Examining consumer attitudes towards retailers' m-commerce mobile applications – An initial adoption vs. continuous use perspective

Graeme McLean[a], Kofi Osei-Frimpong[b], Khalid Al-Nabhani[c], Hannah Marriott[d]

[a] *University of Strathclyde, Scotland, United Kingdom of Great Britain and Northern Ireland*

[b] *GIMPA Business School, Ghana*

[c] *University of Strathclyde, Scotland, United Kingdom of Great Britain and Northern Ireland*

[d] *University of Winchester, England, United Kingdom of Great Britain and Northern Ireland*

ABSTRACT

This paper provides an empirical perspective into the antecedents and outcomes of consumer attitudes towards retailers' mobile commerce (m-commerce) applications (apps). A longitudinal perspective was obtained from 474 consumers over a period of 12 months. The research examines the variables influencing consumer attitudes and behaviours during the initial adoption phase (1 month) of a retailer's m-commerce app compared to the usage phase (12 months) of the app. Previous research primarily outlines some of the determinants of mobile app adoption; moving beyond this, through a direct comparison with the same set of consumers at each phase of the research the results illustrate significant differences between the variables influencing consumer attitudes towards the m-commerce app at the initial adoption phase compared to the usage phase. Additionally, the results assert that, over time (following the usage phase), positive attitudes towards the app results in increased purchase frequency through the app, positive attitudes and loyalty towards the brand. The results further reveal the influence of smartphone screen size on consumer attitudes and behaviours.

1. Introduction

The growth of smartphone devices and the subsequent adoption of mobile applications (also known as an 'app' or 'apps') have changed the way in which consumers interact with a brand (Fang, 2018; Dinsmore et al, 2017; Kim et al., 2015). According to recent figures, 61% of UK and 71% of US consumers' total digital time are spent on smartphone devices, with 82% of

This is a peer-reviewed, accepted author manuscript of the following research article: McLean, G., Osei-Frimpong, K., Al-Nabhani, K., & Marriott, H. (2020). Examining consumer attitudes towards retailers' m-commerce mobile applications – An initial adoption vs. continuous use perspective. Journal of Business Research, 106, 139-157. https://doi.org/10.1016/j.jbusres.2019.08.032

UK and 87% of US consumers' total smartphone time spent on mobile apps (ComScore, 2017). The proliferation of mobile technologies has seen the rapid growth of mobile apps. Nelson (2016) reports that social networking platforms (such as Facebook, Facebook messenger, YouTube and Instagram), along with Google apps and Apple music, make up the leading nine apps adopted by consumers. Amazon's mobile app takes the tenth place and is the only retail mobile app to make the top ten (Nelson, 2016); yet (apparel) retailers are adopting mobile apps as a service tool and distribution channel at an exhilarating rate and attempt to contest for screen space on an individual's smartphone (McLean et al, 2018).

Previous research examines some of the determinants of initial mobile app adoption (e.g., Alnawas and Aburb, 2016; Baptista and Oliveira, 2015; Harris et al, 2016; Kim et al., 2014; Munoz-Leiva et al, 2017; Kang et al., 2015) predominantly through utilising and extending the Technology Acceptance Model (TAM; Davis, 1986) or the Unified Theory of Technology Acceptance and Use (UTAUT; Venkatesh et al, 2012). According to Rodgers (2004), the diffusion of an innovation is the process of communicating, adopting and adapting new products over time. Therefore, the adoption of technology is only one step in the overall process of diffusion (Choudrie et al, 2018; Cooper & Zmud, 1990). While the trend has been to study initial adoption of mobile apps, more recently, some studies have explored the variables influencing the continuous use of mobile applications (e.g., McLean et al, 2018, Fang, 2018; Fang, 2017; Verissimo, 2018). However, despite the growing interest and importance placed on understanding consumer attitudes and behaviours with mobile applications and their potential impact as a mobile commerce (m-commerce) service delivery channel, to date no prior studies have examined the variables influencing consumer attitudes and behaviours at the initial adoption phase compared to the continuous usage phase. Fang (2017;2018) and Fong et al (2017) call for a longitudinal approach to better understand consumers' attitudes and behaviours towards mobile applications over time. Specifically, Fong et al (2017) encourage researchers to examine actual customer behaviours over-time by re-approaching the same set of participants.

In contributing to the extant literature on the adoption and use of mobile apps, we respond to such calls for research and undertake analysis in the form of a longitudinal study with customers of apparel retailers' mobile apps. To date, the majority of research examining mobile applications has not focused on a specific type of app or industry (see table 1 for an overview of research on mobile apps), instead they have primarily assessed the general adoption and use of mobile applications. However, given that different types of mobile applications serve

different purposes, Dinsmore et al (2017) and Fang (2018) highlight the importance of examining specific types of mobile apps and industries. Additionally, given the importance of the channel to m-commerce retailers, it is essential to understand consumer attitudes and behaviours towards such apps over time. In light of this, this research draws direct comparisons on consumer attitudes and behaviours towards apparel retailers' mobile applications between the initial adoption phase (1 month) and the continuous usage phase (12 months). Going beyond the current literature (as shown in table 1), a direct comparison between the initial adoption phase and the continuous usage phase with the same set of consumers at provides a deeper theoretical understanding of consumer attitudes and behaviours towards retailers' apps and how these change over time. Specifically, this research firstly examines the variables influencing attitudes towards the app over time and secondly, examines the influence of consumer attitudes towards retailers' mobile applications on attitudes towards the brand, purchase frequency and loyalty towards the brand over time. Limited research has assessed the influence of attitudes towards the app on consumer attitudes towards the brand. Whilst Bellman et al. (2011) took the initial steps in investigating the influence of branded mobile apps on brand attitudes, this remained at one time-point and across a range of product categories.

From a managerial perspective it is essential to understand the identified changes in attitudes and behaviours over time in order to develop appropriate strategies to meet customers' specific needs. Table 1 illustrates that previous research on the adoption and use of mobile applications mainly focuses on behavioural intentions towards mobile apps, while intentions are regarded a useful predictor of behaviour, it is important to study actual behaviour, thus this research addresses calls to examine actual behaviour (Fong et al, 2017; Fang, 2017, 2018; Hsiao et al, 2016). Moreover, given the difference in the screen size of mobile devices and calls for research (Shanker et al. 2010) on its potential influence on customer behaviour, the moderating effect of smartphone screen-size is also established.

2. Conceptual Development

2.1. Mobile Applications

Mobile devices have introduced both convenience and easiness to contemporary consumers (Groß, 2016; Ozturk et al., 2016; Zhang et al., 2013). Part of what makes a smartphone an integral part of an individual's day-to-day life is the capability of using smartphone apps on-the-go (Wang et al., 2015). Mobile apps are defined as, *software that is downloadable to a mobile device, which prominently displays a brand identity, often via the name of the app and*

the appearance of a brand logo or icon, throughout the customer experience (Bellman et al., 2011, p.191). Mobile apps were originally offered for general utilitarian purposes, such as email, calendars and weather information (Hsiao et al., 2016); however, further advancements in technology established even more utilitarian as well as hedonic functions for consumers, such as banking (e.g. Baptista & Oliveria, 2015; Munoz-Leiva et al., 2017), social networking (e.g. Salehan & Negahban, 2013), health (Verissimo, 2018) and shopping (e.g.; Kim et al., 2010; Kim et al., 2014; Lu et al., 2017). Unlike websites, a mobile app can offer a more customised experience and use both the software and hardware features of the mobile device to provide consumers with a distinctive experience; i.e. using the camera function to scan bar-codes, utilising GPS functionality to provide location-specific content and keeping customers up to date with push notifications. Therefore, mobile apps are end-user software apps developed for a smartphone operating system and are capable of extending the device's capabilities by facilitating individuals and app providers to complete tasks further than those available on a brand's website (Purcell et al., 2010). Often heralded as a unique benefit of smartphone apps is the ability to access anytime, and anywhere leading to a useful and easy way for consumers to shop (Kim et al., 2013; Marriott & Williams, 2018).

2.2.Attitudes towards Mobile Apps

Most studies aiming to understand consumer attitudes towards mobile apps utilise TAM, based on the Theory of Reasoned Action (TRA: Ajzen, 1985). The TAM is one of the most popular models in explaining technology adoption with such popularity being evident in the hundreds of articles applying the model to various research settings. Davis et al's (1989) TAM predicts users' attitudes and intentions towards using technology based on two determinants, (1) perceived ease of use and (2) perceived usefulness. Perceived ease of use refers to the extent an individual views the use of a technological system as being free from effort (Davis, 1989). Thus, a technological system should be clear and understandable to use and enable individuals to complete tasks free from effort while allowing individuals to become skilful at using the technology. Rather, perceived usefulness refers to an individuals' confidence that utilising a particular technological system will enhance their performance (Davis, 1989). Thus, the technology should enable an individual to complete tasks in a timely manner increasing their efficiency and productivity.

Kang et al. (2015) stress that for consumers to be motivated to adopt a mobile app, its content ought to be useful and the experience free from effort. Davis et al. (1989) suggest that the

usefulness and ease of use of the technology is an individual's belief that using the technological system will increase performance. Prior research has investigated the perceived usefulness and ease of use of technology on individuals' attitudes towards downloading a mobile app (Munoz-Levia et al., 2017; Ko et al., 2009; Liu & Li, 2011). Accordingly, the extant literature asserts that the variables influencing initial adoption may be stronger, weaker or different from the variables influencing the continued usage of the technology (Belanche et al., 2014; Venkatesh et al., 2003; Groß, 2016). Bhattacherjee's (2001) Expectancy Confirmation Theory of Information Technology (ECT-IT) provides theoretical understanding of consumers' continued use of technology; it suggests that the variables influencing initial adoption and actual use may differ due to initial adoption relying on expectations, whereas usage is based on the evaluation of experience. Thus, upon initial adoption, consumer attitudes may be influenced by information obtained about the ease of use and usefulness of the technological system (Hubert et al, 2017). Conversely, following the usage phase of the technology, the importance of the ease of use and usefulness may become stronger or weaker in influencing attitudes towards the technology based on the actual experience of using the technological system (Bhattacherjee, 2001). Furthering this line of thought, Groß (2016) suggests that the strength of the variables influencing the *actual* experience following initial adoption may differ from the experience of continued use. Hong et al. (2006) assert that after individuals have further sufficient experience, they develop more informed beliefs. Additionally, the authors affirm that the TAM better explains continuous usage (63% variance explained) than initial adoption (40% variance explained) (Hong et al. 2006). Despite theoretical support for the differences between adoption and continuous usage in consumer behaviour research (Howard and Sheth, 1969), and despite Davis's (1989) original conceptualisation and Bhattacherjee's (2001) conceptulisation of potential differences between adoption and continuous usage in information technology, the technology adoption literature often makes the assumption that the processes of adoption decisions are the same for continued usage decisions. Thus, drawing on this discussion, we hypothesise:

H1a Perceived ease of use will have greater influence on positive attitudes towards the app at the usage phase compared to the initial adoption phase.

H1b Perceived usefulness will have greater influence on positive attitudes towards the app at the usage phase compared to the initial adoption phase.

Meta analyses have outlined that the perceived ease of use and perceived usefulness explain around 40% of the variance in the behavioural intention to use a technological system (Rese et al, 2017; Legris et al, 2003). As a result, TAM as a theoretical framework has come under criticism due to its simplified view of technology adoption and use. Accordingly, TAM2 (see: Venkatesh and Davis, 2000) and TAM3 (see: Venkatesh and Bala, 2008) were developed to include variables on human behaviour and experience. Most notably introducing social norms (TAM2) and enjoyment (TAM3) in influencing the adoption and use of technology. In line with the TAM and its subsequent extensions (TAM2 and TAM3), various scholars have outlined additional variables that influence the initial adoption of mobile apps, including enjoyment, social norms, and the perceived customisation of the app (see: Shang & Wu, 2017; Chaouali et al., 2017; Fong et al., 2017; Munoz-Leiva et al., 2017; McLean et al., 2018; Hsiao et al., 2016; Gupta & Arora, 2017; Kim et al., 2013; Yang, 2013; Magrath & McCormick, 2013). In line with this, Yang (2013) outlines that the most important criteria for predicting mobile app acceptance and attitude towards apps are perceived usefulness, ease of use, enjoyment, and social influences. Thus, each of these variables are capable of influencing customer attitudes towards the adoption of mobile apps.

