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Examining the determents and outcomes of mobile app engagement- a longitudinal perspective

ABSTRACT

Through undertaking a longitudinal study with 474 consumers over a 12-month period and conducting structural equation modelling, this research provides insight on the determinants and outcomes of consumer engagement with a retailer's m-commerce application. Critical outcomes of positive attitudes towards the brand and loyalty towards the brand derive from consumer engagement with a retailer's m-commerce app. Drawing upon the TAM, TTF and SDT, the research established perceived ease of use, perceived usefulness, convenience and enjoyment influencing engagement with an m-commerce application, while customisation of the app has an enhancing influence on engagement. The findings assert that utilitarian variables of perceived ease of use, perceived usefulness and convenience become even more influential on engagement with a retailer's m-commerce application following continued retention, while enjoyment becomes less important. However, the research finds that the location of use has an effect on the variables influencing engagement with an m-commerce application.

INTRODUCTION

Smartphone devices and mobile applications (apps) have become an integral part of consumers' everyday life (Kim et al, 2013). Recent figures highlight that over 70% of consumers total digital minutes are spent on mobile devices, an increase of 28% since 2011 (Lipsman and Lella, 2017; Kim et al, 2013). Smartphone 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). Such apps allow consumers to shop, access information and keep up to date with their social networks, anytime, anywhere (Alnawas and Aburub, 2016). In contrast to websites, mobile apps are able to utilise the hardware and software features of the smartphone device to deliver a unique experience to users, i.e. scanning of bar codes through the use of the built in camera function, offering location specific content with the use of GPS and informing customers with the use of push notifications. Thus, mobile apps are end-user software applications that can extend the smartphone's capabilities by enabling

users and app providers to perform tasks beyond those capable on a website (Purcell et al, 2010).

The proliferation of smartphone devices and the subsequent advancement in technology has seen retailers adopt apps as a channel of service delivery and communication (Wang et al, 2015). While retailers compete for screen space on a consumer's smartphone device (Magrath and McCormick, 2013), only one retailer appears in the top 10 most popular apps across the Apple App store and the Android Play store (Nelson, 2016). Numerous studies have explored the variables influencing the adoption of mobile applications (Munoz-Leiva et al, 2017; Gupta and Arora, 2017; Chaouali et al, 2017; Yang, 2016; Hsiao et al, 2016; Kang et al, 2015; Kim et al, 2014; Venkatesh et al, 2012; Lin et al, 2011; Deng et al, 2010). However, while initial adoption is essential for the dissemination of an innovation, such adoption does not affirm engagement with the innovation (Hong et al, 2006). Previous research asserts that consumers are willing to download mobile applications, however, 50% of smartphone applications are subsequently deleted from a consumer's device following download (Linton and Kwortnik, 2015). Bellman et al (2011) suggest that mobile applications provide firms an effective means for high levels of customer engagement. Despite this, limited academic research has explored the factors influencing customer engagement with m-commerce mobile applications and the subsequent outcomes of customer engagement (Kim et al, 2013). Thus, while retailers are adopting m-commerce applications as a channel of service delivery, firms are unaware of the factors influencing customer engagement with a retailer's m-commerce application and the subsequent outcomes for the brand, as a result, this research aims to address this gap in knowledge. We conduct such analysis through a longitudinal study with adopters of apparel retailers' m-commerce applications. Through assessing customer attitudes following the retention of the m-commerce app after one month and then again after twelve months, the research is able to analyse the variables influencing customer engagement and the outcomes of engagement with the application over a sustained period of time.

CONCEPTUAL DEVELOPMENET

Customer Engagement

Customer engagement is heralded as having numerous benefits such as positive attitudes and commitment towards the brand, increased purchase and loyalty (Evanschitzky et al, 2012).

Previous research has conceptualised engagement as focused attention (Chapman et al, 1999), curiosity (Jacques et al, 1995) and appeal (Jennings, 2000). Customer engagement is thought to share similar characteristics with the concept of interactivity and use (Quesenbery, 2003). The verb 'to engage' has several meanings including: to employ and hire, to bind by contract and to take part (Oxford Dictionary, 2016), affirming a behavioural focus. Thus, while no universally agreed definition or set of attributes pertaining to engagement exist (Cheung et al, 2011), generally, engagement embraces cognitive, affective and behavioural elements of individuals' experiences (Brodie et al, 2011) and thus considered a multidimensional construct. Hollebeek et al. (2014, p. 154) conceptualise consumer engagement as "a consumer's positively valence cognitive, emotional and behavioural brand-related activity during, or related to, specific consumer/brand interactions". Hollebeek et al (2014) conceptualisation of consumer engagement highlights the multidimensionality of the construct. Therefore, customer engagement behaviour can be considered as 'behavioural manifestations that have a brand or firm focus, resulting from motivational drivers' (Van Doorn et al, 2010, p.254). As a result, such manifestations may either be positive or negative resulting in either approach or avoidance behaviour towards the brand. Therefore, despite being subject to varying interpretations, consumer brand engagement is often considered a motivational construct, with unpredictable intensity. It involves firstly an object (i.e. branded app), secondly a subject (i.e. the consumer) and thirdly it has valence (i.e. either positive or negative) (Hollebeek and Chen, 2014; Dessart et al, 2015).

The literature outlines numerous variables influencing the motivation for consumer brand engagement, particularly within online brand communities (Hammedi et al, 2015; Hollebeek et al, 2014; Osei-Frimpong and McLean, 2017). Consumer brand engagement is often dependent on the needs, motives and goals of the consumer which essentially defines their rules of participation. Engagement is considered interactive and context dependent (Brodie et al, 2011; Dolan et al, 2016), thus the variables motivating consumer engagement reported in other contexts might differ. Therefore, it is important that we turn our attention to the context of m-commerce mobile applications to further our understanding of the variables influencing customer engagement with such branded apps. The subsequent section will outline variables that previous studies have conceptualised and empirically examined in influencing the adoption of mobile applications.

Variables influencing customer behaviour

As previously outlined, while initial adoption is essential for the dissemination of an innovation (such as that of a branded m-commerce mobile app), such adoption does not affirm engagement with the innovation (Ozturk et al, 2016; Hong et al, 2006). Thus, it is important that we investigate the variables capable of influencing customer behaviour in relation to m-commerce mobile applications.

