

Consumers' intention to adopt virtual grocery shopping: do technological readiness and the optimisation of consumer learning matter?

Consumers'
intention to
adopt VGS

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Abstract

Purpose – It has generally been anticipated that the growth of Internet technology and e-commerce would result in virtual grocery shopping (VGS) becoming a normal way of life for consumers worldwide. However, the adoption of VGS, except in China and other Asian countries, has been quite slow and there is little understanding for this reason. Using Canada as a research context, the purpose of this study was to investigate the attitudes of consumers towards VGS with a focus on their technological readiness and the impact of the optimisation of consumer learning.

Design/methodology/approach – A quantitative research methodology was undertaken using cluster analysis with descriptive statistics to segment the different groups of consumers from a sample of 1,034 adult respondents. Structural equation modelling (SEM) was then used to test a theoretical model for consumers' intention to adopt VGS.

Findings – The study found that the attitudes of consumers towards virtual shopping, convenience motivation, perceived ease of use (PEOU), perceived risk and consumer learning are all factors that impact consumers' intention to adopt virtual food shopping. The research also identified four segments of consumers in the Canadian market based on their attitudes and intention to adopt VGS. These results allow grocers to target the consumer groups favourable to VGS and provide insights on the factors that can be manipulated via marketing strategies to reach these consumers.

Practical implications – Retailers are provided with insights on consumers behaviour that will allow them to target specific segments with shopping modalities.

Originality/value – This research investigated VGS, focussing on consumer learning as a socio-cultural influence as well as the consumer's technological readiness as an intention to adopt to this modality of shopping for food. These constructs have not been investigated by previous studies on food grocery shopping.

Keywords Virtual grocery shopping, Food retail, Technological readiness, Consumer learning, Attitudes towards virtual grocery shopping, Canadian consumer

Paper type Research paper

Introduction

The growth of the Internet and digital technology has resulted in the transformation of retailing businesses from locally based institutions to businesses that are accessible worldwide. Examples include Alibaba Group, Amazon, eBay and Rakuten Group, with Alibaba Group as the world's largest online retailer in China and globally (Hänninen *et al.*, 2018). These multifaceted businesses include operations that facilitate business-to-business, business-to-consumer and



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consumer-to-consumer e-commerce functions (Hänninen *et al.*, 2018; Thomas *et al.*, 2014). The Alibaba Group of companies accommodates both online and offline shopping, allowing consumers a multitude of options, such as eating in store, selecting products and allowing staff to cook the food, along with numerous fully automated consumer self-services (Cheng and He, 2018). Although Walmart remains the world's largest retailer in terms of brick and mortar stores, it is still in the process of digitalising its retail ecosystems and is experiencing an emerging level of consumer adoption (Blitz, 2016; Hänninen *et al.*, 2018). These "new retail" models offer consumers convenience and a vast selection of goods and services, together with the opportunity to co-create value due to the customisation of shopping experiences while also tapping into consumer loyalty programmes and shared platforms for entertainment (Hänninen *et al.*, 2018; Vargo and Lusch, 2008).

China's lead in the development of multifaceted business (ecosystems) was facilitated by their government's policy interventions that sought to integrate Internet technology into traditional industries by encouraging innovation, the improvement of overall business efficiency and, ultimately, rapid growth (Greeven and Wei, 2017). A total of six (6) policy interventions in 2015, including the Internet Plus policy, were instrumental in creating the current business environment (Greeven and Wei, 2017). Consequently, consumer adoption of the "new retail" is notably greater in China, which is evident from Chinese consumer embracement of aspects of the Alibaba Group (virtual, smart and hybrid shopping; Ding *et al.*, 2018).

While an increase in the volume of consumers using virtual grocery shopping (VGS) has been predicted (Hiser *et al.*, 1999; Kinsey, 1998; Kumar, 2014; Mortimer *et al.*, 2016; Schuster and Sporn, 1998; Shukri, 2014), growth in the format has been considered slow (Anesbury *et al.*, 2016; Halzack, 2015; Ring and Tigert, 2001) except in China and other Asian countries (Bell, 2015; Ding *et al.*, 2018).

The "new" retail for grocery shopping can be identified as belonging to two distinct categories, virtual and smart grocery shopping, while recognising that the future of new retail is probably a consolidation of both categories (Ding *et al.*, 2018). Virtual or online grocery shopping is defined as the purchase of food or personal use items via a food retail company's Internet-based portal or application with delivery at the consumers' home or designation or in-store pickup (Thomas-Francois and Somogyi, 2020, p. 3).

Narayanareddy *et al.* (2016) described virtual stores as stores that are web/Internet based and use websites to create a level of comfort, visual quality and even pleasure by presenting information to consumers on web products and service interactions to facilitate favourable online shopping experiences (Algharabat and Shatnawi, 2014; Im *et al.*, 2010; Luan *et al.*, 2016; Mosteller *et al.*, 2014). These websites allow consumers to evaluate products or services and make purchasing decisions (Luan *et al.*, 2016), with delivery or pickup at a later time (Raijas and Tuunainen, 2001).

