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Clustering consumers' shopping journeys: eye tracking fashion m-retail

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Abstract

Purpose

Despite the rapid adoption of smartphones among digital fashion consumers, their attitude to retailers' mobile apps and websites is one of increasing dissatisfaction. This suggests that understanding how mobile consumers use smartphones for fashion shopping is important in developing digital shopping platforms that fulfil consumer' expectations.

Design/methodology/approach

For this research, mobile eye tracking technology was employed in order to develop unique shopping journeys for 30 consumers, using fashion retailers' websites on smartphones, documenting their differences and similarities in behaviour.

Findings

Based on scan path visualizations and observed shopping experiences, three prominent mobile shopping journeys and shopper types were identified, namely *'directed by retailer's website'*, *'efficient self-selected journey'* and *'challenging shopper'*. These prominent behaviour patterns were used to characterise mixed-cluster behaviours, and three distinct mixed-clusters were identified, namely *'extended self-selected journey'*, *'challenging shoppers directed by retailer's website'* and *'focused challenging shopper'*.

Research limitations/implications

This research argues that mobile consumers can be segmented based on their activities and behaviours on the mobile website. Knowing prominent shopping behaviour types any other complex behaviour patterns can be identified, analysed and described.

Practical implications

The findings of this research can be used in developing personalised shopping experiences on smartphones by feeding these shopper types into retailers' digital marketing strategy and Artificial Intelligence (AI) systems.

Originality/value

This paper contributes to consumer behaviour literature by proposing a novel mobile consumer segmentation approach based on detailed shopping journey analysis using mobile eye tracking technology.

Keywords: Mobile consumer, fashion consumer behaviour, consumer segmentation, eye tracking, shopping journey

1. Introduction

With rapid adoption of smartphones, retailers have seen major shifts in consumer shopping behaviour with more than half of e-commerce sales initiated via smartphones. Fashion is the most popular category bought online in the UK, and online sales of fashion account for 24% of total fashion spend in 2017 (Mintel, 2017). Digital users spend over 61% of shopping time using mobile devices, but only 45% of them are satisfied with retail mobile apps and websites (Euromonitor International, 2016). However, 80% of digital users expect mobile experiences to be 'higher or equal to experience offered on the desktop website' (IBM, 2015). Retailers experience an increase in mobile traffic, but the conversion rate is still lower than on the desktop (Internet Retailing, 2016c). The majority of mobile consumers are dissatisfied with retail mobile apps and websites, as they encounter various issues when shopping via smartphones. The most affected companies are those operating in digital-only environments, as digital space is the only touch point with their customers.

The field of m-retail is attracting interest from researchers, but many use traditional marketing tools and concepts developed from high street retailing. This research study makes use of tools that have only recently become available, together with the willingness to question received wisdom on market segmentation.

2. Literature Review

As m-commerce has been analysed often from a perspective of an extension of e-commerce, mobile consumer segmentation models are adopted from the same source (Zhang et al., 2013). Another possible perspective to research m-commerce is as a unique segment of e-commerce with fundamentally different interaction modalities and features which are not available in the traditional e-commerce environments (Kourouthanassis and Giaglis, 2012). This study takes an open stance towards mobile consumer research in order to explore potential m-retail strategies for consumer acquisition and conversion marketing. Retailers are relying on digital analytics data, and adopting existing models and theories is no longer realistic as mobile is changing the ways users behave. Therefore, identifying novel methodologies for analysing mobile consumer behavioural habits on smartphones and predicting future behaviour patterns based on consumer data are required. An overview of previous studies showed that research in the area of mobile marketing has been explored from the perspective of businesses, rather than that of consumers (Büyüközkan, 2009; Davis & Chaudhri, 2012; Huang, 2011; Huang, 2012; Pantano, 2016; Scharl et al., 2005).

Previous studies have analysed differences in mobile usage (Sinisalo & Karjaluoto, 2009), influences on purchase intention (Bellman et al., 2011), major consumers' motivations to use the mobile shopping channel (Grant & O'Donohoe, 2007; Yang & Kim, 2012), and behavioural intentions towards mobile shopping (Gao et al., 2010; Bellman et al., 2011; Gao et al., 2012; Wells et al., 2012; Holmes et al., 2013). Others have analysed m-commerce usage activities in relation to demographics and motivations (Chong, 2013), gender, convenience (Okazaki & Mendez, 2013) and decision-making process (Holmes et al., 2013). In order to maintain consumers' interest, 'retailers, digital marketers and website developers have to understand new consumer types' (Tupikovskaja-Omovie et al., 2014).