Subsequent versions of TAM (Venkatesh and Bala, 2009) and UTAUT (Venkatesh et al., 2012) outline enjoyment as a motivational factor in consumer adoption of a technological system. Perceived enjoyment is defined as "*the activity of using a specific system which is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use*" (Venkatesh, 2000, p. 351). Regarding mobile devices, although mobile apps have undeniable utilitarian benefits, due to their ubiquitous and convenient nature, consumers' hedonic motivation to use them is fundamental to app successfulness (Fang, 2018). Hsiao et al. (2016) affirm that the level of enjoyment experienced during use of a mobile app can influence consumers' attitudes and satisfaction with it. Previous research within the online environment asserts that consumers who do not experience intrinsic enjoyment during their shopping encounter will switch to alternative means of shopping (Rose et al., 2012; Martin et al., 2015). However, previous research has not been consistent in affirming that enjoyment positively influences customer attitudes during the initial adoption of technology, as utilitarian variables are often seen as highly important during the adoption phase of a retailer's mobile app (McLean et al., 2018). However, although Hubert et al. (2017) examine hedonic motivation as an antecedent of perceived usefulness and ease of use towards m-shopping usage intention, both relationships were found insignificant, thus confirming that there remain questions surrounding

the role of enjoyment at the usage phase in this instance. Still, Shiau & Luo (2012) illustrate the important role of enjoyment in influencing positive customer attitudes during the continued use phase of the technology (in an online blog platform). Following this, Lu et al. (2017) point to the importance of enjoyment in predicting the continuous use of a mobile app. Additionally, Chen (2014) asserts that the enjoyment an individual experiences with a technological function, such as a social networking site, influences continuous use of the technology. Given that following sufficient experience, individuals develop more informed beliefs (Hong et al. 2006), they may expect enjoyment from their interactions with an apparel retailer's mobile app to continue their use of the app. Thus, we hypothesise:

> *H1c Enjoyment in using the app will have greater influence on positive attitudes towards the app at the usage phase compared to the initial adoption phase.*

Subjective norm has been a consistent motivational factor for consumers in the adoption of technology (Davis, 1989) and in research on understanding consumer behaviour (Ajzen, 1985). Ajzen (1991, p.188) defines subjective norm as "*the perceived social pressure to perform or not to perform a behaviour*". In the context of this research, subjective norm refers to the consumers' perception of the expectations of important others regarding the use of retailers' mobile apps. User acceptance research examining the role of subjective norm on the adoption of technology has yielded mixed results (Venkatesh and Davis, 2000). In the original TAM Davis et al. (1989, p.986) argued against including subjective norm in the model "because of its uncertain theoretical and psychometric status.", but illustrated the need for further research on it. Accordingly, through a longitudinal study, TAM2 (Venkatesh and Davis, 2000) found subjective norm to have an initial positive effect on employees' intentions to use technology but became slightly weaker following three months. Venkatesh and Davis (2000) further identified that when use of the technological system was voluntary, such as in the context of this study, subjective norm had no influence on intention to use over and above the perceived usefulness and perceived ease of use. However, in a related study, Yang (2013) found that consumers' attitudes towards adopting mobile apps were influenced by important people in their life, such as peers, parents, idols and professors. Thus, drawing on the above discussion, this research hypothesises:

> *H1d Subjective norms will have a weaker influence on positive attitudes towards the app at the usage phase compared to the initial adoption phase.*

Venkatesh and Davis (2000) encourage further exploration of variables that may influence customer attitudes towards technology adoption and use. Integral to mobile apps is the capacity to offer consumers a customised service encounter utilising both the hardware and software features of the app (Magrath & McCormick, 2013; Hsiao et al., 2016). As per the Service-Dominant Logic, as consumers are more often regarded as "prosumers" in this modern day, customisation of their m-commerce experiences is often found to better meet their needs and subsequently enhance their positive attitudes towards branded apps (Fang, 2018). A customised experience is outlined as being inherent within mobile apps (Chen et al., 2017; McLean et al. 2018) and is conceptually defined as the personalisation or individualising of services or content to an individual's own preferences (Lee & Crange, 2013). Importantly, customisation allows organisations to personalise the delivery of the right content to the right person at the right time (Tam & Ho, 2005). The customisation features on smartphone apps enable individuals to modify app features to their own particular needs with the use of filtering and refinement tools (McLean et al, 2018; Magrath & McCormick, 2013) whilst, in turn, facilitating customers' role in co-creating their experience. Additionally, the unique nature of mobile apps allows individuals to retain data in a distinctive manner, including user preferences, personal details and location information (Hsiao et al., 2016). Accordingly, such characteristics provide retailers the unique capacity to utilise smartphone features (including hardware and software) for location-based information, context understanding and product customisation (Alnawas & Aburub, 2016). Prior research outlines, following the identification and learning how to use customisation tools, customisation can enhance efficiency and reduce an individual's level of effort during use (Lee & Crange, 2010; Rose et al., 2012). Therefore, upon initial adoption of a mobile app, customisation tools may not be as important in influencing attitudes towards the app; however, following continued use such tools may shape a customer's attitudes (Mclean et al., 2018). Thus, this research hypothesises:

> *H1e Customisation of the mobile application will have greater influence on positive attitudes towards the app at the usage phase compared to the initial adoption phase.*

2.3. Attitudes towards the brand

Attitude towards the brand and purchase intentions or personal action tendencies, such as loyalty or repeat visit intention, have been popular attitudinal constructs within the literature (Bagozzi et al., 1979; Ostrom, 1969). Previous research within the technological domain has asserted the influence of consumer attitudes towards a website influencing attitudes towards

the brand (Song & Zinkhan, 2008). Although there is some debate over which of these attitudes (website or brand) the consumer forms first (Brown & Stayman, 1992), there is little debate of the presence of a relationship. Bellman et al. (2011) suggest that one reason for the increase in the popularity of branded mobile apps as a marketing device is their high level of consumer engagement and the presumable positive impact it has on consumer attitudes towards the brand, although not empirically examined. Sundar et al. (2010), as well as Song & Zinkhan (2008), suggest that consumer interactivity with technology (websites) has a positive impact on attitudes towards the brand. In addition, both Bellman (2011) and Kim et al. (2015) assert that interaction with branded mobile apps have a positive effect on attitudes towards the brand. The extant literature has identified perceived ubiquity as one of the most distinguishing aspects of mobile services (Balasubramanian et al., 2002); the 'always on' immediacy, portability and search-ability of mobile services has been outlined as an important factor in increasing customer usage of mobile apps with such constant availability likely to reflect positively on the brand (Kim et al., 2015). Accordingly, such constant availability of services, even on the go (Wang et al., 2015), may influence the perceived value of retailers' smartphone apps and consumers' attitudes regarding the brand. Previous research emphasises that continued usage of a mobile app is an indication of positive attitudes and satisfaction towards it (Hsiao et al., 2016). However, there is a lack of research examining the behavioural outcomes of positive attitudes towards the app. Within the e-commerce environment, research suggests that, over time, positive attitudes toward the website often result in favourable behavioural outcomes such as revisit intention, positive attitudes towards the brand and loyalty (Evanschitzky et al., 2010; Kandampully, 2015). Drawing upon Wang et al. (2015) and Hsiao et al. (2016), we suggest that following the continued usage phase of mobile apps customers may develop more positive attitudes towards the brand, and therefore hypothesise:

> *H2 Positive customer attitudes towards the mobile application will have a greater positive influence on customer attitudes towards the brand at the usage phase compared to the initial adoption phase.*

2.4. Loyalty towards the brand

The concept of customer loyalty is key to marketing scholarship (Toufaily et al., 2013). Oliver (1999, p.392) defines customer loyalty as "*a deeply held commitment to re-buy or re-patronise a preferred product/service consistently in the future, thereby causing repetitive same brand or same brand set purchasing, despite situational influences and marketing efforts having the*

potential to cause switching behaviour". Establishing loyal customers helps firms to develop long-term mutually beneficial relationships (Pan et al., 2012); such loyal customers often demonstrate attachment and commitment towards the brand and are not attracted to competing brands offerings (So et al., 2013). Evanschitzky et al (2010) assert that loyal customers are often willing to pay more, have higher purchase intentions and resist brand switching. As such, it is essential that brands have loyal customers and explore uses of technology to strengthen customer loyalty (Kandampully et al., 2015). Consumers' extensive adoption of technology has created a new role for customers in co-producers of value and co-owners of the brand (Wirtz et al., 2013). Thus, organisations seek strategies to encourage and enhance customers' active engagement and to function as brand ambassadors (James, 2013).

Many organisations have shifted their emphasis away from customer acquisition to creating customer engagement and participation (Sawhney et al., 2005). Such a strategy is believed to help organisations generate brand referral and add value to the offering while contributing to an organisation's innovation process (Hoyer et al., 2010). Shankar et al. (2010) suggest that retailers could view the wider concept of mobile marketing as an opportunity to enrich consumers' loyalty towards a brand, as mobile apps provide retailers with a platform to interact with customers. In support of this, Kim and Adler (2011) outline the possibility that mobile apps could enhance an individual's loyalty towards a brand due to additional interactions with the brand over a continued period of time. Such commitment to retain a mobile appn on an individual's smartphone device could therefore be the first stage of overarching loyalty towards the brand (Ozturk et al., 2016).

Further engagement with the mobile app on a continued basis over time could instigate loyalty towards the brand (Kim et al, 2015). The additional value that retailers could offer customers from m-commerce mobile apps (Hisiao et al, 2016) may help to establish customer loyalty, as value is considered inextricably linked with customer loyalty, where perceived value is fundamental in inducing positive responses from consumers (Cheng, 2013). Thus, the potential for value-enhanced service that retailers can offer customers through the unique characteristics and functionality of mobile apps provide retailers the opportunity to strengthen its bond with customers to sustain long-term relationships (Kandampully et al, 2015). From research conducted within the lodging industry, Anuar et al (2014) expect that mobile apps will play a vital role in establishing and strengthening customer relationships and brand loyalty. Kumar et al. (2010) affirm that loyal customers develop bonds with a brand and display different behaviours than non-loyal customers. Thus, loyalty due to well-developed bonds with a brand

affects behavioural outcomes such as repeat purchase intentions, increased share of wallet, word-of-mouth (WOM) and lower acquisition costs (Evanschitzky et al, 2012; Gandomi & Zolfaghari, 2013; Gurau, 2003). Despite the initial adoption being critical for the diffusion of technology, the initial adoption phase of m-commerce apps may not be as influential as the usage phase of mobile apps in enhancing customer loyalty to the brand (Hong et al, 2006). Therefore, we hypothesise:

> *H3 Positive customer attitudes towards the mobile application will have a greater positive influence on customer loyalty towards the brand at the usage phase compared to the initial adoption phase.*

2.5. Purchase

Despite the growing interest in, firstly, mobile marketing and, secondly, m-commerce apps, few studies have specifically examined the financial effect of using m-commerce apps (Kim et al., 2015; Bellman, 2011), particularly concerning mobile purchase and mobile purchase adoption (see Gao et al., 2015; Agrebi & Jallais, 2015). Kim et al. (2015) illustrate that branded app adoption has a positive effect on in-store purchase intentions which becomes elevated when customers become more active on the app and utilise more features. However, to our knowledge, there is no empirical research that investigates actual purchase frequency through a retailer's *m-commerce app*. Some studies have conceptualised that positive attitudes towards an app may influence purchase intentions. However, Yoo et al. (2000) comment that purchase intention refers to a customer's likelihood to purchase a product. Therefore, it does not necessarily mean *actual purchase* or *promise* to purchase. Despite this, it is important to recognise that a customer's behaviour can often be predicted by his or her intentions (Hsu et al, 2016), as illustrated by the TRA (Ajzen & Fishbein, 1975). Thus, purchase intentions become the likelihood of buying (Wu et al., 2015).

Following the TRA, Bagozzi et al. (1979) stress that consumer attitudes influence purchase intentions, with previous research within the technological domain stating that a customer's attitudes towards a technological system (such as a website or in-store computer) can influence purchase intentions (Agag & El-Masry, 2017; Chen et al., 2016; Chen, 2012). Gao et al. (2015) assert that customers purchase intentions increase following continuous usage of mobile websites. However, criticisms have been aimed at measuring purchase intentions rather than actual purchase; thus, we aim to investigate actual customer purchase frequency and hypothesise:

H4 Positive *customer attitudes towards the app will have a greater positive influence on purchase frequency through the application at the usage phase compared to the initial adoption phase.*

H5 Positive customer attitudes towards the brand will have a greater influence on purchase frequency through the application at the usage phase compared to the initial adoption phase.

H6 Customer loyalty towards the brand will have a greater positive influence on purchase frequency through the application at the usage phase compared to the initial adoption phase.

2.6. Smartphone Screen Size

Inherent to mobile devices are their small screen sizes (Wang et al, 2013). Although screen size and functionalities available on smartphones are limited in comparison to PCs, given their flexibility and their use 'on the go' (Okazaki & Mendez, 2013), they provide convenient access for consumers to shop, particularly when consumers want to achieve specific goals or satisfy habitual needs (Wang et al., 2015). Previous research asserts that with habitual shopping, mobile convenience leads to purchase intentions and behavioural loyalty (Okazaki & Mendez, 2013; Yang & Kim, 2012; Yang, 2010). Habitual shopping is believed to require less search and cognition on behalf of the customer. On the contrary, hedonic shopping activities are more search intensive and require further cognitive decision making (Wang et al., 2015). Thus, previous research asserts that mobile devices, in particular smartphones, are more useful in utilitarian habitual shopping contexts (Okazaki & Mendez, 2013).