The theoretical foundations and variables for this study are derived from the Technology Acceptance Model (TAM: see Davis, 1989), Self Determination Theory (SDT: see Ryan and Deci, 2000) and Task-Technology Fit Theory (TTFT: see Goodhue, 1995). Based on Fishbein and Ajzen's (1967) theory of reasoned action (TRA), the TAM has been extensively used in understanding customer behaviour towards accepting and using technology. TAM pertains that when customers are presented with new technology, the perceived ease of use and the perceived usefulness of the technology will influence a customer's decision on whether to use it or not (Yang, 2013). While the impact of the ease of use and usefulness in technology acceptance has been extensively studied, the initial acceptance of an innovation does not ascertain engagement with a brand's technology (Hsieh et al, 2008). Thus, while customers may initially decide to download an app (use a technology), they could stop interacting with the app if they consider too much effort is required.

Furthermore, Task-Technology Fit theory (TTF) suggests that a technology is more likely to be adopted and used if the capabilities of the technology match accordingly to the tasks that the individual wishes to perform (Goodhue, 1995). Thus, the customer should believe that the technological system and action to be carried out fit together (Irick, 2008). The fit between the 'task characteristics' and the 'technology characteristics' can lead to positive perceptions of Task-Technology Fit, which provides convenience for the consumer (Goodhue, 1995). While criticisms have been aimed at the TTF theory in its ability to predict technology acceptance and adoption (like the TAM), as an individual is required to utilise the system before making a judgement on the fit between the technology and the customer's tasks (Irick, 2008). However, such criticisms can also be viewed as a strength of TTF as it provides an insight into why consumers may stop using particular technologies rather than focusing on initial adoption. Thus, as this study examines customer behaviour following one-month and twelve months use and retention of an m-commerce application, it provides an important theoretical insight into the level of customer engagement with branded m-commerce applications.

Moreover, Self-Determination theory provides understanding regarding the motivation behind consumer choices without external influence (Ozturk et al, 2016). According to Ryan and Deci (2000) Self-Determination theory proposes two motivations for technology adoption. Firstly, intrinsic motivation which refers to completing a task due to the love and enjoyment from the activity. On the other hand, extrinsic motivation refers to obtaining a result, possibly in the pursuit of a goal (Roca and Gagne, 2008). For example, two cyclists may cycle for different reasons (1) for the enjoyment (intrinsic motivation) or (2) for the exercise and improved health benefits (extrinsic motivation). Thus, consumers may use a retailer's m-commerce mobile application for goal directed utilitarian purposes of completing a particular task or for the purpose of intrinsic enjoyment.

As a result, through integrating each theory (TAM, TFF and SDT) the research captures technology, social and self-related variables in the development of the theoretical model that examines the role of perceived ease of use, perceived usefulness, convenience and enjoyment in explaining consumers level of engagement with branded m-commerce mobile applications.

Perceived ease of use

The perceived ease of use of a technological system has been an integral part of technology adoption and use (Park, 2009; DeLone and McLean, 2003). The Technology Acceptance Model (TAM) has been extensively used in order to understand why individuals adopt particular technologies. Davis (1989) suggests that perceived ease of use is the degree to which an individual regards the use of a technological system will be free from effort. Further to this, the ease of use of a technological system is based on how the system allows the customer to perform tasks, increase productivity, performance and efficiency (Chau and Lai, 2003). Rose et al (2012) assert that the ease of use of a website has a profound influence on consumer's behaviour towards a website. Additionally, Munoz-Leiva et al (2017) outline the importance of perceived ease of use on the intention to use mobile applications. Previous research suggests that the perceived ease of use of a mobile application will have an influence on the customer's experience (McLean et al, 2016). This research suggests that the perceived ease of use of the app will have an influence on a customers continued engagement with a retailer's m-commerce application. Thus the research hypothesises, following the retention of the mobile application over a 12-month period:

H1 The perceived ease of use of the m-commerce mobile application will have an influence on continued customer engagement with the application.

Perceived usefulness

The perceived usefulness of a technological system is a core part of the Technology Acceptance Model (TAM) (McLean and Osei-Frimpong, 2017). Despite its early introduction to the literature (Davis, 1989), the perceived usefulness of technology continues to be cited as one of the most important constructs in influencing the adoption of new technologies (Kim et al, 2017). Davis (1989) asserts that the usefulness of technology is considered to be an individual's belief that using a specific system will increase their performance. Customer's expectations with technological systems are constantly rising due to increasing alternatives and technological advancements (McLean and Wilson, 2016; McColl-Kennedy et al, 2015), thus the usefulness of the technology (be it a website or mobile app) is continuing to come under even more customer scrutiny. Previous research has empirically examined the influence of the perceived usefulness of the technology on intentions to use the system (Munoz-Levia et al, 2017; Jeong and Yoon, 2013; Liu and Li, 2011 Ko et al, 2009). Thus, this research advances our theoretical understanding in relation to m-commerce applications through examining the influence of perceived usefulness on continued engagement with a retailer's branded m-commerce mobile application. Thus the research hypothesises, following the retention of the mobile application over a 12-month period:

H2: The perceived usefulness of the m-commerce mobile application will have an influence on continued customer engagement with the application.

Convenience

Customer convenience is often outlined as one of the most important determinants of online shopping (Jiang et al, 2013). Further to this, mobile devices have introduced convenience to contemporary consumers where they can access service offerings anytime, anywhere (Ozturk et al, 2016). An essential component of what makes a smartphone device an indispensable part of a consumer's everyday life is the ability to use mobile applications on the go (Kim et al, 2013). Brown (1990) outlines five distinctive dimensions regarding the concept of convenience (1) Time- the service/product is delivered at a time that is convenient for the customer; (2) Place- the service/product is offered in a place that is more convenient for the customer; (3) Acquisition- firms make it simpler for customers to complete their task; (4) Use- the product is developed/made in a more convenient way for the customer to use; (5) Execution- the firm actually providing the service/product to the consumer. In this line, Task-

Technology Fit theory (TFF) suggests that a consumer is more likely to use a technological system if the capabilities of the technology match accordingly to the tasks that the individual wishes to perform (Goodhue, 1995). Wang et al (2015) assert that m-commerce applications are often used on the go. Therefore, for many consumers the ability to use a mobile application anytime, anyway and potentially on the go is important and leads to a convenient way to shop (Shanker et al, 2016; Andrews et al, 2015), thus fitting the task with the technology. Therefore, in line with Brown's (1990) dimensions of convenience, the technology should fit the tasks consumer's want to complete. Previous research has outlined convenience as an important construct in influencing the use of websites and the adoption of mobile applications (Shanker et al, 2016; Andrews et al, 2015; Wang et al, 2015; Yang et al, 2014; Jiang et al, 2013). As a result, this research posits that the convenience of the mobile application will have an influence on continued engagement with a retailer's m-commerce application. Thus the research hypothesises, following the retention of the mobile application over a 12-month period:

H3: The perceived convenience of the m-commerce mobile application will have an influence on continued customer engagement with the application.