Fashion websites and advertisement on mobile devices have been analysed using static eye trackers in a form of static pictures or manipulating elements of the website (Chae, 2016; Huang and Kuo, 2011; Ho, 2014; Wang et al., 2014). The investigation of stimulus from dynamic environments during the actual shopping process online is limited (Huddleston et al., 2015; Tupikovskaja-Omovie & Tyler, 2018; Tupikovskaja-Omovie et al., 2015). Furthermore, the majority of previous eye tracking studies analysing fashion websites (Benn et al., 2015; Djamasbi et al. 2010a,b; Gidlof et al. 2012; Guo et al. 2015) excluded the payment stage,

which can reveal crucial usability issues of the retailer's website as well as how mobile consumers approach payment on smartphones (Tupikovskaja-Omovie & Tyler, 2018). Therefore, this paper aims to answer the following research question: What are mobile consumers' browsing and purchasing behaviour patterns in fashion m-retail?

3. Methodology

Eye tracking technology was used in this research to record fashion consumers' behaviour on smartphones while browsing and shopping on fashion retailers' websites. In order to ensure the same conditions for all participants and eliminate any bias during the data collection, all participants of this research study were given the same smartphone, iPhone 8, connected to the same Wi-Fi. This paper analyses consumer behaviour on two fashion retailers' websites on smartphones. A major retailer of fashion leisurewear was involved in the first part of this research, and is anonymised for the analysis. In this paper, this fashion leisurewear company is called the fashion retailer R-A. Its current online business has over 310K unique users per year, and over 52% of them use smartphones to access the website. The second part of this research explores a major high street fashion retailer's website, this retailer is anonymised as fashion retailer R-B.

After consultation with the fashion retailers' R-A and R-B customer databases, it was established that the majority of the retailers' customers use iPhones for shopping on their website. Therefore, participants were recruited and selected based on the following criteria: own an iPhone and have experience with shopping on smartphones on the fashion retailer's website. A total of 14 participants successfully completed the study with retailer's R-A website on smartphone, aged 18 to 34 years old. Half of them identified as females, and 50% as males (Table 1). All of these participants were working adults and they were given a promotional voucher code for the retailer's website as an incentive to join this study.

Table 1: Sample description of fashion retailer R-A (P1, P2… P14 – participant number, F – female, M – male).

Participant	Gender	Browser
P1	F	Safari
P2	F	Google App
P3	F	Safari
P4	F	Safari
P5	F	Google App
P6	M	Chrome
P7	M	Safari
P8	M	Safari
P9	M	Chrome
P10	F	Safari
P11	M	Safari
P12	M	Google App
P13	M	Safari
P14	F	Chrome & Safari

For the second eye tracking study with fashion retailer's R-B website, a total of 16 female participants aged 18 to 34 years old took part in this research. All of these participants were working adults and none of them were incentivized to join this research.

All participants browsed the same fashion retailer's website using the same smartphone. The participants were provided with a set budget of £55 (max) and instructed to purchase up to 2 items from the fashion retailer's website. For the purpose of this research, a natural and an unobtrusive interaction with retailer's website on a smartphone was required. In order to achieve this mobile eye tracking glasses were employed to record users' interactions with the stimulus (the fashion retailer's mobile website). This allowed the participants to hold the smartphone in the way they were feeling the most comfortable with, also they were able to sit comfortably in any position and posture they chose. SMI Eye Tracking Gasses 2.0 with smartphone-based recorder by SensoMotoric Instruments were used for this research as this eye tracking kit is a light-weight spectacle type which does not limit users' freedom. This allowed for the most natural settings for data collection.

4. Analysis and Results

For the purpose of this research, SMI BeGaze 3.7 software was used to extract the data files from the eye tracking experiments recorded with the mobile eye tracking glasses. A number of different data files were gathered during eye tracking experiments for this research, majority of them are video-based data files. The scan path eye tracking data files were used to develop shopping journeys for each participant. These shopping journeys account for each step in the user's journey and go beyond merely counting clicks (Tupikovskaja-Omovie & Tyler, 2018). These shopping journeys record where the participants were looking at even if they did not click on anything there. Such important elements of the browsing experience as checking customer reviews or suggested products were logged into these shopping journeys, as well as filtering options these users were selecting.

