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## Article

# E-grocery challenges and remedies: Global market leaders perspective

Cogent Business & Management

## Provided in Cooperation with:

Taylor & Francis Group

**Suggested Citation:** Mkansi, Marcia; Eresia-Eke, Chukuakadibia; Emmanuel-Ebikake, Oyetola (2018) : E-grocery challenges and remedies: Global market leaders perspective, Cogent Business & Management, ISSN 2331-1975, Taylor & Francis, Abingdon, Vol. 5, <https://doi.org/10.1080/23311975.2018.1459338>

This Version is available at:

<https://hdl.handle.net/10419/206060>

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Received: 02 January 2018  
Accepted: 25 March 2018  
First Published: 02 April 2018

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Reviewing editor:  
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## OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

# E-grocery challenges and remedies: Global market leaders perspective

Marcia Mkansi<sup>1\*</sup>, Chukuakadibia Eresia-Eke<sup>2</sup> and Oyetola Emmanuel-Ebikake<sup>3</sup>

**Abstract:** The purpose of the study is to identify logistic elements germane to e-grocery businesses, and to reveal the challenges collateral with each logistic element. Further, it strives to create a better understanding of specific remedies that have been employed by top e-grocery retailers to overcome existing challenges while aligning identified challenges with Turban's framework. Extensive semi-structured interviews were conducted with management staff in three of the top ten global online grocery retailers and another that was a market leader in a European country. The qualitative data collected was transcribed and coded using a non-hierarchical axial coding to identify emerging themes in content analysis. The results expose a range of challenges that could be compartmentalised into three broad categories, in harmony with the different stages of the order fulfilment process. Interestingly, the study found that most challenges were operational rather than tactical or strategic in nature. While the study expands existing knowledge, its revelation that most challenges lie in the management of roles and responsibilities domain is instructive. This makes it imperative for practitioners to focus on this specific area if meaningful improvement in e-grocery retailing performance is to be realised. This research offers a systematic understanding of supply and distribution challenges, including remedies utilised to ameliorate the effect of the challenges from the perspectives of the top companies in the industry. These remedies can be invaluable for existing and emerging e-grocers.

### ABOUT THE AUTHORS

Marcia Mkansi (University of South Africa), Chukuakadibia Eresia-Eke (University of Pretoria) and Oyetola Emmanuel-Ebikake (Edgehill University) are senior academics with PhD and industrial experience in the broader fields of supply chain and operations management. They are currently responsible for teaching and research in the areas of supply chain and operations management. Their cross-country blend of hands-on practical industry experience and academic insight avail them as rare arsenal of notions, materials and approaches that enhance knowledge-transfer effectiveness. Their prime research interests lie in the arena of management practice improvement, especially supply chain and operations in the digital age. This research relates to the wider issues associated with emerging issues and business models in the era of digitalisation and key logistics elements that underpins the success of every organisation irrespective of sector and nature of goods and services.

### PUBLIC INTEREST STATEMENT

The rise in the use of the Internet by individuals across the world has amongst others, made it a virtual market place. Global grocery-retailing businesses have, like others, latched onto the Internet platform to sell items online, a practice known as e-grocery. Expectedly, the business of e-grocery is not without its challenges at strategic, tactical and operational levels. The paper entitled "E-grocery Challenges and Remedies: Global Market Leaders Perspective", interrogates these challenges from the perspective of managers working in the top global e-grocery market and unveils practical remedies employed to overcome them. Interestingly, the challenges identified are predominantly linked to managing roles and responsibility, far much more than the previously covered inventory and supply vs. demand problems. The whole point of this is to share best practices and empower prospective and existing entrepreneurs in the e-grocery business space with requisite knowledge that should lend itself to better competitiveness and growth.