Enjoyment

Later versions of the Technology Acceptance Model have outlined the level of enjoyment a customer experiences as a factor influencing the use of technology (Venkatesh et al, 2012; Venkatesh and Bala, 2008) as well as satisfaction with the experience (Hsiao et al, 2016). Enjoyment is regarded as the activity of using a specific system that is enjoyable in its own right, aside from any performance consequences resulting from system use (Venkatesh et al, 2012). Previous research suggests that consumers who do not experience intrinsic enjoyment during their online shopping encounter will move their shopping efforts to an alternative provider (Faiola et al, 2013; Lee et al, 2011). More recent research asserts that consumers will not research satisfaction with the experience without the element of intrinsic enjoyment (Hsiao et al, 2016). As previously outlined, self-determination theory (SDT) proposes two motivations regarding consumer choices, namely intrinsic motivation and extrinsic motivation. Thus, based on self-determination theory and previous research regarding the need for enjoyment during an online shopping activity, this research posits that continued engagement with a retailer's m-commerce application will be influenced by the level of

enjoyment experienced during use. Thus the research hypothesises, following the retention of the mobile application over a 12-month period:

H4: The level of enjoyment from using the m-commerce mobile application will have an influence on continued customer engagement with the application.

Customisation

Inherent to smartphone applications is the ability to provide customers with a customised experience (Hsiao et al, 2016). Customisation refers to the personalisation or individualising of services and content to a customer's own preferences and interests (Lee and Cranage, 2013). Additionally, customisation refers to a firm's ability to personalise the delivery of the right content, to the right person at the right time (Tam and Ho, 2005). As a result, customisation can influence a customer's level of control and the ability to be an active part in creating their own experience (Cheng et al, 2010). The customisation features on mobile applications allow customers to tailor their settings to their own specific needs through refinement tools (Magrath and McCormick, 2013). In addition, the distinctive nature of smartphone apps allows customers to store data in a unique manner such as preferences, location awareness and personal details (Hsiao et al, 2016), which in turn, offers retailers the unique ability to utilise such data for location specific content, context sensing and product personalisation (Alnawas and Aburub, 2016).

Previous research (Lee and Crange, 2010; Rose et al, 2012; Magrath and McCormick, 2013, Cheng et al, 2010) asserts that firms providing customers the ability to customise their experience can enhance the usefulness of technology, how easy the technology is to use, the convenience of the technology along with influencing the level of enjoyment with the technology. Extending upon Magrath and McCormick's (2012) conceptualisation in the role of customisation features within m-commerce applications offering the ability to enhance the ease of use, usefulness, convenience and enjoyment of a mobile application, this research hypothesises:

H5 The customisation of an m-commerce application to the customer's individual preferences will positively influence the relationship between (a) ease of use and engagement (b) usefulness and engagement (c) convenience and engagement (d) enjoyment and engagement.

Outcomes of Brand Engagement

The extant literature asserts that positive engagement with a brand can lead to enhanced attitudes and behaviours towards the brand (Chu and Kim, 2011). Taking note of the aforementioned cognitive, affective and behavioural dimensions of brand engagement (Hollebeek et al, 2014; Brodie et al, 2011) it is believed that brand engagement can enhance the image of the brand to those consumers interacting with the brand, potentially resulting in enhanced attitudes toward the brand and loyalty towards the brand (Evanschitzky et al, 2012; Mollen and Wilson, 2011).

Numerous studies have examined consumer attitudes and behavioural intentions based on Ajzen's (1985) theory of planned behaviour (TPB). Ajzen (1985) defines 'attitude' as a consumer's 'disposition to respond favourably or unfavourably to an object, person, institution, or event'. Thus, in this context, consumer attitudes can be considered a collection of an individual's beliefs regarding a brand. Therefore, a consumer's active engagement (involving cognitive, affective and behavioural actions) with a retailer m-commerce application is likely to influence their attitude towards the brand due to their interactions with the firm's mobile application.

In a similar vein, following Ajzen's (1985) theory of planned behaviour, engagement with a retailer's branded mobile application is likely to influence customer behaviours. As organisations are gradually shifting their emphasis from customer acquisition to creating customer engagement and participation (Sawhney et al, 2005), mobile applications serve as a tool for organisations to encourage and enhance customers' active engagement and to serve as brand ambassadors (James, 2013). Previous research outlines that consumer brand engagement can lead to customer loyalty (Wirtz et al, 2013; Hollebeek, 2011; Dassart et al, 2015). Shankar et al (2010) suggest that retailers should view smartphone devices as an opportunity to enhance customer loyalty as it allows retailers to engage and interact with customers, while providing customers an opportunity to take part in brand related interactions. Customer loyalty towards a brand can be activated in a number of different forms through interactions with the brand (Dassart et al, 2015), thus, Kim and Adler (2011) conceptualise the potential of mobile apps to increase customer loyalty through further customer engagement with the brand and brand commitment. A key dimension of loyalty as expressed by Oliver (1997, p.34) is 'a deeply held commitment'. The commitment to retain and engage with a brand through a mobile app on one's mobile device is a potential signal of loyalty intentions. Additionally, Kim et al (2015) suggest that continued brand engagement with a retailer's m-commerce application on a repeated basis may develop loyalty towards

the brand (Kim et al, 2015). Thus, through customers continued engagement with a retailer's branded mobile application following the retention of the app for a 12-month period this research hypothesises:

H6 Customer engagement with the m-commerce mobile application over a sustained period of time will have a positive influence on attitudes towards the brand.

H7 Customer engagement with the m-commerce mobile application over a sustained period of time will have a positive influence on loyalty towards the brand.

Location of Use

As previously outlined, smartphone devices allow customers to access mobile applications on the go (Wang et al, 2015), anytime, anywhere (Shankar et al, 2016). Andrews et al (2015) assert that the ability to use mobile applications on the go make them a more convenient means of accessing information from a brand. The location of mobile application use can be conceptually defined as the physical setting where consumers use a mobile application on their smartphone device. Previous research suggests that the location of using mobile applications can have an influence on customer attitudes and behaviour (Andrews et al, 2015). Thus, this research draws upon the work of Wang et al (2015), Shankar et al (2016) and Andrews et al (2015) and aims to further our theoretical understanding on the role of location of mobile app use (i.e. at home or on the go) in influencing customer engagement with an m-commerce application. Therefore, this research hypothesises:

H8 The variables influencing customer engagement with an m-commerce application will be dependent on the location of use.

Following the conceptual development, with exception to H8, figure 1 outlines a pictorial representation of the hypothesised relationships.

