3.754	6.022	-.383	.114	-.511
Std. Error of Kurtosis		.301	.301	.301	.301	.301	.301	.301	.301
Range		4	4	4	4	4	4	4	4
Minimum		0	0	0	0	0	0	0	0
Maximum		4	4	4	4	4	4	4	4
Percentiles	25	3.00	3.00	3.00	3.00	3.00	2.00	2.00	2.00
	50	3.00	3.00	4.00	4.00	4.00	3.00	3.00	2.00
	75	4.00	4.00	4.00	4.00	4.00	3.75	4.00	3.00

Table 30: Descriptive Statistics for SSTSQ items (Source: SPSS)

Tables 29 and 30 highlight graphical and numerical problems with skewness and/or kurtosis of the scores, respectively. However, given a large sample size (n>30), Field (2017) argues that such results are expected and thus, should rely on the Central Limit Theorem (CLT)[7]. Nevertheless, the Kolmogorov-Smirnov and Shapiro-Wilk tests for normality were performed and resulted to be significant (p<0.05), implying that the scores were significantly different from a normal distribution (Table 31). In other words, the value of p=0.00 for all items reflected distributions which deviate from normality (i.e. non-normal).

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
FUN1	.333	260	**.000**	.650	260	**.000**
FUN2	.277	260	**.000**	.769	260	**.000**
FUN3	.259	260	**.000**	.757	260	**.000**
FUN4	.320	260	**.000**	.678	260	**.000**
FUN5	.217	260	**.000**	.880	260	**.000**
ENJ1	.271	260	**.000**	.771	260	**.000**
ENJ2	.336	260	**.000**	.692	260	**.000**
ENJ3	.276	260	**.000**	.840	260	**.000**
ENJ4	.262	260	**.000**	.829	260	**.000**
SEC1	.246	260	**.000**	.774	260	**.000**
SEC2	.228	260	**.000**	.879	260	**.000**
ASU1	.236	260	**.000**	.830	260	**.000**
ASU2	.241	260	**.000**	.812	260	**.000**
DES1	.246	260	**.000**	.858	260	**.000**
DES2	.257	260	**.000**	.766	260	**.000**
CON1	.320	260	**.000**	.679	260	**.000**
CUS1	.250	260	**.000**	.871	260	**.000**
CUS2	.226	260	**.000**	.869	260	**.000**
CUS3	.288	260	**.000**	.866	260	**.000**
CNT1	.268	260	**.000**	.794	260	**.000**
CNT2	.270	260	**.000**	.711	260	**.000**
SPE1	.362	260	**.000**	.652	260	**.000**
SPE2	.350	260	**.000**	.695	260	**.000**

[7] *The CLT states that as sample sizes increase, the sampling distributions become more normal, until the point in which the sample size is 'big enough' that the sampling distribution is normal.*

SPE3	.377	260	**.000**	.647	260	**.000**
EMP1	.230	260	**.000**	.851	260	**.000**
EMP2	.233	260	**.000**	.841	260	**.000**
EMP3	.192	260	**.000**	.901	260	**.000**

a. Lilliefors Significance Correction

Table 31: Tests of Normality for SSTSQ items (Source: SPSS)

Given that the scores were non-normal, non-parametric tests were utilised to identify variations among dependent and independent scores. In the case of this study, the former referred to the questionnaire items with the lowest (CUS3, EMP3, FUN5) as well as the highest (FUN4, CON1, ENJ2, FUN1, SPE1, SPE2, SPE3) mean/median/mode values. In contrast, the independent scores referred to the demographic and behavioural information[8]. Given that all the independent scores in this study contained more than two categories, the Kruskal-Wallis H test (non-parametric equivalent of ANOVA) was utilised. Prior to conducting this test, the below hypotheses were formed:

H_0 (Null hypothesis):

There are no differences in the mean ranks of groups (i.e. they are the same)

H_A (Alternate Hypothesis):

There are differences in the mean ranks of the groups (i.e. they are not the same)

[8] *Demographic (D) and Behavioural (B) information within this study included Gender (D), Age (D), Education level (D), and Frequency of using the SCS at Decathlon (B).*

Testing each of the dependent item against each of the independent scores resulted in the following outcomes:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of FUN5 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.762	Retain the null hypothesis.
2	The distribution of CUS3 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.828	Retain the null hypothesis.
3	The distribution of EMP3 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.332	Retain the null hypothesis.
4	The distribution of FUN1 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.557	Retain the null hypothesis.
5	The distribution of FUN4 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.585	Retain the null hypothesis.
6	The distribution of ENJ2 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.605	Retain the null hypothesis.
7	The distribution of CON1 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.571	Retain the null hypothesis.
8	The distribution of SPE1 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.709	Retain the null hypothesis.
9	The distribution of SPE2 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.593	Retain the null hypothesis.
10	The distribution of SPE3 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.375	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 13: Kruskal-Wallis H test for SSTSQ items against gender (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of FUN5 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.069	Retain the null hypothesis.
2	The distribution of CUS3 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.783	Retain the null hypothesis.
3	The distribution of EMP3 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.072	Retain the null hypothesis.
4	The distribution of FUN1 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.410	Retain the null hypothesis.
5	The distribution of FUN4 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.829	Retain the null hypothesis.
6	The distribution of ENJ2 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.752	Retain the null hypothesis.
7	The distribution of CON1 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.973	Retain the null hypothesis.
8	The distribution of SPE1 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.263	Retain the null hypothesis.
9	The distribution of SPE2 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.183	Retain the null hypothesis.
10	The distribution of SPE3 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.420	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 14: Kruskal-Wallis H test for SSTSQ items against age (Source: SPSS)

Figures 13 and 14 suggest that $p>0.05$ in all cases, implying that the null hypothesis was accepted and thus, the selected items were not significantly affected by either gender or age differences.

The outcome in Figure 15 suggests that the null hypothesis was accepted ($p>0.05$) for all items with the highest mean/median/mode values, but rejected ($p<0.05$) for all items with the lowest mean/median/mode values. The latter implied that FUN5 ($p=0.010$), CUS3 ($p=0.00$), and EMP3 ($p=0.012$) items were significantly influenced by the education level of the respondent. In other words, there was an effect of the education level on such items. Pairwise comparisons through Post Hoc testing further highlighted that the major significant differences for all three items appeared between respondents with a Tertiary and above level of education when compared to respondents with a Secondary educational level (a detailed analysis of the post hoc tests for SCS service quality items is in Appendix D(i)).

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of FUN5 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.010	Reject the null hypothesis.
2	The distribution of CUS3 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
3	The distribution of EMP3 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.012	Reject the null hypothesis.
4	The distribution of FUN1 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.947	Retain the null hypothesis.
5	The distribution of FUN4 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.980	Retain the null hypothesis.
6	The distribution of ENJ2 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.934	Retain the null hypothesis.
7	The distribution of CON1 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.309	Retain the null hypothesis.
8	The distribution of SPE1 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.936	Retain the null hypothesis.
9	The distribution of SPE2 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.483	Retain the null hypothesis.
10	The distribution of SPE3 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.951	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 15: Kruskal-Wallis H test for SSTSQ items against education level (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of FUN5 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.011	Reject the null hypothesis.
2	The distribution of CUS3 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.367	Retain the null hypothesis.
3	The distribution of EMP3 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.346	Retain the null hypothesis.
4	The distribution of FUN1 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.003	Reject the null hypothesis.
5	The distribution of FUN4 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
6	The distribution of ENJ2 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.003	Reject the null hypothesis.
7	The distribution of CON1 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.004	Reject the null hypothesis.
8	The distribution of SPE1 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
9	The distribution of SPE2 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
10	The distribution of SPE3 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 16: Kruskal-Wallis H test for SSTSQ items against frequency of SCS usage (Source: SPSS)

Figure 16 suggests that the null hypothesis was accepted ($p>0.05$) for two of the items with the lowest mean/median/mode values (CUS3, EMP3) but rejected ($p<0.05$) for one of the items with the lowest mean/median/mode value (FUN5) and all items with the highest mean/median/mode values. This implied that each rejected item was significantly influenced by the usage level of the SCS by participants. In other words, there was an effect of the frequency of SCS usage on:

FUN5 (p=0.011)	CON1 (p=0.004)
FUN1 (p=0.003)	SPE1 (p=0.000)
FUN4 (p=0.000)	SPE2 (p=0.000)
ENJ2 (p=0.003)	SPE3 (p=0.000)

Pairwise comparisons through Post Hoc testing further highlighted significant differences between respondents when compared to those who always used the SCS at Decathlon (a detailed analysis of the post hoc tests for SCS service quality items is in Appendix D(i)).

4.5.2 Responses and analysis of Customer Satisfaction dimensions

The descriptive analysis statistics for customer satisfaction items in Table 32 highlight that the majority of participants felt neutral, with slight disagreement, to the statement "The Self-Checkout System at Decathlon exceeds my expectations" (SAT3). On the other hand, SAT1 had the highest mean/median/mode values, implying that the majority of customers agreed to the item "Overall, I am satisfied with the Self-Checkout System at Decathlon".

Statistics

		SAT1	SAT2	SAT3
N	Valid	260	260	260
	Missing	0	0	0
Mean		3.39	3.30	2.79
Median		4.00	3.00	3.00
Mode		4	4	3
Std. Deviation		.776	.852	1.060
Variance		.602	.727	1.123
Skewness		-1.909	-1.589	-.577
Std. Error of Skewness		.151	.151	.151
Kurtosis		5.567	3.264	-.415
Std. Error of Kurtosis		.301	.301	.301
Range		4	4	4
Minimum		0	0	0
Maximum		4	4	4
Percentiles	25	3.00	3.00	2.00
	50	4.00	3.00	3.00
	75	4.00	4.00	4.00

Table 32: Descriptive Statistics for Customer Satisfaction items (Source: SPSS)

All customer satisfaction items had distribution values of 'skewness' and 'kurtosis' different from zero, and had an associated standard error, indicating deviation from normality. All values were negatively skewed and had a distribution with a positive kurtosis, with the exception of SAT3 (negative skew and kurtosis), as seen in the below histograms:

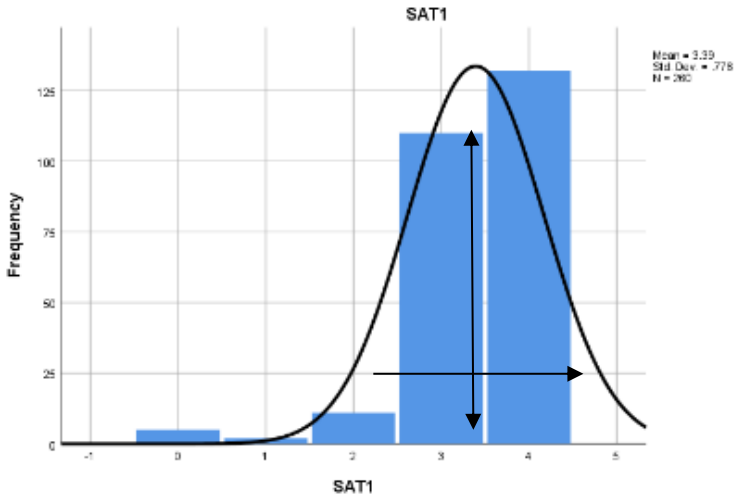


Figure 17: Negative Skewness and Positive Kurtosis for SAT1 (Source: SPSS)

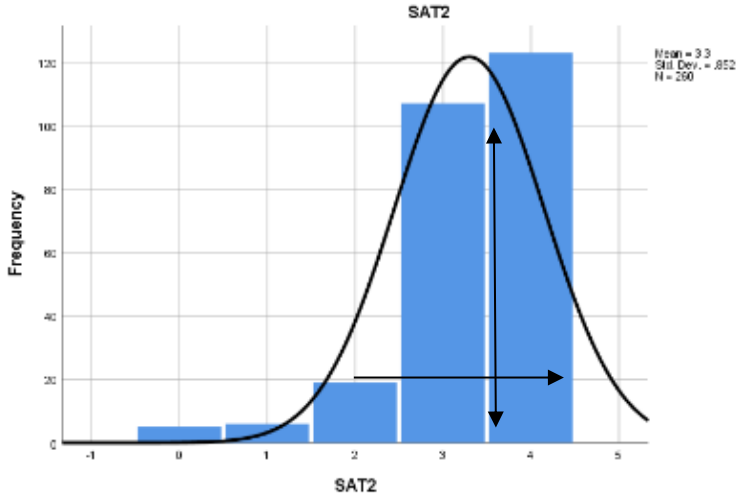


Figure 18: Negative Skewness and Positive Kurtosis for SAT2 (Source: SPSS)

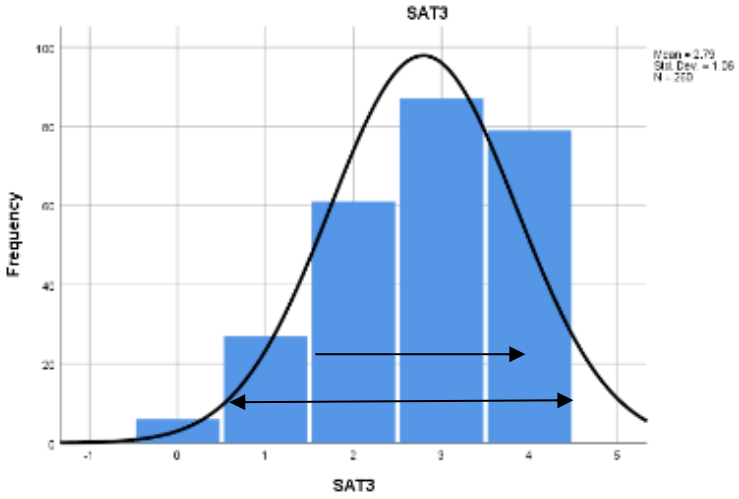


Figure 19: Negative Skewness and Negative Kurtosis for SAT3 (Source: SPSS)

The Kolmogorov-Smirnov and Shapiro-Wilk normality tests were performed, further indicating that the scores were significantly different from a normal distribution (i.e. non-normal), given that they proved to be significant ($p<0.05$). Particularly, $p=0.00$ for all items reflected distributions which deviate from normality (Table 33).

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SAT1	.291	260	**.000**	.685	260	**.000**
SAT2	.269	260	**.000**	.736	260	**.000**
SAT3	.216	260	**.000**	.871	260	**.000**

a. Lilliefors Significance Correction

Table 33: Tests of Normality for Customer Satisfaction items (Source: SPSS)

Given that the scores were non-normal, the Kruskal-Wallis H test was applied to identify any variations among each customer satisfaction item and each demographical/behavioural factor within the questionnaire. Prior to conducting such test, the following hypotheses were formulated:

H_0 (Null hypothesis):

There are no differences in the mean ranks of groups (i.e. they are the same)

H_A (Alternate Hypothesis):

There are differences in the mean ranks of the groups (i.e. they are not the same)

Testing the above resulted in the following outcomes:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of SAT1 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.660	Retain the null hypothesis.
2	The distribution of SAT2 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.766	Retain the null hypothesis.
3	The distribution of SAT3 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.688	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 20: Kruskal-Wallis H test for Customer Satisfaction against gender (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of SAT1 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.134	Retain the null hypothesis.
2	The distribution of SAT2 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.149	Retain the null hypothesis.
3	The distribution of SAT3 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.113	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 21: Kruskal-Wallis H test for Customer Satisfaction against age (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of SAT1 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.979	Retain the null hypothesis.
2	The distribution of SAT2 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.864	Retain the null hypothesis.
3	The distribution of SAT3 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.144	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 22: Kruskal-Wallis H test for Customer Satisfaction against education level (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of SAT1 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.004	Reject the null hypothesis.
2	The distribution of SAT2 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.001	Reject the null hypothesis.
3	The distribution of SAT3 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.003	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 23: Kruskal-Wallis H test for Customer Satisfaction against frequency of SCS usage (Source: SPSS)

The above outcomes suggest that customer satisfaction items were not significantly affected by differences in the respondents' gender, age, or educational level, since $p>0.05$, implying the acceptance of the null hypothesis. However, when testing the customer satisfaction items (SAT1, SAT2, SAT3) against the frequency of SCS usage, the null hypothesis was rejected in each case ($p<0.05$). This implied that there was an influence of the frequency of SCS usage on customer satisfaction.