**Subjects:** Production, Operations & Information Management; e-Business; Operations Management; Supply Chain Management

**Keywords:** E-retail; distribution management; grocery; logistics

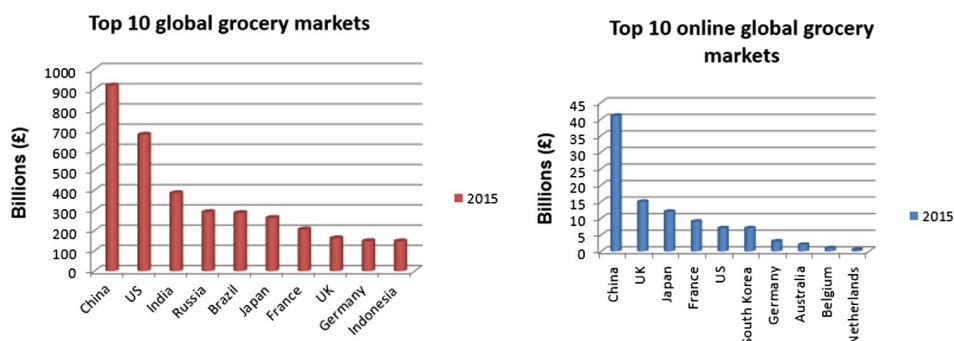
## 1. Introduction

E-commerce is believed to be an avenue for doing business, which promises relative convenience to the customer, given that customers can shop from the comfort of their homes or offices and at their own time.

With a general desire by people to acquire products and services more conveniently, the rational expectation would be that the global retail e-commerce would continue to increase. Current statistics suggest that this is indeed the case, as global retail e-commerce revenues have increased from \$694.8 billion to \$1,155.7 billion over the past four years (Statista, 2016). While this aggregate improvement at macro-level is not unexpected, the same does not necessarily appear to be the case at micro-level. Indeed, with particular reference to the grocery retail market, at global level there seems to be an unexpected disconnect between the performances of countries in offline sales, relative to online sales.

**Figure 1. Top ten global grocery markets (offline and online).**

Data source: Institute of Grocery Distribution (Institute of Grocery Distribution, 2015).

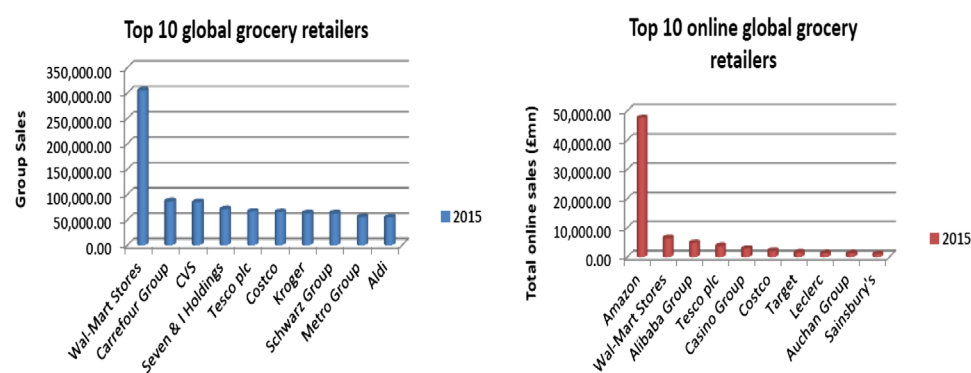


A comparison of countries in the 2014–2015 top ten list of offline–online global grocery markets shows that performance in the offline market, contrary to expectations, is not necessarily matched by performance in the online market. As shown in Figure 1, besides China and the United States, countries like India, Russia and Brazil in the top five global grocery markets in 2015, did not even appear in the top ten online list (Institute of Grocery Distribution, 2015).

While access to technology may be a plausible explanation for the disharmony in the countries listed in the top ten offline grocery markets relative to those in the top ten online grocery markets, this argument becomes untenable when a similar mismatch is evident when the top ten offline grocery retail organisations are compared to counterparts in the online grocery retailers' group, given that they operate in the same geographical locations.

**Figure 2. Top 10 offline and online global grocery retailers.**

Data source: Institute of Grocery Distribution (2015).



As shown in Figure 2, in 2015, out of the top ten offline global grocery retailers, only 30% (Walmart stores, Tesco plc. and Costco) appear as part of the top ten online global grocery retailers. While Walmart stores led the offline global grocery ranking, it appears only second in the online list, where Amazon leads. This disharmony between countries as well as organisations relating to performance in the offline and online global grocery spaces, signals the existence of uniqueness, possible complexities and challenges in the online grocery business.

The implication of this is that a more profound understanding of the challenges encountered in online grocery retailing is necessary if performance of an organisation in traditional offline grocery retailing is to translate into concomitant performance in the online grocery area. Furthermore, knowledge of the mechanism(s) created by some organisations to overcome or mitigate effects of identified challenges can be invaluable if better performance in online grocery retail is to become a reality.