Figure 1 Hypothesised Model
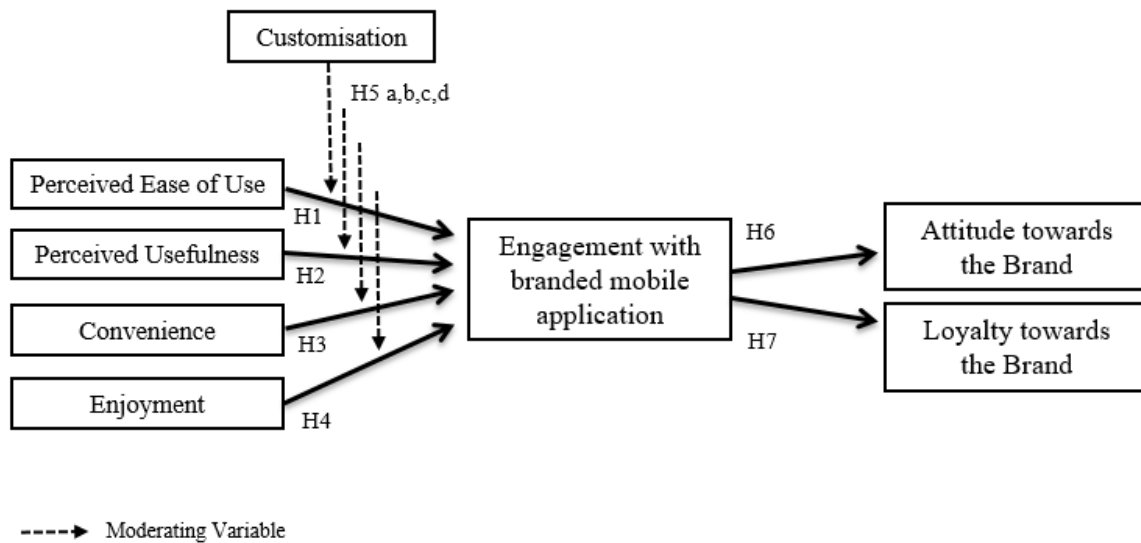
METHODOLOGY

In order to gather the data for the study an online questionnaire was utilised. Data were initially obtained from individuals that had retained an apparel retailer's m-commerce application for one month. A longitudinal approach was taken in this research to assess the research hypotheses, therefore, data were collected twice from the same respondents. At collection Time 1, data were collected from 689 consumers (366 females, Mean age = 28 years; 323 males, Mean age = 26 years). Thereafter at collection Time 2, a total of 474 consumers participated in the second survey questionnaire 11 months later (69% of the original sample) (271 females, Mean age = 29 years; 203 males; Mean age = 28). In order to gather the required data, respondents were recruited with the assistance of a market research firm. In order to conduct direct comparisons between Time 1 and Time 2 only those that had completed both questionnaires were included in the sample, thus our working sample consisted of 474 consumers. Further details regarding the sample are provided in table 1.

Table 1 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
Motivation for using App				
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
App Location of Use				
At Home	177	37	182	38
On the go	297	63	292	62

Furthermore, prior to collecting data for the questionnaire, a pilot study was carried out with a sample of 29 participants. Analysis of the pilot study showed that each of the scales measured a Cronbach alpha $\alpha > 0.7$ with correlation significance of $p < 0.05$ (Hair et al, 2013). The questionnaire scales were adapted from established scales within the literature to measure perceived ease of use, perceived usefulness, convenience, enjoyment, engagement, customisation, attitudes towards the brand and loyalty towards the brand. Thus, 30 items on a 7 point Likert scale ranging from (1) Strongly Disagree to (7) Strongly Agree were used to measure perceived ease of use, perceived usefulness, convenience, enjoyment, engagement

(capturing the multidimensional nature: cognitive/affective/behavioural), customisation and loyalty towards the brand. A semantic differential scale with 7 points was used to measure attitude towards the brand. Table 2 outlines the scales and the items used in this research.

Table 2 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
Convenience	Adapted from: Mathwick et al (2001)	• Shopping from the app is a convenient way to manage my time. • Shopping from the app makes my life easier. • Shopping from the app fits with my schedule.	.881
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	.812
Engagement	Adapted from: Hollebeek et al (2014)	• Using the brand's app gets me thinking about the brand • Using the brand's app stimulates my interest in the brand • I feel positive when I use the brand's app • I feel good when I use the brand's app	.786

Loyalty towards the brand	Adapted from: Zeithaml and Berry (1996)	• I spend a lot of time using the brand's app compared to other brands. • 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
Attitudes towards the brand	Adapted from: Spears and Singh (2004)	• Unappealing/Appealing • Bad/Good • Unpleasant/Pleasant • Unfavourable/Favourable • Unlikeable/Likeable	.823

FINDINGS

Preliminary Analysis

In order to assess the reliability of the scales used in the research, Cronbach's alpha coefficient was calculated as presented in table 2. The scales used to measure their corresponding constructs were all above the critical value of .7 (Pallant, 2013), therefore the scales can be considered reliable measures of their corresponding constructs. Due to the multidimensional nature of the scale measuring the level of engagement with the app, following the reliability tests, to conducted rigorous scientific research a further exploratory factor analysis (EFA) using the principal component analysis and Varimax rotation was conducted (Pallant, 2013). The results of the EFA highlighted a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.792, exceeding the cut-off value of 0.6 with a ρ-value < .0001 for Bartlett's Test of Sphericity (Kaiser, 1970). All Items loaded appropriately on the constructs they were intended to measure averaging above .7 while there was no evidence of any cross loading.

In order to test the hypotheses outlined in figure 1, Structural Equation Modelling (SEM) was adopted with the use of AMOS Graphics 24. Structural equation modelling with an analysis of moment structures takes a confirmatory approach to SEM (Byrne, 2013). First, a confirmatory factor analysis (CFA), known as the measurement model, was estimated and assessed followed by the structural model. The purpose of the CFA is to outline the causal relationships between the exogenous and endogenous variables or among endogenous variables. Therefore, the CFA measurement model was specified and estimated for both

collection periods, Time 1 and Time 2. The results outline goodness of fit, Time 1: $x^2_{(682)}$ = 1957, ρ = .001, x^2/df = 2.87; RMSEA = .054, RMR = .016, SRMR = .044, CFI = .961, NFI = .958 and Time 2: $x^2_{(682)}$ = 1901, ρ = .001, x^2/df = 2.79; RMSEA = .052, RMR = .015, SRMR = .043, CFI = .963, NFI = .960. In line with the fit statistics regression loadings were adequate and significant $p < .05$.