The three diagrams below show the post hoc pairwise comparisons, represented by the average rank within each frequency group, whereby the yellow lines represents a significant difference between the frequency of SCS usage levels:

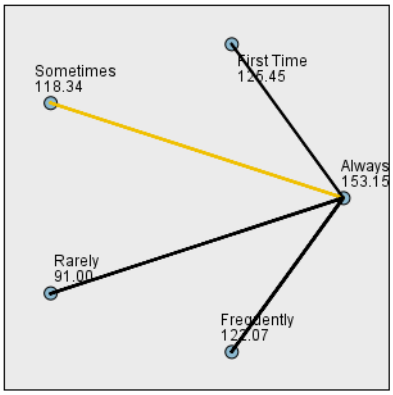


Figure 24: Pairwise Comparisons for SAT1 (Source: SPSS)

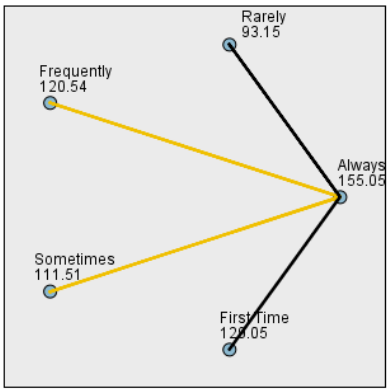


Figure 25: Pairwise Comparisons for SAT2 (Source: SPSS)

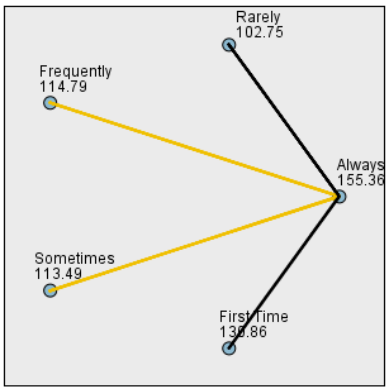


Figure 26: Pairwise Comparisons for SAT3 (Source: SPSS)

All three figures depict how the highest average rank is associated with participants that always use the SCS when shopping at Decathlon. This implies that such individuals responded with higher values (i.e. Agree and Strongly Agree) to the customer satisfaction items. Thus, it can be concluded that customers who always (highest mean rank) make use of the SCS when shopping from Decathlon seem to be more satisfied with the SCS than other customers who rarely (lowest mean rank) use the SCS (a comprehensive analysis of the post hoc tests for customer satisfaction items is in Appendix D(ii)).

4.5.3 Responses and analysis of Customer Loyalty dimensions

The mean/median/mode values within the descriptive analysis statistics in Table 34 highlight that most participants agreed with all the customer loyalty items, implying that, respondents are highly likely to use the SCS again (LOY1), given that it is their preferred choice (LOY4), as well as are likely to recommend (LOY2) and speak positively (LOY3) about the SCS at Decathlon with others.

Statistics

		LOY1	LOY2	LOY3	LOY4
N	Valid	260	260	260	260
	Missing	0	0	0	0
Mean		3.60	3.52	3.43	3.42
Median		4.00	4.00	4.00	4.00
Mode		4	4	4	4
Std. Deviation		.670	.700	.766	.823
Variance		.449	.490	.586	.677
Skewness		-2.444	-1.722	-1.494	-1.636
Std. Error of Skewness		.151	.151	.151	.151
Kurtosis		8.864	4.276	2.701	2.974
Std. Error of Kurtosis		.301	.301	.301	.301
Range		4	4	4	4
Minimum		0	0	0	0
Maximum		4	4	4	4
Percentiles	25	3.00	3.00	3.00	3.00
	50	4.00	4.00	4.00	4.00
	75	4.00	4.00	4.00	4.00

Table 34: Descriptive statistics for Customer Loyalty items (Source: SPSS)

All customer loyalty items had distribution values of negative skew and positive kurtosis which were different from zero and had an associated standard error, indicating deviation from normality. This portrays histograms with more frequent scores towards the right and a heavy-tailed distribution that is pointy, as below:

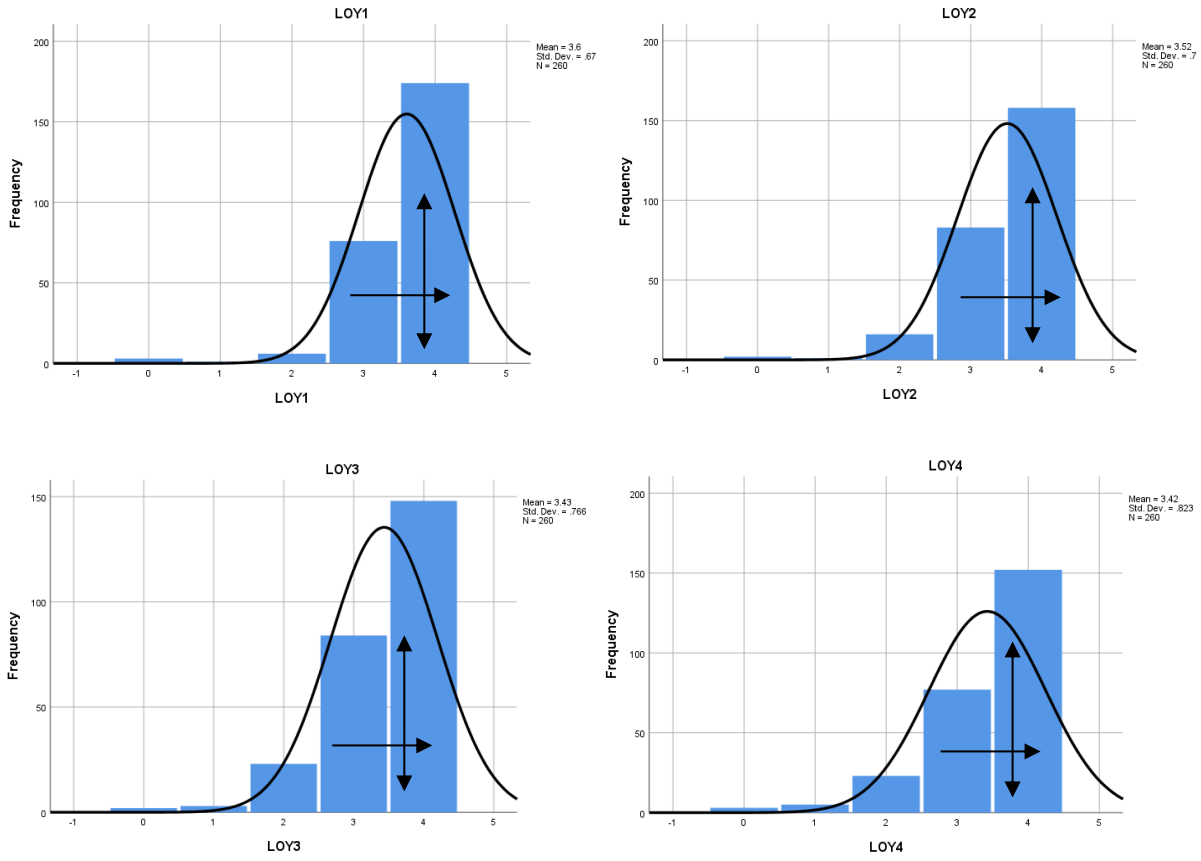


Figure 27: Negative Skewness and Positive Kurtosis for Customer Loyalty items (Source: Author)

The Kolmogorov-Smirnov and Shapiro-Wilk tests for normality were performed, further indicating that the scores were significantly different from a distribution that is normal (i.e. non-normal), given that they resulted to be significant ($p<0.05$). Specifically, $p=0.00$ for all items reflected distributions which deviate from normality (Table 35).

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LOY1	.392	260	**.000**	.594	260	**.000**
LOY2	.363	260	**.000**	.677	260	**.000**
LOY3	.339	260	**.000**	.715	260	**.000**
LOY4	.343	260	**.000**	.703	260	**.000**

a. Lilliefors Significance Correction

Table 35: Tests of Normality for Customer Loyalty items (Source: SPSS)

Given that the scores were non-normal, the Kruskal-Wallis H test was conducted to identify any variation amongst each customer loyalty item and each demographical/behavioural factor within the questionnaire. Prior to conducting this test, the following hypotheses were formed:

H_0 (Null hypothesis):

There are no differences in the mean ranks of groups (i.e. they are the same)

H_A (Alternate Hypothesis):

There are differences in the mean ranks of the groups (i.e. they are not the same)

Testing the above resulted in the following outcomes:

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of LOY1 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.767	Retain the null hypothesis.
2	The distribution of LOY2 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.143	Retain the null hypothesis.
3	The distribution of LOY3 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.190	Retain the null hypothesis.
4	The distribution of LOY4 is the same across categories of GENDER.	Independent-Samples Kruskal-Wallis Test	.576	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 28: Kruskal-Wallis H test for Customer Loyalty items against gender (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of LOY1 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.317	Retain the null hypothesis.
2	The distribution of LOY2 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.695	Retain the null hypothesis.
3	The distribution of LOY3 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.404	Retain the null hypothesis.
4	The distribution of LOY4 is the same across categories of AGE.	Independent-Samples Kruskal-Wallis Test	.216	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 29: Kruskal-Wallis H test for Customer Loyalty items against age (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of LOY1 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.655	Retain the null hypothesis.
2	The distribution of LOY2 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.425	Retain the null hypothesis.
3	The distribution of LOY3 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.422	Retain the null hypothesis.
4	The distribution of LOY4 is the same across categories of EDUCATION.	Independent-Samples Kruskal-Wallis Test	.575	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 30: Kruskal-Wallis H test for Customer Loyalty items against education level (Source: SPSS)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of LOY1 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
2	The distribution of LOY2 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.001	Reject the null hypothesis.
3	The distribution of LOY3 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.002	Reject the null hypothesis.
4	The distribution of LOY4 is the same across categories of FREQUENCY.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 31: Kruskal-Wallis H test for Customer Loyalty items against frequency of SCS usage (Source: SPSS)

As was in the case of the customer satisfaction items, the above outcomes suggest that customer loyalty items were not significantly affected by differences in the respondents' gender, age, or educational level (given that $p>0.05$), consequently accepting the null hypothesis. However, when testing each of the customer loyalty items (LOY1, LOY2, LOY3, LOY4) against the frequency of SCS usage, the null hypothesis was rejected in each case ($p<0.05$). This implied that there was an influence of the frequency of SCS usage on customer loyalty.

The four diagrams below show the post hoc pairwise comparisons, represented by the average rank within each frequency group, whereby the yellow lines represents a significant difference between the frequency of SCS usage levels:

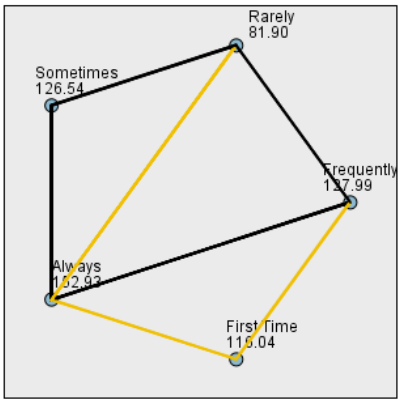


Figure 32: Pairwise Comparisons for LOY1 (Source: SPSS)

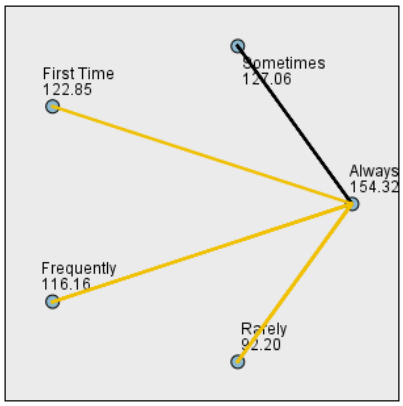


Figure 33: Pairwise Comparisons for LOY2 (Source: SPSS)

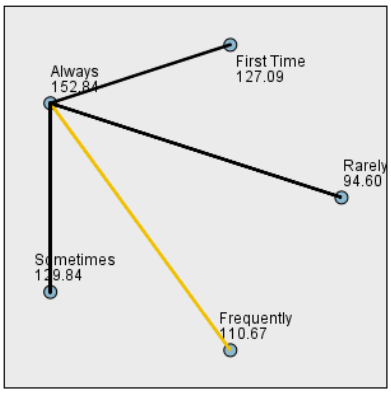


Figure 34: Pairwise Comparisons for LOY3 (Source: SPSS)

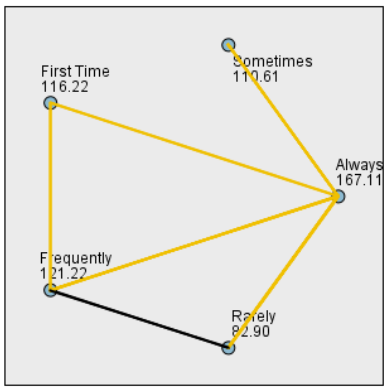


Figure 35: Pairwise Comparisons for LOY4 (Source: SPSS)

Figures 32 to 35 show how the highest average rank is associated with participants who always use the SCS when shopping at Decathlon. This implies that such individuals responded with higher values (i.e. Agree and Strongly Agree) to the customer loyalty items. Thus, it can be concluded that customers who always (highest mean rank) make use of the SCS when shopping from Decathlon seem to be more loyal in using the SCS than other customers who rarely (lowest mean rank) use the SCS (a detailed analysis of the post hoc tests for customer loyalty items is in Appendix D(iii)).

4.6 Correlation Analysis

Given that the questionnaire was based on Likert scale (continuous) data and such data was non-linear, a non-parametric test was utilised to measure the association between the items in this study. The Spearman rank-order correlation test was conducted to define the Spearman correlation coefficient, ρ ("rho"), whereby:

H_0 (Null Hypothesis):

There is no relationship between the variables understudy ($\rho=0$)

H_A (Alternate Hypothesis):

There is a relationship between the variables understudy ($\rho\neq0$)

The correlation matrix in Table 36 portrays that only two correlation coefficients (marked in red) were not statistically significant, implying that no significant linear correlation exists between FUN3 and CUS3 (p=0.176), and between EMP3 and LOY1 (p=0.053). This was further verified through the below scatter plots, whereby the value of the R^2 Linear[9] for both relationships was very small, suggesting a very weak relationship.