This study was motivated by a lack of understanding of the slower adoption rate of VGS by consumers in some Western countries in comparison to urban Eastern countries, in particular China (Ding *et al.*, 2018; Thomas-Francois and Somogyi, 2020). According to the United States Census Bureau (2018), the US Grocery Retail Sector in 2017 recorded grocery sales of USD 641.04 billion; in the same year, a study found that only 2% of the respondents reported that they virtually shop for groceries (Statista, 2017). It has been acknowledged that VGS is riskier than shopping in store and, as a result, consumers who shop online are mostly influenced by situational factors such as ill health, families with young children and mobility issues (Hand *et al.*, 2009). In several countries around the world, there has been a sudden increase in online grocery shopping due to the threat of contracting the coronavirus through exposure in public spaces (situational factor); these include Australia (e.g. Coles and Woolworth Supermarket; Mitchell, 2020); the United Kingdom (e.g. Tesco; ITV REPORT, 2020); Singapore (e.g. Lazada's grocery arm of RedMart; Choudhury, 2020) and Canada (e.g. Walmart and Costco; Foran, 2020). In general, consumers perceive that online

food shopping negates the sensory power to view, touch and even taste the products being purchased before completing the online transaction (Huyghe *et al.*, 2017; Thomas-Francois and Somogyi, 2020).

Given the low level of VGS adoption in Western countries, the aim of this study was to investigate Western consumer attitudes and intentions to adopt VGS, using Canada as an example in focussing on the impacts of consumer learning and technological readiness. The study attempts to determine the attitudes towards VGS and intention to adopt VGS among groups of consumers, as well as the general causal factors that contributes to adoption. Canada has a high level of Internet access and speed, a relatively urban and geographically concentrated population. Similar to other Western Countries such as Sweden and the Netherlands, e-commerce in Canada has been adopted by 69% of its population (eCommerce DB, 2020). While Statista reported there is no usage by the population of Sweden for online grocery shopping, it indicated that user penetration in Canada is expected to increase by 21% during 2021 (Statista, 2020).

We have observed in the literature that most of the previous studies incorporated constructs from the technology acceptance model (TAM) by Davis (1989) (see Table 1). However, noting the general limitation of the TAM model (Amoroso and Magnier-Watanabe, 2012), we incorporated social influences, such as consumer's technology readiness and consumer learning, which may provide insights on consumer willingness to integrate VGS into their lives. We have also considered convenience as a motivation for virtual shopping as advocated by Childers *et al.* (2001) and Hand *et al.* (2009).

Using cluster analysis, we were able to segment four types of Canadian consumers and measure for each group their level of technological readiness and the level of optimisation of consumer learning, including socio-demographical findings. For the second phase of the study, we used structural equation modelling (SEM) to examine the causal relationships amongst constructs in the data (Janssens *et al.*, 2008; McDonald and Ho, 2002).

Authors	Topics	Quantitative method	Constructs measured
Driediger and Bhatiasevi (2019)	Online grocery shopping in Thailand: Consumer acceptance and usage behaviour	Structural equation modelling $n = 263$	Subjective norm, visibility, enjoyment, perceived risk, perceived usefulness, perceived ease of use, intention to use and usage behaviour
Radka and Martin (2018)	Technology acceptance as a determinant of online grocery shopping adoption	Structural equation modelling $n = 480$	Perceived ease of use, perceived risk, attitude towards online grocery shopping and behavioural intention
Mortimer <i>et al.</i> (2016)	Online grocery shopping: the impact of shopping frequency on perceived risk	Structural equation modelling $n = 555$	Online shopping satisfaction, perceived risk, trust and repurchase intention
Campbell (2013)	Buy local: Differentiating Hispanic and Caucasian shoppers of locally produced foods in US grocery	Structural equation modelling $n = 353$, $n = 512$	Attitudes, connectedness, subjective norms, perceived product availability, intention to purchase, extent of purchase
Hand <i>et al.</i> (2009)	Online grocery shopping: the influence of situational factors	Cluster analysis, one-way ANOVA $n = 1,058$	Situational factors and adoption
Childers <i>et al.</i> (2001)	Hedonic and utilitarian motivations for online grocery shopping in the US	Structural equation modelling $n = 274$, $n = 366$, $n = 93$	Attitude, usefulness, ease of use, enjoyment, convenience, navigation, sub-personal examination

Table 1. Previous research in virtual food retailing

In the next section, we will discuss the constructs used in the research that relate to VGS consumer behaviour and the proposed hypotheses. This section will be followed by a description of phase 1 of the investigation, which included cluster analysis findings, and subsequently, phase 2 of the investigation, which attempt to validate the structural equation model. The discussion section will be an amalgamation of the results for both phases to provide general insights from this study.

Perceived risk, perceived ease of use and attitudes towards virtual grocery shopping

The TAM is thoroughly discussed in the literature, and it relates to people's adoption of new technology or innovation (Brandon-Jones and Kauppi, 2018; Davis, 1989; Davis *et al.*, 1989; Manis and Choi, 2019; Radka and Martin, 2018). Its origin is a result of the development of measurement scales to predict and assess the use of computer technology by white collar workers (Davis, 1989) however, it is often criticised for the omission of influential social factors (Amoroso and Magnier-Watanabe, 2012). The constructs of "perceived risk" and "perceived ease of use" appear to be major factors influencing technology acceptance (Childers *et al.*, 2001; Driediger and Bhatiasevi, 2019; Mortimer *et al.*, 2016; Radka and Martin, 2018). As such perceived risk is a strong influencer of consumer attitudes, and attitudes determine whether the user will embrace the technology (Davis, 1989; Yeo, *et al.*, 2017) or have a preference for the new systems (Park and Kim, 2013), which then influences their intention to adopt or use the new technology (Chemingui and Iallouna, 2013) (See all measurement scale items in Appendix). Considering the extant literature, we expect that perceived ease of use (PEOU) and perceived risk will affect consumers' intentions, as well as consumers' attitudes. We therefore propose the following hypotheses:

- H3.* There is a direct relationship effect on perceived ease of use (PEOU) and consumer intention to adopt (ITADPT) VGS.
- H4.* Perceived risk (PRISK) has a direct effect on consumer intention to adopt (ITADPT) VGS.
- H5.* Perceived risk (PRISK) has a direct effect on consumer attitude towards VGS (ATTV).
- H8.* Consumer attitude towards VGS (ATTV) is positively related to their intention to adopt (ITADPT) VGS.