While smartphones provide excellent portability, such advantage comes with limitations, as the screen size of mobile devices are small and often limited in functionality; such limitations have been shown to alter customer search behaviour (Huang et al, 2018; Wang et al., 2015). Ghose et al. (2013) state that, due to the small screen size, customers tend to exert less effort when browsing on a smartphone device and click links that have higher ranks in search results on smartphone devices than when they use PCs. Additionally, Ghose et al. (2013) outline that consumers are reluctant to purchase niche or non-habitual products when they use devices with small screens. Thus, literature suggests that due to smaller screen sizes on smartphones,

consumers are reluctant to invest in search costs and prefer to use them to shop according to habitual needs. Shanker et al. (2010) outline that searching on small screens requires different forms of scrolling, which can often limit the information customers can obtain. Therefore, while mobile devices provide consumers access to online shopping (Wang et al., 2015), previous research conceptualises that a smaller screen size may have a negative effect on shopping behaviour with mobile devices (Shanker et al., 2010; Tang et al., 2016). However, limited research has assessed the impact of varying screen sizes on mobile devices, particularly concerning smartphones (McLean et al., 2018). Additionally, the focus of research with regard to mobile screen size has been on websites (e.g., Kim & Sundar, 2016; Yu & Kong, 2016). While screen size remains the same during use of mobile apps, such apps are specifically designed for smaller screen sizes, thus, further understanding is required on the role of smartphone screen size on customer attitudes and behaviours. Drawing on Shanker et al.'s (2010) conceptualisation that smaller screen sizes may have a negative effect on customer attitudes and behaviour, we hypothesise:

H7: A smaller smartphone screen size will have a negative moderating effect on:

(a) perceived ease of use, perceived usefulness, enjoyment, subjective norms, and customisation in influencing attitudes towards the mobile application.

(b) a customer's attitudes towards the app and attitudes towards the brand, purchase frequency and loyalty towards the brand.

Given the aforementioned conceptual development, figure 1 provides an illustrative outline of our hypothesised relationships.

>>Insert Figure 1 Hypothesised Model Here<<

3. Methodology

3.1. Data collection and sampling

An online questionnaire was used in order to gather the data required for the study. Data were collected from consumers within the UK that had downloaded a retailer's m-commerce app and retained it for up to 30 days but at least for more than 7 days. Other than restricting the study to apparel m-commerce apps, respondents were not restricted to specific brands but

nevertheless had to outline which app they were referring to. In order to avoid student sampling and to provide a more representative sample, the participants were employed with the support of a market research firm. Not restricting the sample to a specific apparel retailer enabled the study to achieve a suitable sample. In response to various calls for longitudinal research in management research (Polyhart and Vandenberg, 2010) and more specifically in technology and the mobile domain (Fong et al, 2017), a longitudinal approach was adopted in this research to assess the hypothesised relationships; thus, data were collected at two time points from the same set of respondents regarding the same m-commerce app. In our first phase (Adoption Phase) we informed respondents this was a two-part research study, accordingly we asked respondents for permission to contact them again regarding the same app in 11 months' time. Those that did not agree to be contacted in 11 months' time were taken to the end of the survey. For Time 1 (Adoption Phase), data were gathered from 689 respondents. Eleven months later (Time 2- the Usage Phase), 474 respondents partook in the second questionnaire, this represented 69% of the original sample. Respondents dropped out due to not responding to the invitation to participate in the second questionnaire, although this may be due to simply not wanting to respond to the second questionnaire or deleting the app. To analyse comparisons between the Adoption Phase and the Usage Phase, we only include those in our sample that completed both questionnaires; therefore, the sample consisted of a total of 474 respondents. As detailed, the sample achieved a relatively even split between males and females as well as age group. Table 2 outlines further details of the sample.

>>INSERT Table 2 Sample Characteristics Here<<

3.2. Measures

The scales used in the questionnaire were drawn from previously used scales in the extant literature (see Table 3). Therefore, 34 items were measured on a 7-point Likert scale (ranging from Strongly Disagree to Strongly Agree), including: perceived ease of use, perceived usefulness, subjective norm, customisation, enjoyment, attitudes towards the app, purchase frequency and loyalty towards the brand. A 7-point semantic-differential scale was deployed for measuring attitudes towards the brand. Table 3 illustrates the scales adopted in the questionnaire.

>>INSERT Table 3 Measurement Scales Here<<

4. Results

4.1. Preliminary Analysis

A number of preliminary analyses were carried out before Structural Equation Modelling (SEM) with AMOS Graphics. In the assessment of scale reliability, Cronbach's alpha coefficient was calculated for each scale used in the study as shown in Table 3 and exceeding the critical value of .7 (Pallant, 2013), thus rendering the scales as reliable measurements of corresponding variables.

In the assessment of Figure 1, SEM in AMOS Graphics 24 was used to test the hypothesised relationships. We chose to use SEM due to the statistical integrity of the approach compared with other methods such as multiple regression (Byrne, 2013). Additionally, SEM allows the study to test all of the relationships in the hypothesised model simultaneously. SEM in AMOS deploys a confirmatory, and therefore covariance-based, approach to SEM (CB-SEM; Byrne, 2013). Confirmatory SEM is a two-step approach, (1) a confirmatory factor analysis (CFA) is performed followed by (2) the estimation and assessment of the structural model. The confirmatory factor analysis is conducted to illustrate the causal relationships. Accordingly, the model was estimated for both the Adoption Phase and the Usage Phase. The output reveals *goodness of fit*, Adoption Phase: $x^2_{(731)} = 1{,}471.33$, $\rho = .001$, $x^2/df = 2.01$; RMSEA = .046, RMR = .014, SRMR = .043, CFI = .959, NFI = .961 and Usage Phase: $x^2_{(731)} = 1{,}486.75$, $\rho = .001$, $x^2/df = 2.03$; RMSEA = .047, RMR = .016, SRMR = .042, CFI = .960, NFI = .963. In accordance with the fit statistics, the regression loadings were ample and significant.

Furthermore, following the CFA, further analysis satisfied discriminant and convergent validity as the results shown in table 4 indicate convergent validity was satisfied following the average variance extracted (AVE) values above .50 and construct reliabilities above .70. Additionally, the AVE values were greater than the square of their correlations, supporting discriminant validity. Additionally, in the assessment of multi-collinearity, a variance inflation factor analysis (VIF) was conducted in IBM SPSS. Given that the results outlined no variable above the critical value of 3.0 (Hair et al, 2013) it can be concluded that multi-collinearity was not violated.

Additionally, in avoiding misleading conclusions, tests for common method bias (CMB) were conducted (Podsakoff et al, 2003). The scale items of corresponding constructs were mixed throughout the questionnaire as a technique to reduce the likelihood of CMB (Karikari et al, 2017; Ranaweera & Jayawardhena, 2014). Additionally, a common latent factor (CLF) was presented with all indicators of the constructs included in the model. The CLF produced a value of .567. To calculate the common method variance .567 was squared, which equals .3214 (32.1%). Values which fall below 50% (Ranaweera and Jayawardhena, 2014) are considered to satisfy the unlikelihood of CMB.

>>INSERT Table 4 Convergent and Discriminant Validity Here<<

Following the confirmatory factor analysis, the data were pooled and examined for configural invariance (CF). It is important to examine configural invariance in order for pooled data analysis to provide meaningful insights (Vandanberg & Lance, 2000). The CF test is used to evaluate the conjecture that the regression loadings are similar across groups (Vandenberg & Lance, 2000). Following the analysis of the pooled data from the adoption phase and the usage phase, the findings outlined *good fit* ($x^2_{(731)} = 1{,}466.78$, $\rho = .001$, $x^2/df = 2.01$; RMSEA = .046, RMR = .016, SRMR = .043, CFI = .958, NFI = .963). Therefore, there is confirmation of configural invariance in the data, allowing for appropriate comparisons.

4.2. Structural Equation Modelling

Due to the *goodness of fit* of the CFA and satisfying the subsequent tests, the structural equation model was then estimated based on the hypothesised model in figure 1 for both collection phases, Adoption Phase and Usage Phase. The structural models presented *good fit* (Adoption Phase: $x^2_{(27)} = 84.63$, $p < .05$, $x^2/df = 3.1$ RMSEA = .058 SRMR = .020, RMR = .015, CFI = .958, NFI = .957, GFI = .966, AGFI = .931; Usage Phase: $x^2_{(27)} = 83.74$, $p < .05$, $x^2/df = 3.1$ RMSEA = .057, SRMR = .014, RMR = .013, CFI = .968, NFI = .963, GFI = .971, AGFI = .929) (see Hu & Bentler (1999) for good and acceptable fit indices) and provide support for a number of the hypothesised relationships, shown in table 5. We also controlled for *frequency of mobile app use* (Adoption Phase: $\beta = .064$, $p = .202$; Usage Phase: $\beta = .071$, $p = .177$) and *confidence in mobile app use* (Adoption Phase: $\beta = .044$, $p = .312$; Usage Phase: $\beta = .0.49$, $p = .276$) on customer attitudes towards the retailer's app and found no significant effects.

>>INSERT Table 5 SEM Results Here<<

With regard to the Adoption Phase (Time 1), the estimated model illustrated significant relationships between perceived ease of use, perceived usefulness, enjoyment, subjective norm and customisation on consumers' attitudes in relation to the app. Significant relationships were found between (1) attitudes regarding the app and loyalty to the brand, (2) attitude regarding the brand and purchase frequency, and (3) loyalty towards the brand and purchase frequency. However, the relationship between attitudes towards the app and attitudes towards the brand was non-significant, as well as the relationship between attitudes towards the app and purchase frequency. Reflecting the analysis for Time 1, the data for Time 2 was analysed, as shown in Table 5. In contrast to the adoption phase (Time 1), in the usage phase (Time 2) subjective norm did not have a significant influence on consumers' attitudes towards the app, while attitudes towards the app influenced attitude towards the brand and purchase frequency. While not hypothesised, we found a significant relationship between attitudes towards the brand and loyalty towards the brand at both time points (Adoption Phase: $\beta = .277^{**}$; Usage Phase: $\beta = .309^{**}$; $p = .202$ – no difference between each phase). This finding is not unusual and is well supported by previous studies outlining such a relationship (e.g. Liu et al, 2011; Chaudhuri and Holbrook, 2001; Baldinger and Rubinson, 1996). However, this study further points to the important role of attitudes towards the app influencing such variables.

Furthermore, a chi square difference test revealed a significant difference in the structural models, Adoption Phase and Usage Phase = $x^2 = 2.98$, $p = < .001$. Despite this, in order to assess where such differences lie, additional analyses between each path is necessary to assess the research hypotheses. Thus, in AMOS Graphics, the regression paths were named, bootstrapping was selected, where the bootstrapping confidence output illustrates the confidence interval between each collection, adoption phase and usage phase (Time 1 and Time 2). The analysis shown in Table 6 outlines significant differences for many of the paths.

>>INSERT Table 6 Multi-group Analysis (Adoption Phase Time 1 and Usage Phase Time 2) Here<<

The analysis in Table 6 reveals that hypotheses H1a, H1b and H5 were not supported. Thus, a non-significant difference was found between the adoption phase and the usage phase for: (H1a) perceived ease of use and attitudes towards the app (Adoption Phase: β =.479***; Usage Phase: β =.489***; *p* =.113), (H1b) perceived usefulness and attitudes towards the app (Adoption Phase: β =.456***; Usage Phase: β =.477***; *p* =.142), and (H5) attitude towards the brand and purchase frequency (Adoption Phase: β =.338**; Usage Phase: β =.491**; *p* =.061).

The remaining paths examined revealed significant differences between each collection phase (Adoption phase and Usage phase). Thus, the results from Table 6 support H1c, H1d, H1e, H2, H3, H4 and H6. With regard to H1c, the results assert that enjoyment has a greater influence on consumers' attitudes towards the app following the usage phase of the app (Adoption Phase: β =.319**; Usage Phase: β =.511***; *p* =.019). The results also support hypothesis H1d as the subjective norm has a greater influence on attitudes towards the app during the initial adoption phase and, in contrast, a non-significant influence at the usage phase (Adoption Phase: β =.648***; Usage Phase: β =.258^{ns}; *p* = <.001). In support of H1e, the results also indicate that, while app customisation has an influence on attitudes towards the app upon initial adoption, a greater influence on can be seen following the usage phase of the m-commerce app (Adoption Phase: β =.321**; Usage Phase: β =.541***; *p* = <.001). With regard to H2, following the usage phase of the app, customer attitudes towards the app have a more positive influence on customer attitudes towards the brand in comparison to the initial adoption phase (Adoption Phase: β =.213^{ns}; Usage Phase: β =.681***; *p* =.016). Additionally, in support of H3, after the usage phase of the app, customer attitudes towards the app have a more significant positive effect on loyalty towards the brand in comparison to the initial adoption phase (Adoption Phase: β =.337**; Usage Phase: β =.699***; *p* =.030). In support of H4, we find that, in the usage phase, customers' attitudes towards the app have a stronger effect on purchase frequency in comparison to the initial adoption phase (Adoption Phase: β =.269^{ns}; Usage Phase: β =.581**; *p* =.021). Moreover, in support of H6, a customer's loyalty towards the brand has a stronger positive effect on purchase frequency following the usage phase in comparison to the initial adoption phase (Adoption Phase: β =.411***; Usage Phase: β =.703 **; *p* =.037).

4.3. Multi-group Analysis – Screen Size

Lastly, to assess hypotheses H7a and H7b, multi-group analyses were conducted in AMOS Graphics between screen sizes following Karikari et al.'s (2017) method. Measurement invariance was assessed to determine if there was equivalence across groups. This test was

conducted by assigning constraints to the groups, following this the difference in the CFI value between the configural model and the constrained model were calculated, providing a CFI difference value of < .01, accordingly we can assume equivalence between the groups (Cheung & Rensvold, 2008). We categorised a large screen size as 4.7 inch and above (e.g. iPhone 8 – iPhone 8+) and small screen size as 4.6 inch and below (e.g. iPhone 5 – Samsung Galaxy models). A chi-square test was calculated and provided useful insight into the difference between each model (Small Screen Size Vs Large Screen Size). The results revealed a significant difference between each group (Adoption Phase = $x^2 = 2.951$, p = < .001 and at Usage Phase = $x^2 = 2.993$, p = < .001). Subsequently, the aforementioned steps earlier outlined were followed to further analyse the individual paths as shown in Table 7.

