Online grocery shopping: The impact of shopping frequency on perceived risk

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Abstract

Online grocery shopping has enjoyed strong growth and it is predicted this channel will continue to grow exponentially in the coming years. While online shopping has attracted an abundance of research interest, examinations of online grocery shopping behaviour are only now emerging. **S**hopping online for groceries differs considerably from general online shopping due to the perishability and variability of the product, and frequency of the shopping activity. Two salient gaps underpin this research into online grocery shopping. This study responds to calls to investigate the online shoppers' experience in the context of online purchasing frequency. Second, this study examines the mediating effect of *perceived risk* between *trust* and *online repurchase intention* of groceries. An online survey was employed to collect data from shoppers who were recruited from a multi-channel grocery e-retailer's database. The online survey, comprising 16 reflective validated scale items, was sent to 555 frequent and infrequent online grocery shoppers. Results find that while customer satisfaction predicts trust for both infrequent and frequent online grocery shoppers, perceived risk fully mediates the effect of trust on repurchase intentions for infrequent online grocery shoppers. Furthermore path analysis reveals that the developed behavioural model is variant across both groups of shoppers. Theoretically, we provide a deeper understanding of the online customer experience, while gaining insight into two shopper segments identified as being important to grocery e-retailers. For managers, this study tests an online customer behavioural model with actual purchasing behaviour and identifies the continued presence of perceived risk in grocery e-retailing regardless of purchase frequency or experience.

Article Classification: Research paper

Keywords: Online grocery shopping, online customer experience, perceived risk, trust, satisfaction, purchasing frequency, e-retailing

Introduction

With total online retail sales estimated to reach €191 billion in Europe and $370 billion in the US by 2017 (Mulpuru 2013), many retailers have moved to capitalise on the advantages this channel has to offer (Christodoulides et al. 2012, Euromonitor 2012). Equally, online grocery shopping has also enjoyed strong growth and it is argued this channel will continue to thrive in the coming years (Shukri 2014). In the UK, it is estimated that some 20% of adults now do all or most of their grocery shopping online and sales are projected to increase in value to £9.5bn by 2015 (Shukri 2014). Similarly, in the US, online grocery sales are projected to grow from $23 billion in 2014 to nearly $100 billion by 2019, capturing 12 percent of total grocery spending (Kumar 2014). As a result, the segment is swiftly becoming crowded with multi-channel, multi-format and pure-play grocery retailers (Jayasankaraprasad and Kathyayani 2014; Nilsson et al. 2015). Existing grocery retailers face increasing challenges, like maintaining online customer loyalty, improving profitability and understanding how to progress occasional, sceptical or non-online grocery shoppers to become more established, trusting, frequent shoppers (Hansen 2006, 2008). Accordingly, there have been calls for more research concerning consumer online grocery shopping experience (Hansen 2006; Soopramanien 2011).

Knowledge in the area of the online customer experience (OCE) in relation to online grocery shopping remains emergent and provides a fertile ground for ongoing research (Chiagouris and Ray 2010; Rose et al. 2012; Trevinal and Stenger 2014). While initial work has resulted in the development of a holistic model (Rose et al. 2011, 2012) there are still limitations in understanding this experience in an applied online grocery setting. The experience of purchasing groceries online is unlike other forms of online shopping due to product perishability and variability. The perceived risks associated with receiving perishable food

products purchased online presents a significant barrier for online grocers (Citrin et al. 2003; Huang and Oppewal 2006). In order to overcome these barriers, online grocers need to ensure shoppers are satisfied with the quality of their products ordered. Accordingly, shoppers who are satisfied with their past purchases will develop higher levels of trust for the online grocer and be more likely to engage in online repurchase behaviour (Cronin Jr. 2002; Ha and Perks 2005; Ha et al. 2010). It is further argued that the increasing frequency of purchase will additionally reduce perceived risk and improve the probability of repetitive purchasing (Anschuetz 1997; Min et al. 2012). Hence, examining the constructs of shopping satisfaction, trust, perceived risk and frequency of online grocery shopping, will provide academia with a deeper understanding of this unique online shopping experience. For practitioners, we are able to demonstrate the application of an empirical model in an applied online grocery context, which should encourage online grocers to implement satisfaction and trust building strategies (Newholm et al. 2004), as well as risk mitigation strategies (Cases 2002).

This research addresses two important gaps in online grocery shopping knowledge. First, we respond to calls to investigate online purchasing *frequency* in order to draw closer links between *online shopping satisfaction* and *trust* and the actual behaviour of shoppers (Rose et al. 2012). Second, although the importance of perceived risk in the online domain remains an important factor (Penz and Hogg 2011; Soopramanien 2011; Faqih 2013), it has not been fully examined in the context of online grocery shopping knowledge. Perceived risk, particularly in relation to purchasing food from grocery e-retailers, is of vital importance (Dholakia 2012; Xiao 2015), as such, we examine the role of *perceived risk* and how it mediates the relationship between the outcome variables, *trust* and *repurchase intention*. The objectives of this study are to first, examine the specific relationships between *online shopping satisfaction*, *trust* and *repurchase intention*, across two groups, frequent and

infrequent online grocery shoppers, and second, to investigate the impact of *perceived risk*. An online survey was employed to collect data from shoppers who were recruited from an Australian multi-channel grocery e-retailer's database. The online survey, comprising 16 reflective validated scale items, was sent to 555 frequent and infrequent online grocery shoppers. In addressing these objectives, this study contributes to the ongoing development and understanding of the OCE in the context of online grocery shopping while providing practical insights for grocery e-retailers. We begin with a brief description of the customers' online shopping experience, before detailing the context of online grocery shopping. Constructs are then described, shopping frequency determined before justifying the methods, presenting results and discussion.