Convenience

The online shopping environment provides an alternative distribution channel for businesses and contributes to reduced costs of operations while potentially removing geographical access barriers (Pham *et al.*, 2018). It allows for knowledge seeking consumers to shop around in multiple virtual stores as opposed to physical store-to-store (Newman and Staelin, 1972), thus reducing costs and the time required for consumers. Further, consumers are demanding the convenience of self-service retailing systems (Demirkan and Spohrer, 2014), often due to situational factors (Hand *et al.*, 2009).

Convenience as a consumer motivation was originally associated with products and consumer ease of use (Berry *et al.*, 2002; Pham *et al.*, 2018), particularly related to product dimensions, shelf life, packaging or design, all of which contributed to reduce time and effort on the part of the consumer (Anderson and Shugan, 1991; Kelley, 1958). Berry *et al.* (2002) added to this by providing an advanced discussion about the distinction between services and goods in terms of service convenience but, nonetheless, researchers generally agree that

time and savings efforts are the major factors that define convenience for the consumer (Anderson and Shugan, 1991; Anderson, 1971; Berry *et al.*, 2002; Brown, 1989). Jiang *et al.* (2013, p. 200) identified five dimensions of convenience, namely, access (ease) convenience, search convenience, evaluation convenience, transaction convenience and possession or post-purchase convenience. Based on the previous discussion, this study adopts convenience as a motivation for VGS (Childers *et al.*, 2001).

We therefore propose the following hypotheses:

- H1. There is a positive relationship between convenience motivation (CONM) and consumer intention to adopt (ITADPT) VGS.
- H2. Convenience motivation (CONM) has a direct effect on consumer perceived ease of use (PEOU).

Technological readiness (optimism from Techqual TM)

Research into technology readiness emerged during a period of time named “technoculture”; a period where technology became pervasive amongst the general population (Postman, 1992). In this era, the introduction of technology aids made life easier, cleaner and, in some cases, longer (Postman, 1992). On this point, Mick and Fournier (1998, p. 123) advanced the literature in consumer behaviour from simply understanding technology adoption to a multimethod, multiproduct study of consumer technology in everyday life; a conceptual framework that synthesises views on not only the cost-benefit of technology but also the impact of situational factors, emotions and coping strategies in the technological consumer products domain.

Parasuraman (2000) put forward the notion of technological readiness in acknowledging the proliferation of self-service technologies that demand competence on the part of consumers to use (Bitner *et al.*, 2002; Meuter *et al.*, 2005). Put simply, technological readiness refers to people’s propensity to embrace and use technology for accomplishing goals in their home life and at work (Parasuraman, 2000, p. 8). Meuter *et al.* (2005) described it as a condition or state of the consumer. Parasuraman (2000) validated four dimensions of technological readiness. These dimensions include optimism and motivation, which are considered as motivators, and discomfort and insecurity, viewed as inhibitors (Parasuraman and Colby, 2015).

Optimism was selected as the focus for this study since it represents the extent to which consumers are willing to integrate technology into their lives and tolerate its impact on their lives. Optimism is generally considered to be important since it is associated with the belief that differentiates and impacts consumers’ future expectation of technology (Boschetti *et al.*, 2016; Ramirez-Correa *et al.*, 2020). Technology is often viewed as making life more efficient; however, the efficiency of technology also permanently transforms culture (Postman, 1992; Roweton, 1994). Techno-fear or resistance to technological change is often seen as a sociological factor that often describes varying demographics of consumers who have had a different type of socialisation. However, it is often common among older consumers (Mogelonsky, 1995). This optimism dimension of the technology readiness index therefore allows for the investigation of different groups of people based on their readiness to embrace VGS.

Technological readiness may explain consumers’ intention to adopt VGS. Technological readiness may also provide insights on how consumers are utilising omni-channel options for shopping since consumers often use different channels for different services (Verhoef *et al.*, 2015). For example, they may conduct a search in the online store to find products and source information then visit in-store to purchase (Verhoef *et al.*, 2015; Mercier *et al.*, 2014; Bell *et al.*, 2014). Information combined with consumers’ attitudes ultimately influence their behaviour (Verhoef *et al.*, 2015; Bell *et al.*, 2014). Considering the discussion in the literature, we propose the following hypotheses:

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- H7.* Consumer attitude toward VGS (ATTV) is positively related to their technological readiness (TECHR).
- H10.* There is a positive relationship between consumer technological readiness (TECHR) and their intention to adopt (ITADPT) VGS.