>>INSERT Table 7 Multi-group Analysis Screen Size Here<<

The findings shown in Table 7 yield some interesting results. The results assert that there is no significant difference on the variables influencing attitudes towards the app with regard to small screen-size smartphone users (4.6 inch and below) and large screen-size smartphone users (4.7 inch and above) at the initial adoption phase (Time 1). However, following the usage phase (Time 2), a significant difference is found with regard to enjoyment influencing customers' attitudes towards the app. Thus, enjoyment is more influential on positive attitudes towards the app amongst customers using a large screen size device in comparison to those with a smaller screen size device. Therefore, gaining enjoyment from the app is important to consumers with a large smartphone screen size, which indicates that following continued use of the app, large-screen size users may use mobile apps for more hedonic purposes.

Moreover, following the usage phase (Time 2), the results indicate significant differences between small screen sized smartphone users and large screen sized smartphone users with regard to attitudes towards the app and its influence on attitudes in relation to the brand, loyalty towards the brand and purchase frequency, as large screen size users are more likely to be loyal towards the brand, hold positive attitudes regarding the brand and have increased purchase frequency.

5. Discussion

5.1. Theoretical Discussions

This study provides a longitudinal insight into the variables influencing consumer attitudes towards retailers' m-commerce smartphone apps upon the initial adoption phase compared to the usage phase of a retailers' app. As illustrated in table 1, to date researchers have focused

primarily on pre-adoption and initial adoption, in particular the antecedents of pre and initial mobile app adoption (Alnawas and Aburb, 2016; Baptista and Oliveira, 2015; Harris et al, 2016; Kim et al., 2014; Munoz-Leiva et al, 2017; Kang et al., 2015). However, this research responded to calls for a longitudinal insight to better understand consumers' attitudes and behaviours towards mobile applications over time (Fang 2017, 2018 and Fong et al, 2017). Through undertaking direct comparisons between initial adoption and continuous use of retailers' mobile apps with the same set of consumers this research has furthered our theoretical understanding. Specifically, the findings assert that positive attitudes in relation to an m-commerce mobile app leads to positive brand attitudes, loyalty towards the brand and increased purchase frequency following continued usage of a retailer's m-commerce smartphone app. Interestingly, the findings reveal that upon initial adoption, positive attitudes towards the app do not lead to positive attitudes towards the brand or purchase but signal loyalty towards the brand. Thus following use of the mobile application, positive brand attitudes and higher levels of purchase frequency are developed over time.

In line with TAM (Davis et al, 1989), the results affirm the significance of the ease of use and usefulness of the mobile app in shaping positive customer attitudes towards it during the initial adoption phase and continued usage phase. Previous research on mobile app adoption has mainly focused on the importance of perceived ease of use and perceived usefulness during the initial adoption phase; this research outlines the significance of each variable in influencing consumers' attitudes to continue using the app. Venkatesh et al. (2003) and Venkatesh et al. (2012) conceptualised that the variables influencing initial adoption may be stronger, weaker or different from the variables influencing the continued usage of technology due to the experience gained from using a technological system. However, this research affirms the consistent importance of the m-commerce app being free from effort and providing content that is relevant in positively influencing customer attitudes towards the app at both the initial adoption phase through to the continued usage phase of the app.

Subsequent versions of TAM (i.e. TAM3) outline enjoyment as a motivational factor in adopting technology. Hsiao et al (2016) suggest that the level of enjoyment consumers' experience during use of a mobile app has the potential to influence customers' attitudes towards the app. The results indicate that the enjoyment an individual acquires from the m-commerce app is more influential on an individual's attitudes towards the app within the usage phase than at the initial adoption phase. Therefore, this finding affirms Davis's (1989) conceptualisation and Hong et al. (2006) position that particular variables may be stronger in

influencing customer attitudes towards technology following continued usage. Thus while enjoyment is still necessary during the initial interactions with the mobile app, the level of enjoyment becomes more important during continued use.

Moreover, subjective norm has been a consistent motivational factor for consumers in the adoption of technology. Subjective norm in this study refers to the consumers' perception of the expectations of important others (e.g. peers, parents, idols and professors) regarding the use of specific mobile apps. Extending on Venkatesh and Davis (2000) as well as Yang (2013), this research finds that subjective norm has a significant influence on shaping customers' attitudes regarding an m-commerce app in the initial adoption of the mobile app, however, following its continued usage, such influence does not shape customer attitudes towards a retailer's app. This finding is supported by Venkatesh et al. (2012) in that the opinions of important others may shape customer expectations influencing the initial adoption; however further actual customer experience becomes more important following continued use. Thus, subjective norm plays an important role during initial adoption of a retailer's app, but has no influence following continued usage.

Furthermore, mobile apps allow consumers and firms to personalise services or content to the individuals own needs. Thus, with the use of filtering and refinement tools within mobile apps and the ability to store personal details, customers are able to co-create their experience with the retailer. This research finds that during the initial adoption phase, customisation has a significant influence on shaping positive customer attitudes towards the mobile app. However, following the continued usage phase, customisation becomes more significant in influencing positive customer attitudes. Thus, as customers learn how to use the customisation tools within the mobile app and utilise the ability to store personal details over time, customers are likely to experience increased efficiency and reduced effort during use.

As a result, the perceived ease of use and perceived usefulness are consistent in influencing customer attitudes regarding a retailer's app at both the initial adoption and continuous usage phase, while the level of enjoyment and customisation of the app have a greater significant influence in shaping positive customer attitudes following the continued usage phase. In contrast, the influence of important others (subjective norm) is found to have a significant influence in shaping customer attitudes during initial adoption, yet no influence on customer attitudes towards the app following continued use. One explanation for this finding may be that some m-commerce apps may not be mainstream, and therefore not familiar to individuals, thus

requiring the opinions of others to convince them to try the app for the first time. Another explanation could be that, over time, personal experiences contribute to overall attitude towards an m-commerce app, which subsequently outweigh the opinions of others as personal familiarity and competency with the app has been established. Therefore, while important others are influential in the adoption process of the app, the customisation along with the intrinsic enjoyment of the app becomes more important in continuous use.

Moreover, the results affirm that, following the usage phase of the mobile app, positive attitudes towards the app have a greater influence on positive attitudes regarding the brand, increased loyalty towards the brand and higher purchase frequency in comparison to the early adoption phase of the retailer's mobile app. Thus, over time and following continued usage, customers develop more favourable attitudes and behaviours towards m-commerce apps. Accordingly, the findings assert the importance of mobile app retention and continuous usage in influencing important attitudinal and behavioural outcomes. Importantly, we find that positively perceived m-commerce apps not only serve as a tool for service delivery and distribution, as previously outlined, but as a strategy for developing positive attitudes in relation to the brand while also encouraging customer commitment and loyalty to the brand.

Bellman et al. (2011) suggested that the proliferation in the attractiveness of smartphone apps as a marketing tool is based on their high level of customer engagement and the presumable positive impact it has on consumer attitudes towards the brand. Drawing from the results of this study, we find that customers' positive attitudes towards the app, following the continued usage phase, has a positive influence on a customer's perceptions towards the brand. Mobile apps have been outlined as a useful channel for distribution of products, service delivery and communications; however, to our knowledge, this research is the first to illustrate the influence and importance of mobile app technology on individuals' attitudes towards the brand. Therefore, the competition for screen space on an individual's smartphone becomes more important as the continued usage of the app has a positive effect on the customer's attitudes towards the brand. Inherent to mobile apps is the 'always on' nature and the constant availability of services even on the go (Wang et al, 2015). This availability has been conceptualised as having a positive effect on consumers' perception of the brand, accordingly this research affirms the use of mobile apps on the go (see table 1) and such effects on the brand.

Following Kim and Adler's (2011) conceptualisation, our results assert that customers' positive attitudes towards an m-commerce app has a positive influence on their loyalty towards the brand, in which the influence becomes stronger over time. As such, through the positive perceptions and usage of an m-commerce app, brands can benefit from customers' developing loyalty to the brand. Therefore, in line with Ozturk et al. (2016), the commitment to retain a mobile app indicates loyalty to the brand. Furthermore, Evanschitzky et al. (2012) suggests that customer commitment is crucial to developing loyalty; therefore, m-commerce mobile apps provide a *tool* for brands to encourage customer commitment and, in turn, loyalty towards the brand. Brands seek strategies to create and maintain loyalty with customers to develop long-term mutually beneficial relationships (Pan et al, 2012) and m-commerce apps not only provide firms a further channel of distribution, communication and service delivery but also a means of developing customer loyalty, in turn benefiting from repeat purchase intentions, lower cost acquisition and word-of-mouth (Evanschitzky et al., 2012; Gandomi & Zolfaghari, 2013; Gurau, 2003).

Despite interest in m-commerce apps, few studies have specifically examined the financial outcomes of such technology. Kim et al. (2015) suggest that a branded mobile app has a positive effect on in-store purchase. Extending upon this, the results indicate that during the initial adoption phase of an m-commerce app, positive customer attitudes towards the app have no effect on purchase frequency through the m-commerce app. However, following the continued usage phase, positive attitudes towards the retailer's app results in an increase in the frequency of purchase through the app. Thus, while the TPB asserts that consumer attitudes influence purchase intentions, drawing on the above discussion, we find that customer attitudes towards the app only influence purchase frequency following a sustained period of app usage. Furthermore, in line with previous research (Bagozzi et al, 1979; Ostrom, 1969) the results outline relationships between positive perceptions of the brand as well as loyalty towards the brand on a customer's purchase frequency through the retailer's app. The results indicate that such relationships become stronger following the usage phase of the m-commerce app. Thus, in-line with the benefits of loyalty outlined by Evanschitzky et al. (2012), the increased loyalty to the brand and positive attitudes regarding the brand, influenced by positive attitudes towards app results in increased purchase frequency through the m-commerce app.

Furthermore, a characteristic of the smartphone is a smaller screen size in comparison to PCs and tablets. Despite such a limitation, smartphone devices are heralded for their portability, accessibility and convenience (Okazaki & Mendez, 2013, Wang et al., 2015). However,

previous research conceptualised that a smaller screen size may have a negative effect on shopping behaviour with mobile devices (Shanker et al., 2010). The findings from this study shed light on such conceptualisations with m-commerce apps in finding the level of enjoyment customers' experience in using the mobile app is more influential in shaping positive attitudes towards the app for large screen size users. Additionally, the findings outline that individuals using smartphone devices with a larger screen size have higher purchase frequency, more positive attitudes towards the brand and show more loyalty towards the brand following positive attitudes regarding the app. However, following the usage phase of the m-commerce app, those using smartphone devices with a smaller screen size do exert positive attitudes in relation to the brand, loyalty towards the brand and increased purchase frequency compared to initial adoption of the app. Although it should be noted that users of larger screen smartphone devices show a more significant effect on such attitude and behavioural outcomes of positive perceptions regarding the m-commerce smartphone app.

5.2. *Practical Implications*

This research presents numerous practical implications for m-commerce app providers, specifically apparel retailers. Our research affirms differences in the variables influencing customers' attitudes towards m-commerce apps during the initial adoption phase compared to the continued usage phase. Table 8 provides a summary of the results ordered by the level of importance for retailers at each phase.

>>> INSERT TABLE 8 HERE <<<

Retailers should note that enjoyment and the ability to customise content on the app becomes more important over time. Mobile apps provide retailers with the possibility of enabling customers to store personal details, obtain location specific content, save information and products to their own dashboard while using advanced filtering and refinement tools during browsing and search. Accordingly, as consumers learn to utilise such tools over time the customisation becomes even more important in influencing individuals to use the application, purchase through the application and develop loyalty towards the brand. Thus, it is important that apparel retailers continually develop functionality within their app that enables customers to customise their experience while enhancing the enjoyment from interacting with the app to encourage them to continue to use the app in the future. For example, retailers may consider virtual try-ons that enables high levels of customisation while developing arousal during the experience. Apparel retailers such as ASOS have recently introduced a search by image feature

which enables advanced customisation of content combining the real world environment and the virtual environment, in turn the customisation of such content may provide users with an enjoyable experience.

Moreover, the results affirm the importance of the ease of use and usefulness of the mobile application across both the initial adoption and the continuous usage phase. Accordingly, retailers must ensure that customers are able to complete tasks trouble-free and in a timely manner. Thus, retailers are encouraged to seek continuous feedback from customers' experiences through regular usability testing to ensure users of the app are able to shop in a productive, timely and trouble-free way.

The results also indicate the influence of important others (e.g. peers, parents, idols and professors) in persuading individuals' attitudes towards m-commerce apps during the initial adoption phase but not during the continued usage phase. Thus, to encourage the initial adoption of an m-commerce mobile application, brands should encourage and incentivise existing users to engage in positive word-of-mouth through digital channels such as social media, social messaging and email. For example, brands could provide a promotional offer when customers share a unique code with peers. Such a strategy has been highly successful for the ride service firm, Uber and the mobile banking app, Monzo. Additionally, brands could leverage social media platforms by providing social sharing links within the app to encourage word of mouth. Lastly, m-commerce app providers could utilise testimonials from idols, such as social media influencers and micro-influencers, who appeal to the target audience, and recommendations from peers within the target audience to influence consumers to adopt the mobile app and to develop favourable attitudes towards it.