4.1. Females versus Males Comparison – Digital Fashion Consumer Behaviour

Having an even gender split of the sample for the retailer R-A, it was possible to compare female versus male behaviour differences on the website. The data gathered during eye tracking experiments as well as information logged from each shopping journey were aggregated into individual tables. These data were further processed to calculate the average numbers of steps on the home page, browsing, on product pages and at the checkout, the average numbers of product pages visited and the average number of products added to the basket for a sample of females and males (Figure 1). Surprisingly, in regards to browsing behaviour and numbers of steps conducted by users on smartphones both females and males performed relatively similar activities. These findings suggest that the gender is not the key criterion for differentiation between mobile fashion consumers, and deeper understanding of their behaviour is required in order to segment these users into meaningful and useful clusters for retailers' use.

	Total number of steps	Number of steps in browsing	Number of steps on product pages	Number of steps at the checkout	Number of product pages visited	Number of unique product pages	Number of products added to the basket	The same product added to the basket twice
F	77	40	12	26	3	3	3	1
M	72	33	11	28	4	4	3	2
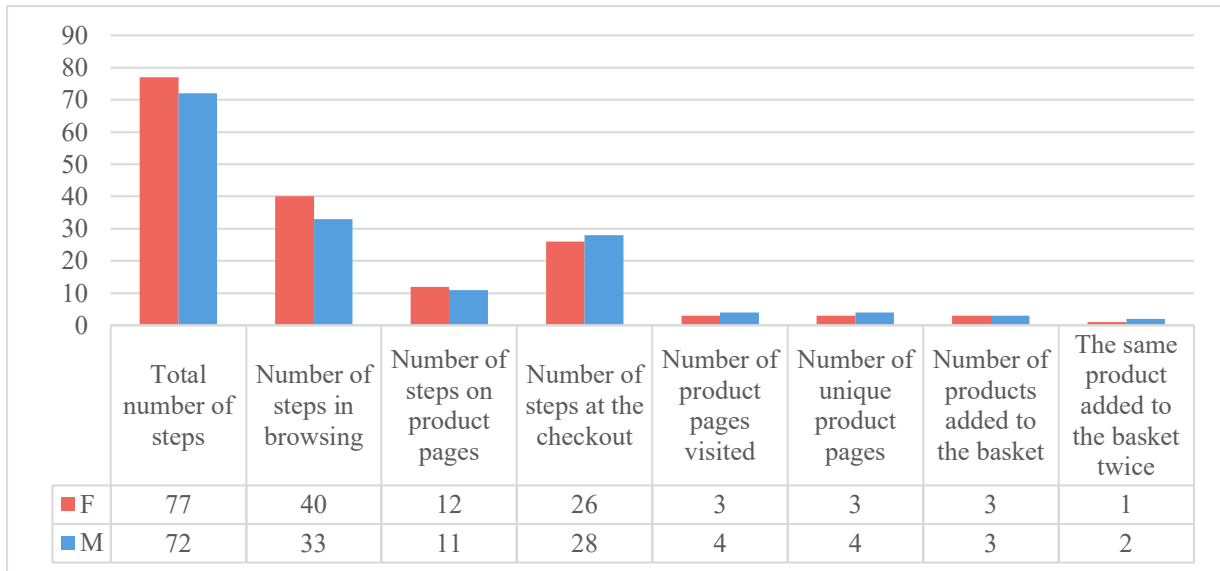
Figure 1: Comparison of gender differences based on numbers of steps for the fashion retailer's R-A website (F - females, M - males).

4.2. Clustering Mobile Fashion Consumers' Shopper Journey Types

Therefore, this research study focused on behaviour analysis irrespective of gender. The aim was to compare all 30 shopping journeys developed for each participant for heterogeneity of behaviour patterns. The initial analysis was conducted using visual examination of these shopping journeys for potential similarities in patterns. All descriptive information about participants' browsing and purchasing activities were recorded in observation notes. Following this detailed analysis of shopping journeys, further clustering was conducted to seek out similar behaviour types. This analysis resulted in identifying 3 prominent shopping journey types and 3 mixed-clusters (Table 2). Using the most distinct examples of these behaviour types, other participants of this study were allocated accordingly to one of these three organic or mixed clusters.