Additionally, convergent and discriminant validity in the data were assessed and supported due to the following, (1) all loadings were significant ($p < .001$), (2) the composite reliability for each construct exceeded the recommended level of .7 as shown in table 3 (Fornell and Larcker, 1981), (3) the average variance extracted (AVE) for each construct exceeded the recommended benchmark of .50, and is also above the maximum shared variance (MSV) (Hair et al, 2010) as seen in table 3. Further to this, the square root of the AVE for each construct was calculated to assess the discriminant validity. According to Hulland (1999) and Hair et al (2010) the AVE should exceed the inter-correlation for each construct. Thus, table 3 outlines that the data satisfies such requirements. Lastly, further analysis was conducted through a variance inflation factor (VIF) analysis in SPSS and found no variable to be above the benchmark of 3.0 (Hair et al, 2010), as a result we can conclude that we are unlikely to have any multi-collinearity issues within the data.

Moreover, common method bias (CMB) was assessed in the data, which if exists could result in misleading conclusions (Podsakoff et al, 2003). The construct scale items were mixed throughout the questionnaire for both collection phases (Time 1, Time 2) as a provision to minimise the chance of CMB (Karikari et al, 2017; Ranaweera and Jayawardhena, 2014). Additionally, in line with Podsakoff et al (2003), a common latent factor was introduced and assigned with all the items of the principal constructs included in the model with use of AMOS Graphics as an extension of the confirmatory factor analysis. The common latent factor presented a value of 0.531, to which the common method variance is the square of such value, which presents a value of 0.281. Therefore, it can be concluded that it is unlikely common method bias exists in the data as the calculated variance (28.1%) is below the threshold of 50% (Ranaweera and Jayawardhena, 2014).

Table 3 Convergent and Discriminant Validity

	CR	AVE	MSV	PEOU	PU	CON	ENJ	CUS	ENG	ATB	LOY
PEOU	0.833	0.722	0.511	**0.849**							
PU	0.847	0.736	0.502	0.444	**0.857**						
CON	0.881	0.703	0.436	0.312	0.471	**0.838**					
ENJ	0.859	0.671	0.222	0.271	0.285	0.214	**0.819**				
CUS	0.812	0.710	0.337	0.219	0.342	0.286	0.211	**0.842**			
ENG	0.786	0.689	0.210	0.377	0.202	0.341	0.302	0.246	**0.830**		
ATB	0.823	0.657	0.159	0.230	0.177	0.266	0.242	0.207	0.232	**0.810**	
LOY	0.861	0.727	0.207	0.317	0.231	0.241	0.173	0.191	0.217	0.501	**0.852**

(CR - Construct Reliability; AVE – Average Variance Extracted; MSV - Maximum Shared Variance; PEOU – Perceived Ease of Use; PU – Perceived Usefulness; CON – Convenience; ENJ – Enjoyment; CUS – Customisation; ENG – Engagement; ATB – Attitude towards Brand; LOY – Loyalty towards Brand)

In addition to the independent CFA models previously outlined, the pooled data was tested for Configural invariance. The purpose of Configural invariance is to assess the assumption that the fixed factor loadings are the same across groups (the two measurement periods) and should be established in order for further multi-group analysis (between-group tests) to be meaningful (Vandenberg and Lance, 2000; Horn and McArdle, 1992). Thus, following the analysis of the pooled data from Time 1 and Time 2, the pooled model showed acceptable goodness of fit ($x^2_{(682)} = 1,634$, $\rho = .001$, $x^2/df = 2.40$; RMSEA = .052, RMR = .018, SRMR = .045, CFI = .956, NFI = .959), thus, the data provides evidence of Configural invariance, making it suitable for comparison.

Structural Equation Modelling

Following on from the preliminary analyses and due to the goodness of fit regarding the CFA measurement models and other analysis exceeding recommended benchmarks, the structural model was specified and estimated for both collection phases, Time 1 and Time 2. The fit statistic of the structural model showed goodness of fit (Time 1: $x^2_{(21)} = 54.36$, p < .05, $x^2/df =$

3.16, RMSEA = .058, SRMR = .022, RMR = .019, CFI = .952, NFI = .957, GFI = .959; Time 2: $x^2_{(21)}$ = 52.18, p < .05, x^2/df = 2.48, RMSEA = .056, SRMR = .022, RMR = .019, CFI = .953, NFI = .957, GFI = .955) and provided some supporting evidence for the hypothesised relationships. The standardised path coefficient regression weights and statistical significance can be seen in table 4.

Table 4 Regression Estimates

Hypotheses			Time 1 Standardised Estimate β	t	R^2	Time 2 Standardised Estimate	t	R^2	Time1 – Time2
H1	PEOU	→	ENG	.683***	5.61	.47	.641***	5.06	.66	p = .547
H2	PU	→	ENG	.577**	2.89	.47	.659***	6.24	.66	p = .048
H3	CON	→	ENG	.581**	2.45	.47	.806***	8.31	.66	p = .039
H4	ENJ	→	ENG	.544**	2.56	.47	.297**	2.06	.66	p = .043
H6	ENG	→	ATB	.224ns	1.79	.06	.521**	3.01	.27	p = .031
H7	ENG	→	LOY	.311**	2.11	.10	.689***	7.02	.47	p = .041

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

(PEOU – Perceived Ease of Use; PU – Perceived Usefulness; CON – Convenience; ENJ – Enjoyment; CUS – Customisation; ENG – Engagement; ATB – Attitude towards Brand; LOY – Loyalty towards Brand)

With regard to collection time 1, table 4 illustrates significant effects between perceived ease of use, perceived usefulness, convenience and enjoyment on influencing customer engagement with the branded m-commerce mobile application. Further to this, the results pertain that engagement with the mobile application has an influence on loyalty towards to the brand, however, the results find that engagement with the mobile application does not have an influence on customers' attitudes towards the brand. Mirroring the analysis conducted for time 1, table 4 outlines that each of the hypothesised relationships show statistical significance.

Following the results for each collection phase (Time 1 = 1-month retention; Time 2 = 12 months' retention), a chi square difference test found there was a significant difference between each structural model, Time 1 and Time 2 = x^2 = 2.64, p = < .001. However, in order to test the research hypotheses further analyses between each path is required. As a result, within AMOS Graphics, each regression path was named for analysis, followed by selecting bootstrapping, where the bootstrapping confidence output outlines the confidence interval

between each group (Time 1 and Time 2). Table 4 outlines the calculated difference between each time period.

Drawing from the results of the multi-group analysis presented in table 4, significant differences can be seen between each of the hypothesized relationships with expecting to *H1*. The results illustrate that following continued retention of the mobile application after 12 months, perceived ease of use has no increased influence on engagement with the brand, despite no increased influence, perceived ease of use still remains to have a significant effect on engagement with a retailer's m-commerce app. Furthermore, the results pertain that in support of *H2* and *H3*, following the retention of the m-commerce application after 12 months, the perceived usefulness and the convenience of the m-commerce application has an increased influence on engagement with the mobile application in comparison to retention after 1 month. Thus, the perceived usefulness and convenience of the app becomes more important in influencing customer engagement with the application following continued retention of the app.