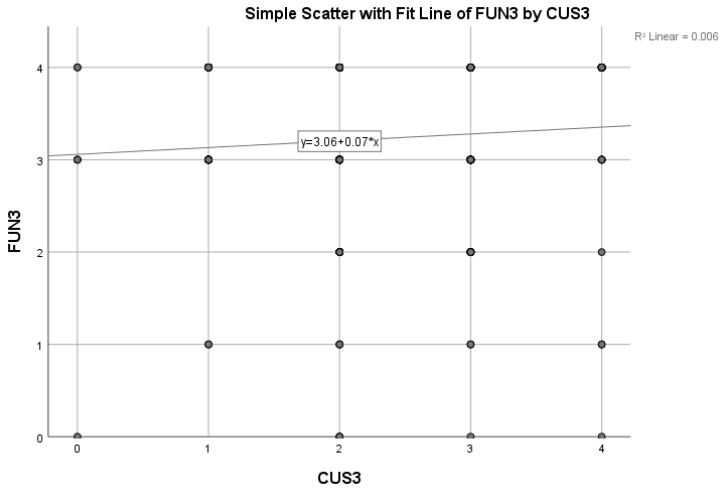


Figure 36: Scatter Plot for FUN3 against CUS3 (Source: SPSS)

[9] *R^2 Linear is the difference between the observed and fitted values.*

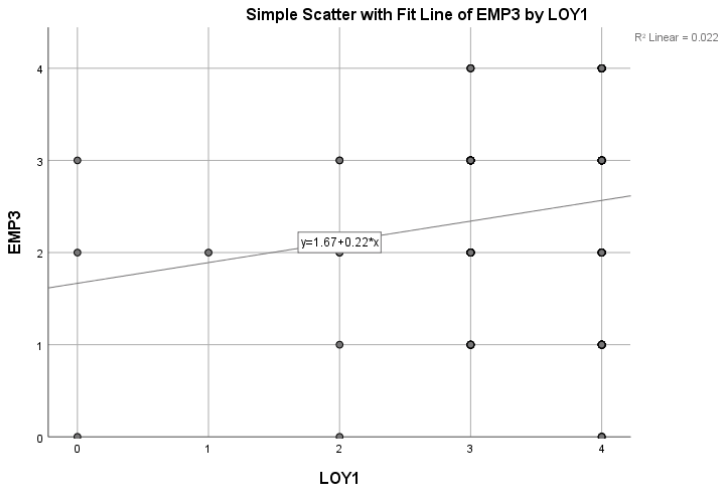


Figure 37: Scatter Plot for EMP3 against LOY1 (Source: SPSS)

All other correlation coefficients within the matrix suggested a moderate or strong (marked in yellow) positive statistically significant linear relationship ($p<0.05$), rejecting the null hypothesis signifying that the correlation coefficients are statistically different from zero. In particular, the strongest correlations were found between items of the same construct (circled in black in Table 36 below). In fact, the highest correlation coefficient of 0.84 explained the correlation amongst SAT1 and SAT2. This was followed by the correlations between items of SPE1 and SPE2 ($p=0.82$) as well as LOY1 and LOY2 ($p=0.81$).

Spearman's rho Correlation Coefficients

	FUN1	FUN2	FUN3	FUN4	FUN5	ENJ1	ENJ2	ENJ3	ENJ4	SEC1	SEC2	ASU1	ASU2	DES1	DES2	CON1	CUS1	CUS2	CUS3	CNT1	CNT2	SPE1	SPE2	SPE3	EMP1	EMP2	EMP3	SAT1	SAT2	SAT3	LOY1	LOY2	LOY3	LOY4
FUN1	1.000																																	
FUN2	.690**	1.000																																
FUN3	.569**	.609**	1.000																															
FUN4	.751**	.702**	.638**	1.000																														
FUN5	.467**	.473**	.464**	.471**	1.000																													
ENJ1	.379**	.351**	.324**	.403**	.274**	1.000																												
ENJ2	.482**	.462**	.436**	.468**	.380**	.637**	1.000																											
ENJ3	.247**	.326**	.211**	.254**	.401**	.506**	.439**	1.000																										
ENJ4	.391**	.491**	.406**	.436**	.477**	.413**	.488**	.530**	1.000																									
SEC1	.523**	.465**	.451**	.475**	.469**	.326**	.384**	.239**	.477**	1.000																								
SEC2	.285**	.321**	.187**	.214**	.366**	.254**	.315**	.459**	.481**	.379**	1.000																							
ASU1	.326**	.309**	.309**	.351**	.271**	.304**	.366**	.178**	.360**	.356**	.213**	1.000																						
ASU2	.354**	.343**	.332**	.382**	.333**	.363**	.402**	.315**	.477**	.398**	.293**	.730**	1.000																					
DES1	.266**	.352**	.300**	.373**	.382**	.424**	.313**	.292**	.375**	.394**	.349**	.416**	.454**	1.000																				
DES2	.360**	.419**	.387**	.455**	.342**	.534**	.463**	.408**	.503**	.438**	.317**	.356**	.449**	.624**	1.000																			
CON1	.490**	.548**	.400**	.502**	.388**	.409**	.485**	.350**	.382**	.403**	.235**	.324**	.404**	.369**	.496**	1.000																		
CUS1	.306**	.444**	.256**	.340**	.433**	.386**	.379**	.450**	.500**	.335**	.368**	.299**	.436**	.452**	.390**	.348**	1.000																	
CUS2	.300**	.383**	.224**	.288**	.392**	.382**	.363**	.446**	.489**	.328**	.417**	.243**	.405**	.405**	.354**	.290**	.684**	1.000																
CUS3	.170**	.292**	0.084	.159*	.325**	.282**	.248**	.537**	.359**	.167**	.486**	.141*	.272**	.305**	.231**	.183**	.558**	.660**	1.000															
CNT1	.450**	.483**	.371**	.402**	.370**	.421**	.417**	.331**	.362**	.407**	.357**	.281**	.364**	.355**	.434**	.447**	.459**	.397**	.359**	1.000														
CNT2	.554**	.530**	.412**	.568**	.389**	.403**	.444**	.259**	.428**	.439**	.233**	.356**	.454**	.337**	.439**	.471**	.394**	.291**	.171**	.648**	1.000													
SPE1	.547**	.482**	.414**	.525**	.347**	.431**	.465**	.349**	.380**	.416**	.234**	.278**	.342**	.365**	.430**	.583**	.305**	.343**	.219**	.501**	.479**	1.000												
SPE2	.537**	.507**	.442**	.559**	.373**	.400**	.476**	.311**	.382**	.465**	.252**	.304**	.321**	.412**	.406**	.570**	.328**	.262**	.234**	.530**	.533**	.822**	1.000											
SPE3	.554**	.486**	.450**	.568**	.369**	.469**	.522**	.263**	.343**	.468**	.199**	.323**	.317**	.354**	.439**	.534**	.280**	.237**	.130*	.543**	.513**	.772**	.797**	1.000										
EMP1	.264**	.298**	.183**	.296**	.279**	.273**	.331**	.309**	.381**	.296**	.272**	.222**	.389**	.288**	.315**	.319**	.395**	.409**	.369**	.274**	.262**	.311**	.269**	.285**	1.000									
EMP2	.367**	.372**	.269**	.387**	.342**	.289**	.336**	.303**	.389**	.381**	.344**	.260**	.407**	.325**	.297**	.339**	.437**	.450**	.398**	.354**	.324**	.307**	.330**	.311**	.734**	1.000								
EMP3	.191**	.262**	.175**	.210**	.269**	.237**	.270**	.370**	.372**	.229**	.391**	.215**	.306**	.263**	.223**	.253**	.430**	.485**	.489**	.280**	.174**	.162**	.146*	.136*	.557**	.606**	1.000							
SAT1	.573**	.537**	.410**	.529**	.392**	.436**	.500**	.378**	.420**	.452**	.365**	.327**	.343**	.334**	.453**	.498**	.347**	.388**	.285**	.505**	.521**	.531**	.549**	.527**	.358**	.448**	.312**	1.000						
SAT2	.560**	.512**	.433**	.571**	.402**	.389**	.423**	.304**	.386**	.503**	.325**	.336**	.381**	.383**	.457**	.503**	.375**	.380**	.239**	.511**	.523**	.501**	.492**	.487**	.344**	.462**	.275**	.840**	1.000					
SAT3	.354**	.421**	.317**	.426**	.411**	.439**	.375**	.522**	.466**	.294**	.326**	.220**	.279**	.370**	.435**	.303**	.421**	.466**	.420**	.387**	.366**	.400**	.361**	.340**	.273**	.353**	.357**	.556**	.573**	1.000				
LOY1	.563**	.487**	.453**	.529**	.305**	.427**	.533**	.234**	.332**	.496**	.216**	.316**	.330**	.328**	.443**	.519**	.299**	.268**	.146*	.517**	.527**	.592**	.600**	.674**	.338**	.319**	0.120	.627**	.583**	.346**	1.000			
LOY2	.514**	.500**	.442**	.509**	.381**	.492**	.566**	.354**	.425**	.487**	.310**	.327**	.329**	.403**	.485**	.529**	.354**	.342**	.249**	.488**	.478**	.565**	.619**	.603**	.331**	.336**	.208**	.658**	.606**	.424**	.810**	1.000		
LOY3	.510**	.461**	.423**	.498**	.382**	.449**	.572**	.356**	.446**	.436**	.359**	.278**	.330**	.373**	.470**	.510**	.372**	.395**	.260**	.497**	.486**	.516**	.520**	.526**	.346**	.399**	.266**	.662**	.646**	.499**	.658**	.744**	1.000	
LOY4	.560**	.511**	.443**	.542**	.416**	.431**	.471**	.334**	.423**	.571**	.279**	.238**	.270**	.374**	.434**	.500**	.374**	.289**	.203**	.501**	.475**	.546**	.578**	.590**	.321**	.354**	.212**	.541**	.566**	.437**	.638**	.661**	.634**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 36: Correlation Matrix for all items (Source: SPSS)

4.7 Factor Analysis

4.7.1 Kaiser-Meyer-Olkin test

The Kaiser-Meyer-Olkin (KMO) test was carried out to calculate sampling adequacy for the data within this study, explicitly, to assess if the correlations between variables are adequate for factor analysis. Evaluations of the KMO results were based on the threshold set by Kaiser (1974):

Levels of Indices of Factorial simplicity	Evaluation
0.00 to 0.49	Unacceptable
0.50 to 0.59	Miserable
0.60 to 0.69	Mediocre
0.70 to 0.79	Middling
0.80 to 0.89	Meritorious
0.90 to 1.00	Marvellous

Table 37: Evaluation of levels of indices of factorial simplicity (Source: Kaiser (1974))

The KMO value represents the correlation coefficient for every item with itself, known as the anti-image correlation matrix, as highlighted in Table 38. Each item resulted in a KMO value above 0.8 (marked in yellow), indicating ‘meritorious’ or ‘marvellous’ variables, hence each SSTSQ item resulted to be highly adequate for factor analysis.

Anti-image Matrices																												
		FUN1	FUN2	FUN3	FUN4	FUN5	ENJ1	ENJ2	ENJ3	ENJ4	SEC1	SEC2	ASU1	ASU2	DES1	DES2	CON1	CUS1	CUS2	CUS3	CNT1	CNT2	SPE1	SPE2	SPE3	EMP1	EMP2	EMP3
Anti-image Correlation	FUN1	.925[a]	-0.152	-0.129	-0.531	-0.063	-0.053	-0.063	0.005	0.125	-0.154	-0.120	-0.061	0.000	0.120	0.050	0.086	0.044	-0.021	0.046	0.018	-0.122	-0.120	0.022	-0.050	-0.046	0.013	0.035
	FUN2	-0.152	.965[a]	-0.107	-0.162	-0.037	0.023	-0.029	0.056	-0.195	-0.027	-0.031	-0.028	0.146	-0.054	-0.019	-0.191	-0.073	0.029	-0.091	0.001	-0.085	-0.019	0.068	-0.038	0.036	-0.086	0.007
	FUN3	-0.129	-0.107	.949[a]	-0.202	-0.145	0.009	-0.078	0.004	-0.028	-0.030	0.039	0.015	-0.124	0.024	-0.037	0.067	0.066	-0.050	0.096	-0.088	0.113	0.039	-0.086	0.031	0.109	0.027	-0.049
	FUN4	-0.531	-0.162	-0.202	.929[a]	-0.041	-0.019	-0.013	0.016	-0.107	0.045	0.119	-0.014	-0.004	-0.034	-0.021	-0.131	-0.031	0.056	-0.029	0.083	-0.091	0.025	-0.074	0.043	0.057	-0.079	0.022
	FUN5	-0.063	-0.037	-0.145	-0.041	.964[a]	0.112	-0.016	-0.145	-0.041	-0.185	-0.038	0.040	0.039	-0.148	0.023	0.003	-0.080	0.002	-0.038	0.003	0.000	0.027	0.019	-0.025	-0.013	-0.025	-0.009
	ENJ1	-0.053	0.023	0.009	-0.019	0.112	.920[a]	-0.410	-0.293	0.086	-0.014	0.087	0.025	-0.015	-0.171	-0.179	0.041	-0.005	-0.064	0.025	-0.026	0.007	0.008	0.088	-0.118	0.055	-0.055	0.042
	ENJ2	-0.063	-0.029	-0.078	-0.013	-0.016	-0.410	.954[a]	-0.063	-0.070	0.026	-0.115	-0.105	-0.019	0.139	-0.004	-0.068	-0.023	-0.080	0.053	0.033	-0.028	0.036	-0.021	-0.137	-0.056	0.041	-0.025
	ENJ3	0.005	0.056	0.004	0.016	-0.145	-0.293	-0.063	.914[a]	-0.248	0.094	-0.145	0.036	-0.031	0.114	-0.060	-0.058	-0.041	0.083	-0.281	0.072	0.009	-0.061	-0.076	0.101	-0.005	0.064	-0.065
	ENJ4	0.125	-0.195	-0.028	-0.107	-0.041	0.086	-0.070	-0.248	.935[a]	-0.092	-0.199	-0.020	-0.120	0.158	-0.190	0.011	-0.153	-0.101	0.173	0.054	-0.075	0.052	-0.056	0.029	-0.082	0.100	-0.081
	SEC1	-0.154	-0.027	-0.030	0.045	-0.185	-0.014	0.026	0.094	-0.092	.968[a]	-0.158	-0.039	-0.075	-0.019	-0.041	-0.003	0.020	-0.059	0.101	-0.048	-0.016	0.070	-0.103	-0.057	0.015	-0.088	0.007
	SEC2	-0.120	-0.031	0.039	0.119	-0.038	0.087	-0.115	-0.145	-0.199	-0.158	.917[a]	-0.023	0.022	-0.145	-0.013	0.084	0.084	0.025	-0.247	-0.093	0.075	-0.071	0.054	0.052	0.071	-0.067	-0.029
	ASU1	-0.061	-0.028	0.015	-0.014	0.040	0.025	-0.105	0.036	-0.020	-0.039	-0.023	.880[a]	-0.579	-0.165	0.123	-0.050	0.030	0.027	0.034	0.015	0.028	0.121	-0.012	-0.081	0.055	0.060	-0.051
	ASU2	0.000	0.146	-0.124	-0.004	0.039	-0.015	-0.019	-0.031	-0.120	-0.075	0.022	-0.579	.907[a]	-0.081	-0.066	-0.076	-0.081	-0.017	-0.070	0.036	-0.151	-0.153	0.140	0.036	-0.077	-0.106	0.093
	DES1	0.120	-0.054	0.024	-0.034	-0.148	-0.171	0.139	0.114	0.158	-0.019	-0.145	-0.165	-0.081	.886[a]	-0.445	0.060	-0.090	-0.085	0.013	0.017	0.043	0.040	-0.221	0.091	0.011	-0.017	-0.029
	DES2	0.050	-0.019	-0.037	-0.021	0.023	-0.179	-0.004	-0.060	-0.190	-0.041	-0.013	0.123	-0.066	-0.445	.926[a]	-0.153	0.037	0.023	0.049	-0.053	-0.040	-0.031	0.145	-0.120	-0.079	0.033	0.048
	CON1	0.086	-0.191	0.067	-0.131	0.003	0.041	-0.068	-0.058	0.011	-0.003	0.084	-0.050	-0.076	0.060	-0.153	.968[a]	0.005	-0.026	0.068	-0.080	-0.061	-0.098	-0.145	-0.010	-0.011	0.054	-0.091
	CUS1	0.044	-0.073	0.066	-0.031	-0.080	-0.005	-0.023	-0.041	-0.153	0.020	0.084	0.030	-0.081	-0.090	0.037	0.005	.947[a]	-0.395	-0.136	-0.073	-0.073	0.119	-0.048	-0.016	0.005	-0.024	-0.020
	CUS2	-0.021	0.029	-0.050	0.056	0.002	-0.064	-0.080	0.083	-0.101	-0.059	0.025	0.027	-0.017	-0.085	0.023	-0.026	-0.395	.914[a]	-0.382	-0.064	0.003	-0.242	0.164	0.051	-0.005	-0.026	-0.081
	CUS3	0.046	-0.091	0.096	-0.029	-0.038	0.025	0.053	-0.281	0.173	0.101	-0.247	0.034	-0.070	0.013	0.049	0.068	-0.136	-0.382	.865[a]	-0.137	0.100	0.084	-0.171	0.082	-0.071	0.023	-0.140
	CNT1	0.018	0.001	-0.088	0.083	0.003	-0.026	0.033	0.072	0.054	-0.048	-0.093	0.015	0.036	0.017	-0.053	-0.080	-0.073	-0.064	-0.137	.945[a]	-0.374	0.024	-0.014	-0.190	0.106	-0.049	-0.053
	CNT2	-0.122	-0.085	0.113	-0.091	0.000	0.007	-0.028	0.009	-0.075	-0.016	0.075	0.028	-0.151	0.043	-0.040	-0.061	-0.073	0.003	0.100	-0.374	.954[a]	0.056	-0.128	0.021	-0.007	-0.035	0.016
	SPE1	-0.120	-0.019	0.039	0.025	0.027	0.008	0.036	-0.061	0.052	0.070	-0.071	0.121	-0.153	0.040	-0.031	-0.098	0.119	-0.242	0.084	0.024	0.056	.925[a]	-0.380	-0.303	-0.086	0.115	-0.022
	SPE2	0.022	0.068	-0.086	-0.074	0.019	0.088	-0.021	-0.076	-0.056	-0.103	0.054	-0.012	0.140	-0.221	0.145	-0.145	-0.048	0.164	-0.171	-0.014	-0.128	-0.380	.902[a]	-0.467	0.091	-0.155	0.106
	SPE3	-0.050	-0.038	0.031	0.043	-0.025	-0.118	-0.137	0.101	0.029	-0.057	0.052	-0.081	0.036	0.091	-0.120	-0.010	-0.016	0.051	0.082	-0.190	0.021	-0.303	-0.467	.928[a]	-0.098	0.048	0.010
	EMP1	-0.046	0.036	0.109	0.057	-0.013	0.055	-0.056	-0.005	-0.082	0.015	0.071	0.055	-0.077	0.011	-0.079	-0.011	0.005	-0.005	-0.071	0.106	-0.007	-0.086	0.091	-0.098	.884[a]	-0.531	-0.180
	EMP2	0.013	-0.086	0.027	-0.079	-0.025	-0.055	0.041	0.064	0.100	-0.088	-0.067	0.060	-0.106	-0.017	0.033	0.054	-0.024	-0.026	0.023	-0.049	-0.035	0.115	-0.155	0.048	-0.531	.889[a]	-0.314
	EMP3	0.035	0.007	-0.049	0.022	-0.009	0.042	-0.025	-0.065	-0.081	0.007	-0.029	-0.051	0.093	-0.029	0.048	-0.091	-0.020	-0.081	-0.140	-0.053	0.016	-0.022	0.106	0.010	-0.180	-0.314	.931[a]
a. Measures of Sampling Adequacy(MSA)																												

