

Cross-visiting Behaviour of Online Consumers Across Retailers' and Comparison Sites, a Macro-Study

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Abstract

Extant academic research provides a comprehensive view of online consumer behaviour on a single website, paying less attention to the integrated environment in which websites operate. Retailers' products, however, are not only available on their own website, but also through other connected channels such as comparison sites. Our limited knowledge of consumers' integrated behaviour across the entire market poses difficulties to design effective online strategies. At the same time, practitioners have mainly focused on website performance measures, ignoring the reasons behind the behaviour of consumers. A deeper understanding of consumers who visit different websites or, cross-visit, can inform successful online channel strategies. This macro-level study aims to bridge this gap by investigating how the usage behaviour on retailers' websites and comparison sites influences each other, using large-scale industry-based data. A new measure of 'cross-visiting' behaviour is introduced and examined.

Keywords: cross-visiting; comparison sites; search behaviour; e-services; usage behaviour

1. Introduction

Over the past decades, the Internet has immensely transformed the retailing industry. It has not only altered the level of competition and market structure, but also created opportunities for emergence of new forms of intermediaries. For instance, online intermediaries such as comparison sites have become a fundamental part of online retailing scene (Armstrong and Zhou 2011), with 85% adoption rate in the UK (Hanson et al. 2017). Comparison sites are vertical search engines that offer helpful information to consumers by conveniently aggregating products from various retailers in one place (Laffey and Gandy 2009). They affect the behaviour of consumers by changing their search and decision-making processes (Bodur et al. 2015) and influencing their switching behaviour (McDonald and Wren 2012). Therefore, consumers who visit comparison sites may behave differently on retailers' channels. Understanding their holistic and interrelated behaviour where retailers' websites and comparison sites cohabit is essential.

Consumers search for and compare alternatives across different websites (Balasubramaniam et al. 2005; Chatterjee 2010; Wang et al. 2018) and move from one to another for a single purchase (Choudhury and Karahanna 2008). During their journey, they may visit both retailers' website and comparison sites; this translates into cross-visiting behaviour between the two. Their behaviour on one website is influenced by previously visited ones (Park and Fader 2004). However, consumers' holistic behaviour and the way they search and move across different websites has received little attention (Wang et al. 2018). On one hand, studies of comparison sites have focused on their role as standalone decision support systems that facilitate consumer decision-making, even though these websites do not perform in isolation. On the other hand, extant literature on online channels has remained focused on the delivery of products/services through either the retailers' or intermediaries' channel (See Fig 1a). But consumers do not make a 'monolithic decision' between the two; they may simultaneously interact with both retailers and online intermediaries, in other words, cross-visit (See Fig 1b).

Retailing industry suffers from the same deficiencies. Despite their increasing reliance on Web analytics to collect visitors' behavioural data, their measurement metrics are concerned with behaviour on one website or, at best, compare the reach from different sites, rather than capitalizing on cross-visiting behaviour. Moreover, these

metrics are treated as standalone granular performance measures that their relation to consequent behavioural measures has remained unclear. Hence, these measurement systems are not used to their potential and for strategic purposes (Järvinen and Karjaluoto 2015).

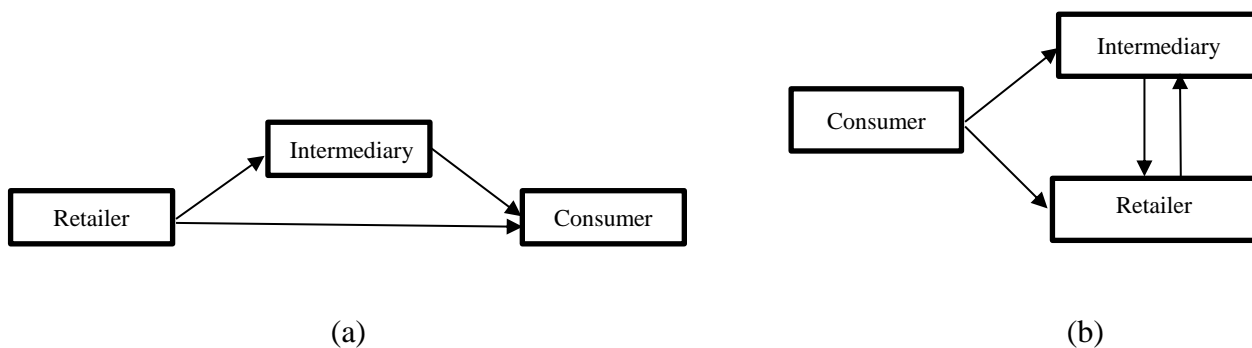


Fig 1: Two approaches to consumers' online channel usage: a) abiding channel behaviour b) dynamic cross-channel behaviour

This research explores how consumers actively engage with this entangled network of retailers and intermediaries and, through their behaviour, shape cross-channel interrelations. It addresses a number of important frontiers in Information Systems that concern academics and practitioners. At first, it introduces a new measure of cross-visiting that captures entangled interactions of consumers on online platforms and complements conventional measures (Aydin and Perdahci 2019). Then, it draws on a large-scale tracking data of million users across different websites to analyze consumers' holistic behaviour. Examining real-life logs of user behaviour is increasingly important, as it captures the actual usage rather than users' intension (Wang et al. 2010) and provides valuable insight into online behaviour (Wang et al. 2012; 2015). In addition, actual usage does not rely on participant's self-reported behaviour. This is advantageous because usage data retrieved from system logs is not necessarily correlated with subjective self-reported usage (Albashrawi et al. 2019). In addition, measuring the actual behaviour of consumers can create business insights by offering valuable usage-based segmentation (Trivedi et al. 2018).