Literature review

Online Customer Experience

The Rose et al. (2011) seminal work conceptualised OCE. In contrast to the in-store customer experience, a number of unique factors have been shown to affect consumers' attitudes and behaviours when shopping online (Scarpi et al. 2014), such as the tangibility of products and the spatial and temporal separation between the retailer and the customer. Online shoppers can perceive greater unreliability of infrastructure and systems (Pavlou 2003, McCole et al. 2010), as well as lowered trust and higher perceived risk (Laroche, Yang et al. 2005). In a second study, Rose et al. (2012) empirically tested the antecedents, components and outcomes of the OCE model. Although perceived risk has been recognised as an important construct in studies of online behaviour (Forsythe et al. 2006; Moore and Mathews 2006), neither study examined the impact specifically, although the authors acknowledged perceived risk may be significant (Rose et al. 2011). In concluding, Rose et al. (2012) called for research in the context of purchasing frequency. In a broad managerial sense, it is important

to understand market segments based on purchasing frequency because frequent shoppers contribute a far higher volume of sales than infrequent shoppers and cost less to service (Anschuetz 1997; Kotler 1999). The proposed model is depicted in Figure 1 below.

INSERT: Figure 1: Proposed Model

Online grocery shopping

The experience of shopping online for food and groceries is fundamentally different from other forms of online shopping, due to the perishability and variability of the product, and frequency of shopping. Hansen (2006) found that some shoppers attached lower relative advantage and higher complexity specifically to online grocery shopping. This differs from general online shopping where shoppers often report convenience and ease of use as positive drivers of adoption (Sin and Tse 2002). Further, where online shoppers will visit multiple e-retailers, making sporadic purchases often linked to their disposable incomes, online grocery shopping accounts for a much larger proportion and regular outlay of consumer income (Ramus and Nielsen 2005). Products such as fresh produce, baked goods and meat, tend to fall into the see/touch/smell category (Huang and Oppewal 2006), which present a challenge in an online environment (Citrin et al. 2003). Even though superior freshness and quality can be claimed online, a shopper must contend with the risk that the product purchased may deteriorate prior to delivery (Tsiros and Heilman 2005). The repetitiveness of grocery shopping (Blaylock 1989) and similarly, online grocery shopping (Chiagouris and Ray 2010) tends to be more frequent than general online shopping (Opreana 2013), again due to the habitual nature of grocery shopping (Mortimer and Weeks 2011). Finally, the very nature of general online shopping conjures up notions of excitement, flow and enjoyment (Wolfinbarger and Gilly 2001), as shoppers search sites for exclusive and novel products. In

contrast, the activity of online grocery shopping is mostly considered a mundane, routine task (Dawes and Nenycz-Thiel 2014; Brengman and Geuens 2003).

Hypotheses development

Online Grocery Shopping Satisfaction

Satisfaction has previously been described as an 'affective condition' (Belanche et al. 2012) where the consumer derives a pleasurable state of consumption-related fulfilment from emotions such as happiness, surprise or delight during the shopping experience (Ha and Perks 2005). Contrasting views posit that expectancy disconfirmation, attribution and inequity judgments inform a cognitive evaluation of satisfaction based on attribute evaluation (Oliver and Swan 1989). Oliver (1997) proposed a framework whereby consumer satisfaction is a product of both affective and cognitive experience (O'Guinn and Faber 1989). Several studies have argued that satisfaction (Shim et al. 2001; Nesset et al. 2011) and trust (McCole et al. 2010; Toufaily et al. 2013) are the most important antecedents of customers' repurchase intentions in online shopping. The relationship between satisfaction and trust is well established (Cronin Jr. et al. 2002; Ha and Perks 2005; Ha et al. 2010). In the context of online grocery shopping, shoppers order perishable products, such as fruit, vegetables and meat, trusting that the e-retailer will select quality products and have them delivered in a timely manner. It is therefore argued that shoppers, who experience satisfying transactional outcomes from their online grocery purchases, will develop higher levels of trust. Accordingly, the following hypothesis is presented;

> H1: *Online shopping satisfaction has a positive impact on customer trust in the online grocer.*

Trust and Online Repurchase Intention

Online trust is defined as the conviction that allows consumers to willingly become exposed to online retailers after having taken the retailers' characteristics into consideration (Newholm et al. 2004; Toufaily et al. 2013). The importance of trust is further emphasized in an online transaction context, particularly involving consumables like food and groceries (Citrin et al. 2003) and is a critical condition for the success of an online grocer (Pavlou and Fygenson 2006; Toufaily et al. 2013). Trust may take the form of subjective beliefs about trust in the online retailer (McCole et al. 2010; Bianchi and Andrews 2012; Toufaily et al. 2013) or aspects of the grocery retailers' website that enhances consumer trust during their online experiences (Ogonowski et al. 2014). Once trust is established, repurchase intention is more likely. As such, we predict a positive relationship between trust and online repurchase intention of groceries. Accordingly, we hypothesise;

> H2: *Customer trust has a positive impact on the customers' repurchase intention from the online grocer.*