Table 38: Anti-image Correlation Matrix (Source: SPSS)

Furthermore, Table 39 shows that the KMO statistic for the overall SSTSQ dimensions was 0.928, and the Bartlett's Test resulted in a substantial value lower than 0.005, both suggesting suitability of the SSTSQ items for factor analysis.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.928**
Bartlett's Test of Sphericity	Approx. Chi-Square	4608.766
	df	351
	Sig.	**.000**

Table 39: KMO and Bartlett's Test (Source: SPSS)

4.7.2 Confirmatory Factor Analysis

Given the KMO and Bartlett results, Confirmatory Factor Analysis (CFA) was completed utilizing SPSS AMOS 26 software. Rather than conducting an Exploratory Factor Analysis (EFA), which is conducted to discover the original structure of variables, CFA was applied to validate the factor structure of the dataset within this study. Explicitly, CFA was utilised to prove construct validity of the SSTSQ questionnaire items, regarding how well the dimensions explained their respective items (Hair, Black, Babin and Anderson, 2010). Thus, a high correlation of the items under the same dimension implied construct validity. Furthermore, the regression weights (factor loadings) and the squared multiple correlations of the items also contributed to the construct validity comprehension.

In this case, CFA was conducted on the SSTSQ items, which were measured using a ten-latent factor model, including a total of 27 items. The resulting diagram (Figure 38) includes standardised estimates of the factor loadings for each dimension on their corresponding items (Table 40) and the correlations between the latent variables themselves (Table 41).

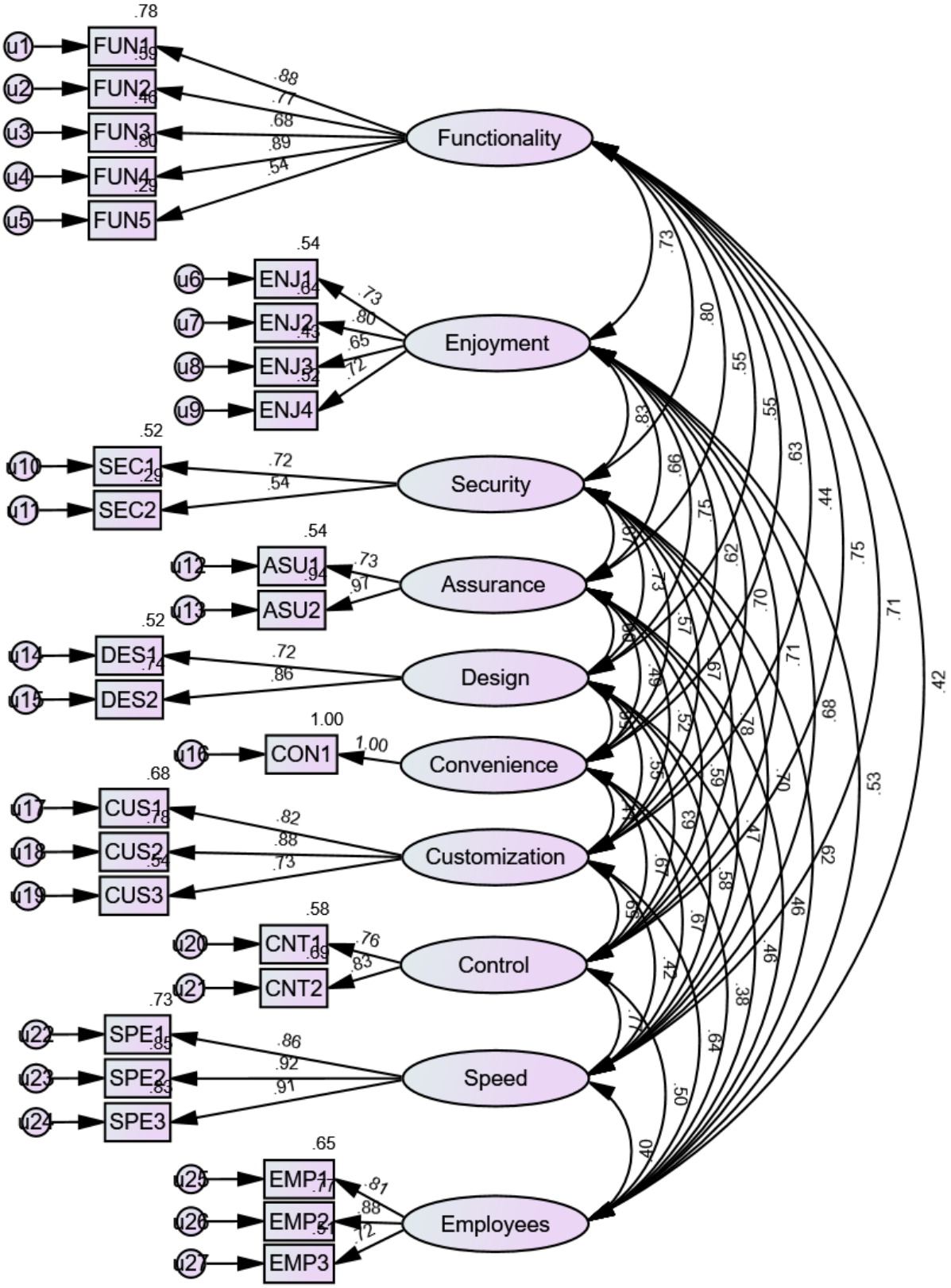


Figure 38: Confirmatory Factor Analysis for SSTSQ items (Source: SPSS AMOS)

Table 40 reveals that all items in each SSTSQ dimension had a significant regression weight ($p<0.05$), indicating construct validity. In other words, all SSTSQ items loaded significantly on their corresponding latent factor (dimension). In fact, all standardised factor loadings were positive and mostly greater than 0.7, suggesting a strong correlation between the item and its respective latent variable.

		Standardised Factor Loadings*			**Standardised Factor Loadings***
FUN1 ←	Functionality	.883	DES2 ←	Design	.862
FUN2 ←	Functionality	.768	CON1 ←	Convenience	1.000[10]
FUN3 ←	Functionality	.677	CUS1 ←	Customization	.822
FUN4 ←	Functionality	.893	CUS2 ←	Customization	.885
FUN5 ←	Functionality	.543	CUS3 ←	Customization	.733
ENJ1 ←	Enjoyment	.732	CNT1 ←	Control	.759
ENJ2 ←	Enjoyment	.801	CNT2 ←	Control	.832
ENJ3 ←	Enjoyment	.652	SPE1 ←	Speed of Delivery	.856
ENJ4 ←	Enjoyment	.723	SPE2 ←	Speed of Delivery	.919
SEC1 ←	Security	.721	SPE3 ←	Speed of Delivery	.914
SEC2 ←	Security	.536	EMP1 ←	Support by Employees	.808
ASU1 ←	Assurance	.734	EMP2 ←	Support by Employees	.877
ASU2 ←	Assurance	.970	EMP3 ←	Support by Employees	.716
DES1 ←	Design	.719			

**All values are significant at p<0.001*

Table 40: CFA results - Standardised Factor Loadings (Source: SPSS AMOS)

Table 41 portrays how the correlations between the latent variables were all positive and significant ($p<0.05$), indicating significant correlations among the SSTSQ dimensions. The strongest correlation appeared between the dimensions of 'Enjoyment' and 'Security', with a standardised coefficient of 0.83, while the weakest correlation was between the 'Convenience' and 'Support by Employees' dimensions, with a standardised coefficient of 0.38.

[10] The Standardised Factor Loading of CON1 on 'Convenience' was one given that CON1 was the only item within such dimension.

			Standardised Correlations*				Standardised Correlations*
Functionality	↔	Enjoyment	.728	Security	↔	Support by Employees	.618
Functionality	↔	Security	.796	Assurance	↔	Design	.599
Functionality	↔	Assurance	.546	Convenience	↔	Assurance	.489
Functionality	↔	Design	.549	Assurance	↔	Customization	.522
Convenience	↔	Functionality	.626	Assurance	↔	Control	.588
Functionality	↔	Customization	.436	Assurance	↔	Speed of Delivery	.469
Functionality	↔	Control	.747	Assurance	↔	Support by Employees	.461
Functionality	↔	Speed of Delivery	.708	Convenience	↔	Design	.560
Functionality	↔	Support by Employees	.416	Design	↔	Customization	.554
Enjoyment	↔	Security	.828	Design	↔	Control	.627
Enjoyment	↔	Assurance	.657	Design	↔	Speed of Delivery	.583
Enjoyment	↔	Design	.749	Design	↔	Support by Employees	.463
Convenience	↔	Enjoyment	.619	Convenience	↔	Customization	.412
Enjoyment	↔	Customization	.702	Convenience	↔	Control	.667
Enjoyment	↔	Control	.714	Convenience	↔	Speed of Delivery	.674
Enjoyment	↔	Speed of Delivery	.677	Convenience	↔	Support by Employees	.377
Enjoyment	↔	Support by Employees	.531	Customization	↔	Control	.593
Security	↔	Assurance	.672	Customization	↔	Speed of Delivery	.423
Security	↔	Design	.731	Customization	↔	Support by Employees	.637
Convenience	↔	Security	.568	Control	↔	Speed of Delivery	.767
Security	↔	Customization	.666	Control	↔	Support by Employees	.503
Security	↔	Control	.778	Speed of Delivery	↔	Support by Employees	.402
Security	↔	Speed of Delivery	.702				

**All values are significant at p<0.001*

Table 41: CFA results - Standardised Correlations among latent variables (Source: SPSS AMOS)

4.7.3 Model Fit

The Model fit identifies the general fit of the model to the data, from the CFA outcomes. It also refers to how well the proposed model in this study accounts for the correlations amongst variables in the data set. The below table outlines certain measures which can be computed to determine goodness of fit, together with a guideline of their acceptable thresholds, adapted from Hu and Bentler (1999):

Measure	Threshold		
	Terrible	Acceptable	Excellent
CMIN/DF	>5	>3	>1
CFI	<0.90	<0.95	>0.95
SRMR	>0.10	>0.08	<0.08
RMSEA	>0.08	>0.06	<0.06
PClose	<0.01	<0.05	>0.05

Table 42: CFA Fit indices (Source: Hu et al. (1999))

In this study, the model fit measures that emerged after conducting CFA, together with their respective interpretation, are shown in Table 43:

Model Fit Indices		Interpretations
Chi Squared (χ^2) **df** **p-value**	632.186 280 0.00	The model resulted in a statistically significant Chi-square (632.19, 280, $p<0.05$), indicating a lack of fit, which was expected given sample size sensitivity.
Comparative Fit Index (CFI)	0.921	According to Hu *et al.* (1999), such CFI value falls within the 'acceptable' threshold, signifying a good model fit.
Standardized Root Mean Squared Residual (SRMR)	0.0624	The SRMR value of this model (0.0624) implies that the model has an 'excellent' fit.
Root Mean Square Error of Approximation (RMSEA)	0.07	With a cut-off value close to 0.06 (Hu *et al.*, 1999), the model RMSEA value (0.07) shows an 'acceptable' fit.

Table 43: Model Fit Indices (Source: Author)

Evidence implies that the SSTSQ model reflected a good fit with the data. This implied that there was convergent validity of all the constructs within the SSTSQ measurement model. Thus, although there appeared to be certain statistics that were below the acceptable threshold outlined by the literature, they did not substantially harm internal consistency or model fit, hence, all items were retained.