Finally, the importance of cross-visiting is not confined to its occurrence but to its ability to explain consequent behaviour. This research examines the relation between cross-visiting and other important behavioural

measures. It is motivated by retailers' profound reliance on tracking data from Web analytics, while such measures are not yet connected to other performance/behavioural measures. Therefore, two phenomena associated with consumer cross-visiting behaviour are tested. First, cross-visiting with comparison sites may affect the extent of search behaviour on retailers' website. That is because comparison sites encourage asymmetric behaviour across different retailers (Iyer and Pazgal 2003) and alter consumers' information search (Breuer et al. 2011). Second, use of retailers' e-services could relate to the portion of switching-related activities, i.e. cross-visiting with comparison sites. Customers who tend to be frequent users of retailers' services are less likely to actively research competitors on comparison sites (Keaveney and Parthasarathy 2001). E-loyalty is an important measure of success in online channels (Chen et al. 2015).

This research contributes to the literature by examining the cross-visiting behaviour of consumers between comparison sites and retailers' websites. Findings inform managers on how to devise successful segmentation and distribution strategies across their online network. In addition, this research bridges the gap between academic research and managerial practices by using industry-based measures to test theoretically important questions. The objectives of this paper are as follows:

- First, a measurement framework is introduced to examine various aspects of consumer 'within-site' and 'cross-visiting' behaviour.
- Second, the relation between cross-visiting and search behaviour on retailers' website is examined.
- Third, the relation between e-service usage behaviour and the extent of switching-related activities is tested.

To do so, the interactions of consumers with all the retailers and main comparison sites are analyzed in two UK markets: mobile network providers and banking sector. These two sectors are of particular interest to this research, because comparison sites have introduced significant changes to their consumers' search and switching behaviour. Whereas they highly depend on long term and continuous use of their services and consumer switching has a shattering effect on their bottom lines (Keaveney and Parthasarathy 2001).

2. Research background

2.1. Consumers' behaviour across the network

Researchers have long emphasized the importance of understanding consumer cross-channel behaviour (Montoya-Weiss et al. 2003; Xiao et al. 2019), focusing mainly on retailers' online and offline channels (e.g. Dholakia et al. 2005; Konus et al. 2008). They have identified consumer preferences and determinants of online channel use (Neslin et al. 2006; Ansari et al. 2008; Montoya-Weiss et al. 2003). But only a handful of studies have recognized the role of online intermediaries that operate alongside retailers within the market (Nicolau 2013; Magnini and Karande 2011; Su 2007), with no attention being paid to cross-channel behaviour between retailers' and intermediaries' websites. It is consumers' dynamic interactions with both channels that shape their overall purchase behaviour (Karimi et al. 2010), making it crucial for firms to understand cross-channel activities.

At the same time, online search behaviour has become more and more complex. Consumers are able to access product information from variety of sources. They visit different retailers and perform cross-site search activities (Su 2007) to reach a decision. Complex product purchases, in particular, involve collecting information from diverse range of sources and consulting impartial information from online intermediaries (Urban et al. 2000). Therefore, consumers move across different retailers' sites (Balasubramaniam et al. 2005; Chatterjee 2010) and comparison sites (Magnini and Karande 2011; Nicolau 2013) to maximize their purchase utility. This leads to high degree of complex cross-visiting behaviour on the network.

To provide a comprehensive understanding of consumers' search behaviour across the market, the relation between within-site and cross-visiting behaviour should be explored (Fig 2). This study develops the concept of cross-visiting by drawing on measures of behaviour in a single website (Montgomery et al. 2004; Park and Fader

2004; Johnson et al. 2004) and industry-based metrics. A measurement framework that is managerially relevant and can capture and examine the behaviour in a more holistic manner is introduced.