Moreover, this research outlines the importance of positive attitudes towards the app resulting in favourable marketing outcomes during the continued usage phase. This research highlights to managers that over-time positive attitudes towards an m-commerce mobile application lead to favourable behavioural outcomes of positive brand attitudes, increased loyalty and purchase frequency. Thus, we illustrate the return on investing in an m-commerce app. While positive results may not be immediate, consumers become more loyal, have positive attitudes towards the brand and increase purchase frequency following continued usage of the app; as such, retailers ought to promote the key value proposition of the app, drawing on the usefulness of the app, the ease of use, the ability to customise and testimonials from peers to encourage consumers to download the brand's app.

Moreover, while retailers can benefit from m-commerce apps as a new service delivery and distribution channel, brands can also utilise them as a strategy for developing customer loyalty. Numerous brands employ varying strategies to encourage customer loyalty (Evanschitzky et al., 2012) such as loyalty programmes with large financial commitment. The initial adoption of a mobile application acts as a signal of commitment towards the brand. However, this research affirms that over time positive customer attitudes towards the app become even more influential on developing loyalty towards the brand. Positive attitudes towards the branded app not only increases customer loyalty but such loyalty positively increases customers' purchase frequency through the app, which again becomes greater over time. Thus, m-commerce apps that evoke positive attitudes during the continued usage phase through providing customers enjoyment in their experience, customisation tools and an app that enhances productivity while being easy to manipulate, will result in increased loyalty towards the brand.

The research highlights to retailers: an app that is free from exerting effort, provides useful content, enables customers to customise their experience to their own needs while providing enjoyment during use are essential in developing positive attitudes towards the app and subsequent outcomes of increased brand attitudes, loyalty and purchase frequency. Thus, as customer expectations continue to increase with continued exposure and use of mobile applications, retailers must continually advance their offering and seek perpetual feedback on the performance of their app to meet customers' evolving expectations in order to maintain positive customer attitudes towards the m-commerce app.

Lastly, a smaller screen size is key characteristic of a smartphone device. Managers should note that the findings of this research suggest that favourable attitudes and behaviours might be restrained due to customers using smaller screen smartphone devices (small screen = 4.6 inch and below) in comparison to those using larger screened devices (large screen = 4.7 inch and above). Thus, this may provide managers with an explanation on the fluctuation in sales through mobile devices. Managers are able to identify the type of device that was used to access their app through analytics programmes such as Google Analytics. Such understanding may shed light on interpreting the performance of the m-commerce app against key performance indicators.

6. Limitations and Future Research

The implications of this study are somewhat constrained by certain limitations, some of which guide the agenda for future research. Firstly, like most longitudinal research, our sample-size

reduced in the 2nd phase of data collection due to non-responsive participants, despite this we still achieved an appropriate sample size. Those respondents that did not respond to our second invitation in phase 2 may have deleted the app, hence not responding to our call. Future research should examine the variables that motivate consumers to delete mobile apps from their mobile device.

While our study took a longitudinal approach through collecting data at two different time periods, after one month of mobile app retention and following twelve months of mobile app retention, future research could explore attitudes and behaviours following six months of retention to provide three data points to further enhance the reliability of the findings. Such examination at these time points would help to narrow down the point in which consumer attitudes and behaviours become more favourable to app providers.

Additionally, we focussed specifically on apparel apps; while it may be rational to assume the findings would encompass other types of mobile commerce apps, future research could explore different categories of mobile commerce smartphone apps to offer a comprehensive understanding. Furthermore, we did not distinguish between hedonic and utilitarian use of the m-commerce app. Thus, future research could compare outcome attitudes and behaviours between each context of use. We also focussed on positive attitudes, given that attitudes can be both positive and negative we urge researchers to explore the impact of negative customer attitudes on brand image, purchase frequency and loyalty towards the brand. While we captured some demographic details as illustrated in table 2, future research should further explore the heterogeneity of consumers to identify if their different characteristics influence their attitudes and behaviours.

Additionally, we did not focus on a specific app or set of apps. While this research explored customisation as a general variable, future research could focus on a particular app or conduct a controlled experiment to assess the role of app specific customisation such as location based content, the use of the camera and push notifications on attitudes towards a retailer's app.

Regarding the inclusion of social influence, literature often examines the influence of consumers' important or significant others; however, social media literature has drawn attention to the role of opinion leaders and online reviews on the consumer decision-making process (e.g. Van Noort et al., 2012). As such, future research examining the role of social influence could extend this to include non-personal social connections, especially as app

reviews (through star ratings and reviewer comments) are made apparent to consumers upon downloading the app.

REFERENCES

AGAG, G. M., & EL-MASRY, A. A. (2016). Why Do Consumers Trust Online Travel Websites? Drivers and Outcomes of Consumer Trust Toward Online Travel Websites. *Journal of Travel Research, 56*(1)**,** 347-369.

ALNAWAS, I., & ABURUB, F. (2016). The effect of benefits generated from interacting with branded mobile apps on consumer satisfaction and purchase intentions. *Journal of Retailing and Consumer Services, 31*(1)**,** 313-322.

AJZEN, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior*. Berlin, Heidelber, New York: Springer-Verlag. pp. 11-39.

AJZEN, I. 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.

ANUAR, J., MUSA, M., & KHALID, K. (2014) Smartphone's Application Adoption Benefits using Mobile Hotel Reservation Systems among 3 to 5-star City Hotels in Malaysia, *Procedia Social and Behavioural Sciences.*

BAGOZZI, R. P., & BURNKRANT, R. E. (1979). Attitude Organization and the Attitude-Behavior Relationship. *Journal of Personality and Social Psychology, 37*(1), 913-923.

BALASUBRAMANIAN, S., PETERSON, R. A., & JARVENPAA, S. L. (2002). Exploring the Implications of M-commerce for Markets and Marketing. *Journal of the Academy of Marketing Science, 30*(4), 348–61.

BALDINGER, A. L., & RUBINSON, J. (1996). Brand Loyalty: The link between attitude and behavior, *Journal of Advertising Research*, Nov-Dec, 22+.

BAPTISTA, G., & OLIVEIRA, T. (2015). Understanding mobile banking: The unified theory of acceptance and use of technology combined with cultural moderators. *Computers in Human Behavior*, *50*(1), 418-430.

BAXENDALE, S., MACDONALD, E. K., & WILSON, H. N. (2015). The Impact of Different Touchpoints on Brand Consideration. *Journal of Retailing, 91*(1)**,** 235-253.

BELANCHE, D., CASALÓ, L. V., FLAVIÁN, C., & SCHEPERS, J. (2014). Trust transfer in the continued usage of public e-services. *Information & Management*, *51*(6), 627-640.

BELLMAN, S., POTTER, R.F., TRELEAVEN-HASSARD, S., ROBINSON, J.A., & VARAN, D. (2011) The Effectiveness of Branded Mobile Phone Apps, *Journal of Interactive Marketing*¸ *25*(1), 191-200.

BEJA, I., LANIR, J., & KUFLIK, T. (2015). Examining Factors Influencing the Disruptiveness of Notifications in a Mobile Museum Context. *Human–Computer Interaction, 30*(1)**,** 433-472.
BHATTACHERJEE, A. (2001) Understanding Information Systems Continuance: An Expectation-Confirmation Model, *MIS Quarterly*, 25, 351-370.
BRASEL, S. A., & GIPS, J. (2014). Tablets, touchscreens, and touchpads: How varying touch interfaces trigger psychological ownership and endowment. *Journal of Consumer Psychology, 24*(1)**,** 226-233.
BROWN, S. P., & STAYMAN, D. M. (1992) Antecedents and Consequences of Attitude Toward the Ad: A Meta-Analysis, *Journal of Consumer Research*, 19, 1, 34-51.
BYRNE, B. M. (2010). *Structural equation modeling with amos: Basic concepts, applications, and progamming,* Routledge, New York.

CHANG, K. C. (2013). How reputation creates loyalty in the restaurant sector. *International Journal of Contemporary Hospitality Management, 25*(4), 536-557.
CHAOUALI, W., SOUIDEN, N., & LADHARI, R. (2017). Explaining adoption of mobile banking with the theory of trying, general self-confidence, and cynicism. *Journal of Retailing and Consumer Services, 35*(1)**,** 57-67.
CHAUDHURI, A., & HOLBROOK, M. B. (2001). The chain effects from brand trust and brand affect to brand performance: The role of brand loyalty, *Journal of Marketing,* 65, 2, 81-93.
CHEN, Q., ZHANG, M., & ZHAO, X. (2017). Analysing customer behaviour in mobile app usage. *Industrial Management & Data Systems*, *117*(2), 425-438.
CHOUDRIE, J., JUNIOR, C.C., MCKENNA, B., & RICHTER, S. (2018) Understanding and conceptualising the adoption, use and diffusion of mobile banking in older adults: A research agenda and conceptual framework, *Journal of Business Research,* 88, 449-465.
CHEN, J. V., YEN, D. C., KUO, W.-R., & CAPISTRANO, E. P. S. (2016). The antecedents of purchase and re-purchase intentions of online auction consumers. *Computers in Human Behavior, 54*(1)**,** 186-196.
CHEN, Y.-Y. (2012). Why Do Consumers Go Internet Shopping Again? Understanding the Antecedents of Repurchase Intention. *Journal of Organizational Computing and Electronic Commerce, 22*(1)**,** 38-63.
CHEN, Y-F. (2014). See you on Facebook: exploring influences on Facebook continuous usage. *Behaviour and Information Technology, 33*(11), 1208-1218.
CHEUNG, G. W., & RENSVOLD, R. B. (2008). Evaluating Goodness of fit Indexes for Testing Measurement Invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(1), 233-255.
COMSCORE (2017) The 2017 US Mobile App Report. ComScore Online, Available from: https://www.comscore.com/Insights/Presentations-and-Whitepapers/2017/The-2017-US-Mobile-App-Report [Accessed 19/11/2017]

COOPER, R. B. & ZMUD, R. W. (1990) Information Technology Implementation Research: A Technological Diffusion Approach, *Management Science*, 36, 2, 123-139.

DAVIS, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results.* Massachusetts Institute of Technology.

DAVIS, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly, 13*(1), 319-340.

DAVIS, F. D., BAGOZZI, R. P. & WARSHAW, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science,* 35**,** 982-1003.

DINSMORE, J.B., SWANI, K., DUGAN, R.G. (2017) To free or not to free: Trait predictors of mobile app purchasing tendencies, *Psychology and Marketing,* 34,2, 227-244.

EVANSCHITZKY, H., RAMASESHAN, B., WOISETSCHLÄGER, D.M., RICHELSEN, V., BLUT, M., & BACKHAUS, C. (2012). Consequences of customer loyalty to the loyalty program and to the company. *Journal of the Academy of Marketing Science*, 40(5), 625-638.

FANG, Y.H. (2017) Beyond the usefulness of branded applications: Insights from consumer-brand engagement and self-construal perspectives, *Psychology and Marketing*, 34, 1, 40-58.

FANG, Y. H. (2018). An app a day keeps a customer connected: Explicating loyalty to brands and branded applications through the lens of affordance and service-dominant logic. *Information & Management (in press)*.

FISHBEIN, M., & AJZEN, I. (1975) Belief, attitude, intention, and behaviour. Reading, MA: Addison-Wesley.

FONG, L. H. N., LAM, L. W., & LAW, R. (2017). How locus of control shapes intention to reuse mobile apps for making hotel reservations: Evidence from Chinese consumers. *Tourism Management, 61*(1)**,** 331-342.

FORNELL, C., & D. F. LARCKER. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1)**,** 39-50.

FREY, R.M., XU, R., & ILIC, A. (2017). Mobile app adoption in different life stages: An empirical analysis. *Pervasive and Mobile Computing*, 40, 512-527.

GANDOMI, A., & ZOLFAGHARI, S. (2013). Profitability of loyalty reward programs: an analytical investigation. *Omega*, 41(4), 797-807.

GHOSE, A., GOLDFARB, A., HAN, S. P. (2013) How is mobile internet different? Search costs and local activities, *Information Systems Research*, 24, 3, 613-631.

GROß, M. (2016). Impediments to mobile shopping continued usage intention: A trust-risk-relationship. *Journal of Retailing and Consumer Services*, *33*(1), 109-119.

GUPTA, A., & ARORA, N. (2017). Understanding determinants and barriers of mobile shopping adoption using behavioral reasoning theory. *Journal of Retailing and Consumer Services, 36*(1)**,** 1-7.

GURAU, C. (2003). Tailoring e-service quality through CRM. *Managing Service Quality, 13*(6), 520-531.

HAIR, J. F. (2010). Multivariate Data Analysis, Prentice Hall.

HARRIS, M. A., BROOKSHIRE, R., & CHIN, A. G. (2016). Identifying factors influencing consumers' intent to install mobile applications. *International Journal of Information Management*, 36, 3, 441-450.

HONG, S. J., THONG, J., & TAM, K. Y. (2006). Understanding continued information technology usage behavior: a comparison of three models in the context of mobile internet. *Decision Support Systems, 42*(1), 1819–1834.

HOPP, T., & GANGADHARBATLA, H. (2016). Examination of the factors that influence the technological adoption intentions of tomorrow's new media producers: A longitudinal exploration. *Computers in Human Behavior*, *55*(1), 1117-1124.