4.8 Structural Equation Modelling

CFA provided evidence that the SSTSQ model has a good fit with the data. Thus, all 27 SSTSQ items suggested a strong correlation with their respective dimensions (latent variables). To test the impact of each of the ten dimensions on SSTSQ and the correlations between SSTSQ, customer satisfaction and loyalty (H1-H4), Structural Equation Modelling (SEM) was applied utilizing SPSS AMOS 26, resulting in the below structural model:

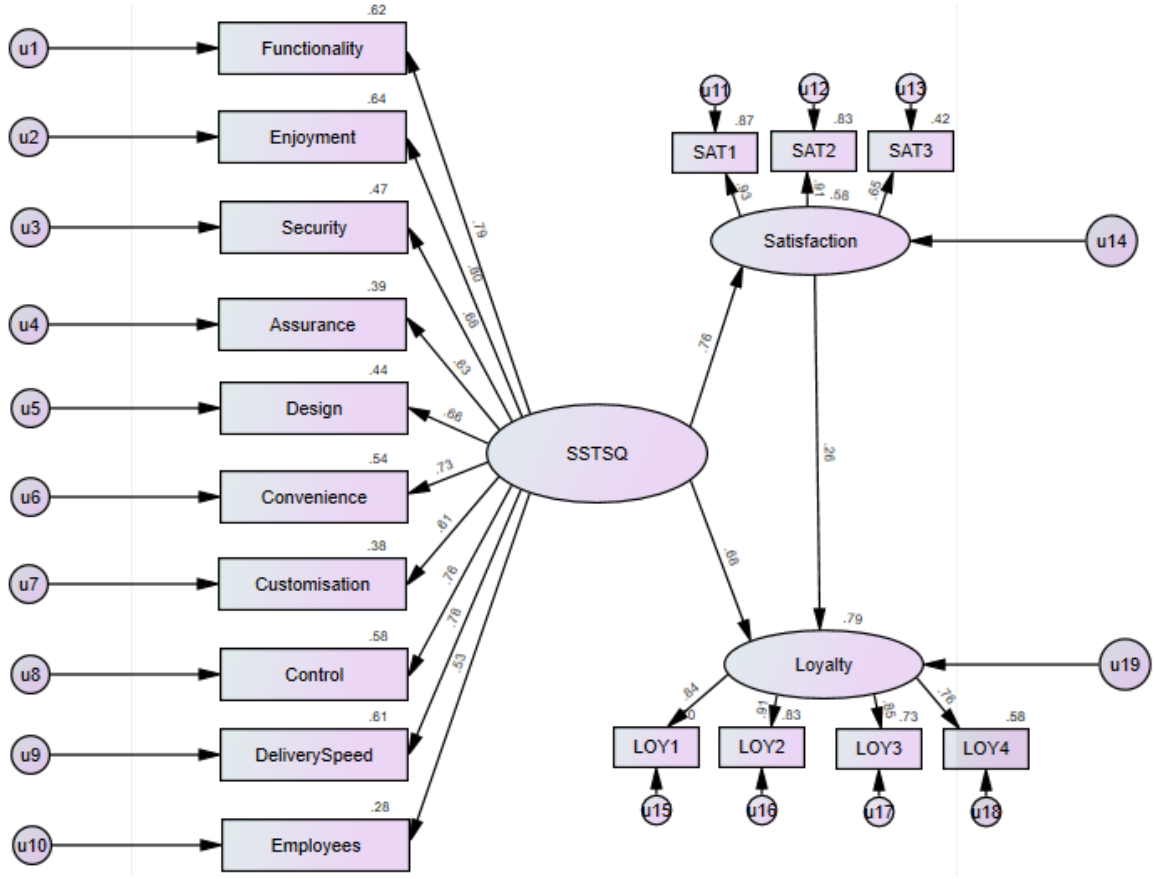


Figure 39: Structural Model tested (Source: SPSS AMOS)

Figure 39 depicts the tested structural model based on the proposed model outlined in the literature review, with the path coefficients and the respective significance test outcomes. All standardised estimates resulted to be positive and statistically significant, given that the p-value was less than 0.05 for all structural paths.

Further evaluation of the structural model can be viewed in Table 44 below.

Structural Paths			β	t-value*	R^2	Relationship
Functionality	←	SSTSQ	.790	-	.624	Positive & Significant
Enjoyment	←	SSTSQ	.800	14.226	.640	Positive & Significant
Security	←	SSTSQ	.684	11.690	.468	Positive & Significant
Assurance	←	SSTSQ	.627	10.538	.393	Positive & Significant
Design	←	SSTSQ	.660	11.209	.436	Positive & Significant
Convenience	←	SSTSQ	.732	12.708	.536	Positive & Significant
Customization	←	SSTSQ	.614	10.295	.377	Positive & Significant
Control	←	SSTSQ	.764	13.396	.583	Positive & Significant
Speed of Delivery	←	SSTSQ	.778	13.718	.605	Positive & Significant
Support by Employees	←	SSTSQ	.532	8.746	.283	Positive & Significant
Satisfaction	←	SSTSQ	.762	12.256	.580	Positive & Significant
Loyalty	←	SSTSQ	.680	8.774	.792	Positive & Significant
Loyalty	←	Satisfaction	.256	3.858	-	Positive & Significant

**All values are significant at $p<0.001$*

Table 44: Structural Model results and interpretations (Source: Author)

4.8.1 Primary Objective

Figure 39 (also explained in Table 44) portrays a positive and significant relationship among SSTSQ and each of the ten dimensions utilized to measure SSTSQ from the Maltese customer's viewpoint, with the Beta (β) coefficient representing the relationship between SSTSQ and each of the individual dimensions. Thus, the structural model concluded that all dimensions had an impact on on-site SSTSQ within the Maltese retail industry, hence answering RQ1.

A deeper analysis was undertaken to determine which of the ten dimensions had the strongest impact on SSTSQ. In fact, by analysing the values for the 'Standardized Coefficients' (β) and the 'Squared Multiple Correlations' (R^2), it was concluded that some dimensions had a stronger impact on SSTSQ than others. From Table 45, it could be noted that the dimension of 'Enjoyment' while using the SCS (β=0.800, R^2=0.640) had the strongest impact on SSTSQ within the Maltese retail industry. This was followed by the dimensions of 'Functionality' (β=0.790, R^2=0.624), 'Speed of Delivery' (β=0.778, R^2=0.605), as well as 'Control' (β=0.764, R^2=0.583) of the SCS. In contrast, the dimensions of 'Customization' (β=0.614, R^2=0.377) and 'Support by Employees' (β=0.532, R^2=0.283) had the least impact and estimated reliability on SSTSQ.

	Impact	**Structural Paths**			**β**	**R^2**
Strongest	1	Enjoyment	←	SSTSQ	.800	.640
	2	Functionality	←	SSTSQ	.790	.624
	3	Speed of Delivery	←	SSTSQ	.778	.605
	4	Control	←	SSTSQ	.764	.583
→	5	Convenience	←	SSTSQ	.732	.536
	6	Security	←	SSTSQ	.684	.468
	7	Design	←	SSTSQ	.660	.436
	8	Assurance	←	SSTSQ	.627	.393
Weakest	9	Customization	←	SSTSQ	.614	.377
	10	Support by Employees	←	SSTSQ	.532	.283

Table 45: Analysis of the impact of SSTSQ dimensions (Source: Author)

To provide a higher perspective for the results achieved above, a word cloud was constructed using an online word cloud generator tool, to portray a visual representation of text data collected from Section four within the questionnaire[11]. Creating the word cloud allowed the most frequently used words by respondents, such as “time”, “convenient”, “easy”, “fast” and “efficient” to be highlighted as the most commonly used words expressed by participants when describing their experience while using the SCS at Decathlon. Supplementing the arguments and results that emerged from SEM, such frequently used words emphasize that dimensions such as ‘Speed of Delivery’, ‘Convenience’, and ‘Functionality’ have a relatively strong effect on SSTSQ.

Figure 40: Word Cloud (Source: https://www.wordclouds.com/)

[11] *Section four involved an open-ended statement in which respondents were asked to write additional comments, feedback and opinions regarding their own experience while using the SCS at Decathlon in Malta.*

4.8.2 Secondary Objective

Finally, Table 44 shows that a positive and significant relation is present among SSTSQ and customer satisfaction (β=0.762, t=12.256). This supports H1, suggesting a positive and direct correlation among SSTSQ and satisfaction. The correlation between SSTSQ and customer loyalty is positive and significant (β=0.680, t=8.774), which satisfies H2. The outcomes also show a positive and significant correlation among satisfaction and loyalty (β=0.256, t=3.858), suggesting that satisfaction was directly and positively linked to loyalty, hence supporting H3.

To determine the indirect effect between SSTSQ (IV) and customer loyalty (DV), with customer satisfaction as a mediating effect (MV), Mediation Analysis was performed using SPSS AMOS 26. To measure the mediating effect of customer satisfaction, the three steps outlined by Baron and Kenny (1986) were performed (refer to Appendix E for the full Mediation Analysis steps). In line with these steps, Table 46 outlines the following outcomes:

- SSTSQ (IV) had a positive and significant relationship with Customer Loyalty (DV) (β = 0.680, t = 8.774).
- SSTSQ (IV) had a positive and significant relationship with Customer Satisfaction (MV) (β = 0.762, t = 12.256).
- When Customer Satisfaction (MV) was introduced, the impact of SSTSQ (IV) on Customer Loyalty (DV) reduced in magnitude (β = 0.195, t = 2.294).

Mediation Analysis: SSTSQ – Customer Satisfaction – Customer Loyalty					
Steps	**Variables**	**β**	**s.e.**	**t-value***	**p-value**
1	IV: SSTSQ DV: Customer Loyalty	0.680	0.080	8.774	<0.001
2	IV: SSTSQ MV: Customer Satisfaction	0.762	0.082	12.256	<0.001
3	IV: SSTSQ MV: Customer Satisfaction DV: Customer Loyalty	0.195	0.085	2.294	<0.01

**All values are significant at p<0.001*

Table 46: Mediation Analysis (Source: Author)

To determine whether such mediation effect was statistically significant, the Bootstrapping approach by Preacher and Hayes (2004) was undertaken, based on the below hypotheses:

H_0 (Null hypothesis):

Indirect effect is equal to zero

H_A (Alternate Hypothesis):

Indirect effect is different from zero

Bootstrapping results suggested that at the 95% confidence interval, zero fell outside the range outlined by the lower bound and upper bound values of 0.053 and 0.386, respectively. This implied that the indirect/mediating effect is non-zero, hence the null hypothesis (H_0) was rejected. Such findings imply that the standardized indirect (mediated) effect of SSTSQ on loyalty was statistically different from zero at the 0.01 level (p=0.005), hence, the mediating role of customer satisfaction was proved. This supported the final hypothesis (H4) in this study, suggesting that customer satisfaction mediates the link amongst SSTSQ and loyalty.

To determine the mediation strength, the Variance Accounted For (VAF) was computed, utilising the below formula, as suggested by Hair, Hult, Ringle and Sarstedt (2014):

$$VAF = \frac{Indirect\ Effect}{Total\ Effect}\ x\ 100$$

Equation 1: VAF (Source: Hair et al. (2014))

In this case:

Indirect Effect = (SSTSQ → Satisfaction) * (Satisfaction → Loyalty)

= 0.762 * 0.256

= 0.195

Total Effect = Indirect Effect + Direct Effect

= 0.195 + (SSTSQ → Loyalty)

= 0.195 + 0.680

= 0.875

$$VAF = \frac{0.195}{0.875}\ x\ 100 = 22.29\%$$

The above calculations suggest that 22% of the influence of SSTSQ on customer loyalty was explained via customer satisfaction. In line with Hair *et al.* (2014), given that the VAF value fell between 20% and 80%, it can be assumed that customer satisfaction partially mediated the correlation amongst SSTSQ and customer loyalty, supporting H4.

4.9 Chapter Summary

This chapter evaluated the data acquired from the online and face-to-face questionnaires, portraying results which highlighted statistical significance of all ten tested dimensions, some of which had a higher impact on SSTSQ than others. Additionally, the results also offered empirical evidence of a positive and statistically significant correlation amongst SSTSQ, customer satisfaction and loyalty, as well as proved that customer satisfaction partially mediates the link amongst SSTSQ and loyalty, within the Maltese retail industry.

Chapter 5: Discussion and Implications

5.1 Summary of findings

The adoption of SSTs has become a crucial part of consumers' daily lives, with the use of several SSTs in a variety of industries and countries experiencing an ever-increasing trend. However, although their increasing importance and relevance in service delivery, and despite the significant amount of research in recent years, major gaps are present in the current SST literature. This study identified, and addressed three main gaps within the current SST literature.

Addressing gaps one and two required this study to focus on evaluating consumers' perceptions towards service quality (GAP 1) of on-site SSTs (GAP 2). This was done by identifying the relevant on-site SSTSQ dimensions from the SCS at Decathlon, a newly introduced concept within the Maltese retail industry (GAP 3). The latter overcame the final cultural gap found within SST literature, by investigating SSTSQ dimensions in a new cultural dimension (i.e. Malta), which is characterised by:

- An exceedingly high uncertainty avoidance,
- A relatively high indulgence, individualism, and power distance, and
- An intermediate level of masculinity and long-term orientation.

  (*Country Comparison - Hofstede Insights*)

This reflects a society which is hierarchical, individualistic, and tends to avoid uncertainty, but at the same time is optimistic and exhibits willingness to enjoy life and have fun. Such a diversified Maltese culture led to different SSTSQ perceptions from previous studies conducted in distinct culturally oriented countries.

By addressing the above-mentioned gaps, it was possible to reach the goals of this study, which involved identifying the dimensions of SSTSQ from the Maltese consumers' perspective (primary objective) and determining the impact of such dimensions on satisfaction and loyalty (secondary objective). Reaching such objectives, involved collecting data from 260 Maltese customers who had interacted with the SCS at Decathlon in Malta.

The sample was made up of more female than male participants, similar to previous SCS studies (e.g. Weijters, Rangarajan, Falk and Schillewaert, 2007; Lee, Fairhurst and Lee, 2009; Lee, Fairhurst and Cho, 2013; Orel and Kara, 2014). Furthermore, the majority of SCS users were aged between 18 to 45, supporting the results of Lee *et al.* (2009, 2013), Orel *et al.* (2014), and Iqbal, Hassan and Habibah (2018) with regards to the age group of typical SCS users. This confirms that younger consumers have higher tendencies to make use of SCSs. Additionally, most respondents (86.93%) had a tertiary educational level or higher, which is a relatively important characteristic of SCS users (Orel *et al.*, 2014). Such an outcome confirms Weijters *et al.* (2007) findings, concluding that individuals with a high education level have a greater tendency to adopt SSTs when perceived as new, as in the case of the SCSs at Decathlon in Malta.

Reliability analysis suggested reliable Cronbach's Alpha values (0.7-0.8), except for the 'Security' subscale. This is consistent with the study conducted by Orel *et al.* (2014), who claimed that given that coefficients are effected by the number of scale items, then it is likely to have α values around 0.5 (Pallant, 2007). In the same way, this study assumed a low Cronbach Alpha value due to the fact that only a few items are on the scale and not because of the scales' unreliability. Furthermore, the SSTQUAL scale items have been extensively used in previous literature and are considered to have internal consistency and validity. Hence, all scale items, including the 'Security' subscale, were retained.