Interestingly, with regard to *H4*, the results find that the level of enjoyment consumers obtain from using the app has less influence on engagement with the app following the retention of the app for 12 months. Instead, enjoyment is more important in influencing engagement with the m-commerce application after initial adoption of the app.

With regard to the outcomes of engagement with an m-commerce application the results pertain that following retention of the app for one month, engagement with the application has an influence on consumers' loyalty towards the brand, conversely however, engagement with the mobile application does not have an influence on attitudes towards the brand. In spite of this, and in support of *H6* and *H7*, following the retention of the m-commerce application for 12 months, engagement with the mobile application influences both attitudes towards the brand and loyalty towards the brand.

Interaction Effect Analysis

Moreover, following the evaluation of the multi-group analysis, moderating effect analysis was carried out to assess *H5a, b, c, d*. Using moderated SEM with AMOS 24, the moderating effects were examined hierarchically (Xanthopoulou et al., 2007). Additional variables were computed in SPSS to test the interactive effects of each moderating variable (Ranaweera and

Jayawardhena, 2014; Matear et al, 2002). With regard to H5a, firstly, the continuous independent variable (Perceived Ease of Use) and moderating variable (Customisation) was adapted through mean centring, which subsequently created an interactive term the multiplication of the independent variable and the moderating variable. This lead to in the following interactive term: 'Perceived Ease of Use X Customisation'. The dependent variable (Engagement) was regressed on the independent (Perceived Ease of Use), the moderator (Customisation), and the interactive term (Perceived Ease of Use X Customisation). Following the steps outlined above, the interaction effects were assessed for *H5b, H5c* and *H5d*. Table 5 outlines the results for each analysis.

Table 5 Interaction Effect Analysis – Customisation

Hypotheses	Path	Standardised Path Coefficient	t-value
H5a	PEOU → ENG	.683***	5.61
(Time 1)	CUS → ENG	.377**	3.01
	PEOU X CUS → ENG	.411**	2.16
	Model fit indices	RMSEA = .058, SRMR = .023, RMR = .020, CFI = .954, NFI = .955, GFI = .953	
H5a	PEOU → ENG	.641***	5.06
(Time 2)	CUS → ENG	.401**	3.20
	PEOU X CUS → ENG	.475**	2.36
	Model fit indices	RMSEA = .055, SRMR = .019, RMR = .014, CFI = .957, NFI = .953, GFI = .969	
H5b	PU → ENG	.577**	2.89
(Time 1)	CUS → ENG	.377**	3.01
	PU X CUS → ENG	.444**	2.51
	Model fit indices	RMSEA = .057, SRMR = .024, RMR = .022, CFI = .947, NFI = .952, GFI = .955	
H5b	PU → ENG	.659***	6.24
(Time 2)	CUS → ENG	.401**	3.20
	PU X CUS → ENG	.507**	2.97
	Model fit indices	RMSEA = .055, SRMR = .021, RMR = .015, CFI = .950, NFI = .955, GFI = .956	
H5c	CON → ENG	.581**	2.45
(Time 1)	CUS → ENG	.377**	3.01
	CON X CUS → ENG	.480**	3.12
	Model fit indices	RMSEA = .057, SRMR = .025, RMR = .019, CFI = .948, NFI = .951, GFI = .949	

H5c	CON → ENG	.806***	8.31
(Time 2)	CUS → ENG	.401**	3.20
	CON X CUS → ENG	.611***	5.66
	Model fit indices	RMSEA = .056, SRMR = .022, RMR = .023, CFI = .953, NFI = .954, GFI = .958	
H5d	ENJ → ENG	.544**	2.57
(Time 1)	CUS → ENG	.377**	3.01
	ENJ X CUS → ENG	.386**	2.64
	Model fit indices	RMSEA = .058, SRMR = .025, RMR = .021, CFI = .949, NFI = .950, GFI = .952	
H5d	ENJ → ENG	.297**	2.06
(Time 2)	CUS → ENG	.401**	3.20
	ENJ X CUS → ENG	.279**	1.98
	Model fit indices	RMSEA = .056, SRMR = .017, RMR = .018, CFI = .955, NFI = .956, GFI = .958	

(PEOU – Perceived Ease of Use; PU – Perceived Usefulness; CON – Convenience; ENJ – Enjoyment; CUS – Customisation; ENG – Engagement; ATB – Attitude towards Brand; LOY – Loyalty towards Brand)

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

The results presented in table 5 outline significant moderating effects. In support of H5a, b, c, and d, customisation of the app strengthens the influence of perceived ease of use, perceived usefulness, convenience and enjoyment on engagement with the branded m-commerce application. Thus a customer's ability to customise the app to their own preferences increase a customer's perception of how easy the app is to use, how useful the app appears to the customer, how convenient the app is to use and the level of enjoyment a customer obtains from using the app, while further enhancing the influence of engagement with the branded m-commerce application. While significant moderating effects can be seen at both time periods (1-month retention and 12-months retention), the moderating effect becomes stronger following continued retention of the mobile application. As a result, the moderating effects outline the importance of customisation in encouraging consumers to engage with a retailer's m-commerce application.

Multi-group Analysis – Location of Use

Previous research has outlined that mobile apps are often used on the go (Wang et al, 2015; Andrews et al, 2015). In order to assess *H8* multi-group analysis was conducted on location of use (1 – At Home, 2 – On the Go) in AMOS Graphics following McLean and Osei-