Trust and Perceived Risk

Trust and perceived risk continue to be important constructs in studies of online purchasing behaviour because of the spatial and temporal separation between the retailer and the customer (Aghekyan-Simonian et al. 2012; Belanche et al. 2012; Nepomuceno et al. 2014). It is argued that a shopper will weigh their levels of trust against their levels of perceived risk during an online grocery purchase decision, therefore to measure trust alone is not sufficient because its influence is relative to, and determined in some part, by that of perceived risk (Soopramanien 2011; Bianchi and Andrews 2012). Simply, a customer who trusts the online grocery retailer will perceive less risk during online shopping, whereas a less trusting customer will perceive higher risk. Therefore, it is hypothesised;

> H3: *Customer trust in the online grocer has a negative impact on perceived risk.*

Perceived Risk and Online Repurchase Intention

Perceived risk is a particularly relevant construct because of its close ties to intention to repurchase (Hansen 2006, Soopramanien 2011). Given the centrality of perceived risk to online retailing (Pechtl 2003), the customer experience and actual buying behaviour, it is surprising that this construct was not investigated in the context of OCE. While Rose et al. (2011) acknowledged the potential impact of perceived risk, they did not include it in their subsequent model (Rose et al. 2012). Perceived risk has consistently been identified as an inhibitor to online purchasing, regardless of advances in technology and the increasing skill and competence of consumers on the Internet (Belanche et al. 2012; Bianchi and Andrews 2012). It is proposed that during the online shopping process for food and groceries, the customer may develop feelings of negative affect such as displeasure, disappointment, sadness, anxiety, anger or frustration over the transaction, which in turn increases their perceptions of risk with the experience and accordingly reduces their intentions to repurchase from the grocery e-retailer. This it is hypothesised;

> H4: *Perceived risk has a negative impact on the customers' repurchase intention from the online grocer.*

Purchasing Frequency

Online repurchase intention is a key outcome of the customers' online shopping experience, recognising that past purchasing behaviour often leads to continued purchasing behaviour (Hansen 2006; Rose et al. 2012). We argue that it is important to examine customer groups based on online shopping frequency because frequent shoppers may be more loyal to a grocery e-retailer and accordingly provide higher revenue and profit than infrequent shoppers (Anschuetz 1997; Min et al. 2012). Frequency of shopping is also specifically relevant for grocery e-retailers as transactions tend to be more regular and consistent than those found in

other online retail channels, like clothing or consumer electronics (Chiagouris and Ray 2010). Online retailing as a channel experiences a high amount of customer churn, so understanding the different needs these two groups is particularly important to customer retention (Joia and Sanz 2006). Additionally, research in other shopping contexts highlight variances between frequent and infrequent shopping behaviours (Chen and Dubinsky 2003; Bridges and Florsheim 2008).

It is argued that frequent and infrequent online grocery shoppers, given their varying exposure to, and experience with, the grocery e-retailer may be at different stages in the satisfaction-loyalty development process. Using our model to explain variations in levels of satisfaction, it is reasonable assumed infrequent customers, who have not necessarily engaged in repeat purchasing behaviour, will experience less developed levels of experience and satisfaction. Conversely, frequent customers of a grocery e-retailer will have begun to transition more toward higher levels of satisfaction, after many transactional experiences. We further argue, that although perceptions of risk will be present in both groups, the indirect effect will be greater for infrequent than frequent shoppers, because infrequent shoppers may have less familiarity with the retailers' website (Citrin et al. 2003; Huang and Oppewal 2006). Following this logic, infrequent shoppers may accordingly be less trusting of a grocery e-retailer because of lower exposure and experience with the website, or past unsatisfying transactions, whereas frequent shoppers would have attained higher levels of trust (Chiagouris and Ray 2010). Based on this above discussion, it is predicted that frequent and infrequent online grocery shoppers will exhibit different degrees of satisfaction, trust and perceived risk. As such, it is hypothesised;

H5: *The model will be variant across frequent and infrequent online grocery shoppers.*

Method

Participants

The sampling frame used was a database of online shoppers held by a large multi-channel grocery e-retailer. The stratification of 'frequent' and 'infrequent' was defined by the e-retailer's metrics; where frequent purchasers had made 4-6 transactions in the 12 weeks prior to the survey and infrequent purchasers had purchased only once during this period. These metrics also determined that frequent purchasers attained higher aggregate spending in comparison to infrequent purchasers. Those who completed the survey were offered the chance to enter a prize draw. Response bias testing between early versus late respondents (Armstrong and Overton 1977) showed no evidence of differences.

Questionnaire and procedure

Respondents were recruited from a multi-channel grocery e-retailer's database. The grocery e-retailer forwarded an email invitation to respondents explaining the nature of the study and the ethical considerations together with an embedded URL link to the online survey. As we wanted to capture data from frequent and infrequent online grocery shoppers, respondents received an explicit URL depending on their purchasing frequency as identified above. In order to reflect the context of the study, respondents were asked to answer questions in relations to their online grocery shopping experience. Respondents first answered demographic questions, followed with 16 reflective scale items, anchored from 1 (Strongly disagree) to 7 (Strongly agree), online shopping satisfaction, trust, perceived risk and repurchase intention. Scales for all constructs in the model, except perceived risk, were adapted from the validated scales used in Rose et al. (2012) by adding the words, '…this supermarket's website…'. Measures for perceived risk came from Bianchi and Andrews (2012) (See Appendix 1).