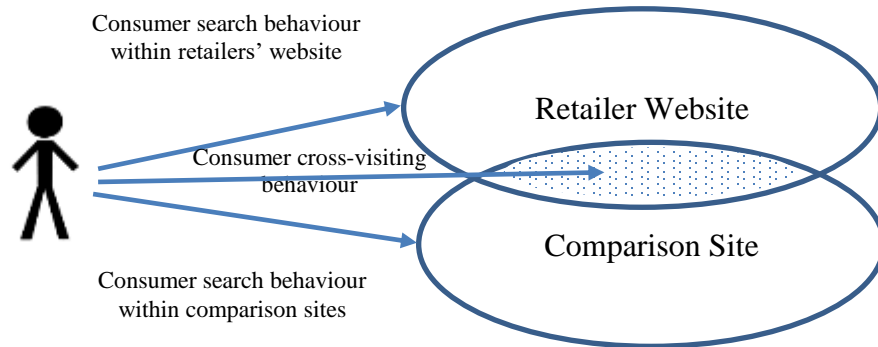


Fig 2: Consumer behaviour across retailers' and comparison websites

2.1.1. Within-site behaviour

Behaviour within a website is related to consumers' use of that website. It can be associated with the level of adoption and usage intensity (Klein 1998; Sproule and Archer 2000). Level of adoption shows the portion of the population that uses a particular website, channel or service. It captures the total number of consumers, as unique visitors (UV), who have used the Internet to reach retailers or comparison sites. While usage intensity shows the depth of online activities that consumers engage with. It is associated with the amount of information that is retrieved and evaluated on a website (Klein 1998; Rozic-Hristovski et al. 2002). Usage intensity or engagement in an online environment has been previously measured by the duration of visit (Ip and Wagner 2008; Trivedi et al. 2018) and number of pages visited (Rozic-Hristovski et al. 2002). These measures capture the behaviour of consumers within one specific website and are used in this research.

Usage behaviour on retailers' website only captures a portion of overall search behaviour. Many consumers choose to perform their search activities on comparison sites and have a relatively high usage intensity within these websites. This is because comparison sites enhance the utility of online purchase by providing helpful aggregated

information in one place. They simplify consumer search and evaluation behaviour, reduce confusion, and increase decision satisfaction (Barnes and Hinton 2007; Laffey and Gandy 2009). Therefore, one might expect their adoption and usage intensity to be, if not higher, comparable to retailers' websites.

2.1.2. Cross-visiting behaviour

Online consumers disaggregate their search and purchase activities over available channels and move from one to another (Choudhury and Karahanna 2008; Tih and Ennis 2006), shaping a complex behaviour across different websites. They might visit retailers' website and/or comparison sites to evaluate and purchase products. Their behaviour across the network of multiple websites includes the new concept of 'cross-visiting'. Cross-visiting behaviour occurs when a consumer visits two websites or online channels in one journey.

Studies that account for consumer cross-visiting behaviour are scarce (Chatterjee 2010). However, analyzing the behaviour on one channel, and in isolation, can lead to incorrect conclusions (Anderl et al. 2016). When consumers interact with multiple websites, their behaviour on a particular site is influenced by their activities on previously visited ones (Park and Fader 2004). Cross-visiting retailers' website and comparison sites in one journey means that their behaviour is influenced by the two. Thus, recognizing cross-visiting behaviour is essential to a realistic understanding of consumers. Such knowledge has important implications for those offering their product and services on both channels. This can affect marketing strategies of competing firms (McDonald and Wren 2012), provide some retailers with a higher visibility and enhanced traffic, and influence performance (Su 2007). In addition, cross-visiting with comparison sites is an indicator of the size of price sensitive switchers in the market that can influence targeting strategies of retailers (Iyer and Pazgal 2003; Koçaş and Bohlmann 2008).

2.2. Cross-Visiting and Behaviour on Retailers' Website

Despite the dependency of behaviour on different websites, the relation between cross-visiting and within-site behaviour has not been previously examined. It is already known that comparison sites alter the way consumers interact with retailers (Armstrong and Zhou 2011). By allowing users to compare prices and product information (Anderl *et al.* 2016), they influence the information search behaviour (Peterson and Merino 2003) and purchase

decisions (Haubl and Trifts 2000). The distribution of online activities, i.e. search, over different retailers is also transformed due to the way consumers interact with these websites (Brynjolfsson et al. 2010). Therefore, cross-visiting with comparison sites may alter the behaviour on retailers' online channel.

More specifically, comparison sites facilitate information search and evaluation, and simplify consumer problem-solving behaviour (Anderson and Anderson 2002; Sarkar et al. 1995). By providing effective information, they can reduce the time and effort allocated to search activities (Eighmy and McCord 1998; Klein 1998). In other words, use of comparison sites can simplify decision making and reduce cognitive effort on retailers' website. When consumers visit comparison sites, a link takes them directly to the product page on retailers' site (Breuer et al. 2011) minimizing their navigation. Therefore, use of comparison sites affects the usage intensity on retailers' website in terms of number of pages visited and time spent. This study examines whether a higher level of cross-visiting between a retailer and comparison sites will result in lower usage intensity (less time spent and fewer number of pages visited) on the retailer.

H1a: The level of cross-visiting with comparison sites is negatively related to the duration of visit on retailers' website.

H2b: The level of cross-visiting with comparison sites is negatively related to the number of pages visited on retailers' website.