HORN, J. L., & MCARDLE, J. J. (1992). A practical and theoretical guide to measurement invariance in aging research. *Experimental Aging Research, 18*(1),117–144.
HOWARD, J. A. & SHETH, J. N. (1969) The Theory of Buyer Behaviour, John Wiley & Sons, NY.
HOYER, W.D., CHANDY, R., DOROTIC, M., KRAFFT, M., & SINGH, S.S. (2010). Consumer co-creation in new product development. *Journal of Service Research*, 13 (3), 283-296.
HSIAO, C.-H., CHANG, J.-J., & TANG, K.-Y. (2016). Exploring the influential factors in continuance usage of mobile social Apps: Satisfaction, habit, and customer value perspectives. *Telematics and Informatics, 33*(1)**,** 342-355.
HSU, C. L., CHEN, M. C., & KUMAR, V. (2016) How social shopping retains customers? Capturing the essence of website quality and relationship quality, 29, 1-2, 161-184.
HU, L., & BENTLER, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.
HUANG, G.H., KORFIATIS, N., & CHANG, C.T. (2018) Mobile shopping cart abandonment: The roles of conflicts, ambivalence and hesitation, *Journal of Business Research*, 85, 165-174.
HUBERT, M., BLUT, M., BROCK, C., BACKHAUS, C., & EDERHARDT, T. (2017) Acceptance of smartphone-based mobile shopping: Mobile benefits, customer characteristics, perceived risks and the impact of application context, *Psychology and Marketing*, 34, 2, 175-194.
HULLAND, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies, *Strategic Management Journal, 20*(1), 195-204.
JAMES, J. (2013). The heart makes the mouse: Disney's approach to brand loyalty. *Journal of Brand Strategy, 2*(1), 16-20.
KANDAMPULLY, J., ZHANG, T., & BILGIHAN, A. (2015). Customer loyalty: a review and future directions with a special focus on the hospitality industry. *International Journal of Contemporary Hospitality Management, 27*(1)**,** 379-414.
KANG, J.-Y. M., MUN, J. M., & JOHNSON, K. K. P. (2015). In-store mobile usage: Downloading and usage intention toward mobile location-based retail apps. *Computers in Human Behavior, 46*(1)**,** 210-217.
KARIKARI, S., OSEI-FRIMPONG, K., & OWUSU-FRIMPONG, N., (2017). Evaluating individual level antecedents and consequences of social media use in Ghana. *Technological Forecasting and Social Change*, *123*(1), 68-79.
KIM, D., AND ADLER, H. (2011). Student's use of hotel mobile Apps: Their effect of brand loyalty. Retrieved from: http://scholarworks.umass.edu/cgi/viewcontent.cgi?article1⁄41242&context1⁄4gradconf_hospitality [Accessed 14 Nov 17].
KIM, C., MIRUSMONOV, M., & LEE, I. (2010). An empirical examination of factors influencing the intention to use mobile payment. *Computers in Human Behavior*, *26*(3), 310-322.
KIM, E., LIN, J.-S., & SUNG, Y. (2013). To App or Not to App: Engaging Consumers via Branded Mobile Apps. *Journal of Interactive Advertising, 13*(1)**,** 53-65.
KIM, J., FIORE, A. M., & LEE, H.-H. (2007). Influences of online store perception, shopping enjoyment, and shopping involvement on consumer patronage behavior towards an online retailer. *Journal of Retailing and Consumer Services, 14*(1)**,** 95-107.
KIM, K. J., & SUNDAR, S. S. (2016). Mobile persuasion: Can screen size and presentation mode make a difference to trust?. *Human Communication Research*, *42*(1), 45-70.

KIM, S. C., YOON, D., & HAN, E. K. (2014). Antecedents of mobile app usage among smartphone users. *Journal of Marketing Communications, 22*(1)**,** 653-670.
KIM, S. J., WANG, R. J.-H., & MALTHOUSE, E. C. (2015). The Effects of Adopting and Using a Brand's Mobile Application on Customers' Subsequent Purchase Behavior. *Journal of Interactive Marketing, 31*(1)**,** 28-41.
KAISER, H. F. (1970). A second generation little jiffy. *Psychometrika, 35*(1)**,** 401-415.
KO, E., KIM, E. Y., & LEE, E. K. (2009) Modeling consumer adoption of mobile shopping for fashion products in Korea. *Psychology &Marketing*, *26,* 7, 669-687.
LATHIA, N., PEJOVIC, V., RACHURI, K. K., MASCOLO, C., MUSOLESI, M., & RENTFROW, P. J. (2013). Smartphones for large-scale behavior change interventions. *IEEE Pervasive Computing*, *12*(3), 66-73.
LEE, C. H., & CRANGE, D. A. (2011). Personalisation - privacy paradox: The effects of personalisation and privacy assurance on customer responses to travel web sites, *Tourism Management, 32*(1), 987-994.
LINTON, H., & KWORTNIK, R. (2015). The mobile revolution is here: are you ready? *Cornell Hospitality Report*, *15*(6), 6-18.
LIU, Y., & LI, H. (2011) Exploring the impact of use context on mobile hedonic services adoption: An empirical study on mobile gaming in China. *Computers in Human Behavior*, *27,* 2, 890-898.
LIU, F., LI, J., MIZERSKI, D., & SOH, H. (2011) Self-congruity, brand attitude, and brand loyalty: a study on luxury brands. *European Journal of Marketing*, 46, 7/8, 922-937.
MAGRATH, V. & MCCORMICK, H. (2013). Marketing design elements of mobile retail apps. *Journal of Marketing and Management: An International Journal, 17*(1)**,** 115-134.
MARRIOTT, H. R., & WILLIAMS, M. D. (2018). Exploring consumers perceived risk and trust for mobile shopping: A theoretical framework and empirical study. *Journal of Retailing and Consumer Services*, *42*(1), 133-146.

MCLEAN, G., AL-NABHANI, K., & WILSON, A. (2018). Developing a Mobile Application Customer Experience Model (MACE) – Implications for retailers. *Journal of Business Research, 85*(1), 325-336.
MARTIN, J., MORTIMER, G., & ANDREWS, L. (2015). Re-examining online customer experience to include purchase frequency and perceived risk. *Journal of Retailing and Consumer Services,* 25(1), 81-95.
MUÑOZ-LEIVA, F., CLIMENT-CLIMENT, S., & LIÉBANA-CABANILLAS, F. (2017). Determinants of intention to use the mobile banking apps: An extension of the classic TAM model. *Spanish Journal of Marketing - ESIC, 21*(1)**,** 25-38.
NELSON (2016). Tops of 2016: Digital. Nelson Online, Available from: http://www.nielsen.com/us/en/insights/news/2016/tops-of-2016-digital.html [Accessed 25/09/17].
OLIVER, R. L. (1999) Whence consumer loyalty? *Journal of Marketing,* 63, 33-44
OSTROM, T. M. (1969). The Relationship Between the Affective, Behavioral, and Cognitive Components of Attitude. *Journal* of *Experimental Social Psychology, 5*(1), 12-30.
OKAZAKI, S., & MENDEZ, F. (2013). Perceived Ubiquity in Mobile Services. *Journal of Interactive Marketing,* 27(1), 98–111.
OZTURK, A. B., BILGIHAN, A., NUSAIR, K., & OKUMUS, F. (2016). What keeps the mobile hotel booking users loyal? Investigating the roles of self-efficacy, compatibility, perceived ease of use, and perceived convenience. *International Journal of Information Management, 36*(1)**,** 1350-1359.

PALLANT, J. (2013). SPSS Survival Manual: A step by step guide to data analysis, 5th Ed., Open University Press, New York.
PAN, Y., SHENG, S., & XIE, F. T. (2012). Antecedents of customer loyalty: an empirical synthesis and re-examination. *Journal of Retailing and Consumer Services, 19*(1), 150–158.
PINDEH, N., SUKI, N. M., & SUKI, N. M. (2016). User Acceptance on Mobile Apps as an Effective Medium to Learn Kadazandusun Language. *Procedia Economics and Finance, 37*(1)**,** 372-378.
PLOYHART, R. E. & VANDENBERG, R. J. (2009) Longitudinal Research: The Theory, Design and Analysis of Change, *Journal of Management*, 36, 1.
PODSAKOFF, P. M., MACKENZIE, S. B., LEE, J. Y., & PODSAKOFF, N. P. (2003). Common Method Biases in Behavioural Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology, 88*(5), 879-903.
POUSTTCHI, K., TILSON, D., LYYTINEN, K., & HUFENBACH, Y. (2015). Introduction to the Special Issue on Mobile Commerce: Mobile Commerce Research Yesterday, Today, Tomorrow—What Remains to Be Done? *International Journal of Electronic Commerce, 19*(1)**,** 1-20.
PURCELL, K., ENTNER, R., & HENDERSON, N. (2010), "The Rise of Apps Culture," Pew Internet and American Life Project, September 14, http://www.pewinternet.org/Reports/2010/The-Rise-of-Apps-Culture.aspx.
RANAWEERA, C., & JAYAWARDHENA, C. (2014). Talk up or criticize? Customer responses to WOM about competitors during social interactions. *Journal of Business Research, 67*(1), 2645-2656
RODGERS, E. M. (2004) A porspective and retrospective look at the diffusion model, *Journal of Health Communication*, 9, 1, 13-19.
ROSE, S., CLARK, M., SAMOUEL, P. & HAIR, N. (2012). Online Customer Experience in e-Retailing: An empirical model of Antecedents and Outcomes, *Journal of Retailing*, *88*(1), 308-322.
RUBINSON, J., & ALAN, L. (1996) Brand Loyalty: The link between Attitude and Behavior, *Journal of Advertising Research*, 36, 6.
SALEHAN, M., & NEGAHBAN, A. (2013). Social networking on smartphones: When mobile phones become addictive. *Computers in Human Behavior*, *29*(6), 2632-2639.
SAWHNEY, M., VERONA, G. AND PRANDELLI, E. (2005). Collaborating to create: the Internet as a platform for customer engagement in product innovation. *Journal of Interactive Marketing*, *19*(4), 4-17.
SHANG, D., & WU, W. (2017). Understanding mobile shopping consumers' continuance intention. *Industrial Management & Data Systems, 117*(1)**,** 213-227.
SHANKER, V., & MALTHOUSE, E. C. (2007). The Growth of Interactions and Dialogs in Interactive Marketing. *Journal of Interactive Marketing, 21*(2), 2–4.
SHANKAR, V. (2016). Mobile Marketing: The Way Forward. *Journal of Interactive Marketing, 34*(1)**,** 1-2.
SHANKAR, V., KLEIJNEN, M., RAMANATHAN, S., RIZLEY, R., HOLLAND, S. & MORRISSEY, S. (2016). Mobile Shopper Marketing: Key Issues, Current Insights, and Future Research Avenues. *Journal of Interactive Marketing, 34*(1)**,** 37-48.
SHANKAR, V., VENKATESH, A., HOFACKER, C. & NAIK, P. (2010). Mobile Marketing in the Retailing Environment: Current Insights and Future Research Avenues. *Journal of Interactive Marketing, 24*(1)**,** 111-120.
SHEN, G. C. C. (2015). Users' adoption of mobile applications: Product type and message framing's moderating effect. *Journal of Business Research*, 68, 11, 2317-2321.

SHIAU, W. L., & LOU, M. M. (2012). Factors affecting online group buying intention and satisfaction: A social exchange theory perspective. *Computers in Human Behavior*, 28, 2431–2444

SO, K.K.F., KING, C., SPARKS, B.A. AND WANG, Y. (2013) The influence of customer brand identification on hotel brand evaluation and loyalty development, *International Journal of Hospitality Management*, 34, 31-41.

SONG, J. H., AND ZINKHAN, G. M. (2008) Determinants of perceived website interactivity, *Journal of Marketing*, 72, March, 99-113

SPEARS, N., & SINGH, S. N. 2004. Measuring Attitude toward the Brand and Purchase Intentions. *Journal of Current Issues & Research in Advertising, 26*(1)**,** 53-66.

SUNDAR, S. S., & XU, Q., BELLUR, S. (2010) Modality is the message: interactivity effects on perception and engagement, *Proceedings of the 28th International Conference on Human Factors in Computing Systems*.

TAM, K. Y. AND HO, S. Y. (2005). Web personalization as a persuasion strategy: An elaboration likelihood model perspective. *Information Systems Research, 16*(3), 271 – 291.

TANG, D., YANG, Y., YAN, Y., & ZHOU, M. (2016). What determines online consumers to migrate from PCs to mobile devices?-An empirical approach on consumers' internet cross-channel behaviours. *International Journal of Services Technology and Management*, *22*(1/2), 46-62.

TOUFAILY, E., RICARD, L., & PERRIEN, J. (2013). Customer loyalty to a commercial website: descriptive meta-analysis of the empirical literature and proposal of an integrative model. *Journal of Business Research, 66*(9), 1436-1447.

VANDENBERG, R. J., & LANCE, C. E. 2000. A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*(1), 4–70.

VENKATESH, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, *11*(1), 342-365.

VENKATESH, V. & BALA, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. Decision Sciences, 39, 273-315.

VENKATESH, V., & DAVIS, F. D. (2000). A theoretical extension of the Technology Acceptance Model: Four Longitudinal Field Studies, *Management Science*, 46, 2, 186-204.

VENKATESH, V., MORRIS, M. G., DAVIS, G. B. & DAVIS, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27, 425-478.

VENKATESH, V., THONG, J. Y., & XU, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology, *MIS Quarterly*, *36*(1), 157-178.