Analysis

The data was analysed using structural equation modelling in AMOS 21 (Arbuckle 2005). Following the deletion of outliers, there were 381 valid responses from frequent online grocery shoppers and 174 responses from the infrequent group (see Table 1), which is consistent with the requirements of AMOS analysis (Arbuckle 2005). Considering the guidelines of Marsh et al. (1988) and Westland (2010) our sample (n=555) meets the requirement of lower bound sample size. Tests for non-response bias were carried out (Armstrong and Overton 1977), revealing no potential threat of non-response bias in either data set. Harman's single factor test (Podsakoff et al. 2003) also revealed no common methods bias in either group data set. While the sample was significantly skewed toward women, previous research has suggested, women are more often responsible for grocery shopping (Beynon et al. 2010).

INSERT: Table 1: Sample characteristics for frequent and infrequent purchaser groups

RESULTS

Confirmatory Factor Analyses (CFA) and Path Analyses

Psychometric properties of the constructs were evaluated by conducting a CFA using AMOS 21 on the dataset. We employed the covariance-based SEM approach (Jöreskog 1993) which is usually used with an objective of model validation and needs a moderately large sample. As our primary aim was theory development and model testing across two groups of consumer, the covariance-based SEM approach was a more appropriate choice in comparison to components-based approach which is mainly used for score computation and can be carried out on very small samples (Henseler 2012).

Although Chi-Square ($\chi 2$) remains significant with $\chi 2$= 416.171, df= 114, $\chi 2$/df = 3.6651, ($p < .01$), the fit of the CFA for the study conducted is deemed acceptable with other indices such as comparative fit index (CFI) = 0.962, Incremental fit index (IFI) =0.962, standard root mean square residual (SRMR) = 0.0406 and root mean square error of approximation (RMSEA) = 0.040. Considering all these goodness of fit measures, the model has adequately suitable fit to the data from the sample. Items having cross (<0.3) or poor (<0.5) factor loading were deleted (Chin, 1998). Perceived risk was the only construct that had two items. Following Gardner et al. (1998) and Wanous and Hudy's (2001) recommendations, reliability and convergent validity scores of two-item construct of risks were deemed appropriate to for further analysis. Table 2 shows that the values of Composite Reliability and Cronbach Alpha scores of all constructs were above than the recommended cut-off i.e. 0.70, demonstrating good reliability (Nunnally and Bernstein 1994).

INSERT: Table 2: Scale items, sources and CFA results

Table 2 further demonstrates that all item loadings are significant ($p < .01$), in support of convergent validity (Gerbing and Anderson 1988). Inspection of inter-factor correlation matrix revealed (see Table 3) slightly high correlations between Trust and Satisfaction and Trust and Perceived Risk constructs. While these slightly high correlations are understandable due to their uniqueness (identification of perceived risk as a possible moderator between trust and repurchase intentions and predictor of repurchase intentions and constructs' close nature in an online environment) and we could expect respondents to identify the theorised constructs as nearly indistinct (Bagozzi et al. 1991; Hair et al. 2006; Ping 2007). Chi-square difference test (Bagozzi and Phillips 1982) was used to assess discriminant validity between each pair of constructs. In this method, first model analysed through CFA will be a model where the two constructs are not correlated, while the second will be the one where we will allow for correlation. Each model will present a value for Chi-

square and degrees of freedom (df). After doing the difference between the values of the two models we can see if the test is significant or not (Segars 1997, Bertea and Zait 2011). Significant value of chi-square difference test represents the discriminant validity between each pair of constructs in the model. The chi-square difference test is significant for Satisfaction and Trust ($\Delta\ \chi2(1)= 977.958(27) -22.003(24) = 955.955$, $p < .01$), exhibiting discriminant validity between the two constructs. As the non-correlated model between Trust and Perceived Risk returned negative Eigen value, therefore a correlation regression weight was constrained by 1 before analysis was conducted (Ping 2007). The chi-square difference test is significant for Trust and Perceived Risk (($\Delta\ \chi2(1)= 649.697 (5)- 21.701(4) = 627.989$, $p < .01$) confirming discriminant validity between two constructs.

INSERT: Table 3: Inter-factor Correlations

Path Analysis

In order to test the hypotheses, relationships were modelled and tested using AMOS 21. Although chi-square difference remained significant $\chi2\ (120) = 516.356$ ($p < .01$), other indices demonstrate that fit of the structural model is acceptable, with comparative fit index (CFI) = 0.924, incremental fit index (IFI) =0.925, and standard root mean square residual (SRMR) = 0.070 and root mean square error of approximation (RMSEA) = 0.055.

Path analysis for Frequent and Infrequent online grocery shoppers

Table 4 shows that direct positive impact of satisfaction on trust was significant for both frequent ($\beta=.880$, $P<.01$) and infrequent groups ($\beta=.824$, $P<.01$), hence hypothesis (H1) is accepted. The effect of trust on repurchase intentions was positive but non-significant for frequent online grocery shoppers ($\beta=.250$, $P=.367$) but achieved significance for the infrequent group ($\beta=.861$, $P<.01$), accordingly hypothesis (H2) is accepted for the infrequent

group, but rejected for the frequent group. The relationship between trust and perceived risk was negative and significant for both frequent (β=-.896, P<.01) and infrequent (β=-.793, P<.01) groups, therefore hypothesis (H3) is accepted. Perceived risk to repurchase intentions relationship was found to be non-significant for frequent shoppers (β=-.267, P=.333), but significant for infrequent shoppers (β=.282, P<.05), as such hypothesis (H4) is rejected for the frequent group, but accepted for the infrequent group. Overall variance explained for frequent group ranged from 25.3 % (repurchase intentions) to 80.3 % (perceived risk). For infrequent, the variance explained ranged from 43.5 % (repurchase intentions) to 68.0 % (trust).