Consumer learning

As suggested by its name, consumer learning is a concept that relates to how consumers learn about products (van Waterschoot *et al.*, 2008). Hoch and Deighton (1989) claimed that consumers learn from their experiences through a four-stage process: hypothesising, exposure, encoding and integration. Learning is seen as being open to new experiences that lead to a level of consumer confidence and is identified by two psychological factors: consumer familiarity within the domain and motivation to learn, given the ambiguity of the information environment (Hoch and Deighton, 1989, p. 2). There is also the cognitive view of consumer learning (education) since consumers are socialised and have grown to be proficient in decoding information provided by firms in various forms for knowledge implantation (Hoch and Deighton, 1989).

Consumer knowledge acquisition can be considered to be formal (Lakshmanan and Krishnan, 2011) and informal in nature (Shaw, 2014). Formal learning has been described by Hoch and Deighton (1989) as being “packaged” and by Lakshmanan and Krishnan (2011) as being the organised transmission of information that provides experiences to consumers which are generally intangible but delivers familiarity to guide the use of products, services or systems preceding actual use. On the other hand, informal learning encompasses learning from word of mouth (WOM) from friends, family or colleagues as well as other consumer to consumer reviews and forms of virtual word of mouth (VWOM) from experts or other influencers (Cheung *et al.*, 2012; Parry *et al.*, 2012; Shaw, 2014). An important function of food retailers is to facilitate the sharing of information with consumers thereby providing an avenue for consumers to learn more about products and services (Mogelonsky, 1995, p. 7). Therefore, it is reasonable to state that consumer’s optimisation of learning has an impact on their ultimate purchasing behaviour.

- H6.* Consumer attitude towards VGS (ATTV) is positively related to consumer learning (CLEARN).
- H9.* There is a positive relationship between consumer learning (CLEARN) and their intention to adopt (ITADPT)VGS.

Figure 1 therefore illustrates the conceptual model’s hypotheses.

The proposed model shows convenience motivation and perceived risk as antecedents to all latent variables, overall impacting consumer intention to adopt. The model also shows the moderating effect of consumer PEOU of VGS and consumer attitudes towards VGS (a first level serial mediator) followed by consumer learning and technological readiness as distance serial mediators (Hayes, 2013). The study sought to determine the effects of these antecedents on consumer intention to adopt VGS and the mediating effects of the first level and distance serial mediators.

The following section provides a description of the research participants and is followed by findings from phase one and phase two of the research.

Sample population

A representative sample of consumers from Canada was used in this study. This was done using an existing representative panel of consumers through Qualtrics XM and employing

random sampling. A pilot test of 50 respondents and a diagnostic reliability test were completed with all summated scales using Cronbach's alpha (α) (Hair *et al.*, 2014; Janssens *et al.*, 2008) and all tests were passed. Over a period of two weeks a sample of 1,050 consumers was then collected. After screening for missing data and illogical responses, 1,034 valid responses were obtained. The sample included 48% males (498) and 51% females (529) with 7 participants not reporting gender. Age groups in years were as follows: 18–24 (8%), 25–34 (20%), 35–44 (21%), 45–54 (12%), 55–64 (22%) and 65 and over (16%). Thirty-three percent (33%) of respondents reported that they resided in the urban core of a large city; 44% resided in suburban areas, and 22% of respondents reported residing in a small town or rural area. Eight of the respondents did not report on their place of residence. The sample population also consisted of 33% single persons, 55% married or in common law relationships and 11.3% divorced for the marital status.

Fifty percent (50%) of the sample population reported participating in general online shopping in the last six months of the study while 50% did not. However, only 12.8% of the total sample indicated that their grocery shopping is conducted online with 77% of the sample population indicating that their preferred mode of grocery shopping was in-store. In terms of technology use, a cumulated percentage of 84% of the sample showed heavy usage of Internet/mobile technology, and 40% of respondents reported that they have been using mobile devices for 10 years and over. Consumers preferred source of general information and learning about food, products and services was Internet media (42.7%), while 28% preferred television media. When assessing their online purchase behaviour, only 19% of consumers purchased at least one (1) of the following categories of products online (options were; 1-clothing and accessories, 2- meat, fruits and vegetables, 3- cleaning agents, 4-personal care products, 5-confectionaries and snacks, 6-insurance, 7-pharmaceutical and 8-travel), and only 2% of the sample population purchases all categories of products online. Noteworthy, 73% of the sample reported purchasing clothing and accessories online, in contrast to 22% reporting their interest in purchasing meat, fruits and vegetables online.

Method 1: cluster analysis: determining consumer segments through consumer attitudes toward virtual grocery shopping and intention to adopt

This phase of the study explored segments of the Canadian consumers based on their attitudes towards VGS and their intention to adopt. On the premise that a positive attitude by the consumers towards VGS will result in increased interest in their intention to adopt, a cluster analysis was used to segment the sample. Hierarchical clustering as an input for K-Means clustering was computed in SPSS (Janssens *et al.*, 2008). The final clusters from the exploratory hierarchical clustering yielded four cluster centres under the dimensions of attitudes towards VGS and intention to adopt VGS. After 4 iterations, all cluster centres were optimised with a minimum distance between initial cluster centres of 2.25. Analysis of variance test conducted also showed that the groups were distinctly different (Janssens *et al.*, 2008).