2.3. E-service Usage Behaviour and the Extend of Switching-related Activities

The level of involvement with e-services determines consumer switching intentions (Dabholkar and Walls 1999) and can lead to different price comparison behaviour. Higher usage creates psychological attachments which can affect retention (Xiao et al. 2019), hence switching intentions. Study of Keaveney and Parthasarathy (2001) is one of the very few that have investigated the relationship between level of service usage and switching behaviour. Their findings show that more intensive use of services will result in lower switching behaviour. This is because intensive use of retailers' services leads to higher satisfaction with the service, and consumer satisfaction with the service determines their behavioural intentions and loyalty (Dai and Salam 2019; Wang et al. 2004). Higher service

usage is associated with lower service failure and occurrences of disconfirmation of service quality. Consumers compare the quality of a service with a norm or standard expectation they have from the service. A frequent service usage behaviour provides accurate and realistic performance expectations (Keaveney and Parthasarathy 2001) that lead to loyalty or lower switching intentions (Anderson and Sullivan 1993). In addition, frequent service usage leads to consumer learning that is an important predictor of switching intention in online environment (Hoch and Deighton 1989). When consumers become familiar with an online service, they are less likely to switch to competitors. Use of e-services, therefore, affects the switching intentions of consumers.

Switching intentions on the internet are indicated by cross-visiting and search activities on other retailers and comparison sites (Srinivasan et al. 2002; Koças and Bohlmann 2008). Unlike switchers, loyal customers do not perform comparison across retailers (McDonald and Wren 2012) and do not use comparison sites (Iyer and Pazgal 2003). It is expected that more intensive use of a retailers' e-services by its consumers would increase the share of satisfied loyal customers compared to switchers. Having a lower share of switchers is associated with less switching-related activities on retailers' online channel such as use of comparison sites. Therefore, those retailers whose e-services are used more intensively may have a smaller share of switchers, hence, less switching-related activities on their online channel, i.e. cross-visiting with comparison sites. E-service usage can be defined in terms of its frequency and duration (Ram and Jung 1990; Keaveney and Parthasarathy 2001). The extent of switching-related activities on each retailer is defined as the portion of activities on retailers' website that contain cross-visiting with comparison sites.

H2a: Frequency of service usage on a retailers' website is negatively related to the extent of switching-related activities.

H2b: Duration of service usage, on a retailers' website is negatively related to the extent of switching-related activities.

2.4. Retailers' Size and the Extent of Switching-related Activities

The size of a retailer may also be related to the extent of switching-related activities performed by its customers. The number of loyal customers is highly correlated with the firm's size (McDonald and Wren 2012). Larger and more well-known firms focus mainly on loyal customers and charge higher prices. Smaller firms that have fewer loyal customers are more inclined to attract switchers by offering promotions or additional benefits compared with larger ones (Koçaş and Bohlmann 2008). Loyal customers have a high degree of loyalty and stay with the firm. They do not search competitors' products (McDonald and Wren 2012) or use comparison sites (Iyer and Pazgal 2003). In fact, loyalty towards an online retailer is indicated by the absence of search across other retailers (Srinivasan et al. 2002; Koçaş and Bohlmann 2008). Switchers, who are price sensitive, are not loyal to any retailer and switch to the one with the best offer. They use comparison sites to compare and locate the best option (Iyer and Pazgal 2003). Therefore, the extent of switching-related activities on retailers' website is expected to be higher for smaller retailers compared to larger ones as they attract switchers.

H3: A retailer's size is negatively related to the extent of switching-related activities on its online channel.

3. Research Method

3.1. Data Collection

For the purpose of this research and in order to analyze the actual behaviour of consumers who visit retailers' and comparison sites, data was collected from an online panel data provider that measures the behaviour of consumers across the entire market. Most academic research on multi-channel behaviour has been based on surveys or secondary data. Measuring the actual channel usage behaviour is, however, encouraged (Konus et al. 2008). Actual usage data collected through tracking methods allows researchers to form an accurate understanding of online behaviour. This data goes beyond the purchase activity (Van den Poel and Buckinx 2005) and provides detailed analysis of all interactions with retailers. Tracking data can reveal the actual behaviour over time, eliminating the limitations of laboratory experiments. In addition, it captures the behaviour as it occurs and does not rely on self-reported behaviour. It also has the advantages of self-administrated results, such as eliminating the

effect of the researcher, social desirability and time pressure (Kiesler and Sproull 1986; Schwarz et al. 1991). Additionally, this data is more tangible to marketing practitioners, hence enriches the managerial implications of research findings (Houston 2004).

Tracking data has been previously used to measure the behaviour in one particular website (e.g. Montgomery et al. 2004; Moe 2006). However, analysis of data for a single website captures an incomplete view of consumer behaviour; whereas collective behaviour across different websites can depict a more holistic picture (Park and Fader 2004). Online panels offer behavioural data by recording the entire online activities of a very large sample of individuals. They provide interesting insights into consumers' collective behaviour on different websites (Bucklin et al. 2002). In this research, data from an online panel data provider, comScore that tracks the entire behaviour of millions of users was collected. This data source has been used in prior research (e.g. Danaher 2007; Johnson et al. 2003; Koças and Bohlmann 2008; Wang et al. 2018) and includes rich micro-level data on all retailers (Koças and Bohlmann 2008). This advanced real consumer data could therefore be used to understand the behaviour across multiple retailers (Hinz et al. 2011; Van den Poel and Buckinx 2005).