INSERT: Table 4: Path analysis for frequent and infrequent groups

Path Invariance

As the sample was collected from two groups, frequent and infrequent online grocery shoppers, path invariance across the two groups was tested. A multi sample analysis for measurement invariance was conducted to establish invariance across two groups. The non-significant value from the Chi square difference ($\Delta\chi^2$) between the unconstrained model (χ^2/df =516.356/120) and constrained model (χ^2/df =516.356/120) is $\Delta\chi^2$/df= 32.75/22; p=.065 which indicated that there were non-equivalent parameters across the infrequent and frequent samples. The structural invariance was subsequently used to test for the equality of structural covariances and factor variances. The results demonstrated the difference in Chi square was significant between the constrained and unconstrained models for the structural models ($\Delta\chi^2$ =26.511, df.=20; p=0.150), thus indicating that the structural model was equivalent across two groups. As a further assessment of path invariance was conducted with comparison of z-score differences. The results (Table 5) indicate that for frequent and infrequent online

grocery shoppers, frequency of purchase moderates the path from Satisfaction to Trust (z-value = 2.458, P<.05), from Trust to Perceived Risk (z-value = 2.677, P<.01), therefore Hypothesis (H5) is accepted in that our behavioural model is variant across frequent and infrequent online grocery shoppers.

INSERT: Table 5: Results of Z-score differences

Mediation Analysis

Based on the approach employed by Baron and Kenny (1986), Hayes (2009) and Vaske and Kobrin (2001) we tested direct and indirect effects for a mediation effect for frequent and infrequent groups: (1) The relationship between the independent variable (IV) and dependent variable (DV) is represented by relationship 'c' in Table 6; (2) the relationship between IV and mediator variable (MV) is represented by relationship 'a' in Table 6; (3) the relationship between mediator and the DV is represented by relationship 'b' in Table 4and 5); and (4) the original relationship between the IV and the DV, when the mediator is added, is represented by relationship c* in Table 6. In line with the recommendation of Shrout and Bolger (2002) and Delcourt et al. (2013), once mediation is detected, we can examine its significance by bootstrapping the product of the IV → MV and MV → DV effects. If the direct effect between the IV and the DV is non-significant, there is full mediation. If all effects remain significant, there is partial mediation. By applying a non-parametric bootstrapping procedure, we test the mediating role of perceived risk on the relationships between trust and repurchase intentions.

INSERT: Table 6: Mediated role of perceived risk

Table 6 shows that risk does not mediate the relationship between trust and repurchase intentions for frequent online grocery shoppers. However, results demonstrate the full

mediation of risk between its predictor i.e. (trust) and outcome variable (i.e. repurchase intentions) for infrequent online grocery shoppers. In order to further test the mediation effect of mediator for infrequent group, we used Sobel test (Sobel 1986) and confidence interval (CI) for the mediation and report significant Sobel's z-values and values of lower level confidence interval and upper level confidence interval in Table 6. Sobel test and confidence interval (CI) statistics support our mediation results.

Discussion

As online grocery shopping continues to grow exponentially around the world, researchers are beginning to examine the attitudes, behaviours and experiences of shoppers in this e-retailing domain (Picot-Coupey et al. 2009; Kumar 2014; Shukri 2014). The aim of this study was to examine the role of *perceived risk* and how it mediates the relationship between *trust* and the *repurchase intention* of frequent and infrequent online grocery shoppers. Our results show, that for infrequent or occasional online grocery shoppers, perceived risk fully mediates the relationship between trust and the online grocery shoppers' intentions to repurchase. For frequent online grocery shoppers, who experience less perceived risk and higher levels of trust due to their regular online transactions and experience with the e-retailer, no mediation was evident. This is an important finding as these perceptions of risk in dealing with a grocery retailer's website may prevent infrequent shoppers from becoming regular, loyal and profitable shoppers. This finding indicates the need to quickly transition infrequent shoppers with limited experience or exposure, into frequent, experienced online grocery shoppers, as such shoppers offer great economic value to grocery e-retailers.

We tested the relationship between *online shopping satisfaction* and *trust*, which was significant for both frequent and infrequent online grocery shopper groups. The results confirm that customers, who use a grocery e-retailers' website and experience satisfactory

transactional exchanges, will develop trust in this channel. This is not unsurprising as research has previously shown if expectations are met or exceeded, shoppers will be satisfied (Oliver 1981, 1997), and under certain conditions, these feelings of satisfaction lead to increased trust and repurchase intentions. In situations where shopper expectations are high and are consistently met, retention becomes less elastic over time, meaning that e-retailers who maintain consistently high levels of shopper satisfaction will be less sensitive to changes in satisfaction evaluations where purchasing behaviour is concerned (Anderson and Sullivan 1993). Hence the phenomenon in which past satisfaction is translated into trust and future purchasing, while less satisfied or infrequent customers remain sensitive to fluctuations in satisfaction, and purchase accordingly (Zhou et al. 2007). The effect of *trust* on *repurchase intentions* was non-significant for frequent online grocery shoppers but achieved significance for the infrequent group. We assert that as the frequent online grocery shopper has already established high levels of trust in the grocery e-retailer, trust no longer acts as a barrier or driver to repurchase intentions. In contrast, as infrequent shoppers are still in the process of establishing trust and experiencing transactional outcomes, trust remains a significant attribute.