Frimpong's (2017) approach. Firstly, measurement invariance was calculated to assess for equivalence across groups at both the measurement and structural level. The test was conducted by assigning constraints to the groups and calculating the difference in the CFI value from the Configural model and the constrained model, the results illustrated a CFI difference of < .01, affirming equivalence across each group (Cheung and Rensvold, 2008). A chi-square difference test between each model (At Home Vs On the Go) showed significant differences between each structural model, at both collection periods, Time 1 = x2 = 2.316, p = < .001 and at Time 2 = x2 = 2.541, p = < .001. Additionally, following the steps previously outlined, further analysis was conducted in AMOS Graphics to assess the differences between each path. The results outlined significant differences with regard to the influence of enjoyment, perceived usefulness and convenience on consumers' engagement with a retailer's m-commerce application. The level of enjoyment a customer experiences from their interactions with a retailer's m-commerce application is more influential on engagement while used at home (Time 1: β = .702, p < .001, Time 2: β = .651, p = .022) in comparison to when used on the go (Time 1: β = .404, p = .047, Time 2: β = .156, p = .103), resulting in a significant difference between use at home vs use on the go (Time 1: p = .041; Time 2: p = .013). The results further indicate that the perceived usefulness of the app is more influential on app engagement when used on the go (Time 1: β = .613, p < .001, Time 2: β = .703, p < .001) in comparison to when used at home (Time 1: β = .271, p = .041, Time 2: β = .245, p = .059), resulting in a significant difference between use at home vs use on the go (Time 1: p = .022; Time 2: p = .013). Lastly, the results illustrate that the perceived convenience of the m-commerce application is more influential on app engagement when the app is used on the go (Time 1: β = .616, p < .001, Time 2: β = .829, p < .001) in comparison to when used at home (Time 1: β = .206, p = .056, Time 2: β = .276, p = .049), resulting in a significant difference between use at home vs use on the go (Time 1: p = .012; Time 2: p = .019). Thus, while enjoyment, perceived usefulness and convenience influence mobile app engagement, through contextualising the analysis by location of use, the results yield interesting findings and further our understanding on the variables influencing engagement depending on where the consumer uses the app.

DISCUSSION

Theoretical Implications

This research provides a longitudinal empirical understanding on the determinants of customer engagement with a retailer's branded m-commerce mobile application as well as the outcomes of such engagement. The limited research specifically on m-commerce applications has mainly focused on mobile app adoption and retention (Munoz-Leiva et al, 2017; Gupta and Arora, 2017; Chaouali et al, 2017; Hsiao et al, 2016; Kang et al, 2015; Kim et al, 2014; Venkatesh et al, 2012). Bellman et al (2011) conceptualised that the increase in the popularity of branded mobile apps as a marketing device is due to their high level of consumer engagement, yet we had little understanding on the determinants of mobile app engagement. As a result, the research contributes significantly to the literature on m-commerce and customer engagement through extending our knowledge on customer engagement with branded m-commerce mobile applications outlining the determents and outcomes of customer engagement with the technology.

Many organisations acknowledge and previous research outlines the importance of customer engagement in online brand communities (McLean and Osei-Frimpong, 2017; Hollebeek et al, 2014; Brodie et al, 2011; Evanschitzky et al, 2013; Van Doorn et al, 2010). The results find the perceived ease of use of an m-commerce app, the perceived usefulness, the convenience of the app, and the enjoyment obtained from using the m-commerce application influences customers to engage with a retailer's branded m-commerce application. Following a sustained period of retaining the mobile application, thus, over time, the effect of such variables become stronger in influencing consumer engagement with an m-commerce app. Additionally, the results affirm the moderating role of 'app customisation' between perceived ease of use, perceived usefulness, convenience and enjoyment on engagement with the app. Thus, a customer's ability to modify the app to their own preferences, utilise filter tools and receive personalised content enhances a customer's engagement with a retailer's m-commerce application. Importantly, the results assert that engagement with a retailer's branded m-commerce application positively influences customer's attitudes towards the brand and loyalty towards the brand, further extending our knowledge on outcomes of customer engagement.

The Technology Acceptance Model (TAM), Task-Technology Fit Theory (TTF) and Self Determination Theory (SDT) provided the theoretical foundations in examining the

deterrents of mobile app engagement. The TAM has been extensively used in understanding customer behaviour towards accepting and using technology (Yang, 2013). However, while the impact of perceived ease of use and perceived usefulness deriving from the TAM has been outlined as influencing the initial acceptance of mobile applications, such acceptance of an innovation does not ascertain engagement (Hsieh et al, 2008). However, this research outlines the continued importance of a customer's perceived ease of use and usefulness of the technology influencing engagement with a retailer's mobile application upon initial acceptance of the technology and following continued retention of the m-commerce application.

Furthermore, based on the attributes of convenience as illustrated by Brown (1990) and the Task-Technology Fit theory (TTF), a customer is more likely to adopt and engage with a retailer's m-commerce application if the capabilities of the technology match accordingly to the tasks that the individual wishes to perform. The findings of the research illustrate the importance of convenience on mobile app engagement. Following retention of the app over a sustained period of time, the convenience of the app becomes even more influential on continued engagement with the app. Wang et al (2015) assert that m-commerce applications are often used on the go. Shanker et al (2016) and Andrews et al (2015) conceptualise that mobile applications lead to a convenient way to shop. While this research finds that the convenience of the app has an important influence on consumer engagement with the app, the convenience of the m-commerce application is more influential on mobile app engagement when consumers use the app 'on the go' in comparison to using the app at home, thus affirming previous conceptualisations.

Previous research highlights the importance of enjoyment in influencing a customer's use of technology (Venkatesh et al, 2012). Mobile applications are often considered as a utilitarian form of shopping, carried out on the go, anytime, anywhere (Wang et al, 2015). However, based on Self-Determination theory, individuals may adopt a particular technology due to intrinsic motivation or extrinsic motivation. Thus, consumers may use a retailer's m-commerce mobile application for goal directed utilitarian purposes of completing a particular task or for the purpose of intrinsic enjoyment. The results find the importance of enjoyment during initial adoption of a retailer's m-commerce application, however the importance of enjoyment on customer engagement with the branded application subsides following the retention of the app for 12 months. Despite subsidence of the importance of enjoyment, those customers using the m-commerce application at home are more influenced to engage with the

app due to the level of intrinsic enjoyment deriving from their experience with the application. In contrast, the level of enjoyment from the app does not have an influence on those customers using the application on the go following continued retention of the application.

A distinct feature of m-commerce applications is the ability to customise the app to the customer's own needs and preferences (Hsiao et al, 2016). Thus, mobile applications provide retailer's the ability to personalise the delivery of the right content, to the right person at the right time. As previously discussed, customisation features on mobile applications allow customers to tailor settings to their own specific needs through refinement tools (Magrath and McCormick, 2013) as well as store data in a unique manner such as preferences, location awareness and personal details. Extending upon Magrath and McCormick's (2013) conceptualisation, the results find that such customisation features enhance the influence of perceived ease of use, perceived usefulness, convenience and enjoyment on engagement with the m-commerce application.