The majority of mobile fashion consumers' shopping journeys showed that almost half of the participants behave in a specific way, these consumers were allocated to Cluster I. The second largest behaviour pattern was observed among 8 participants of this study, these were grouped in Cluster II. The third organic group, Custer III, has been recorded with 3 participants. These three prominent shopper types are presented in further sections of this paper (Sections 4.3.1., 4.3.2. and 4.3.3.). Three mixed clusters, Clusters IV, V and VI, are described based on the characteristics of the shopper types of the Clusters I, II and III (Sections 4.4.1., 4.4.2. and 4.4.3.).

Retailer	Participant	I	II	III	IV	V	VI
R-A	P101		✓				
	P102						✓
	P103				✓		
	P104				✓		
	P105		✓				
	P106	✓					
	P107		✓				
	P108			✓			
	P109	✓					
	P110	✓					
	P111					✓	
	P112	✓					
	P113	✓					
	P114		✓				
R-B	P201	✓					
	P202			✓			
	P203		✓				
	P204	✓					
	P205		✓				
	P206		✓				
	P207	✓					
	P209	✓					
	P301	✓					
	P302			✓			
	P303						✓
	P304				✓		
	P305					✓	
	P306		✓				
	P307	✓					
	P309	✓					
Total	30	12	8	3	3	2	2

4.3. Prominent Shopping Behaviour Clusters

4.3.1. Cluster I - Directed by Retailer's Website

Fashion shopper journey type in cluster I can be described as **'directed by retailer's website'** (Figure 2). The participants displaying this type of shopper journey followed the default website layout and view search results as displayed on the website in its default version. These shoppers browse the search results of any category by viewing all products page by page, without changing the display of the search results. They did not use any of the options to change the number of products displayed per page, but just followed this pre-set environment. These shoppers wanted to check all available products of the selected category, therefore, they scrolled through all search results pages, from page 1 till the last page. In some cases there were 12 search results pages, and in some up to 26 pages, and these users felt they had to click through the entire collection of products in the category to avoid missing good products. Therefore, these users clicked through pages 1 to 12, and then back through pages

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12 to 1, until they saw the product that has captured their attention earlier. Although, their browsing experience seems prolonged, but they were able to select desired products very quickly after viewing all available products. Therefore, the actual decision-making process was easy and smooth. In total 12 out of 30 participants were allocated to the Cluster I, and this type of behaviour has been identified as the most common browsing pattern.

Figure 2: Shopping Journey for Cluster I (P106).

Figure 3: Shopping Journey for Cluster II (P101).

4.3.2. Cluster II - Efficient Self-Selected Journey

Fashion shopper type of the second cluster displayed the most **'efficient self-selected journey'** (Figure 3). These users have a very clear idea about what product(s) they are looking for and are exceptionally focused in achieving their shopping goals. These users have preferred ways of browsing, they change the display settings to create a more personalised shopping experience. They use a variety of available filters by combining several filtering

options in order to find their desired products quicker. Some of these users were more fashion driven, and they liked to see the most popular products in the category by applying the sorting option. The search results were presented in 'page by page' view in the default version of the retailer's website, but it did not match these users' preferences. These users always change the default version of this retailer's website to be able to view all products in one long page. A total 8 out f 30 participants behaved in this way, suggesting that this browsing behaviour pattern is the second most common way of shopping on smartphones.

Figure 4: Shopping Journey for Cluster III (P108).

4.3.3. Cluster III – Challenging Shopper

Although, the cluster III had only three participants grouped, their browsing behaviour is very distinct from the two previous clusters. The users from the Cluster III are the most **'challenging shoppers'** (Figure 4) because they are unable to decide quickly. These customers hardly use any of the filtering options available, they only made use of menu categories as the means to find desired products. They spend a lot of time browsing and view many more product pages than users from Clusters I and II. What is most significant with these challenging users is that they view the same products several times. This is mainly due to the need to compare not only the different products, but also to compare different colours of these products.