The relationship between *trust* and *perceived risk* was negative and significant for both frequent and infrequent groups. While this relationship could be intuitively linked to infrequent online grocery shoppers, our findings demonstrate that degrees of perceived risk are still present in even the most frequent and regular online grocery shopper. Risk occurs when shoppers perceive an element of uncertainty to a potential outcome (Chang and Tseng 2013). Trust, on the other hand, is a mechanism which shoppers induce to reduce the complexity of decisions which involve risk, such as online shopping (Riegelsberger et al. 2003; Harridge-March 2006). Simply put, the more a shopper trusts the grocery e-retailer, the

less likely they will be to experience perceived risk and the less effort they need to put into evaluating other criteria, such as price, quality or service. The findings of this study are consistent with those of prior studies which tend to find that consumer anxiety and other forms of negative affect such as loss of control (Novak et al. 2000, 2003) can lead to higher perceptions of risk (Weber et al. 2004) but the presence of trust can help to lessen risk perceptions (Jarvenpaa et al. 2000; Chadwick 2001; Harridge-March 2006).

The *perceived risk* to *repurchase intentions* relationship was found to be non-significant for frequent online grocery shoppers. It is claimed, like above, these regular online grocery shoppers have attained high levels of trust through multiple and regular transactions, therefore although perceived risk to some extent is still present, the impact has been mitigated (Hansen 2006). Perceived risk was however significant for infrequent online grocery shoppers. As trust has not yet fully developed, perceived risk still plays a role; hence infrequent shoppers who perceive high risks will have lower repurchase intentions (Pires et al. 2004; Wu and Chang 2007). It is postulated that this is the case only for infrequent online grocery shoppers because they rely on prior satisfaction evaluations in lieu of extensive experience with grocery e-retailer (Pires et al. 2004). In contrast, perceived risk does not influence repurchase intentions for frequent shoppers, so there is no need for them to draw on satisfaction evaluations to overcome this barrier.

Contributions

Theoretical Contributions

Our study makes several theoretical contributions to the area of OCE research. Some have argued that OCE knowledge is limited, yet emerging (Rose et al. 2011, 2012), as such our work contributes to the literature in this area by testing a behavioural model in an online

grocery context, drawing on actual shopping data. We extend this theoretical work by examining two important shopper segments, high and low frequency online grocery shoppers (Liu and Forsythe 2010; Liu et al. 2011; Min et al. 2012). Finally, we include the variable, perceived risk, to extend our understanding of its moderating impact on online grocery shoppers' repurchase intentions. This addition of *perceived risk* extends the explanatory scope of our model, accounting for inferences that a consumer will weigh their levels of trust against their levels of perceived risk during online purchasing. Our findings suggest that perceived risk with grocery online shopping continues to be a factor that needs attention, regardless of consumers' online shopping experience.

Managerial Contributions

Grocery online retailing remains both an area of opportunity and of significant managerial challenge to multi-channel and pure-play grocery e-retailers (Chen and Chang 2003; Chen and Dubinsky 2003). Our study makes a number of managerial contributions. First, our work study investigates the effect of purchasing frequency, which is a more managerially relevant outcome than repurchase intentions alone (Mittal and Kamakura 2001). This should encourage grocery e-retailers to apply greater time and energy interrogating the purchasing data of these two groups in order to identify specific aspects of their behaviour that may lead to profitable outcomes. Second, our study shows that both frequent and infrequent online grocery shoppers develop trust as a result of long term satisfying experiences with the e-retailer. Accordingly, satisfaction and trust building strategies (Newholm et al. 2004), as well as risk mitigation strategies (Cases 2002) should be considered; such as making it easier for shoppers to customise the grocery e-retailers' website to suit their own needs or more clearly articulating the benefits of grocery shopping online. In addition, grocery e-retailers may also engage in trust building exercises to minimise feelings of anxiety associated with risks

inherent in online shopping (Nepomuceno et al. 2014). Finally, we find perceived risk continues to be relevant and is a potential barrier to repurchase intentions (Bianchi and Andrews 2012). Therefore, as more supermarkets and grocers move to capitalise on the advantages the online channel has to offer, they should remain conscious of the potential obstacle perceived risk may have on organic growth.

Limitations and Future Research

The potential limitations of this work create opportunities for future research. We acknowledge the heavy skew toward female participants. While such a skew can be common in grocery shopping studies (Chang and Nicholas 2004; Beynon et al. 2010), it is suggested future research may consider specifically examining male supermarket shoppers in this online context. Conducting gender comparison studies relating to online grocery shopping behaviours would offer additional dimensions to researchers and retailers. While our research extends the understanding of online grocery shopping, as data was captured in only one country, we would caution the generalisation of findings. Future studies might attempt a cross-cultural analysis to determine its relevancy in diverse national cultural settings. Our research reports the findings of online shopping behaviour of a single e-retailer in a specific product category, groceries. Future researchers may choose to examine the influence of other product categories, such as apparel or consumer electronics (Wang et al. 2010). Finally, our determination of frequent and infrequent online grocery shoppers was based on our industry partners' transaction metrics. It might be interesting to examine factors such as age, gender, and education, length of relationship with the retailer or extent of experience with online grocery shopping to identify what other variables influence frequency.