Results – phase 1 investigation

The analysis of variance on the dataset indicated that the four groups or clusters were statistically different for both attitudes towards VGS and intention to adopt VGS at a p -value < 0.001 . Of the total sample of 1,034, cluster 1, which is characterised as the “Fence Sitters” of VGS due to their apparent reservations, represented 23% of the sample population with mean scores of 3.84 for attitudes towards VGS but 2.21 on intention to adopt. Cluster 2, characterised as the “Potential virtual shoppers” due to the above average mean scores of 4.31 and 4.38 for attitude and intention to adopt virtual shopping, respectively, represented 37%

of the population. Cluster 3, characterised as the “Enthusiastic virtual shoppers”, represented 27% of the sample population with mean scores for attitudes towards virtual shopping of 6.11 and 6.10 for intention to adopt. Finally, Cluster 4, characterised as the “Traditional grocery shoppers” due to the apparent low scores on attitude towards VGS of 1.50 and likewise low intention to adopt, represented 13% of the sample population.

The Pearson Chi-square test revealed that there were statistically significant relationships between cluster membership and consumers’ level of education, age group, place of residence (urban, suburban and rural) as well as marital status at p -value < 0.001 . This, however, was not the case for income levels and gender. It was also interesting to find that among the “Enthusiasts”, 63.6% of them were married or in common law relationships and, similarly, almost 50% of the “Potentials” were in that demographic. The largest age group in the study was 55–64, (231 respondents), most of whom constituted the “Traditionalist” segment.

The main objectives of this investigation were to examine consumer technological readiness and optimisation of consumer learning by segments. The four groups of consumers were compared based on these two dimensions using One-Way ANOVA in SPSS 26. The results showed that the “technological readiness” of the four segments was different. The “Traditionalists” showed the least technological readiness (mean score 3.22), followed by the “Fence Sitters” (4.43) and “The potentials” (5.0), while “The Enthusiasts” showed the highest level of technological readiness with a score of 6.1. Therefore, the ANOVA confirmed that there are significant differences among the groups of consumers in regard to their technological readiness. In addition, the Post Hoc test showed that technology readiness is significantly different among all 4 groups (p -value = 0.000 < 0.001 ; mean_{traditionalist} = 3.22; likewise, mean_{fence sitters} = 4.43 then mean_{potentials} = 5.0 and mean_{enthusiasts} = 6.1).

Consumer optimisation of learning showed similar results. “The Enthusiast” segment scored highest on their optimisation of consumer learning (which included both informal and formal learning) with a mean score of 4.86, followed by “The Potentials” (3.72) and “The Fence Sitters”, (3.17) “The Traditionalists” reported the least engagement in consumer learning with a score of 2.72. Subsequent ANOVA results show that there are significant differences among the consumer segments. The Post Hoc tests indicated that level of optimisation of consumer learning by the consumer segments statistically differed among all 4 groups (p -value = 0.000 < 0.001 ; mean_{traditionalist} = 2.72; likewise, mean_{fence sitters} = 3.17 then mean_{potentials} = 3.72 and mean_{enthusiasts} = 4.86). Therefore, the constructs technological readiness and consumer learning indicated good prospects for further investigation using the SEM which is discussed in the next section.

Method 2: structural equation modelling: phase 2 investigation

SEM is a technique used in several disciplines in social sciences that allows researchers to test hypothetical and conceptual theory using quantitative data (Hooper *et al.*, 2008). The technique, also known as Path analysis, is a method used to understand the causal relation of endogenous variables on the dependency factor (McDonald and Ho, 2002). In this research, technological readiness, consumer learning, convenience motivation and the technological acceptance model variables’ influence on consumers’ intention to adopt VGS were examined. SEM was used to understand the causal relationship in the multivariate data that was collected (McDonald and Ho, 2002), and based on the literature, ten hypotheses were developed to test the hypothetical theory, which is illustrated in Figure 1.

The two stage procedure of SEM commenced with the fit of the measurement model followed by the fit of the path model to the latent constructs (McDonald and Ho, 2002). A confirmatory factor analysis using AMOS 26 was conducted to assess the constructs using the maximum likelihood (ML) estimation procedure to estimate the model’s parameters (Arbuckle, 1997, 2016). The model was examined for its unidimensionality, convergent