4.4. Mixed-Clusters

Following a detailed analysis of all shopping journeys, it became apparent that not all users can be assigned to one of the three prominent clusters, Clusters I, II and III, described above. Most importantly, some users have more complex behaviour patterns than others, prompting the idea of mixed-clusters. Although, a total of 7 out of 30 participants exhibited one of the mixed-cluster behaviour patterns, these users might represent an important consumer target for retailers dependant of their spending power. Therefore, the following sections will describe their behaviour characteristics using the parameters from Clusters I, II and III.

4.4.1. Cluster IV – Extended Self-Selected Journey

The major behaviour pattern within the mixed-cluster category is Cluster IV, which groups users who exhibited **'extended self-selected journey'** accounting for 3 out of 7 fashion consumers. These users applied 'refine' function when browsing but not as actively as the Cluster II. Refining is rather an occasional approach towards the second half of the shopping journey, which is applied when ordinary 'Menu' categories do not deliver desired results. These users are quite similar to the Cluster I as they tend to view all available products within the search results in order not to miss anything useful. Furthermore, even the refined search results are viewed with a great attention and scrutiny.

4.4.2. Cluster V – Challenging Shopper Directed by Retailer's Website

This consumer group represents the most struggling fashion consumers, who are **'challenging shoppers directed by retailer's website'**. These users combine the attributes of the Cluster I and III. They try to view as many products as possible going from page 1 all the way to the final page of search results, but then find it difficult to recall all the products seen. Therefore, these users have to go back and forth viewing the same products several times. These users would benefit from a clear section on the website displaying 'previously viewed product', which would make their browsing experiences more satisfying and efficient.

4.4.3. Cluster VI – Focused Challenging Shopper

'Focused challenging shopper' displayed rather quite unique behaviour pattern, which is similar to Clusters II and III. These users use 'refine' function consistently in order to find desired products, often relying on social influences, looking at 'best-selling' products and customer reviews. As these challenging shoppers struggle to make their decisions quickly, they develop an unique strategy to ease their browsing experiences. These users add many products to the basket to help to compare them and choose.

5. Discussion

Customer segmentation is often based on demographics and reported usage activities. Digital consumer segmentation has been based on internet usage, perceived risks, website attributes, intent to do online purchase in future, preference for website attributes (Mathew, 2016), and patterns of medium preference for loyalty programs accompanied by socio-demographics (Ieva and Ziliani, 2017). Within the mobile consumer group, researchers are looking for new segmentation approaches which would more directly reflect actual consumer activities on smartphones. Examples include the purchase rate, lifetime duration, average spending estimated from purchase history data (Morisada et al., 2019) and the perspectives of the usage of the network and the usage of content services (Hamka et al., 2014). Multi-channel fashion retailers have seen shifts in consumer shopping behaviour, and current shoppers are avid mobile users. 77% of fashion consumers use their phones for browsing fashion and 68% use smartphones to buy fashion (Drapers, 2019). When m-retail becomes the dominant platform, segmentation of the consumer base, shopping journeys and customer experience become vital for retailers. Fashion retailers acknowledge that getting the mix right is important for different groups of customers and focusing on convenience has become a significant priority. However, the research into mobile consumer segmentation within fashion e-commerce is limited. This paper has proposed an innovative approach to segmenting mobile fashion consumers based on actual digital user behaviour using eye tracking data.

6. Conclusions

This research suggests that gender differences may be irrelevant when shopping via mobile devices. Furthermore, depending on the individual's goals and decisiveness, mobile consumers display three prominent and distinct types of shopping behaviours, which can be applied in understanding more complex shopping behaviour patterns. These different approaches have implications for mobile app and website design. It would be useful to explore these shopper behaviours on other retailers' mobile websites and to investigate if these proposed types of browsing are constant to the same digital user or adaptable depending on the situation and need.

The three shopping journey types identified in this research can be further validated by extending the sample size for analysis. There is a need to verify if these shopping behaviours are applicable equally to females and males. The knowledge developed during this research study can be applied in granulating the retailer's digital customer profiles by merging the data based on personality traits, budget, lifestyle and product preferences with shopping behaviour

types and browsing styles. Knowing prominent shopping behaviour types any other complex behaviour patterns can be identified, analysed and characterised. This understanding of mobile consumer types can be applied by fashion retailers in developing AI frameworks, enhancing personalisation and implementing marketing strategy. When guided by this knowledge, the retailers' digital and marketing teams will be able to better target their customers and offer a personalised shopping experience satisfying digital consumer' needs.

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