Within- and cross-website behaviour can be measured using online panel data (Karimi 2013). To test the hypotheses, two categories of behavioural data were used: a) consumer within-site behaviour in terms of channel adoption, usage intensity, frequency of using e-services and b) consumer cross-visiting behaviour across multiple websites. The data is based on a sample of over 2 million unique visitors. Three-month behaviour of UK consumers on all retailers in the selected sectors was collected for two consecutive years.

3.2. Measurements

Common measures of within-site usage behaviour which are widely used in industry and academic research were adopted. Due to the absence of a measurement that can capture the cross-visiting behaviour, new measurements were developed. Inclusion of both within-site and cross-visiting measures enables a much more detailed evaluation of online behaviour.

Data was collected to measure the online channel adoption, usage intensity, level of cross-visiting, and extent of switching-related activities. In order to examine the adoption of online channels, two most common

measures of online usage, number of unique visitors (Tarafdar and Zhang 2005) and reach (Li and Wang 2011), were collected. Number of unique visitors (UV) indicates the extent to which a channel or website is accessed by consumers. Reach measures the portion of the population using a channel or a website, which is a direct measure of channel adoption by consumers. Duration and number of pages visited (Ip and Wagner 2008; Rozic-Hristovski et al. 2002) for the entire website as well as product-related pages were examined to assess the intensity of website usage. To test H1, data from the product sub-domain was used in order to eliminate those consumers who visit the website for any reason other than product search, i.e. use of services. Duration and frequency of using online services (Keaveney and Parthasarathy 2001) were also collected for the service sub-domains. Frequency of service use was defined as the number of times that customers engaged with online services and was operationalized as the number of repeated visits. Duration of service usage was measured by the interaction time with e-services. In addition to above within-site measures, this panel provides data on the number of consumers who visit both of any two selected websites. This is termed cross-visiting data. This measurement is of particular interest to this research as it indicates the number of consumers who visit both retailers and comparison sites during their information search, and therefore perform cross-visiting in the market. Cross-visiting data between each retailer and comparison sites was gathered. Comparison sites in the financial sector are not limited to banking products; therefore, collected data was limited to the relevant sub-domains of comparison sites that contained banking products only. The extent of switching-related activities was also collected. This measure indicates the portion of activities on retailers' website that is linked to cross-visiting with comparison sites. Similarly, this data was measured for the sub-domain of comparison sites that offers relevant products. Table (1) summarizes all the variables used in this study.

Table 1: Measurement metrics for consumer behaviour on online channels

Measurement	Definition
Number of unique visitors (UV)	The estimated number of different individuals that visited a website, a sector, or a channel during the reporting period
Reach	The portion of the population visiting a particular website or sector
Usage duration	The average length of time spent on the website/e-services
Number of pages visited	The average number of pages visited by visitors
Frequency of use	The average number of visits to a website/sub-domain per individual
Cross-visiting between two websites	The number of unique visitors who visited any two selected websites/sub-domain
Extend of switching-related activities	The portion of activities on retailers' website that illustrates switching intentions by containing cross-visiting with comparison sites

3.3. Selected Sectors: Banking and Mobile Network Providers

Two sectors of banking and mobile network providers were selected as cross-channel behaviour is an important characteristic of consumers in these markets (Montoya-Weiss et al. 2003). Additionally, they are at the forefront of online distribution and show interesting potentials for development.

The banking sector has undergone significant changes in the way that consumers interact with banks. Online banking services have transformed the banking industry through innovation and improved performance (Boateng et al. 2016). Researchers have paid particular attention to online and mobile banking in this sector. However, a report by *Retail Banking Quarterly*, found that UK consumers are conducting more and more search activities for banking products (Greenlight 2014). This in fact has opened a new chapter for this sector, illustrating the use of online channel for information search in addition to online banking services. Moreover, comparison sites have accelerated the growth of online search for banking products. The second sector selected in this research is mobile network industry, which is an important service sector. The mobile network industry has received a major boost

from the advancements and growing trend of smart device usage. Providers are competing intensely for a greater market share. The rapid rate of change in the UK market, in addition to the complexity of networks, tariffs and contracts, makes comparison between different networks and selection of the best value tariff difficult. Therefore, consumers use comparison sites to evaluate different alternatives.

To test the hypotheses, main market players that had over 5% market share (eight banks and six network providers) as well as the two main comparison sites in each sector were selected for further analysis. Similar studies of online retailers have examined comparable number of firms (e.g. Xing et al. 2006; Koças and Bohlmann 2008).

4. Results and Discussion

To understand the behaviour of consumers across retailers' website and comparison sites, first, a complete picture of their interactions with both channels is presented. Then, the way comparison sites influence behaviour by directing consumers to certain retailers is illustrated; and finally, research hypotheses are tested.

4.1. Overall Online Channel Statistics

Table 2 illustrates the aggregated data for banking sector and network providers. It includes main market players (eight banks and six network providers) and the two main comparison sites in each sector. It is clear that a large number of consumers visit retailers' websites in these two sectors. During the observation period, 39.2% and 30.2% of population interacted with main banks and mobile network providers, respectively. As expected, comparison sites are used by a considerable portion of UK consumers, 11% to 22%, that highlights their importance in the market. The usage intensity of these websites such as average usage duration and number of pages visited is comparable to retailers' websites, showing their influence on consumer decision-making. In addition, a noticeable number of consumers visit both comparison sites and retailers' website, as represented by average cross-visiting between the two.