VERISSIMO, J.M.C. (2018) Usage intensity of mobile medical apps: A tale of two methods, *Journal of Business Research*, 89, 442-447.

WANG, R. J.-H., MALTHOUSE, E. C., & KRISHNAMURTHI, L. (2015). On the Go: How Mobile Shopping Affects Customer Purchase Behavior. *Journal of Retailing, 91*(1)**,** 217-234.

WANG, Y., YUAN, Y., TUREL, O., & TU, Z. (2015). Understanding the Development and Diffusion of Mobile Commerce Technologies in China: A Biographical Study with an Actor-Network Theory Perspective. *International Journal of Electronic Commerce, 19*(1)**,** 47-76.

WIRTZ, J., AMBTMAN, A. DEN, BLOEMER, J., HORVÁTH, C., RAMASESHAN, B., KLUNDERT, J. VAN DE, CANLI, Z.G., & KANDAMPULLY, J. (2013). Managing brands and customer engagement in online brand communities. *Journal of Service Management*, *24*(3), 223-244.

WU, L. L., WANG, Y. T., WEI, C. H., AND YEH, M. Y. (2013) How interactivity works for utilitarian and hedonic customers online. 46th Hawaii International conference on Systems Science. DOI 10.1109/HICSS.2013.249

XANTHOPOULOU, D., BAKKER, A. B., DOLLARD, M. F., DEMEROUTI, E., SCHAUFELI, W. B., TARIS, T. W., & SCHREURS, P. J. (2007). When do job demands particularly predict burnout? The moderating role of job resources. *Journal of managerial psychology*, *22*(8), 766-786.

YANG, H. (2013). Bon appetit for apps: Young American consumers' acceptance of mobile applications. *The Journal of Computer Information Systems*, 53, 3, 85.

YU, N. AND KONG, J. (2016). User experience with web browsing on small screens: Experimental investigations of mobile-page interface design and homepage design for news websites. *Information Sciences*, *330*, pp.427-443.

ZHANG, R., CHEN, J. Q., & LEE, C. J. (2013). Mobile commerce and consumer privacy concerns. *Journal of Computer Information Systems*, *53*(4), 31-38.

ZEITHAML, V. A., & BERRY, L. L. (1996). The behavioral consequences of service quality. *Journal of Marketing, 60*(1), 31-46.

Figure 1 Hypothesised Model

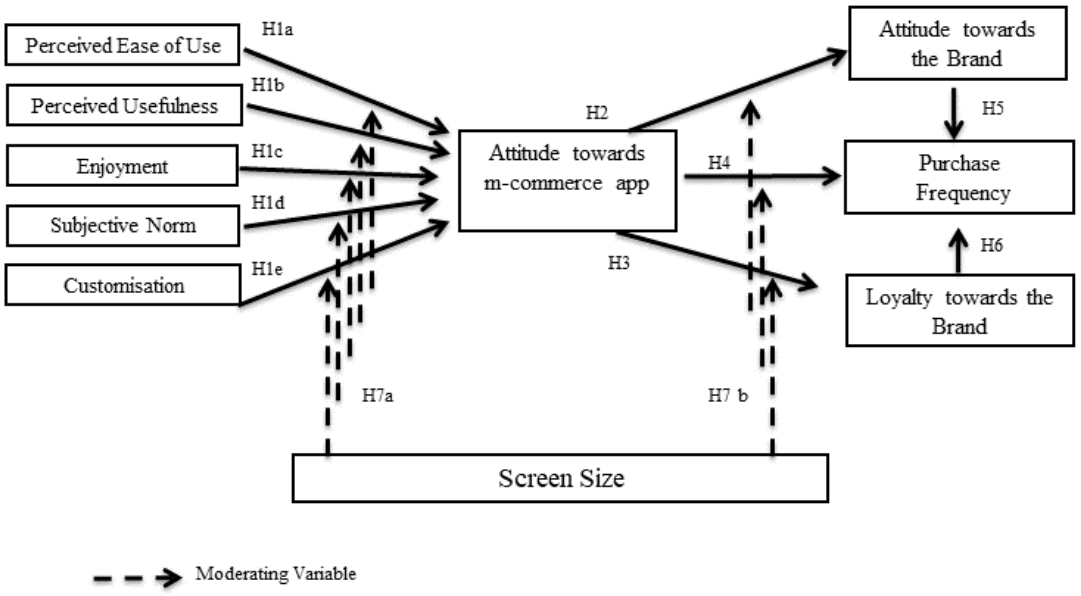

Table 1: Stream of research on adoption and use of Mobile Applications

Reference	Topic	Research type	Sample Size	Antecedents	Moderators	Outcome	Stage of App Use	Key Findings
This study	Attitudes towards retailers' m-commerce apps at initial adoption and during continuous use	Empirical longitudinal survey design	474 consumer sample at each phase of the research	Ease of Use, Usefulness, Enjoyment, Subjective Norms, Customisation	Screen Size	Actual Behaviours	Comparison between Initial Adoption and Continuous Use	This research enabled direct comparisons on attitudes and actual behaviours towards retailers' m-commerce mobile applications between consumers' initial adoption and continuous use. The findings suggest key differences between each phase, for example, the results show that the strength of the variables influencing customer attitudes vary in the initial adoption phase compared to the usage phase (e.g. enjoyment and customisation become stronger over time). This research also finds that subjective norms are significant in shaping customer attitudes towards the app at the initial adoption phase but not significant at the usage phase. Perceived ease of use and perceived usefulness are consistent in influencing attitudes at both phases. The results indicate that attitudes towards the app do not influence purchase frequency or attitudes towards the brand at the initial adoption phase but change over time and thus have a significant positive influence in the usage phase. Additionally, the influence of customer attitudes towards the app is stronger in the usage phase in comparison to the initial adoption phase on loyalty towards the brand.
Alnawas and Aburub (2016)	Customer Satisfaction and Purchase Intention with mobile apps	Empirical cross-sectional survey design	358 consumer sample	Learning benefits, hedonic benefits, personal benefits, social benefits	N/A	Behavioural Intentions	Initial Adoption	Deployed in a middle eastern country, this study takes a uses and gratifications theory approach and finds that learning benefits and hedonic benefits influence satisfaction and purchase intentions, while personal benefits influence satisfaction at the initial adoption of branded mobile apps, all other relationships are not significant. The study does not focus on any particular industry.
Anuar et al (2014)	Benefits of Mobile Apps	Exploratory Empirical qualitative interviews	12 executive interviews	N/A	N/A	Convenient, Access, Design	N/A	Following exploratory interviews the study identified possible core benefits that mobile hotel reservation apps should offer consumers including, convenient access, ability to modify bookings, native design and simple navigation.

Baptista and Oliveira (2015)	Behavioural Intentions to use mobile apps	Empirical cross-sectional survey design	252 consumer sample	UTAUT: Performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivations, price value, habit	Individualism, uncertainty avoidance, long/short term, masculinity/ femininity, power distance.	Behavioural Intentions and use	Initial Adoption	This study applied the established UTAUT2 and established cultural dimensions to assess the intention to use mobile banking apps in Africa. Effort expectancy (usefulness), hedonic motivations, price value and habit influence intentions to use the app. All cultural dimensions and behavioural intentions influence use behaviour with exception of masculinity/femininity.
Bellman et al (2011)	Brand Attitude and Purchase Intention with mobile apps	Empirical pre-test, post-test experiment design	228 consumer sample	Mobile App Use	Gender	Attitude and Behavioural Intention	Initial Adoption	Through an experimental design the results indicate that apps have a positive influence on increasing interest in the brand and the products sold by the brand
Dinsmore et al (2017)	Mobile app payment	Empirical cross-sectional survey design	275 student sample	Impulsivity, Bargain Proneness, Frugality	N/A	Actual Behaviours and Behavioural Intentions	Initial Adoption	This study focuses on the role of personality traits on influencing the purchase of mobile applications and in-app purchases. No specific types of app were selected. The study found that the trait, 'bargain proneness' positively influenced mobile app payment and in-app purchase while 'frugality' was negatively related to both.
Fang (2017)	Consumer Brand engagement with mobile apps	Empirical cross-sectional survey design	637 consumer sample	Interactivity, social presence, ubiquity, localization, perceived usefulness, perceived ease of use	Interdependent self-construal	Behavioural Intentions	Continuous Use	This study assesses continuous usage intention of branded mobile apps across a range of industries. The research finds the positive influence of utilitarian variables and consumer brand engagement on consumer intentions towards using the app and repurchasing from the brand in the future.
Fang (2018)	Mobile App Value in Use	Empirical cross-sectional survey design	634 consumer sample	Visibility, Persistence, Interactivity, Association, Selectivity, personalization, experience, relationship	N/A	Behavioural Intentions	Continuous Use	Focusing on apps from a variety of industries, this study finds a positive influence of value in use on continuous usage intention and brand loyalty intentions.
Fong et al (2017)	Perceptions of Mobile Applications	Empirical cross-sectional survey design	457 consumer sample	Locus of Control: Internal Control, Chance Control, Control by Powerful	N/A	Behavioural Intentions	Continuous Use	Conducted on consumers in China, this research examines the variables influencing the intention to reuse online travel agents booking applications. This research finds that lotus of control variables influence UTAUT

				others, UTAUT: Performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk				variables. Accordingly, performance expectancy, effort expectancy, social influence, facilitating conditions influence intention to reuse the travel booking app, whilst perceived risk negative effects intention to reuse.
Frey et al (2017)	Life Stage influence on mobile app use	Empirical experimental design	1435 consumer sample	Current Life Stage, Personality, Demographics	N/A	Predicted Number of downloaded mobile applications	N/A	This research conducted an experiment to predict the number of apps individuals retain on their mobile device dependent on their current life stage. The results pertain that current life style stage has an influence on the apps individuals adopt. The study illustrates new means to segment customers and build data-driven customer personas.
Harris et al (2016)	Pre-adoption of mobile apps	Empirical cross-sectional survey design	128 student sample	Perceived Benefit, Trust, Perceived Risk	N/A	Behavioural Intention	Prior to Adoption	This research examines the factors influencing consumers to install a mobile application prior to initial adoption. The research was not confined to a specific type of mobile application. Trust, perceived risk and perceived benefit all influence the intention to install a mobile application.
Hsiao et al (2016)	Continuous usage of mobile apps	Empirical cross-sectional survey design	378 Student Sample	Perceived usefulness, perceived enjoyment, social ties, habit, satisfaction	N/A	Behavioural Intention	Continuous Use	Conducted in the far east, this research examines the influence of perceived usefulness, perceived enjoyment, social ties, habit, satisfaction on the intention of continuing to use social media applications. All variables have an influence on continuous usage intention with exception of perceived usefulness.
Jeon et al (2019)	Determinants of intentions to use mobile apps	Empirical cross-sectional study design	369 consumer sample	UTAUT: Performance expectancy, effort expectancy, social influence, facilitating conditions, customer innovativeness, customer involvement, perceived trust	N/A	Behavioural Intentions	Initial Adoption	This research examined the UTAUT variables and perceived trust on consumers' intention to use mobile apps for flight bookings. The findings illustrate that Performance expectancy, facilitating conditions, customer innovativeness and perceived trust all influence intentions to use the flight booking app.
Kang et al (2015)	Download and Usage intention of	Empirical cross-sectional survey design	undisclosed	Time convenience, interactivity, compatibility, effort	Experiential Orientation	Behavioural Intention	Prior/Initial Adoption	This research examined cognitive and affective components on the intention to download retailers' mobile apps. The results indicated that perceived

	retail mobile apps			expectancy, affective involvement and cognitive involvement				interactivity and compatibility influenced affective involvement, which subsequently influenced intention to download. In contrast cognitive involvement did not influence the intention to download a retailer's mobile application.
Kim et al (2013)	Engaging consumers via mobile apps	Exploratory Content Analysis	106 branded apps	N/A	N/A	Engagement attributes: vividness, novelty, motivation, control, customisation, feedback and entertainment	N/A	This study conducted a content analysis of 106 branded mobile apps of the top 100 brands to identify the techniques used to encourage consumers to engage with branded mobile apps.
Kim et al (2014)	Attitude towards app use	Empirical cross-sectional survey design	257 Student Sample	Perceived informative usefulness, perceived entertaining usefulness, perceived social usefulness, perceived ease of use, user review and perceived cost effectiveness	N/A	Behavioural Intention	Initial Adoption	This study finds that perceived informative usefulness, perceived entertaining usefulness and perceived ease of use influence attitudes towards the app. Subsequently the results pertain that attitudes towards the app influence intention to use the app while social influence in the form of user reviews has a positive effect on intention to use the app. The study was not focused on any specific type of app.
Kim et al (2015)	Mobile application use and its impact on spending	Empirical experimental design	10,776 app adopters dataset	Interactive features, repeated use, discontinuing use	N/A	Actual Behaviours	N/A	Through the use of a coalition loyalty programme dataset (Air Miles Reward Program), this research compares the spending levels of app adopters with non-app adopters to identify if exposure and use of a branded app encourages higher spend. The results find that while spending doesn't increase, spending falls should customers stop using the app.
Magrath and McCormick (2013)	Mobile App Design	Conceptual paper	N/A	Multimedia viewing, informative content, product promotion, consumer-led interactions	N/A	Design	Initial Adoption	This conceptual paper conducts a literature review drawing on online and mobile design elements to develop a holistic framework for mobile app design.