Finally, CFA suggested internal construct validity of all the SSTSQ dimensions, hence, SEM was performed to validate the relationships within the proposed model. Such analysis was mainly divided into two sections to deal with the primary and secondary objectives of this study separately, as seen in Figure 41 below:

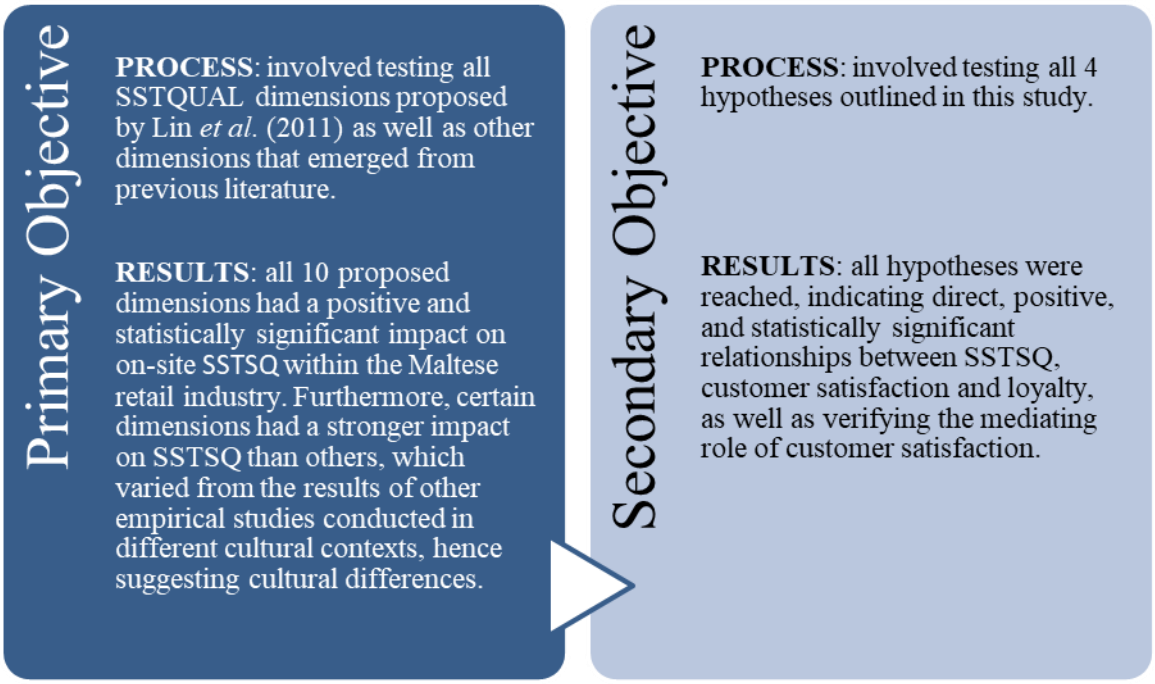


Figure 41: Analysis for Primary and Secondary Objectives (Source: Author)

5.2 Interpretation of findings

The primary objective was to determine the significant SSTSQ dimensions from the customers' perspective within the Maltese retail environment, to answer the following RQ: "Which dimensions impact on-site SSTSQ in the Maltese retail environment?". SEM suggested a positive and statistically significant relationship among all ten dimensions and SSTSQ.

A deeper analysis concluded that certain dimensions had a higher impact on SSTSQ than others, implying that customers tend to give more importance to specific dimensions while using the SCS at Decathlon in Malta.

'Enjoyment' proved to have the highest impact on SSTSQ within the Maltese retail industry, implying that the enjoyment level of customers while using SCSs highly influences SSTSQ. This is consistent with earlier empirical research, suggesting that enjoyment associated with self-checkouts is a highly significant factor (Marzocchi *et al.*, 2006; Orel *et al.*, 2014). In fact, Dabholkar (1996), Anselmsson (2001), and Dabholkar and Bagozzi (2002) proved that enjoyment while using TBSS systems, is a major element that leads to service quality. Additionally, such a finding also supports the fact that Malta's culture is characterised by relatively high Indulgence (one of Hofstede's cultural dimensions), emphasizing the importance of having fun while using new technologies. Finally, such a result also provides interesting contributions with regards to the utilitarian and hedonic values of SCSs in Malta.

The former refers to the value that customers attain from the functionality of a product (Babin, Darden and Griffin, 1994). In the case of SSTs, utilitarian/functional value arises from efficient completion of a task (Sánchez, Callarisa, Rodríguez and Moliner, 2006) or convenient service delivery (Childers, Carr, Peck and Carson, 2001). Conversely, hedonic value is the value that customers receive through subjective experiences of fun and playfulness. In other words, hedonic value refers to consumers' perception of enjoyment while using a particular technology (Davis, Bagozzi and Warshaw, 1992). Childers *et al.* (2001) suggest that using SCSs may be deemed as a fun experience, especially to customers who derive pleasure from machine interaction.

Even though some empirical studies (e.g. Van Der Heijden, 2004; Blut, Wang and Schoefer, 2016) proved that 'Enjoyment' is stronger for hedonic SSTs (e.g. self-serve yogurt) and weaker for utilitarian SSTs (e.g. self-checkout machines), the findings of this study suggested otherwise. In fact, although the self-checkouts at Decathlon can be considered as a utilitarian type of technology, the dimension of 'Enjoyment' had the strongest impact. Such an interesting finding reflects that Maltese consumers predominantly value the hedonic aspects of the SCSs,

rather than solely valuing the utilitarian function of self-checkouts. This is in line with the study by Dabholkar (1996), suggesting that consumers are more inclined to utilize fun-looking SSTs. Furthermore, Dabholkar (1996), Venkatesh (2000) and Van Der Heijden (2004) also suggest that hedonic factors are of particular importance to examine the adoption of technologies and encourage the repeat use of SSTs (Cetto, Klier and Klier, 2015). This suggests that firms within the Maltese retail industry should not only design SCSs that offer the utilitarian values of functionality, time saving, control, and convenience, but mostly focus on hedonic benefits, predominantly enjoyment.

Such a conclusion contradicts Lin *et al.* (2011) findings on the SSTQUAL scale, who suggested that the dimensions of **'Design'**, **'Security'** and **'Assurance'** respectively, have the strongest influence on consumer's overall perceptions towards SSTs in Taiwan. In fact, although all three dimensions resulted to be statistically significant within the Maltese retail industry, they are not considered as having the highest impact on on-site SSTSQ. Such outcome reflects cultural differences, thus suggesting the cultural gap mentioned earlier. Indeed, Taiwan is characterised with a culture of relatively high uncertainty avoidance (similar to Malta) but with low individualism and high long-term orientation (as opposed to Malta), hence suggesting differences in consumers' perceptions regarding the importance of SSTSQ dimensions due to culture. This implies that Maltese firms currently adopting or planning to adopt SCSs should not consider the above dimensions with utmost importance, but should still ensure that they have a fundamental level of such dimensions, especially with regards to the 'Security' aspect.

The dimension of 'Enjoyment' was followed by **'Functionality'** of SCSs, which also proved to be a highly significant and impactful dimension of SSTSQ within the Maltese retail industry. This supported various other studies conducted in Eastern and Asian countries (Lin *et al.*, 2011; Radomir *et al.*, 2012; Orel *et al.*, 2014; Iqbal *et al.*, 2018), which also proved high significance of the 'Functionality' dimension. Such a finding implies that although emphasis should be on

the hedonic function of SCSs, the utilitarian benefits also play an important role, with regards to designing SCSs that are reliable and easy to use.

With regards to **'Convenience'** of SCSs, such a dimension resulted to be positive and statistically significant, with a moderate level of impact on on-site SSTSQ within the Maltese retail industry. Although Radomir *et al.* (2012) concluded that 'Convenience' was an insignificant dimension in determining the SSTSQ by Romanian customers, Orel *et al.* (2014) proved that 'Convenience' is a highly significant factor that Turkish customers perceive when defining SSTSQ. Such a contrast highlights the presence of cultural differences, implying differences in customer perspectives in accordance to culture. Furthermore, this result highlights the importance of implementing SCSs that are easily accessible and suitable within the industry.

Even though the SSTQUAL scale is considered as the most relevant and recent scale in assessing the dimensions of SSTSQ, the three other dimensions were taken into consideration and tested in the Maltese retail environment, as below:

- The dimension of **'Support by Employees'**, referring to the assistance offered by service employees, was tested. Previous studies conducted by Anselmsson (2001) and Anitsal and Paige (2006) concluded that the relationship with employees resulted to have a strong influence on SSTSQ. However, in this study, the 'Support by Employees' did not result as a prominent factor that highly impacts SSTSQ in the Maltese retail environment.
- Alternatively, it could be concluded that the dimensions of **'Speed of Delivery'** and **'Control'** had a strong substantial impact on SSTSQ in the Maltese retail industry. Research conducted by Dabholkar (1996) in the US supported statistical significance of the 'Control' dimension on on-site SSTs but concluded that 'Speed of Delivery' was insignificant. In contrast, a more recent study also conducted in the US by Lee *et al.* (2013),

supports the outcomes of this study, implying that greater control and faster delivery of service by the self-checkout leads to an enhanced service quality perception. Thus, even though the US has cultural characteristics that are different from Malta, both countries are highly individualised Western countries, which might justify the significance of such dimensions.

Such findings raise the need for revision of the SSTQUAL scale, to consider other dimensions, such as 'Speed of Delivery' and 'Control', that might strongly impact SSTSQ.

Finally, the dimension of **'Customization'** was found to be the least significant dimension from all the seven SSTQUAL dimensions tested within this study. Such a dimension was found to be insignificant in certain industries and cultures (Orel *et al.*, 2014) while significant in others (Lin *et al.*, 2011; Radomir *et al.*, 2012; Iqbal *et al.*, 2018). Within the Maltese context, the 'Customization' dimension, although positive and significant, has a relatively small impact on SSTSQ. This is mainly due to the nature of the SCSs at Decathlon in Malta, which do not allow any modifications according to the customer's preferences and needs. This is aligned with the study specifically focusing on SCSs in the Turkish retail industry, highlighting that 'Customization' was deemed to be insignificant due to the simplicity and short interaction with SCSs (Orel *et al.*, 2014). Such a result implies that service providers offering SCSs should focus on other more impactful dimensions rather than offering a customizable experience, given the short interaction time of customers with the SCSs.

From the primary objective outcomes from this study, it can be assumed that all ten tested dimensions had a positive and statistically significant impact on on-site SSTSQ within the Maltese retail industry. However, certain dimensions such as 'Enjoyment', 'Functionality', 'Speed of Delivery', 'Control' and 'Convenience' of SCSs had a stronger impact than other dimensions ('Design', 'Assurance', 'Customization', and 'Support by Employees'). As

interpreted above, such results differed from other SSTSQ studies conducted in different countries and cultures, implying that service quality perceptions may vary between different individuals due to differences in their cultural backgrounds (Donthu *et al.*, 1998; Furrer *et al.*, 2000; Tsoukatos, 2007; Mulaomerovic *et al.*, 2013).

In other words, this study concludes that culture may have an effect on determining the importance and impact of SSTSQ dimensions. Thus, although such findings might suggest revision and possible enhancement of the SSTQUAL framework to develop a more up-to-date scale in determining the relevant dimensions of SSTSQ, this study's results are only relevant to one industry (retail) in a specific culture (Maltese). This outlines the need of additional studies to develop specific scales which differ according to different settings and cultural environments.

The secondary objective of this study was to verify whether SSTSQ leads to satisfaction and loyalty in the Maltese retail environment, by identifying the direct and indirect effects between SSTSQ, customer satisfaction and loyalty, to answer RQ2.

SEM proves a direct, positive, and statistically significant correlation among SSTSQ and customer satisfaction, supporting H1. These results are similar to preceding studies, presenting a positive link among SSTSQ and customer satisfaction (Lin *et al.*, 2006; Orel *et al.*, 2014; Iqbal *et al.*, 2018). Such a direct link implies that higher SSTSQ results in a higher customer satisfaction level (Ganguli *et al.*, 2011). These findings are also comparable to Cronin and Taylor (1992), who concluded that service quality is a strong predictor of customer satisfaction.

Moreover, the SEM results further highlight a direct, positive, and statistically significant correlation among SSTSQ and customer loyalty, supporting H2. Such a direct relationship

implies that better service quality provided by SSTs would improve customer loyalty towards SSTs (Yang *et al.*, 2004; Ganguli *et al.*, 2011; Orel *et al.*, 2014; Iqbal *et al.*, 2018). Such findings are also in accordance with Lee, Fairhurst and Lee (2009), who demonstrate how SSTSQ effects consumers' retail patronage intentions.

The findings from the SEM also highlight a direct, positive, and statistically significant link amongst satisfaction and loyalty, supporting H3. Such results were proved by numerous empirical studies (Djajanto *et al.*, 2014; Orel *et al.*, 2014), implying that highly satisfied consumers are more likely to repurchase (Tam, 2004) and exhibit commitment towards the organisation (Cho *et al.*, 2010). The findings are also comparable to the research by Marzocchi and Zammit (2006), who concluded that that satisfaction from SCSs had a positive effect on the patronage of individuals towards the shop.

Finally, the findings from Mediation Analysis conclude that customer satisfaction partially mediates the relation amongst SSTSQ and customer loyalty, supporting H4. Such findings are in accordance with numerous empirical studies (Iqbal *et al.*, 2017, 2018), suggesting that customer satisfaction has a substantial mediating position among SSTSQ and customer loyalty (Caruana, 2002; Orel *et al.*, 2014).

5.3 Implications of findings

5.3.1 Theoretical Implications

This study's outcomes offer important theoretical contributions to the present SST literature. The main contribution is offering empirical evidence of the dimensions that impact on-site SSTSQ from the perspective of consumers in Malta, a country which has not yet been previously investigated. The results support reliability and validation of the seven SSTQUAL elements ('Functionality', 'Enjoyment', 'Security', 'Assurance', 'Design', 'Convenience', 'Customization') as well as additional three dimensions that emerged from the literature ('Control', 'Speed of Delivery', 'Support by Employees') in a different cultural setting. In fact, this study found various on-site SSTSQ dimensions that better reflect Maltese consumers' perceptions in the context of the retail industry, rather than solely depending on the SSTQUAL scale. This suggests the need for revision and possible enhancement of the SSTQUAL scale, to develop a more up-to-date scale to determine the relevant SSTSQ dimensions which can be applicable in various industries and cultures.

However, such results cannot be generalised but rather only applicable to one industry, i.e. the retail industry in Malta. This leads to another theoretical contribution within the SSTSQ literature, implying that the outcomes from the primary goal of this study seem to suggest that the results vary among different countries and cultures. This is because this study has applied and tested existing relationships among constructs in a diverse cultural environment, highlighting the need to develop specific scales which differ according to different settings and cultural environments.

The final theoretical implication of this study is of finding evidence supporting and validating the hypotheses set out in this study, satisfying the secondary objective. This involved proving a direct, positive, and statistically significant correlation among SSTSQ, customer satisfaction

and loyalty within the Maltese retail industry. Furthermore, this study also found evidence of the indirect effect of customer satisfaction between SSTSQ and customer loyalty, indicating the mediating position of customer satisfaction. This implies that SSTSQ not only directly affects customer loyalty, but also indirectly affects customer loyalty through the mediating effect of customer satisfaction. Such results confirm the findings of previously conducted studies on the direct and indirect effects amongst SSTSQ, customer satisfaction and loyalty, thus, adding relevant contributions to the SST literature regarding such relationships from the perspective of a country not yet investigated, i.e. Malta.

5.3.2 Managerial and Practical Implications

The outcomes of this study also suggest vital managerial and practical implications. In this regard, it is essential for Decathlon, the only retail store in Malta that currently adopts the self-checkout technologies, to understand the relevant service quality dimensions from the SCSs, especially since such technology is a new concept within the Maltese retail industry. The results from this study outline the most significant and impactful dimensions that customers use while assessing on-site SSTSQ, which can be used as guidance to make the SCSs more attractive to customers, to offer superior service quality. In fact, understanding the dimensions that contribute to consumers' higher service quality perceptions leads to improved strategies and enhanced business performance. In other words, Decathlon should focus on improving, developing, and placing extra emphasis on the below dimensions (Table 47), according to their respective impact on consumer's perceptions of SSTSQ, to ensure that the SCSs offer the specific attributes that Maltese consumers actually value.