Table 2: Use of retailers' website and comparison sites

Website	Adoption		Usage intensity		Cross-visiting
	Number of UV	Overall Reach % (Reach in their sector %)	Usage duration (min)	Number of pages visited	Average cross-visiting between comparison sites and each retailer in the sector
Eight banks	16,367,000	39.2	2.95	4.96	N/A
Six Network providers	12,886,000	30.2	4.98	8.65	N/A
Comparison site A - banking sector	3,600,000	8.7 (22)	3.7	3.4	597,600
Comparison site B - banking sector	2,700,000	7.1 (16)	5.0	6.2	325,350
Comparison site C - mobile providers	2,100,000	5.3 (16)	5.0	10.3	432,600
Comparison site D - mobile providers	1,400,000	2.3 (11)	3.3	5.3	222,600

4.2. Impact of Comparison Sites on Consumer Search Behaviour

In order to establish the impact of comparison sites on consumers' decision to visit a retailer, a clustering analysis of cross-visiting behaviour on multiple websites was performed. This analysis categorizes websites based on similar cross-visiting behaviour with other websites. Hence, visitors of websites in one cluster show similar behaviour in terms of visiting other websites. Cross-visiting between any two retailers or a retailer and a comparison site ranges from 2% to 30%. Clustering analysis as a classification tool makes no prior assumption about important differences within a population (Punj and Stewart 1983), and therefore is a suitable choice for grouping macro-level data. The preliminary clusters were identified by a hierarchical method of Ward's minimum variance. The dendrogram (Fig 3) shows that the two comparison sites are very similar, while all other retailers tend to be individually positioned in separate clusters, suggesting a level of dissimilarity. This finding indicates that visitors of comparison sites exhibit similar cross-visiting behaviour and visit the same retailers. That is, these sites influence consumers' behaviour by directing them to certain websites and shaping the distribution of customers in the market.

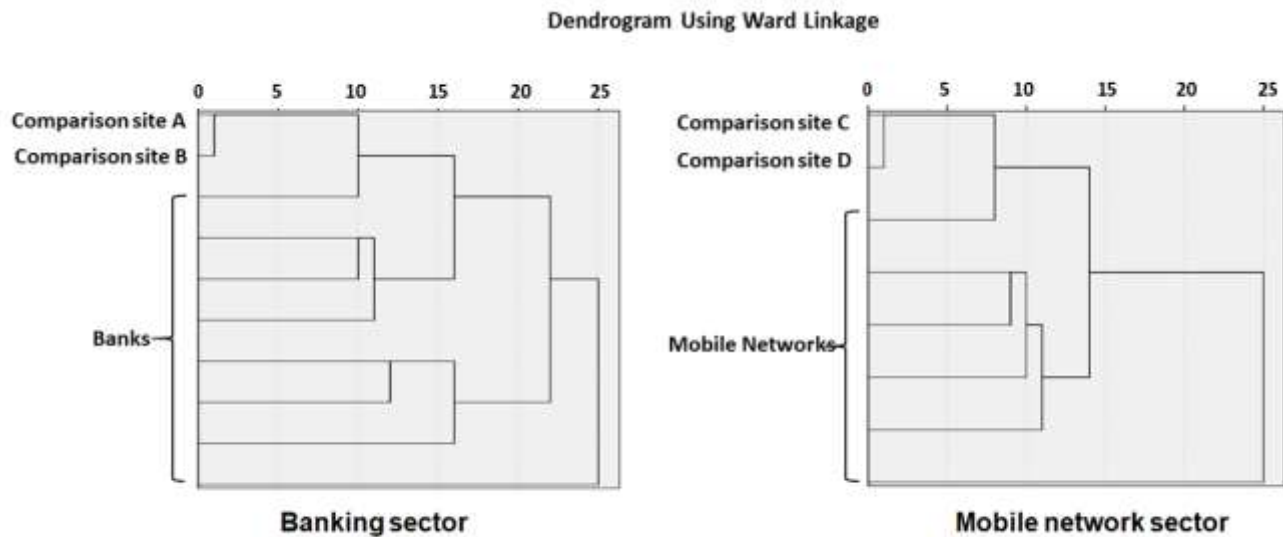


Fig 3: Clustering of retailers' website and comparison sites based on similarity in cross-visiting behaviour across the entire market

4.3. Cross-Visiting with Comparison Sites and Usage Behaviour

To test the impact of cross-visiting with comparison sites on two usage intensity variables, usage duration and number of pages visited (H1a and H1b), multivariate analysis was conducted. The structure of retailers' websites in each sector is very similar; however, there are differences between the two sectors. Sector was used as a control variable to avoid any confounding impact it may have on usage intensity. Tables 3 and 4 show the correlations between variables and the analysis' results. In contrast to the hypothesized H1a and H1b, the level of cross-visiting has a positive effect on the time spend on retailers' website ($F= 6.181, p= .030$) and the number of pages visited ($F=5.048; p =.046$). This positive relationship suggests that comparison sites do not reduce the intensity of search behaviour on retailers' websites; but, as the level of cross-visiting increases, retailers enjoy a more in-depth evaluation of their offerings.