In concluding, our study has contributed to advancing methodological and theoretical knowledge in the field of OCE by examining the role of *perceived risk* and how risk mediates the relationship between *trust* and the *repurchase intention* of online grocery shoppers. Further, our behavioural model demonstrates that in relation to shoppers' satisfaction, trust, perceived risk and repurchase intentions, differences exist across frequent and infrequent online grocery shoppers. Moreover, its practical relevance to e-retail grocery managers is evidenced through its strong links to actual e-retailing performance outcomes; that is actual shopping data, rather than self-reported shopping data. It is anticipated that this study will provide researchers with the required motivation to continue empirical work in the area of OCE in order to aid managers in developing future strategic directions.

INSERT: Appendix 1: Scale items

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Figure 1: Proposed Model

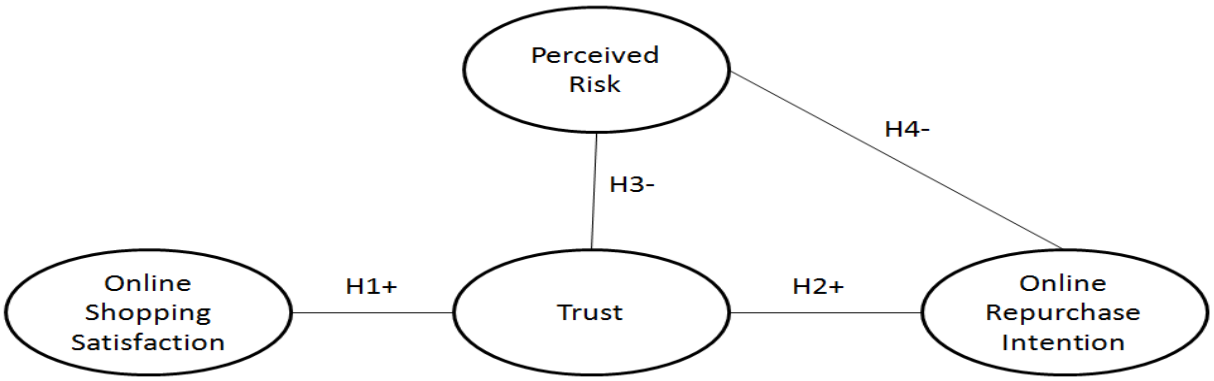

Table 1: Sample characteristics for frequent and infrequent purchaser groups

	Frequent (N=381)		Infrequent (N=174)		All (N=555)	
Demographic Features	Number	Percent	Number	Percent	Number	Percent
Age						
18-24 years	9	2.4%	10	5.7%	19	3.42%
25-35 years	119	31.2%	50	28.7%	169	30.45%
36-45 years	113	29.7%	52	29.9%	165	29.73%
46-55 years	70	18.4%	35	20.1%	105	18.92%
56-65 years	35	9.2%	13	7.5%	48	8.65%
65+ years	35	9.2%	14	8.0%	49	8.83%
Gender						
Female	345	90.6%	157	90.2%	502	90.45%
Male	36	9.4%	17	9.8%	53	9.55%

Table 2: Scale items, sources and CFA results

Construct	Item number	Source	Items description	Item loadings	Z-value	CR	Cronbach Alpha (α)	AVE
Satisfaction	Satisfaction 1	Rose et al (2012)	I am satisfied with the purchase experience of **this supermarket's website** (e.g., ordering, payment procedure).	.750	1	.797	.798	.567
	Satisfaction 2		I am satisfied with the experience I have after I purchase from **this supermarket's website** (e.g., customer support and after sales support, handling of returns/refunds, delivery care).	.739	16.491			
	Satisfaction 3		I am satisfied with my overall experiences of **this supermarket's website**.	.770	17.165			
Trust	Trust 1	Rose et al (2012)	**This supermarket's website** is reliable.	.687	1	.764	.769	.521
	Trust 2		In general, I can rely on **this supermarket's website** to keep the promises that they make.	.684	14.363			
	Trust 3		Internet shopping on **this supermarket's website** is a trustworthy experience.	.789	16.224			
Risk	Risk 1	Bianchi & Andrews (2012)	I feel safe making purchases on **this supermarket's website** using my credit card.	.787	1	.769	.768	.624
	Risk 2		I feel safe giving my personal details to **this supermarket's website** if requested.	.793	16.691			
Repurchase intention	Repurchase intention 1	Rose et al (2012)	I anticipate shopping again at **this supermarket's website** in the near future.	.714	1	.775	.763	.538
	Repurchase intention 2		I regularly repurchase from **this supermarket's website**.	.633	13.061			
	Repurchase intention 3		I expect to repurchase from **this supermarket's website** in the near future.	.838	15.389			

(N= 555), All items were measured using seven-point scales anchored by 1 = "strongly disagree" and 7 = "strongly agree" unless otherwise stated. All item loading are significant at $p < 0.01$ level, Where; AVE = Average Variance Extracted and CR= Composite Reliability.

Table 3: Inter-factor Correlations

Constructs	Mean/Standard deviation	Satisfaction	Trust	Perceived Risk	Repurchase intentions
Satisfaction	5.824/.833	1			
Trust	5.080/1.085	0.840	1		
Perceived risk	3.279/1.371	-0.615	-0.878	1	
Repurchase intention	6.360/.736	0.719	0.493	-0.433	1

(N=555), All values are significant at p< 0.01 level.