Impact	Dimension	Definition	Suggestion
1	Enjoyment	Includes focusing mostly on including fun elements that make consumers enjoy their experience while using the SCSs	e.g. Decathlon could have more fun and engaging SCS elements such as different colours and images that provide consumers using the SCS with a more enjoyable experience
2	Functionality	Involves ease of use and reliability, by ensuring that the SCS service process is clear and smooth for consumers to use the SCS with little effort	e.g. in this case, the retail store has to ensure to have efficient SCSs which are user-friendly and have clear instructions
3	Speed of Delivery	Consists of SCS features that make the shopping experience fast and less time consuming	e.g. Decathlon could issue clearer SCS usage guidelines, which can be communicated through social media so that consumers would have knowledge on how to use the SCS prior to arriving at the shop. Prior knowledge will enable consumers to conduct their purchase using the SCS in a shorter time
4	Control	Requires the inclusion of controllable features in the SCSs to enable customers to take more control of the transaction to reduce uncertainties	e.g. in this regard, SCSs at Decathlon could offer more payment method options such as cash
5	Convenience	Involves ensuring ease of access to the SCS by making sure that the SCS is visible to customers and placed in a convenient setting	e.g. in this case, Decathlon could place more signs around the store to remind consumers that they can conduct their purchase using SCSs

Table 47: Suggested service quality dimensions for service providers to focus on (Source: Author)

The present study verified that the above-mentioned dimensions result in a stronger impact on SSTSQ among Maltese consumers. Such findings support the fact that although it is essential for service providers offering SCSs to assess certain SSTSQ dimensions that have been previously validated by reliable scales (such as the SSTQUAL dimensions), other factors should not be ignored, since they may be applicable and valuable in other cultures, as was in the case of Malta.

Apart from identifying the relevant dimensions that strongly impact SSTSQ, the outcomes of this study also prove that introducing such a newly innovative technology within the Maltese retail industry has been hugely beneficial, leading to positive and enhanced customer

satisfaction and loyalty. Such empirical evidence implies that the introduction of SCSs has served as a good investment within the Maltese retail setting.

This leads to another practical implication of this research, that is, of providing valuable insights to other Maltese organisations, especially those located in the retail industry (department stores, supermarkets, grocery stores, etc.), to evaluate the possibility of successfully introducing SCSs as part of their operations. The identification of SSTSQ dimensions that exert the strongest impact offer useful insights to Maltese firms as to which aspects they should be aware of and focus on if offering SCSs, since higher SSTSQ leads to higher intentions for consumers to adopt SCSs. This study also confirms that it is feasible and beneficial to introduce self-checkouts within the Maltese context, given that the adoption of SCSs supports a positive role on customer satisfaction and loyalty. This implies that consumers who perceive a high service quality while utilizing SCSs, tend to consider an enhanced customer service, ultimately leading to loyalty. Additionally, the mediating role of customer satisfaction implies that both SSTSQ and customer satisfaction play a crucial role within the Maltese retail industry, leading to customer loyalty and profitability for the company adopting SCSs. This is encouraging for retail outlets considering the adoption of SCSs, since adopting such technology may lead to a competitive advantage as well as the possibility to expand its customer base. In other words, it is worthwhile for other Maltese retail companies to invest in such efficient and effective technology.

Chapter 6: Conclusion and Future Research

6.1 Conclusions

In conclusion, the results represent important contributions to the current SSTSQ literature, indicating the need to account for distinctive measurement scales when assessing SCS service quality. Specifically, with regards to SCSs situated within the Maltese retail industry, SEM showed that all ten tested dimensions were positive and statistically significant dimensions of SSTSQ, some of which had a stronger impact than others. Additionally, a positive and significant correlation also resulted amongst SSTSQ, customer satisfaction and ultimately, loyalty. All relationships tested within this study were conducted in a culturally distinct environment in a country which has not yet been investigated in terms of on-site SSTSQ. This offers additional evidence on the construct applicability and validity of an SSTSQ measurement in a culturally distinct environment.

6.2 Learning Experience

This dissertation has proved to be a distinctive learning experience for the researcher in managing and executing such a research project to provide reliable results. Indeed, this study has proved to be a stimulating experience through the engagement of new tasks that required learning new skills and capabilities. This ranged from the recruitment of participants (convincing respondents to participate through the online questionnaire proved to be more difficult than collecting face-to-face responses) to the extraction of outcomes and analysis. The latter presented an opportunity for the researcher to truly engage with tools such as IBM SPSS (previous experience was gained through other academic modules offered by the University of Malta) and IBM SPSS AMOS (no previous experience was available hence, knowledge and skills were acquired through researcher's own initiatives rather than through any formal training), leading to a more beneficial and enriching learning experience.

6.3 Study Limitations

This study had a number of limitations which may have affected the results.

Firstly, the main limitation arose due to the outbreak of the COVID-19 pandemic. Given that such a pandemic was highly active during the data collection period, it made it impossible to conduct and collect face-to-face questionnaires, as was originally intended for this study. Instead, an online questionnaire was constructed and launched in several Facebook groups which were thought of having members that might have used the SCSs at Decathlon, resulting in sample size limitations. Although this was not ideal to capture the perspectives of consumers exactly after utilising the SCS at Decathlon, it was the only solution, given the uncontrollable situation. The easing of certain restrictive COVID-19 measurements, specifically the re-opening of non-essential shops such as Decathlon, made it possible but still challenging to conduct face-to-face questionnaires, since there were still restrictions (such as social distancing and mask wearing) which might have inhibited effective communication between the researcher and the participants.

Another limitation was of sample selection, which affected the representativeness of the sample used within this study. Given that a judgemental/purposive sampling method was utilized to choose participants, even though the sample size was adequate for this study, this might have led to errors in judgment, biases, as well as have an effect on the generalizability of results. The latter implies that since data was collected from a single store (Decathlon) located in the southern part of Malta (Qormi), its generalizability to the whole Maltese population is restricted. However, no other data collection opportunities were available given that Decathlon is the only retail store adopting the SCSs in Malta, to date. In addition to this argument, given that this study was conducted using a relatively small sample (Maltese participants), its generalizability to the 'whole world' is also limited.

Finally, given that Decathlon is an established international sports brand, it has a relatively good reputation and image amongst Maltese consumers. Such a strong market positioning might have presented biases when consumers filled in the questionnaire regarding self-checkouts in Decathlon. Furthermore, the risk of social desirability bias by participants may have also inflicted their responses, resulting in another uncontrollable limitation of this study.

6.4 Future Research

After effectively carrying out this research study and interpreted the results, potential studies can be recommended to enhance and enrich the current SST literature.

Firstly, this study can be replicated by utilizing larger samples taken from various regions of the island, assuming that more retail stores will adopt the SCSs as part of their operations in the near future. This will enable a more generalizable and representative review of the viewpoints of Maltese consumers towards SSTSQ and their effects on customer satisfaction and loyalty. It would be interesting to determine whether the same SSTSQ dimensions will result as impactful and significant.

Furthermore, additional studies can be conducted to test and validate the SSTSQ dimensions recognised within this study, to create a more specific measurement instrument for service quality from SCSs within the Maltese retail industry. In this regard, such research would further verify the value of the other service quality dimensions, rather than only relying on the SSTQUAL scale to measure SSTSQ.

Thirdly, this study specifically concentrated on the impact of service quality on consumers while using self-checkouts. However, it should be acknowledged that various other factors exists that drive customer satisfaction, leading to loyalty. This might also require employing

different methodological approaches, such as mixed methodologies or qualitative approaches, to obtain a more in-depth perspective of the impact of the self-checkouts on Maltese consumers and whether the implementation and use of such technologies leads to satisfaction and loyalty.

Additionally, it is essential that upcoming studies account for other mediating and moderating factors when conducting research to determine the impact of SSTSQ on satisfaction and loyalty. For instance, the corporate image of the service provider can be included as a moderating factor on customer satisfaction.

Finally, future research can also be conducted to determine if there are variations in SSTSQ from self-checkouts that derives from culture. This might require carrying out a study which accounts for different nationalities to determine whether there are any variations in perspective. This will enable researchers to construct specific SSTSQ scales which differ according to different settings and cultural environments.

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Appendices

Appendix A: Post-Pilot Study questionnaire changes

Functionality Q5: Some participants in the pilot study commented that they did not fully understand the meaning of "service item" in the question. Thus, the question was altered to eliminate such term and change the question from "Each service item of the Self-Checkout System at Decathlon is error-free" to "The Self-Checkout System at Decathlon is error-free".

Convenience Q1: The question "The Self-Checkout System at Decathlon has operating hours convenient to me" was decided to be eliminated. This is because, as pointed out by one of the participants, the SCS at Decathlon operates during the same opening hours as Decathlon, thus, such a question, even though validated by existing studies, it not relevant in the case of this study. Furthermore, deleting such item from the scale would only reduce the Cronbach's Alpha to 0.821.

Control Q1: The question "I feel free to use the Self-Checkout System at Decathlon" was to be changed to "At Decathlon, I feel free to use the kind of Self-Checkout System I like to". However, in changing such question, it was noted that this is not relevant in the case of Decathlon in Malta, given that all the Self-Checkout machines at Decathlon operate the same, giving only one option of SCS. Thus, this question was eliminated from the questionnaire. Eliminating such a question was also supported by the fact that the Cronbach's Alpha would only decrease to 0.819.

Level of support offered by service employees Q2: Given that some participants encountered lack of clarity with regards to such question, it was decided to alter the question from "The behaviour of employees at Decathlon instil confidence in me to use the Self-Checkout System" to "The behaviour of employees at Decathlon makes me feel confident to use the Self-Checkout System", in order to make it simpler to understand.

Customer Satisfaction Q2 & Q3: Taking into consideration the feedback provided from the Pilot Study, it was decided to switch the order of such questions and change Q3 from "The Self-Checkout System at Decathlon is close to my idea (how I thought it would be)" to "The Self-Checkout System at Decathlon meets my expectations".

Customer Loyalty Q2: As recommended by the participants in the Pilot Study, the question "I would recommend the Self-Checkout System at Decathlon to any of my friends" was altered to "I would recommend the Self-Checkout System at Decathlon to others" to capture everyone rather than just friends.

Customer Loyalty Q3: The question "If I need to use again, I will come to the Self-Checkout System at Decathlon" was decided to be eliminated due to clarity issues among respondents. Deleting such item from the scale would only reduce the Cronbach's Alpha to 0.813.

Another section was added titled as "**Section 4: Additional Comments**" to encourage participants to add any other comments when experiencing the SCS at Decathlon. This was added since after carrying out the Pilot Study, there seemed to be the need for a section in which customers could communicate their experience.

Demographic Information: The "Other" option was added with regards to Gender as suggested by one of the participants.

Appendix B(i): Final Online Questionnaire

Google Forms Link: Online Questionnaire

Appendix B(ii): Final Face-to-Face Questionnaire

Assessing the impact of Self-Service Technology (SST) service quality on customer satisfaction and loyalty: A case in the Maltese retail industry

By ticking the below, you are consenting your participation in this study: *

Tick all that apply.

- [ ] I have read the information above about the study conducted by Rachel Camilleri (researcher) and Ms. Daniela Castillo (supervisor) from the Faculty of Economics, Management and Accountancy (FEMA) at the University of Malta.
- [ ] I had the opportunity to ask questions related to the study and received satisfactory answers to my questions.
- [ ] I understand that my name will not appear in any report concerning this study.
- [ ] I agree that the data collected will be stored for a maximum of one year after last use and will thereafter be destroyed.
- [ ] I understood that I have the right to refuse or discontinue my participation without giving a reason for withdrawal.
- [ ] I understand that this study has received ethical clearance.
- [ ] I was informed that participation in the study is voluntary.
- [ ] I agree to participate in this study out of my own free will.

Have you ever made use of the Self-Checkout System at Decathlon in Malta? *

Mark only one oval.

- ◯ Yes
- ◯ No

Section 1: Self-Checkout System service quality

Functionality *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I can get my service done with the Self-Checkout System at Decathlon in a short time.					
2. The service process of the Self-Checkout System at Decathlon is clear.					
3. Using the Self-Checkout System at Decathlon requires little effort.					
4. I can get my service done smoothly with the Self-Checkout System at Decathlon.					
5. The Self-Checkout System at Decathlon is error-free.					

Enjoyment *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The operation of the Self-Checkout System at Decathlon is interesting.					
2. I feel good being able to use the Self-Checkout System at Decathlon.					
3. The Self-Checkout System at Decathlon has interesting additional functions.					
4. The Self-Checkout System at Decathlon provides me with all relevant information.					

Security / Privacy *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I feel safe in my transactions with the Self-Checkout System at Decathlon.					
2. A clear privacy policy is stated when I use the Self-Checkout System at Decathlon.					

Assurance *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Decathlon, who provides the Self-Checkout System, is well-known.					
2. Decathlon, who provides the Self-Checkout System, has a good reputation.					

Design *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The layout of the Self-Checkout System at Decathlon is aesthetically appealing.					
2. The Self-Checkout System at Decathlon appears to use up-to-date technology.					

Convenience *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. It is easy and convenient to reach the Self-Checkout System at Decathlon.					

Customization *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The Self-Checkout System at Decathlon understands my specific needs.					
2. The Self-Checkout System at Decathlon has my best interests at heart.					
3. The Self-Checkout System at Decathlon has features that are personalized for me.					

Control *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Using the Self-Checkout System at Decathlon is entirely within my control.					
2. I have the necessary means and resources to use the Self-Checkout System at Decathlon.					

Speed of Delivery *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The Self-Checkout System at Decathlon allows me to save time when shopping.					
2. Using the Self-Checkout System at Decathlon makes my shopping less time consuming.					
3. Using the Self-Checkout System at Decathlon is a convenient way to shop.					

Level of support offered by service employees *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Employees at Decathlon have the knowledge to answer my questions about Self-Checkout System.					
2. The behaviour of employees at Decathlon makes me feel confident to use the Self-Checkout System					
3. Employees at Decathlon give me individual attention while I am using the Self-Checkout System.					

Section 2: Customer Satisfaction

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Overall, I am satisfied with the Self-Checkout System at Decathlon.	◯	◯	◯	◯	◯
2. The Self-Checkout System at Decathlon meets my expectations.	◯	◯	◯	◯	◯
3. The Self-Checkout System at Decathlon exceeds my expectations.	◯	◯	◯	◯	◯

Section 3: Customer Loyalty

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I would use the Self-Checkout System at Decathlon again.	◯	◯	◯	◯	◯
2. I would recommend the Self-Checkout System at Decathlon to others.	◯	◯	◯	◯	◯
3. I would speak positively about the Self-Checkout System at Decathlon to others.	◯	◯	◯	◯	◯
4. The Self-Checkout System at Decathlon is my preferred choice.	◯	◯	◯	◯	◯

Section 4: Additional Comments

Kindly write any additional comments relating to your experience in using the Self-Checkout System at Decathlon.

Section 5: Demographic Information

Gender *

Mark only one oval.

- ◯ Female
- ◯ Male
- ◯ Other

Age *

Mark only one oval.

- ◯ 18 - 25
- ◯ 26 - 35
- ◯ 36 - 45
- ◯ 46 - 55
- ◯ 56+

Education Level *

Mark only one oval.

- ◯ Primary
- ◯ Secondary
- ◯ Tertiary and above

Frequency of using the Self-Checkout at Decathlon *

Mark only one oval.

- Always
- Frequently
- Sometimes
- Rarely
- First Time

Appendix C(i): Participant Information sheet

Dear participant,

You are invited to participate in a research study about the impact of Self-Service Technologies (SST), specifically focusing on Self-Checkout Systems (SCS), established in the Maltese retail industry. This study is being conducted as part of a requirement for the completion of the MSc in Strategic Management and Digital Marketing, offered by the Faculty of Economics, Management and Accountancy at the University of Malta.