Table 3: Correlations between cross-visiting and website usage behaviour

	Number of pages visited	Duration of visit
Level of Cross-visiting	.475*	.675**
Sector	-.518*	-.523*

*p< 0.05; ** p<0.01

Table 4: Impact of cross-visiting on usage intensity (based on 14 retailers)

Dependent variable	Independent variable	df	MS	F	Sig.	R ²
Number of pages visited	Level of cross-visiting	1	37.250	5.048	.046*	.499
	Sector	1	76.336	10.344	.008*	
Duration of visit	Level of cross-visiting	1	11.077	6.181	.030*	.396
	Sector	1	.200	.112	.745	

* p ≤0 .05

Prior research has used comScore data to perform regression analysis on the same number of retailers (e.g. Koças and Bohlmann 2008). However, due to the limited sample size, I collected data for two consecutive years and treated them as separate observations. Same analysis was conducted on the pooled data that contained a sample of 28 retailers (Table 5). As it can be noticed, the direction of cross-visiting effect on usage intensity remained the same. It must be noted that no effect for the year, as a dummy variable, was found.

Although R square shows a good model fit, due to the nature of this research and number of market players in each industry, this should not be treated as a predictive model. The objective is to test the relations between the independent and dependent variables.

Table 5: Impact of cross-visiting on usage intensity (based on pooled data for two years)

Dependent variable	Independent variable	Df	MS	F	Sig.	R ²
Number of pages visited	Level of cross-visiting	1	82.657	12.395**	.002	.453
	Sector	1	21.757	3.263	.083	
Duration of visit	Level of cross-visiting	1	24.959	12.319**	.002	.540
	Sector	1	18.350	9.057**	.006	

*p< 0.05; ** p<0.01

4.4. The Extent of Switching-Related Activities, Retailer’s E-service Usage Intensity and Size

To test the impact of retailers’ size and e-service usage intensity on switching-related activities (H2 and H3), a series of analysis was performed. The extent of switching-related activities for each retailer was calculated as the portion of activities on its website that illustrated switching intentions and involved cross-visiting with comparison sites. Therefore, this measure is independent of retailers’ size. Two regression models were run to test H2 and H3. First analysis included 14 retailers, with total number of UV (size) and service usage frequency as independent variables and the extent of switching-related activities as the dependent variable. In the second model, the service usage duration was also included, using the two-year pooled data. Table 6 and 7 show the regression results. To test for a potential difference in switching-related activities between the two sectors a t-test was conducted; no significant difference was found ($F=.900$; $p = .362$).

Service usage frequency has a significant negative effect on the extent of switching-related activities. H2a is supported in both models. Those retailers whose services are used more frequently tend to have less switching-related activities on their websites. H2b was not supported. The time spent on using online services does not influence switching-related behaviour of consumers. The size of the retailer does not affect the switching-related activities; H3 was not supported. This sample size may be relatively small for excellent prediction level, but it is adequate for a good prediction (Knofczynski and Mundfrom 2008).

Table 6: Impact of e-service usage and size on switching-related activities (based on 14 retailers)

Independent variable	Switching-related activities					
	B	Sig	Std. Error	Beta	T	VIF
Service usage frequency	-1.586	.016*	.561	-.627	-2.827	1.343
Total number of UV	-.001	.309	.001	-.236	-1.066	1.343

* $p < .05$; R Square: .598

Table 7: Impact of e-service usage and size on switching-related activities (based on pooled data for two years)

Independent variable	Switching-related activities					
	B	Sig	Std. Error	Beta	T	VIF
Service usage duration	.208	.322	.205	.145	1.012	1.068
Service usage frequency	-1.759	.000**	.424	-.685	-4.146	1.420
Total number of UV	.000	.440	.001	-.126	-.785	1.352

* ** $p < .01$; R Square: .539

4.5. Nomological Validity

Usage intensity (duration of visit and number of pages visited) and service usage (frequency and duration of service usage) measures are widely used in extant research. Similar to these measurements, the cross-visiting construct is a clear secondary proxy available on the panel data (Houston 2004) that indicates the exact number of individuals who visit any two selected websites. To verify the construct validity of the extent of switching-related activities, its relation to a broader and a theoretically specified nomological network (Houston 2004) was examined. Nomological validity tests whether a construct performs as expected within its nomological network (Boudreau et al. 2001; McKnight, Choudhury and Kacmar 2002).

Literature suggests that consumer satisfaction is negatively related to switching intentions (Antón et al. 2007; McDougall and Levesque 2000). Additionally, complaint management correlates negatively with switching

intention (Keaveney 1995; Colgate and Hedge 2001). Data on consumer satisfaction and complaint management for each of the retailers was collected from industry reports for the sample years. The two sectors were separated for this analysis as data collection methods were not identical. The correlation coefficient was used to examine the suggested nomological links (Houston and Johnson 2000). Results show that a significant negative relationship holds between switching-related activities and satisfaction in both sectors (Banking: $r=-.80$, $p< 0.05$; Mobile Networks: $r= -.94$, $p<0.01$). Data on complaint management was only available for mobile network providers and showed the percentage of complaints that was resolved. Complaint management was significantly related to switching-related activities ($r= -.82$; $p< 0.05$). The third nomological link is H2. As results are consistent with the theory, confidence in the construct validity of this measurement is adequate.