Table 4: Path analysis for frequent and infrequent groups

	Frequent			Infrequent		
Hypotheses	**Estimate**	**Z-value**	**Accepted/ Rejected**	**Estimate**	**Z-value**	**Accepted/ Rejected**
(**H1**) Online shopping satisfaction has a positive impact on customer trust.	.880**	7.187	**Accepted**	.824**	10.779	**Accepted**
(**H2**) Customer trust has a positive impact on online repurchase intention.	.250(ns)	.903	Rejected	.861**	5.777	**Accepted**
(**H3**) Customer trust has a negative impact on perceived risk.	-.896**	-8.185	**Accepted**	-.793**	-10.226	**Accepted**
(**H4**) Perceived risk has a negative impact on online repurchase intention.	-.267(ns)	-.967	Rejected	-.282*	2.034	**Accepted**
Variance explained (%) for (Trust)	77.4			68.0		
Variance explained (%)for (risk)	80.3			62.8		
Variance explained (%) for (Repurchase intentions)	25.3			43.5		

*p<.05, **p<.01, Two tailed tests

Table 5: Results of Z-score differences

Relationship			Frequent group		Infrequent group		
Dependent Variable			Estimate	P	Estimate	P	z-score
Trust	<---	Satisfaction	0.865	0.000	1.291	0.000	2.458**
Risk	<---	Trust	-1.717	0.000	-1.100	0.000	2.677***
Repurchase intention	<---	Risk	-0.236	0.000	-0.327	0.000	-1.503
Notes: *** p-value < 0.01; ** p-value < 0.05;							

Table 6: Mediated role of perceived risk

Group	Hypotheses	Dependent variable (DV)	A Trust→ perceived risk	b Risk→Repurchase intentions (DV)	c trust→ Repurchase intentions (DV)	c* Trust→ Repurchase intentions (DV) (Mediator Controlled)	Confidence Interval (CI) (LLCI)-(ULCI)	Sobel's Z-value	Type of Mediation
Frequent	Risk mediates the relationship between trust and repurchase intentions	Repurchase Intentions	-.896**	-.267(ns)	.506**	.250*	(-.621)-(1.081)	-	No mediation
Infrequent	Risk mediates the relationship between trust and repurchase intentions	Repurchase Intentions	-.793**	-.282*	.665**	.127(ns)	(-.608)-(-.018)	-2.831**	Full mediation

*p<.05, **p<.01, Two tailed tests, LLCI= Lower level confidence interval, ULCI= Upper level confidence interval

Appendix 1: Scale items

Please answer the following 16 questions thinking about the last time you purchased groceries online from this supermarket.

Construct	Source	Code	Original Item	Adapted Item
Online Shopping Satisfaction	Rose et al (2012) adapted from Khalifa & Liu (2007)	SATN1	I am satisfied with the experience I have before I purchase on Internet shopping websites (e.g. good information about products, product comparisons and search functions).	I am satisfied with the experience I have before I purchase from **this supermarket's website** (e.g. good information about products, product comparisons and search functions).
		SATN2	I am satisfied with the purchase experience of Internet shopping websites (e.g., ordering, payment procedure).	I am satisfied with the purchase experience of **this supermarket's website** (e.g., ordering, payment procedure).
		SATN3	I am satisfied with the experience I have after I purchase from Internet shopping websites (e.g., customer support and after sales support, handling of returns/refunds, delivery care).	I am satisfied with the experience I have after I purchase from **this supermarket's website** (e.g., customer support and after sales support, handling of returns/refunds, delivery care).
		SATN4	I am satisfied with my overall experiences of Internet shopping.	I am satisfied with my overall experiences of **this supermarket's website**.
Trust	Rose et al (2012) adapted from Lee & Turban (2001)	TRUS1	Internet shopping can be trusted, there are no uncertainties.	**This supermarket's website** can be trusted, there are no uncertainties.
		TRUS2	In general, I can rely on Internet shopping websites to keep the promises that they make.	In general, I can rely on **this supermarket's website** to keep the promises that they make.
		TRUS3	Internet shopping is reliable.	**This supermarket's website** is reliable.
		TRUS4	Internet shopping is a trustworthy experience.	Internet shopping on **this supermarket's website** is a trustworthy experience.
Perceived Risk	Bianchi & Andrews (2012)	RISK1	There is too much uncertainty associated with using the internet to make purchases	There is too much uncertainty associated with using **this supermarket's website** to make purchases.
		RISK2	Compared with other ways of making purchases, I think that using the internet is more risky	Compared with other ways of making purchases, I think that using **this supermarket's website** is more risky
		RISK3*	I feel safe giving my personal details to an Internet shopping website if requested	I feel safe giving my personal details to **this supermarket's website** if requested.
		RISK4*	I feel safe making purchases on the internet using my credit card	I feel safe making purchases on **this supermarket's website** using my credit card.
Repurchase Intention	Rose et al (2012) adapted from Khalifa & Liu (2007)	RINT1	It is likely that I will repurchase from Internet shopping websites in the near future.	It is likely that I will repurchase from **this supermarket's website** in the near future.
		RINT2	I anticipate shopping again at Internet shopping websites in the near future.	I anticipate shopping again at **this supermarket's website** in the near future.
		RINT3	I regularly repurchase from the same websites.	I regularly repurchase from **this supermarket's website**.
		RINT4	I expect to repurchase from Internet shopping websites in the near future.	I expect to repurchase from **this supermarket's website** in the near future.

*Reversed items (All items anchored from 1 - Strongly disagree) to 7 - Strongly agree)