The objective of this study is to identify and determine the relevant Self-Service Technology (SST) service quality dimensions from the customers' perspective, specifically focusing on Self-Checkout Systems (SCS), and to assess whether such perceptions lead to customer satisfaction and customer loyalty in the Maltese retail industry. To participate in this study, you must be at least 18 years or over, currently living in Malta, and have made use of the SCS at Decathlon Malta at least once.

You are required to answer a short questionnaire, which will only approximately take around 5 to 15 minutes of your time. Your participation is entirely voluntary and will be strictly anonymous. Should you wish to stop answering the questionnaire, you are free to do so at any time, without giving any reasons. Finally, the data collected will be stored in a password-protected computer and destroyed after one year.

Kindly note that by providing your consent, you are not waiving your legal rights.

If you do not understand something, kindly contact us:

- Researcher: Rachel Camilleri (Email: rachel.r.camilleri.16@um.edu.mt)
- Supervisor: Ms. Daniela Castillo (Email: daniela.castillo@um.edu.mt)

Should you wish to read further information, please refer to the below Q&A.

Thank you in advance for your time and patience. Your participation is much appreciated!

What is the purpose of this study?

Existent literature has shown that organisations in various industries are increasingly making use of Self-Service Technologies (SSTs), increasing customer participation. In the case of Malta, although there has been a rise in the adoption of SSTs mainly in the banking (internet banking, ATMs, etc.) and airline (online check-in, etc.) industries, the adoption of Self-Checkout Systems (SCSs) in the retail industry (supermarkets, department stores, etc.) was absent until a few months ago. In fact, Decathlon has recently introduced the use of SCSs. We aim to identify and determine the relevant SST service quality dimensions from the customers' perspective and assess whether such perceptions lead to customer satisfaction and loyalty.

Who can participate?

This research study aims to collect data from participants who have already made use of the SCS at Decathlon (in Malta) at least once. Furthermore, to participate in this study, you must be at least 18 years or over and currently living in Malta.

What are your responsibilities as a participant?

If you decide to participate in this study, you will be asked to fill in an online questionnaire, which involves selecting answers for a series of close-ended statements. This is estimated to take approximately 5 to 15 minutes to complete.

What are your rights as a participant?

Your participation in this study is entirely voluntary. Therefore, you can decide not to participate in this study. Refusal to participate will involve no penalty.

What are the possible benefits of taking part?

You will not receive any payments for your participation in this study. However, contributing in this study may provide valuable insights to Maltese organisations, especially those located in the retail industry (department stores, supermarkets, grocery stores, etc.), to evaluate the possibility of successfully introducing SCSs in their outlets. Thus, your participation is extremely important to us.

What are the possible risks of taking part?

There are no known or anticipated risks associated with the participation in this study. However, should you feel any discomfort in answering any question throughout the whole questionnaire, you have the right to leave the study any time without giving any reasons. Discontinued participation will involve no penalty. Furthermore, data gathered from participants who discontinue participation will be fully eliminated from the study.

What about Anonymity?

Your participation in this study and the data collected is anonymous. This means that the data collected will not have any identifiers associated with it and your identity will not be known. Furthermore, the data generated will only be available to the researcher.

How can you request access for the data collected?

Under the General Data Protection Regulation (GDPR) and the Malta Data Protection Act 2018, you have the right to access, rectify and, where applicable, erase the data concerning yourself. Furthermore, you have the right to request further information about the research by contacting the researcher or her supervisor.

How will the data collected and results be stored?

The data collected and results will be stored in secure password-protected computer. These will be kept for a maximum of one year after last use and will thereafter be destroyed.

What will happen to the results of the research study?

The results of this study will be used to determine the relevant SST service quality dimensions from the customers' perspective and assess whether such perceptions lead to customer satisfaction and loyalty. Such results will be subsequently used in the writing up of the MSc dissertation.

Who is organising and funding the research?

This research is not funded and is being conducted by Rachel Camilleri at the University of Malta.

Who has reviewed this study?

This study has been reviewed and received ethics clearance after the submission of a self-assessment exercise on Research Ethics and Data Protection, from the University of Malta.

Appendix C(ii): Decathlon Information sheet & Consent Form

To whom it may concern,

I am Rachel Camilleri (366098M), currently following the postgraduate course of Master of Science (MSc) in Strategic Management and Digital Marketing at the University of Malta.

A key element of the Masters' is an MSc dissertation involving a research study. In my case, my dissertation deals with the topic of Self-Service Technologies (SSTs), specifically focusing on identifying factors that lead to service quality from Self-Checkout Systems (SCSs). The study will also assess whether SCS service quality leads to enhanced customer satisfaction and loyalty. Such topic will be studied from the perspective of consumers in the Maltese retail industry.

To be able to conduct this study, I am required to collect primary data from consumers who have made use of the SCSs situated at Decathlon. The reason for choosing Decathlon as a primary source of information gathering is that it is the only organisation situated in Malta that has adopted the innovation of SCS in the Maltese retail industry.

Primary data collection is intended to be conducted through a short online/face-to-face questionnaire. For the results to be as accurate as possible, it is required that the questionnaire is administered directly with consumers who experienced the SCS at Decathlon. Although the data collection will be of huge benefit for myself to be able to conduct research, there are some practical and managerial implications for Decathlon. In fact, this study will provide insights as to whether or not the SCSs have served as a good investment in the Maltese context.

Compiling with the University of Malta requirements and regulations, ethical issues will be treated with serious concern throughout the whole study. Firstly, it will be ensured that the data collected from respondents remains anonymous. In fact, during the questionnaire, I will not collect the names and surnames of participants, thus, the data will be anonymous from the very start of the data collection. Secondly, such individuals will be given the option to stop answering the questionnaire at any point they wish. Finally, the purpose of the study will be clearly communicated to the respondents to understand the reason of their participation.

After reading and understanding the information provided on the previous sheet, kindly accurately fill in the below:

I, MATTEO BEGO currently hold the position of STORE MANAGER at Decathlon in Malta, hereby confirm and agree that on behalf of the organisation (i.e. Decathlon):

☒Understood the purpose of the study.

☒Give permission to the researcher to use the name of the organisation (i.e. "Decathlon") for the sole purpose of her dissertation.

☒Give permission to the researcher to conduct her questionnaire inside the Decathlon store near the Self-Checkout Systems.

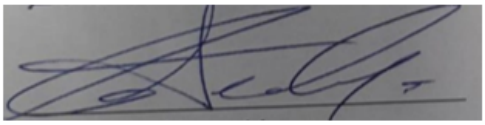
☒Will assist the researcher by sharing her questionnaire through the use of social media or any other electronic means of communication on behalf of Decathlon.

☒Understand that no sensitive information will be gathered from Decathlon consumers and that other non-sensitive information will be treated with confidentiality.

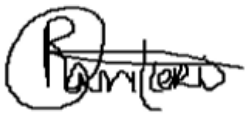
☒Am aware that the researcher is responsible to comply with the University of Malta regulations, in line with the "University of Malta Research Code of Practice" and the "University of Malta Research Ethics Review Procedures".

☒Am aware that any data collected from Decathlon consumers will only be used for the purpose of this study.

☒Understand that the organisation has the right to view the final results.



Signature of Decathlon rep. — MATTEO BEGO (Name of Decathlon rep.)



Signature of Researcher — RACHEL CAMILLERI (Name of Researcher)

Daniela Castillo

Signature of Supervisor — DANIELA CASTILLO (Name of Supervisor)

Appendix D(i): Analysis of Post Hoc tests for SCS service quality items

Education Level

Determining whether the SCS at Decathlon is error-free (FUN5), was significantly affected by the respondents' level of education, H(2)=9.31, p=0.010. After conducting post hoc testing to determine which groups were different from others, the pairwise comparisons with adjusted p-values showed that there were:

- no significant differences in stating that the SCS at Decathlon is error-free between respondents with a Tertiary and above educational level compared to a Primary educational level (p=1.00).
- no significant differences in stating that the SCS at Decathlon is error-free between respondents with a Primary and Secondary educational level (p=1.00).
- significant differences in stating that the SCS at Decathlon is error-free between respondents with a Tertiary and above educational level when compared to respondents with a Secondary educational level (p=0.008).

The same reasoning can be applied to the other two items, whereby post hoc testing suggested there were significant differences in stating that the:

- SCS at Decathlon has personalised features (CUS3) between respondents with a Tertiary and above educational level when compared to respondents with a Secondary educational level (p=0.001).
- Employees at Decathlon give individual attention to customers while using the SCS (EMP3) between respondents with a Tertiary and above educational level when compared to respondents with a Secondary educational level (p=0.031).

There were no significant differences between the other educational levels.

Frequency of SCS usage

Determining if the SCS at Decathlon is error-free (FUN5) was significantly affected by the respondents' frequency of using the SCS at Decathlon, $H(4)=13.02$, $p=0.011$. From Post hoc testing, pairwise comparisons with adjusted p-values showed however that there were no significant differences between stating that the SCS at Decathlon is error-free when participants used the SCS for the first time, rarely, sometimes, frequently or always.

Determining whether respondents can get their service done with the SCS at Decathlon in a short time (FUN1) was also significantly affected by the respondents' frequency of using the SCS at Decathlon, $H(4)=16.41$, $p=0.003$. Pairwise comparisons with adjusted p-values through post hoc testing showed that there were:

- no significant differences between respondents stating that they can get their service done with the SCS at Decathlon in a short time when they had rarely used the SCS compared to sometimes used the SCS ($p=0.67$), frequently used the SCS ($p=0.25$), or used the SCS for the first time ($p=0.23$).
- significant differences in respondents stating that they can get their service done with the SCS at Decathlon in a short time between respondents who had rarely used the SCS when compared to respondents who always used the SCS at Decathlon ($p=0.007$).
- no significant differences between respondents stating that they can get their service done with the SCS at Decathlon in a short time when they had:
  - sometimes used the SCS compared to frequently used the SCS ($p=1.00$), used the SCS for the first time ($p=1.00$), or always used the SCS ($p=0.69$).
  - frequently used the SCS compared to using the SCS for the first time ($p=1.00$), or always used the SCS ($p=0.34$).
  - used the SCS for the first time compared to always using the SCS ($p=0.30$).

Appendix D(ii): Analysis of Post Hoc tests for Customer Satisfaction items

Frequency of SCS usage

The overall satisfaction with the SCS at Decathlon (SAT1) was significantly affected by the respondents' frequency of using the SCS at Decathlon, $H(4)=15.35$, $p=0.004$. After conducting post hoc testing, pairwise comparisons with adjusted p-values showed that there were no significant differences between the respondents' overall satisfaction with the SCS at Decathlon when they had rarely used the SCS compared to sometimes used the SCS ($p=1.00$), frequently used the SCS ($p=1.00$), used the SCS for the first time ($p=1.00$), or always used the SCS ($p=0.057$). Furthermore, there were no significant differences between the respondents' overall satisfaction with the SCS at Decathlon when they had sometimes used the SCS compared to frequently used the SCS ($p=1.00$), or used the SCS for the first time ($p=1.00$). However, there were significant differences in the overall satisfaction between respondents who sometimes used the SCS when compared to respondents who always used the SCS at Decathlon ($p=0.048$). Additionally, there were no significant differences between the respondents' overall satisfaction with the SCS at Decathlon when they had frequently used the SCS compared to using the SCS for the first time ($p=1.00$), or always used the SCS ($p=0.073$). Finally, there were no significant differences between the respondents' overall satisfaction with the SCS at Decathlon when they had used the SCS for the first time compared to always using the SCS ($p=0.131$).

Determining whether the SCS at Decathlon met (SAT2) and exceeded (SAT3) the respondents' expectations were significantly affected by the respondents' frequency of using the SCS at Decathlon; $H(4)=18.11$, $p=0.001$ and $H(4)=16.22$, $p=0.003$, respectively. In both cases, post hoc pairwise comparisons with adjusted p-values showed that there were significant differences in meeting/exceeding expectations between participants who had sometimes used the SCS when compared to those who always used the SCS at Decathlon ($p=0.005$ / $p=0.016$), as well as significant differences between participants who had frequently used the SCS when compared to those who always used the SCS at Decathlon ($p=0.035$ / $p=0.011$). There were no significant differences between the other frequency of SCS usage levels.

Appendix D(iii): Analysis of Post Hoc tests for Customer Loyalty items

Frequency of SCS usage

Whether or not respondents would use the SCS at Decathlon again (LOY1) was significantly affected by the respondents' frequency of using the SCS at Decathlon, H(4)=20.50, p=0.000. The post hoc pairwise comparisons with adjusted p-values showed significant differences in the decision of customers to use the SCS again between those who rarely used the SCS compared to those who always used the SCS at Decathlon (p=0.006), as well as significant differences between those who used the SCS for the first time compared to those who always used the SCS at Decathlon (p=0.003). There were no significant differences between the other frequency of SCS usage levels.

Whether or not respondents would recommend the SCS at Decathlon to others (LOY2) was significantly affected by the respondents' frequency of using the SCS at Decathlon, H(4)=18.05, p=0.001. The post hoc pairwise comparisons with adjusted p-values showed significant differences in the decision of customers to recommend the SCS between customers who:

- rarely used the SCS compared to those who always used the SCS (p=0.043)
- frequently used the SCS compared to those who always used the SCS (p=0.007)
- used the SCS for the first time compared to those who always used the SCS (p=0.036)

There were no significant differences between the other frequency of SCS usage levels.

Whether or not respondents would speak positively about the SCS at Decathlon to others (LOY3) was significantly affected by the respondents' frequency of using the SCS at Decathlon, H(4)=17.18, p=0.002. The post hoc pairwise comparisons with adjusted p-values showed significant differences in the decision of customers to speak positively about the SCS between customer who frequently used the SCS compared to those who always used the SCS (p=0.002). There were no significant differences between the other frequency of SCS usage levels.

Determining whether the SCS at Decathlon is the respondents' preferred choice (LOY4) was significantly affected by the respondents' frequency of using the SCS at Decathlon, H(4)=37.85, p=0.000. The post hoc pairwise comparisons with adjusted p-values showed significant differences in the customers' preference towards the SCS between customers who:

- rarely used the SCS compared to those who always used the SCS (p=0.001)
- sometimes used the SCS compared to those who always used the SCS (p=0.000)
- used the SCS for the first time compared to those who always used the SCS (p=0.000)
- frequently used the SCS compared to those who always used the SCS (p=0.001)

There were no significant differences between the other frequency of SCS usage levels.

Appendix E: Mediation Analysis

The three steps outlined by Baron and Kenny (1986) to test the mediating effect of customer satisfaction include the following:

1. Regressing the dependent variable (i.e. customer loyalty) on the independent variable (i.e. SSTSQ) to prove that SSTSQ affects customer loyalty.
2. Regressing the mediating variable (i.e. customer satisfaction) on the independent variable (i.e. SSTSQ) to confirm a relationship between SSTSQ and customer satisfaction.
3. Regress the dependent variable (i.e. customer loyalty) on both the mediating variable (i.e. customer satisfaction) and the independent variable (i.e. SSTSQ) to verify that SSTSQ predicts customer loyalty through customer satisfaction. When the mediator variable is introduced, the impact of the independent variable on the dependent variable can either:
    - Remain constant, implying that customer satisfaction does not have a mediating effect between SSTSQ and customer loyalty
    - Disappear, implying that customer satisfaction fully mediates between SSTSQ and customer loyalty (full mediation)
    - Significantly reduces, implying that customer satisfaction partially mediates between SSTSQ and customer loyalty (partial mediation)