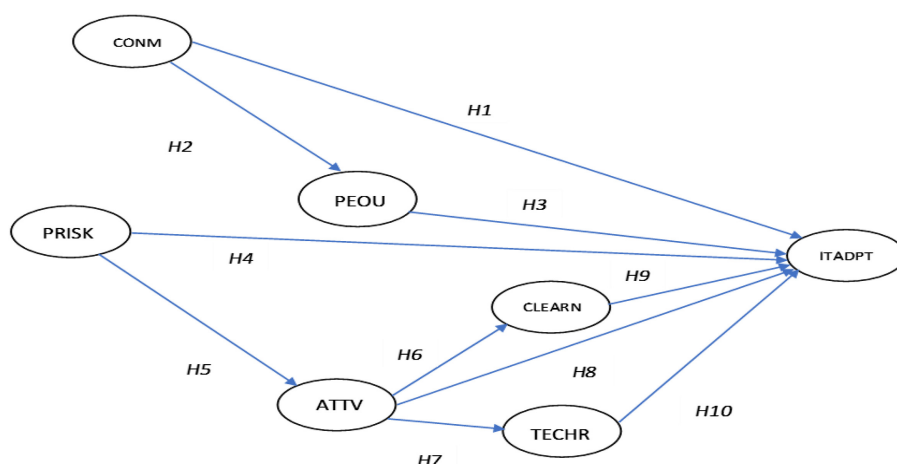


Figure 1.
Proposed model hypotheses

validity, reliability and discriminant validity. The first measurement of the model indicated poor fit; however, after items were recommended to be disregarded, unidimensionality of the proposed model was attained with all variables measured achieving a high loading (>0.50) on all latent variables at a critically significant ratio ($CR = t\text{-value} > 1.96$). The general quality of the model or overall fit was assessed and all indicators showed a good fit of the model to the data. Chi-square goodness of fit statistic $X^2 = 507.5$ with degrees of freedom $2699 > 3$ indicated good fit (Hair *et al.*, 2010); however, $p\text{-value} < 0.001$ was due to large sample size sensitivity (Bagozzi and Yi, 1988). The Tucker–Lewis index (TLI) and comparative fit index (CFI), which are considered reliable indices with a 0.90 cut-off (Hu and Bentler, 1999; Janssens *et al.*, 2008), also indicated good fit together with root mean square error of approximation (RMSEA), goodness of fit index (GFI) and adjusted goodness of fit index (AGFI) which are 0.05 cut-off for good fit (Browne and Cudeck, 1993) and 0.90 cut-off (Jöreskog and Sörbom, 1989, 1993), respectively ($X^2/df = 2.699; p < 0.001$; TLI = 0.987; CFI = 0.989; RMSEA = 0.041, GFI = 0.956; AGFI = 0.940).

The second phase required the fit of path model. The structural equation model showed good model fit ($X^2/df = 2.830; p < 0.001$; TLI = 0.986; CFI = 0.988; RMSEA = 0.042, GFI = 0.953; AGFI = 0.938) after identifying model modification indices that indicated the relationships with disturbances among latent variables have no effect on the causality in the proposed model and are also theoretically justifiable (McDonald and Ho, 2002). For example, disturbances in convenient motivation and PEOU are related. Consumers embracing VGS may consider it convenient because of its ease of use, but the opposite effect is also true. Likewise, consumer perception of risk may have a two-way effect. Nonetheless, these modifications were few and had a negligible effect on the original fit of the model (McDonald and Ho, 2002).

Results – phase 2 structural equation modelling

All tested hypotheses were statistically significant except H10 (see Table 2 for results on hypothesis). The $R\text{-squared} (R^2)$ of the dependent variable intention to adopt (ITADPT) was 0.743 meaning that 74.3% of the variance of consumer intention to adopt VGS was explained by the independent variables in the model which are over the 0.50 (50%) generally expected explanation (Hair *et al.*, 2014). The model suggests that the influence of convenience motivation on intention to adopt VGS is fully mediated by consumer PEOU even as

	Hypotheses (Hs)	Standard regression weights	Results
H1	CONM → ITADP	0.422***	Supported
H2	CONM → PEOU	1.005***	Supported
H3	PEOU → ITADP	-0.113***	Supported
H4	PRISK → ITADP	0.234***	Supported
H5	PRISK → ATTV	0.74***	Supported
H6	ATTV → CLEARN	0.416***	Supported
H7	ATTV → TECHR	0.888***	Supported
H8	ATTV → ITADP	0.332***	Supported
H9	CLEARN → ITADP	0.064***	Supported
H10	TECHR → ITADP	0.03 ^{ns}	Not supported
Note(s): *** $p < 0.001$			
^{ns} not significant			
CONM – convenience motivation; PEOU – perceived ease of use; PRISK – perceived risk; ATTV – attitude towards virtual grocery shopping; CLEARN – consumer learning; TECHR – technological readiness; ITADP – intention to adopt			

Table 2.
Results of tested hypotheses

convenience motivation has a direct influence on consumer intention to adopt VGS. It is important to note, however, that PEOU had a negative influence in its role as a mediator towards intention to adopt. This means that an increase in consumer motivation towards VGS results in less of a barrier to consumer perception of ease of use, given its negative indirect effect as a mediator (Hayes, 2013). This makes theoretical sense considering Hand et al.'s (2009) discussion that some consumers may end up in situations that allow VGS to be the most or only convenient option for them, such as consumers with mobility issues and those who are confined to home. The influence of perceived risk on consumer intention to adopt is fully mediated by consumer attitude to VGS and consumer learning. The influence of consumer perceived risk on intention is also mediated by consumer attitude towards VGS. However, the mediating role of technological readiness was not statistically significant, therefore cancelling out its role as a serial mediator. The model shows that consumer attitude towards VGS is significantly influenced by their technological readiness; however, technological readiness by itself is not a statistically significant determinant of consumer intention to adopt VGS.

Discussion

The aim of this study was to understand the issues impacting Western consumers' intention to adopt VGS, using Canada as an example. The results of this study showed that the attitudes of Canadian consumers towards shopping for groceries online play a pivotal role in their intention to adopt this mode of food purchasing. Endogenous constructs, such as consumer learning and technological readiness, are also influenced by their attitudes. The size of the coefficients, 0.416 and 0.888 for consumer learning and technological readiness, respectively, indicate a large impact on technological readiness, which suggests that consumer attitudes play an important role in their technological readiness to embrace online food shopping.

It is evident, however, that, by itself, technological readiness does not automatically suggest that consumers will adopt VGS. In addition, consumer learning is very important for consumers who accept this mode of grocery shopping. As highlighted by Hoch and Deighton (1989) the exposure, encoding and integration process involved in consumer learning impacts familiarity and eventual behavioural changes.