The literature suggests that engagement with a brand can lead to enhanced attitudes and behaviours towards the brand (Chu and Kim, 2011). Bellman (2011) conceptualised that engagement with a branded mobile app may have an influence on customers' attitudes towards the brand. This research finds that consumer brand engagement with a retailer's mobile application does not influence attitudes towards the brand after the initial adoption and retention of the mobile application (for 1 month). This is in contrast to previous research (McLean and Osei-Frimpong, 2017; Ibrahim et al, 2017; Hollebeek et al, 2014; Brodie et al, 2011) in online brand communities which highlights that consumer-brand interactions in online brand communities result in positive attitudes towards the brand, often due to the social interaction elicited from online brand communities, which is not provided to the same extent in m-commerce mobile applications. However, following retention of the mobile application for 12 months, continued customer engagement with a retailer's branded m-commerce app positively enhances a customer's attitudes towards the brand. Retailer's actively seek strategies to enhance customer attitudes towards the brand (Mollen and Wilson, 2011), thus while initial customer engagement with a mobile application may not influence customer attitudes towards the brand with the immediacy that online brand communities provide, engagement with branded mobile applications can influence positive brand attitudes following continued retention and interaction. As a result, this research outlines the important

role of mobile applications not only as a channel of service delivery but as a mechanism to enhance customer attitudes towards the brand.

Furthermore, in line with Ajzen's (1985) theory of planned behaviour, the results found that engagement with a retailer's m-commerce application influences customer behaviour. Thus, extending upon Kim and Alder (2011) and Kim et al (2015) conceptualisations, the results pertain that following engagement with a retailer's branded m-commerce application, customers' loyalty towards the brand increases. This is in line with research on customer brand engagement within online brand communities (Luo et al, 2015). Following the initial adoption and retention of a retailer's mobile application, engagement with the app enhances customer loyalty towards the brand, however following continued retention, the influence of engagement with the mobile application on customer loyalty becomes stronger. As a result, the findings illustrate the importance of customer engagement with a retailer's branded mobile application influencing essential customer attitudes (towards the brand) and behaviours (loyalty towards the brand).

This research provides significant insight on the determinants and outcomes of consumer engagement with a retailer's m-commerce application. Critical outcomes of increased attitudes towards the brand and loyalty towards the brand derive from consumer engagement with a retailer's branded m-commerce app. Importantly, the research outlines the variables influencing customer engagement with an m-commerce application. Drawing upon the TAM, TTF and SDT, the research established perceived ease of use, perceived usefulness, convenience and enjoyment influencing engagement with an m-commerce application, while customisation of the app has an enhancing influence on engagement. The findings also assert that utilitarian variables of perceived ease of use, perceived usefulness and convenience become even more influential on engagement with a retailer's m-commerce application following continued retention, while enjoyment becomes less important. In spite of this, in furthering our theoretical understanding, it should be noted that location of use has an influence on the variables influencing engagement with a retailer's m-commerce application.

Practical Implications

This research offers providers of m-commerce applications a number of important practical implications. The findings of the research shed light on the variables influencing customer engagement with a branded m-commerce application. While practitioners have some understanding on the variables influencing the adoption of mobile applications, there was no

longitudinal empirical research exploring the variables influencing actual customer engagement with an m-commerce application. The results outline the importance of customer engagement with an m-commerce mobile application. Over time such engagement increases favourable attitudes towards the brand and loyalty towards the brand.

Providers of m-commerce applications ought to note the importance of the perceived ease of use and perceived usefulness of the application influencing customer engagement upon initial adoption of the app and continued retention. Thus, retailers are required to provide customers with an app that is effortless to use, clear and understandable while allowing customers to perform tasks, increase productivity, performance and efficiency. The results find that providing customers with an m-commerce application that can be customised to the individuals own needs and preferences enhances the perceived usefulness and perceived ease of use of the app.

Moreover, retailers should note the importance of the convenience of the app in influencing customer engagement, which becomes even more influential following continued retention of the app. A convenient mobile application allows customers to carry out activities within their own schedule, with ease and in an efficient manner. Measures to make customers aware of the added convenience the mobile application can offer will result in higher levels of engagement with the app, resulting in the aforementioned outcomes of increased loyalty towards the brand and positive attitudes towards the brand. M-commerce app providers should note the influence of app customisation to an individual's personal preferences in enhancing the perceived convenience of the app.

Additionally, while previous research suggests m-commerce applications are used for utilitarian purposes and influenced by utilitarian variables (such as ease of use and usefulness), retailers should acknowledge the importance of enjoyment obtained from using the application. Particularly, this research finds that enjoyment plays an important role during the initial adoption on influencing customers to engage with the m-commerce application.

Moreover, it is important that providers of m-commerce applications are aware of the different variables influencing engagement with the smartphone app depending on the location of use. The level of enjoyment obtained from interacting with the app is more influential on continued customer engagement with the app when the app is used at home. On the other hand, utilitarian variables of perceived ease of use, perceived usefulness and convenience are more influential on customer engagement with the app when it is used on the

go. Thus, it would be advantageous for m-commerce app providers to understand where consumers primarily use their application to adapt the app to the key variables influencing customer engagement.

As previously mentioned, inherent to mobile applications is the ability to provide an enhanced customised experience. M-commerce app providers should ensure functionality that allows customers to customise their experience, unique to their needs, i.e. being able to filter content, favourite content, apply parameters to search and be presented with personalised information, while utilising customer's data to provide an enhanced service, such as customer behaviour within the app, age, gender and location to provide a personalised service.

Overall, continued usability testing on the perceived ease of use, perceived usefulness, convenience and enjoyment obtained from using the app would help to ensure customers are provided with an app that they are likely to continually engage with. The outcomes of engaging with an m-commerce application have been established, thus, outlining that not only do m-commerce mobile applications offer a channel of service deliver but also a means of enhancing positive customer attitudes towards the brand and customer loyalty towards the brand.

LIMITATIONS AND FUTURE RESEARCH

While this research takes the initial steps in developing our understanding on the determents and outcomes of customer engagement with m-commerce applications, the findings and implications of the research are partially constrained by certain limitations, some of which provide opportunities for further research. Firstly, in line with many other longitudinal studies, the sample size obtained during the second period of data collection reduced due to participants not responding and dropping out of the research, however an appropriate sample was still obtained. Secondly, this research focused on apparel m-commerce applications, while it would seem reasonable that the findings would extend to different types of m-commerce applications it would be advantageous for future research to explore other types of m-commerce applications to provide a wide-ranging understanding.

In addition, this research did not focus on the quality of the products, which may influence a customers continued engagement with an m-commerce application, future research could address this gap. Moreover, while this research sheds some light on a contextual factor of

location of use, future research could expand upon such locations to provide a further in-depth understanding of different locations of use, such as the influence of in-store mobile app usage.

While the variables studied in this research explain 66% of the variance in consumer engagement with mobile applications, this research is not conclusive of all the variables capable of influencing engagement. Thus, future research should explore other variables from the extended TAM model, SDT and TTF.

Lastly, this research affirms the role of app customisation in enhancing customer engagement with m-commerce applications. Future research could explore the exact features of app customisation that have the greatest effect on customer engagement.

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