5. Conclusions and Future Research Direction

Consumers simultaneously interact with different websites and their behaviour is spread across the network. In order to provide a more holistic understanding of their actions, this research explores their cross-visiting behaviour across the entire network of retailers and comparison sites in two selected sectors. More specifically, it (i) illustrates that use of comparison sites is related to information search behaviour on retailers' website and (ii) reports that frequency of using e-service is associated with the extent of switching-related activities, i.e. cross-visiting with comparison sites.

This study addresses an important frontier in information systems – it introduces new measurements that can capture users' entangled interactions on digital platforms. Such measures are critical in understanding the complexities of online behaviour (Aydin and Perdahci 2019). The proposed measurement framework contributes to the literature by examining the interrelation of consumer behaviour across different online channels. For this purpose, a new concept of cross-visiting is presented. Cross-visiting provides a rounded understanding of consumers in the marketplace that standard measures such as market share and total number of unique visitors are not able to provide. This measurement can, to some extent, predict the direction of consumer journey on the Internet and

explain the level of information search effort on retailers' websites. Above all, it is an indicator of retailers' access to potential switchers who are actively searching for a better alternative and use comparison sites; therefore, it provides important and actionable insights to practitioners. Cross-visiting informs the scant literature on underlying mechanisms of information search (Wang et al. 2015) by illustrating users' interrelated search behaviour across the network. It also adds to multi-channel research as current performance outcomes are based on limited measures of cross-channel phenomenon (Cao and Li 2015).

Empirical findings highlight the importance of comparison sites to overall information search behaviour. They contribute to the literature by illustrating the relation between consumers' cross-visiting behaviour and the intensity of activities on retailers' website (i.e. duration and number of pages visited). This study shows that comparison sites affect the information search behaviour of consumers by pointing them to certain retailers (see Fig 3) and directing their evaluation effort. That is, visitors of comparison sites have similar behaviour in terms of visiting other retailers. Retailers that have a higher level of cross-visiting with comparison sites benefit from a more intensive evaluation of their products. Despite the long-term relationship with customers in these two sectors, results show a high rate of usage for comparison sites. This illustrates that a considerable number of consumers are actively looking for the best offer. Moreover, retailers that enjoy a more frequent use of their online services attract a smaller portion of price-sensitive consumers who would use comparison sites, and therefore have less switching-related activities on their websites. Those retailers that their consumers are less involved with their services are more exposed to switching risks. Providing high quality and easy to use e-services and encouraging more frequent service usage can enhance customer loyalty. Also, identification of customers who are more prone to perform comparison activities and have switching intentions has interesting implications for retailers. It allows them to locate such customers early on and take measures to prevent them from switching. By offering a usage-based customer segmentation (Trivedi et al. 2018), the findings help managers better understand the cross-channel behaviour of different segments and design effective targeted strategies for each group, for example, price sensitive switchers.

This study examines large-scale observations of consumers' actions, including their entire interactions with different websites. This is valuable as it provides a holistic picture of their behaviour in the market (Wang et al.

2018) and offers in-depth information on continuous usage behaviour which is beyond the purchase activity. This data directly presents the level of cross-visiting behaviour and does not rely on self-reported behaviour. In addition, it has the advantage of being readily understandable by managers and shareholders and ‘enhances marketing researchers’ abilities to communicate effectively with these groups’ (Houston 2004). However, this data is at an aggregate level and the impact of individual differences cannot be measured. Using disaggregated data, future research can provide further insights into individuals’ cross-visiting behaviour. In addition, this data identifies customers who cross-visit websites, but the order of visits is not clear. Thus, the study has hypothesized and tested the relations rather than causations. To test the causality and control for the order of actions taken by consumers, future research can use experimental design.

Furthermore, experiments can be conducted to measure other aspects of behaviour such as decision-making strategy or size of the consideration set. The impact of individual characteristics could also be investigated. For example, maximization tendency of consumers, as a personality trait, affects the intensity of search behaviour (Karimi et al. 2015) and could influence the level of cross-visiting activities. The relation between online service usage, switching-related behaviour and use of comparison sites should be explored in other contexts. This could be expanded to include customer satisfaction and retention measures. Additionally, this study has only examined retailers’ e-service usage. Future research can investigate service usage across different channels. The portion of cross-visiting with comparison sites is a good indicator of switching-related activities as exhibited by a nomological test. However, it should be noted that well-informed switchers might not perform exhaustive search activities across channels. Other studies that focus on individual consumers can address this issue. Banking and mobile network providers have been selected due to the importance of comparison sites in these sectors, large adoption of their e-services, and importance of long term relationship with customers. However, the results should be tested in other service sectors. Finally, this paper does not aim to develop a prediction equation but to test the statistical significance of relationships. A larger sample of retailers are required for prediction purposes.

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