Exogenous factors, such as convenience motivation and perceived risk, were found to have a positive impact on consumer intention to adopt VGS, possibly because the purchasing of general goods and services online has become normalised. This may be linked to the concept of perceived risk, discussed by [Kurnia and Chien \(2003\)](#), who also found unexpected results related to risk, since in the literature perceived risk was considered an inherent barrier to online shopping ([Belanche et al., 2012](#)). Some researchers have concluded that convenience is a major motivator of online shopping ([Childers et al., 2001](#); [Hand et al., 2009](#); [Jiang et al., 2013](#)); however, our finding that an increase in convenience limits the consideration of PEOU was interesting. This implies that retailers can choose to target segments of the population who consider this mode of shopping extremely convenient which would in turn create additional value for this targeted group of consumers and help that business gain competitive advantage. Online grocery businesses ought to be cognisant of targeted communication geared to consumer attitudes towards VGS and its impact on their technological readiness, the convenience of the method, PEOU, the risk involved and consumer opportunities to optimise learning as they strategize to improve slow online food shopping patterns.

Phase 1 of this study examined attitudes towards, and intention to use, VGS which resulted in the clustering of Canadian consumers into groups. Four distinct groups of consumers (traditionalist, fence sitters, potentials and enthusiasts) were found with differences between the segments in terms of consumer technological readiness and optimisation to consumer learning. This suggests that retailers should employ a multi-strategy approach to target specific Canadian online grocery as a one size strategy is not likely to fit all.

Theoretical and practical implications

This study has theoretical and practical implications. As mentioned in the title of this paper: Does technological readiness and the optimization of consumer learning matter when it comes to the intention to shop virtually for groceries? Yes, but technological readiness is not a determinant of consumer intention to adopt VGS. As emphasised in the discussion, it is evident that, by itself, technological readiness does not automatically suggest that consumers will adopt VGS. Therefore, it should not be assumed that a technology “savvy” consumer will automatically shop online for food. They must have favourable attitudes towards this mode of grocery shopping. The research shows that positive consumers’ attitudes towards VGS are a critical success factor in their intention to adopt. We have contributed to the literature on the importance of positive consumer attitudes towards the purchasing of food virtually but also the importance of this behaviour being learnt whether formally or informally. This extends the understanding of the phenomenon beyond technological acceptance constructs raised by other researchers ([Mortimer et al., 2016](#); [Radka et al., 2018](#); [Driediger and Bhatiasevi, 2019](#)). The socio-cultural influences that impact consumers’ attitudes, however, require further investigation.

In terms of practical implications, the study has shown that consumer learning is of critical importance. Companies should work with brand owners to create avenues for both informal (e.g. social media platforms for consumer-to-consumer interactions and information sharing) and formal consumer learning (e.g. how to do videos and fluid information access such as e-chats). Informal learning appears to be more effective than formal, as the results showed that consumers appear to value the suggestions and recommendations of family and friends with peer groups having been known to have a significant influence on changes in behaviour ([White and Simpson, 2013](#)). Consumer learning, specifically informal learning, is also an avenue for social influence; that is, projecting socially acceptable behaviours that is encouraged by peer group members to bring about change ([Schwartz, 1994](#)). This study has shown that the existence of online food purchase options must be prefaced by targeted

opportunities for consumers to learn and embrace the new shopping mode. This approach also requires logistical planning to meet consumers' expectations (Hübner *et al.*, 2016).

Another practical implication and insight from this study is the opportunity to target the second largest group of consumers named the "Enthusiasts". This group of consumers has embraced the opportunity to virtually shop for food and over half of the segment members are couples suggesting factors such as being time poor together with their tendency towards integrating technology into their lives and the optimisation of consumer learning is favouring their use. The cluster analysis indicated that the largest segment of the sample population (37%), identified as "Potentials" can be targeted due to their favourable attitudes towards this food shopping modality. It is also worth noting that the smallest segment of consumers, the "Traditionalist", are mainly middle aged, and as this group ages they are likely to be less of them and therefore more other groups which are amenable to VGS.

The favourable attitudes towards this mode of food shopping and their intentions to adopt indicate that the apparent slow adoption is expected to improve. And may be exacerbated by situations such as a global pandemic where physical distancing is a priority. This study has also confirmed that sociological influences such as consumer learning and technological readiness are contributory factors to adoption and future investigations are needed to unearth other sociological factors that influence consumers' preferences for this mode of shopping.

Limitations and future research

This study's limitations present opportunities for future research and inquiry. It will be useful to get a deeper understanding of the factors that account for changes in consumer attitudes to embrace grocery shopping in this new retail mode. One suggestion would be qualitative research to determine the reasons for greater scepticism in purchasing food online. Factors could include logistical issues, cost implications, the impact of social influences in and outside of peer groups, such as social media influencers and or issues related to trust in the food industry. Nguyen *et al.* (2019) have found that delivery services have an impact on consumers' online retail adoption. Also, important to consider by e-service managers are all the dimensions of service quality and customer satisfaction as emphasised by Trabold *et al.* (2006) and Kumar and Anjaly (2017). The topic of this research is relevant not only due to the benefits of alternative distribution channels for businesses and subsequent alternative streams of revenue (Pham *et al.*, 2018) but also the potential for ease of food access, value creation and eventual ease of life for consumers.