McLean et al (2018)	Mobile application customer experience model	Empirical cross-sectional survey design	1024 consumer sample	Customisation, convenience, ease of use, enjoyment, timeliness, satisfaction, emotions	Gender	Experience	Continuous Use	Based on high street retailer's apps, this research develops a mobile application customer experience model. The research finds utilitarian variables, comprising ease of use, convenience and customisation influence enjoyment and timeliness. The utilitarian variables, enjoyment and timeliness subsequently influence the customer experience.
Muñoz-Leiva et al (2017)	Intention to adopt mobile banking apps	Empirical cross-sectional survey design	103 consumers of online banking	Perceived ease of use, perceived usefulness, social image, attitude, perceived trust, perceived risk	N/A	Behavioural Intentions	Initial Adoption	This research extends the original TAM model to include perceived trust and perceived risk to assess the variables influence on the intention towards using a mobile banking app. Perceived ease of use, perceived usefulness, social image and perceived trust all influence attitude. Perceived usefulness and perceived risk do not appear to influence intention to use the app.
Shen (2015)	Attitude towards mobile applications	Empirical experimental design	Study 1 - 234 student sample; Study 2 – 242 student sample	Attitudes, perceived usefulness	App type (hedonic/utilitarian), Regulatory focus, positive mood, message framing, perceived risk	Behavioural Intentions	Initial Adoption	This paper investigates individuals' behavioural intentions to use mobile applications. The results outline that app type (utilitarian or hedonic but not specific industry) and perceived risk moderate reputation sources influence on attitudes towards using the app, while message framing moderates the effect of app type on the usefulness of the app.
Verissimo (2018)	Usage intensity of medical mobile applications	Empirical cross-sectional survey design and fuzzey-set comparative analysis	199 professional medical respondents	Perceived ease of use, perceived usefulness, peer influence, seniority, age, gender	N/A	Actual Behaviour	Continuous Use	This paper investigates the variables influencing medical professionals' use of medical mobile applications. The findings reveal that high usage intensity is explained by the ease of use and usefulness of the app. Low usage is associated with low peer influence, high seniority and gender.
Yang (2013)	Young consumers' attitudes towards mobile applications	Empirical cross-sectional survey design	555 student sample	Perceived ease of use, perceived usefulness, subjective norm, enjoyment, control, perceived expressiveness	N/A	Behavioural Intention	Initial Adoption	This research focused on young American (18-35) consumers' adoption of mobile applications. No specific type of mobile application was defined. The results present that perceived enjoyment, usefulness, ease of use and subjective norms influence attitudes towards apps, while intention to use is influenced by attitudes, control, usefulness and mobile internet use.

Table 2 Sample Characteristics

Respondent Characteristics	**Frequency (n)**	**%**		
Gender				
Male	203	43		
Female	271	57		
Age (in years)				
18 – 25	110	23		
26 – 35	169	36		
36 – 45	127	27		
46 – 54	61	13		
55 – 65	7	1		
Education				
Senior High School	165	35		
College Graduate (FE)	120	25		
University Graduate (HE)	174	37		
No Qualifications	15	3		
Frequency of Mobile App Use	**Time 1 (n)**	**%**	**Time 2 (n)**	**%**
Multiple times daily	32	7	59	12
Once daily	99	21	121	26
Multiple times weekly	150	32	195	41
Once weekly	181	38	76	16
At least once a month	12	2	23	5
Confidence in Using Mobile Apps				
Extremely confident	82	17	116	24
Confident	235	50	286	60
Somewhat confident	142	30	65	14
Not confident	15	3	7	1
Extremely not confident	0	0	0	0
Main Purpose of M-Commerce App Use				
Browsing	177	37	159	34
Information Search	91	19	33	7
Order Management	32	7	24	5
Keeping up to date on offers	137	29	201	42
Purchasing products	37	8	57	12
Where App is Mostly Used				
At Home	177	37	182	38
On Transport (on the go)	261	55	264	56
At Work	36	8	28	6

Table 3 Measurement Scales

Variable	Scale Reference	Adapted Scale	Cronbach's Alpha
Perceived Ease of Use	Adapted from: Davis (1989)	• Learning to use the app is easy for me • I find it easy to get the app to do what I want it to do • My interaction with the app is clear and understandable • I find the app to be flexible to interact with • It is easy for me to become skilful at using the app • I find the app easy to use	.833
Perceived Usefulness	Adapted from: Davis (1989)	• Using the app enables me to accomplish shopping tasks more quickly. • Using the app enhances my shopping performance. • Using the app increases my shopping productivity. • Using the app enhances my shopping effectiveness. • Using the app would make it easier to shop. • I find the app to be useful.	.847
Enjoyment	Adapted from: Davis et al (1992)	• I find using the app to be enjoyable • The actual process of using the app is pleasant • I have fun using the app	.859
Customisation	Adapted from: Rose et al (2012)	• It feels like the app is talking personally to me as a customer • It is important to me that the app feels like my personal area when I use it • The ability to log into the app makes me feel recognised as a customer • The content in the app is specific to my needs	.812
Subjective Norm	Adapted from: Yang (2013)	• People important to me think I should use the mobile application • It is expected that people like me use the mobile application • People I look up to expect me to use the mobile application	.824
Attitudes towards the app	Adapted from: Kim et al (2014)	• Overall, I find using the brand's mobile app positive • Overall, I feel favourable toward the brand's mobile app • Overall, I am satisfied with the mobile app provided by the brand • Using the app is a good idea • Using the app is a wise idea	.844
Attitudes towards the brand	Adapted from: Spears and Singh (2004)	• Unappealing/Appealing • Bad/Good • Unpleasant/Pleasant • Unfavourable/Favourable	.837

		• Unlikeable/Likeable	
Purchase frequency	New Scale Developed	• I often purchase from the brand through the mobile application • I regularly make purchases from the brand through the mobile application • I frequently purchase from the brand through the mobile application	.879
Loyalty towards the brand	Adapted from: Zeithaml and Berry (1996)	• I encourage friends and relatives to shop with the brand • I say positive things about the brand to other people • I intend to shop with the brand in the next few years • I would recommend the brand to someone who seeks my advice	.861

Table 4 Discriminant and Convergent Validity

	CR	AVE	MSV	PU	PEU	SN	ENJ	CUS	ATA	ATB	PF	LTB
Perceived Usefulness (PU)	0.833	0.659	0.522	**0.811**								
Perceived Ease of Use (PEU)	0.847	0.684	0.516	0.413	**0.827**							
Subjective Norm (SN)	0.824	0.711	0.494	0.232	0.197	**0.843**						
Enjoyment (ENJ)	0.859	0.633	0.488	0.277	0.234	0.232	**0.795**					
Customisation (CUS)	0.812	0.709	0.561	0.348	0.341	0.188	0.384	**0.842**				
Attitudes Towards the app (ATA)	0.844	0.732	0.531	0.219	0.191	0.304	0.274	0.238	**0.855**			
Attitudes Towards Brand (ATB)	0.837	0.694	0.573	0.207	0.201	0.241	0.303	0.173	0.213	**0.833**		
Purchase Frequency (PF)	0.879	0.684	0.546	0.235	0.211	0.216	0.247	0.164	0.194	0.224	**0.827**	
Loyalty Towards Brand (LTB)	0.861	0.665	0.397	0.311	0.274	0.313	0.195	0.208	0.303	0.208	0.191	**0.815**

CR - Construct Reliability; AVE – Average Variance Extracted; MSV - Maximum Shared Variance

Table 5 SEM Results

Hypotheses				**Time 1 Adoption Phase** Standardised Estimate β	t	R^2	**Time 2 Usage Phase** Standardised Estimate	t	R^2
H1a	PEU	→	ATA	.479***	5.12	.53	.489***	5.22	.54
H1b	PU	→	ATA	.456***	4.89	.53	.477***	5.03	.54
H1c	ENJ	→	ATA	.319**	2.26	.53	.511***	4.77	.54
H1d	SN	→	ATA	.648***	5.68	.53	.258 ns	1.91	.54
H1e	CUS	→	ATA	.321**	2.37	.53	.541***	6.10	.54
H2	ATA	→	ATB	.213 ns	1.86	.04	.681**	3.39	.46
H3	ATA	→	LTB	.337**	2.23	.11	.699***	7.24	.49
H4	ATA	→	PF	.269 ns	1.93	.17	.581**	2.57	.49
H5	ATB	→	PF	.338**	2.21	.17	.491**	2.33	.49
H6	LTB	→	PF	.411**	2.45	.17	.703***	7.32	.49

(***$\rho < 0.001$, **$\rho < 0.05$, ns = not significant)

(PEU = Perceived Ease of Use, PU = Perceived Usefulness, SN = Subjective Norm, ENJ = Enjoyment, CUS = Customisation, ATA = Attitude towards the App, ATB = Attitude towards the Brand, LTB = Loyalty towards the Brand, PF = Purchase Frequency, S.E = Standard Error, p = Statistical Significance, R^2 = Coefficient of Determination)

Table 6 Multi-group Analysis (Adoption Phase Time 1 and Usage Phase Time 2)

Relationship (Hypotheses)	**Time 1 (Adoption Phase) (β, R^2)**	**Time 2 (Usage Phase) (β, R^2)**	**Time1-Time2 *p* value**
(H1a) PEU → ATA	β =.479 ***, R^2 = .53	β =.489 ***, R^2 = .53	p = .113
(H1b) PU → ATA	β =.456 ***, R^2 = .53	β =.477 ***, R^2 = .53	p = .142
(H1c) ENJ → ATA	β =.319 **, R^2 = .53	β =.511 ***, R^2 = .53	p = .019
(H1d) SN → ATA	β =.648 ***, R^2 = .53	β =.258 ns, R^2 = .53	p < .001
(H1e) CUS → ATA	β =.321 **, R^2 = .53	.β =.541 ***, R^2 = .53	p < .001
(H2) ATA→ATB	β =.213 ns, R^2 = .045	β =.681 ***, R^2 = .46	p = .016
(H3) ATA→LTB	β =.337 **, R^2 = .11	β =.699 ***, R^2 = .49	p = .030
(H4) ATA→PF	β =.269 ns, R^2 = .17	β =.581 **, R^2 = .48	p = .021
(H5) ATB→PF	β =.338 **, R^2 = .17	β =.491 **, R^2 = .48	p = .061
(H6) LTB→PF	β =.411***, R^2 = .17	β =.703 **, R^2 = .48	p = .037

(***ρ < 0 .001, **ρ < 0 .05, ns = not significant*)

(PEU = Perceived Ease of Use, PU = Perceived Usefulness, SN = Subjective Norm, ENJ = Enjoyment, CUS = Customisation, ATA = Attitude towards App, ATB = Attitude towards the Brand, LTB = Loyalty towards Brand, PF = Purchase Frequency, β = Standardised Regression Coefficient, p = Statistical Significance, R^2 = Coefficient of Determination)

Table 7 Multi-group Analysis Screen Size

Relationship (Hypotheses)	Small Screen Size	Large Screen Size	Screen Size Difference *p* value
Time 1 (Adoption Phase)			
(H7a) PEU→ATA	β =.481 ***	β =.473 ***	p = .218
(H7a) PU→ATA	β =.477 ***	β =.471 ***	p = .173
(H7a) ENJ→ATA	β =.244 **	β =.289 **	p = .111
(H7a) SN→ATA	β =.642 ***	β =.650 ***	P = .237
(H7a) CUS→ATA	β =.302 **	β =.316 **	p = .194
(H7b) ATA→ATB	β =.177ns	β =.202 ns	p = .067
(H7b) ATA→LTB	β =.303**	β =.343 **	p = .072
(H7b) ATA→PF	β =.139ns	β =.288 ns	p = .047
Time 2 (Usage Phase)			
(H7a) PEU→ATA	β =.496 ***	β =.469 ***	p = .134
(H7a) PU→ATA	β =.501 ***	β =.497 ***	p = .119
(H7a) ENJ→ATA	β =.275 **	β =.556 ***	p = .039
(H7a) SN→ATA	β =.233ns	β =.221 ns	p = .228
(H7a) CUS→ATA	β =.532 ***	β =.549 ***	p = .114
(H7b) ATA→ATB	β =.432**	β =.701 **	p = .036
(H7b) ATA→LTB	β =.388 **	β =.703 ***	p = .031
(H7b) ATA→PF	β =.277 ns	β =.614 **	p = .021

(***$\rho < 0.001$, **$\rho < 0.05$, ns = not significant*)

(PEU = Perceived Ease of Use, PU = Perceived Usefulness, SN = Subjective Norm, ENJ = Enjoyment, CUS = Customisation, ATA = Attitude towards App, ATB = Attitude towards the Brand, LTB = Loyalty towards Brand, PF = Purchase Frequency, β = Standardised Regression Coefficient, p = Statistical Significance)

Table 8 Summary of results - ordered by level of importance

Adoption Phase *Influence on Attitudes towards the app*	**Usage Phase** *Influence on Attitudes towards the app*	**Adoption Phase** *Attitudes towards the app influence on outcomes*	**Usage Phase** *Attitudes towards the app influence on outcomes*
1) Social Influence of important others (Subjective Norms)	1) Customisation	1) Loyalty towards the brand	1) Loyalty towards the brand
2) Perceived Ease of Use	2) Enjoyment		2) Attitude towards the brand
3) Perceived Usefulness	3) Perceived Ease of Use		3) Purchase Frequency
4) Customisation	4) Perceived Usefulness		
5) Enjoyment			