The sample population poses another limitation. The sample was drawn from a Qualtrics panel which is Internet based. This may have affected the size of the clusters and have undermined the traditionalist or less technology capable segment that may not have Internet or computer access. As such, the size of the relative clusters may not reflect their actual size in the market. Also, the data was collected before the COVID-19 pandemic was declared and the pandemic has triggered an increase in VGS. Therefore, its impact is not reflected in the data but provides an opportunity for future research. Future research may also consider interaction effects of demographic factors on the model tested.

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Further reading

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	(1-Strongly agree - 7 Strongly disagree)	Factor loading ^b
Convenience motivation		
Using Virtual Grocery Shopping would be convenient for me		0.87
Virtual Grocery Shopping would make my shopping less time consuming		0.86
Using Virtual Grocery Shopping would be a convenient way to shop		0.88
Virtual Grocery Shopping will allow me to shop whenever I choose ^a		
Virtual Grocery Shopping will allow me to save time ^a		
Source(s): Childers <i>et al.</i> (2001)		
Perceived ease of use		
I think Virtual Grocery Shopping is easy to do		0.84
I think it is easy to become skilful at using Virtual Grocery Shopping		0.88
I think it is easy for me to follow the procedures when ordering groceries using Virtual Grocery Shopping		0.88
Overall, I believe that Virtual Grocery Shopping is easy to use		0.90
Source(s): Davis (1989), Kurnia and Chien (2003), Bhatiasevi and Naglis (2016), Driediger and Bhatiasevi (2019)		
Perceived risk		
I am comfortable with the payment security aspects of Virtual Grocery Shopping		0.87
I am comfortable with the privacy of my information provided when using Virtual Grocery shopping		0.88
I am comfortable with the quality of products I am likely to get when using Virtual Grocery Shopping ^a		
I am confident over the security aspects of electronic banking transactions when doing Virtual Grocery Shopping		0.86
Source(s): Davis (1989), Kurnia and Chien (2003), Driediger and Bhatiasevi (2019)		
Intention to adopt		
I plan to adopt to virtual grocery shopping		0.92
I will most likely adopt virtual grocery shopping		0.93
I think it's better for me to adopt virtual grocery shopping		
Over time I will use virtual grocery shopping ^a		0.90
Source(s): Chemingui and lallouna (2013)		
Attitude towards virtual grocery shopping		
Purchasing Food through virtual grocery shopping is wise		0.85
Purchasing Food through virtual grocery shopping is good		0.93
Purchasing Food through virtual grocery shopping is sensible		0.85
Purchasing Food through virtual grocery shopping is rewarding ^a		
Source(s): Childers <i>et al.</i> (2001), Yeo <i>et al.</i> (2017)		

Table A1.
Item used to measure
the constructs in study
Phase 1 and 2

(continued)

Technology readiness (Optimism from techqual™) *

Technology gives people more control over their daily lives^a

Grocery Shopping that uses the newest technologies are much more convenient to use^a

I like the idea of doing Grocery Shopping with new technology because you are not limited to regular business hours^a

I prefer to use the most advanced technology available^a

I like new grocery shopping technology that allows you to tailor things to fit your own needs^a

Technology makes you more efficient in your shopping life^a

I find technology to be mentally stimulating 0.75

Technology gives me more freedom of mobility 0.82

Learning about the new technologies can be as rewarding as the technology itself 0.80

I feel confident that machines will follow through with what you instructed them to do^a

Source(s): Parasuraman (2000)

Consumer learning

(1- Never – 7- Always)

I find out about new shopping trends:

By looking at retail companies' websites^a

By looking at YouTube/Wiki-how videos^a

By reviewing online postings^a

By reading articles in magazines^a

From suggestions and recommendations of my friends^a

By listening to my friends 0.88

From suggestions and recommendations of my family 0.93

By listening to my family 0.79

Source(s): Shaw (2014)

Note(s): Eliminated during scale refining for CFA model^a Factor Loadings SEM^b

^aTechnology Readiness Scale (Optimism)™ has been updated in Parasuraman and Colby (2015)

Table A1.

About the authors

Kimberly Thomas-Francois is a PhD in Management graduate of the University of Guelph specialised in Service Management. Her research programme includes a service-oriented approach to linking the agriculture and tourism sectors, consumer engagement, service leadership, value and supply chain development. She is currently conducting post-doctoral research work in smart and virtual food retailing. Kimberly Thomas-Francois is the corresponding author and can be contacted at: kthoma08@uoguelph.ca

Simon Somogyi is the Arrell Chair in the Business of Food and Director of the Longo's Food Retail Laboratory in the Gordon S. Lang School of Business and Economics at the University of Guelph, Canada. He is also an Honorary Senior Fellow in Agribusiness in the School of Agriculture and Food Sciences, University of Queensland, Australia. He has a PhD in Agribusiness Marketing from the University of Adelaide, Australia and is a teacher and researcher in the area of agri-food value chains, food business sustainability and international market development. Over the past decade he has led and contributed to research and development value chain projects in countries such as China, Japan, Australia, Pakistan, the Philippines, Indonesia, Kenya and Canada. Most of these projects involve creating and delivering consumer driven food supply chains, linking members of the chain from input

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supply and primary production to retail, particularly in the beverage, seafood and horticulture sectors. These projects have led to more efficient food supply chains that create and deliver more food with less waste and with more profitability and economic sustainability for all members of the chain.

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