Essentially, it is this thinking that provides impetus for the current study. Recognising the existing imbalances relating to organisational performance in the offline-online global grocery retail market, the study takes a more-focussed rather than a wide-angled approach to examining the challenges in the online grocery (or e-grocery) business in order to distil findings, which are detailed and practical enough to lend themselves to easy application across the e-grocery retailing industry.

Relying on e-grocery market leaders, this study focuses on the challenges they face within the context of fundamental practical and theoretical elements of supply chain management. For the organisations studied, e-grocery operations are conducted alongside in-store retailing and this increases the complexity of operations.

The study therefore seeks to find answers associated with the research questions:

- (1) What specific challenges face e-grocery retailers?
- (2) How do the challenges align with Turban, King, Lee, Liang, and Turban's (2015) framework?
- (3) What specific remedies have been employed to help the organisation cope with identified e-grocery challenges?

## 2. Literature review

The exponential growth of e-commerce sales worldwide (Centre for Retail Research, 2014; Statista, 2017) has made retailing more complex and more competitive (Internet Retailer, 2014; Turban, Whiteside, King, & Outland, 2017). This has led to the major grocery retail groups introducing online platforms as an added channel to exploit new sales opportunities across the globe. This is not surprising as "click-and-mortar" or "click-and-brick" organisations tend to conduct some e-commerce activities, usually as an additional marketing channel as is the case with Tesco, and Asda (owned by Walmart stores) in the United Kingdom, Albert Heijn and UberMart in the Netherlands, as well as Edeka and Rewe in Germany (Institute of Grocery Distribution, 2015; Turban et al., 2017).

The value of online grocery shopping for both e-retailers and consumers varies. For online grocery retailers, it provides unlimited trading hours, extends geographical reach, enhances customer service, creates faster transactions and shortens product cycles (Pantano, Nguyen, Dennis, & Gerlach, 2016; Wiengarten, Fynes, Humphreys, Chavez, & McKittrick, 2011). For consumers, it provides economic value, a wide assortments of products (Hubner, Kuhn, & Wollenburg, 2016; Sreeram, Kesharwani, & Desai, 2017), convenience, time savings, home delivery and access to multiple retailers (Pan, Giannikas, Han, Grover-Silva, & Qiao, 2017). Although the Internet retailing channel is unlikely to predominate in the total grocery market in the near future, an increase in its share could still

be significant. However, the potential of the sector is deflated by different challenges in the management of supply and distribution of online groceries (Hubner et al., 2016; Melis, Campo, Breugelmans, & Lamey, 2015; Pan et al., 2017; Verhoef, Kannan, & Inman, 2015), and this is one of the major barriers to online grocery operations.

The current paper adopts Turban's et al. (2015) framework to place challenges into three categories: supply vs. demand, managing inventories and managing roles and responsibilities. Turban et al.'s (2015) framework emphasises how business environment pressures create problems and opportunities for organisations. Such problems influence organisational performance and strategies which necessitates innovative responses. The imbalances between the offline and online global grocery markets and global grocery retailers serves as the most conceptual evidence of intense global competition emanating from digital technologies and the purchasing power of consumers (major business environment pressures outlined by Turban et al. (2015)). This have altered the performance and positioning strategy of global grocery players, whilst presenting a digital market and challenges for serving such market (see Figures 1 and 2). In the current study, the choice of Turban et al.'s (2015) framework seems justifiable against the backdrop of the fact that the findings of several scholars' efforts pertaining to businesses pressures and challenges that confront the retail logistics context (see for example Table 1), show evidence of the three broader categories of challenges that fit properly into the position of the framework. These are the compartments of managing inventory, supply vs. demand and managing roles and responsibilities. Such conceptual evidence appears in many scientific journals and books of the last decade (see Table 1): From the perspective of managing inventory, Martino, Yuce, Iannone, and Packianather (2016) identify the problem of allocating inventory from a centralised storage space to a network of stores, whilst trying to balance demand as a crucial issue in the retail fashion industry. Lanzilotto, Martino, Gnoni, and Iannone (2014) echo problematic issues of short product life span, product variety and unpredictable demand in retail fashion. Several more scholars offer a common theme, but with different meanings and emphasis to replenishment and inventory problems in the retail fashion industry (Abbott & Palekar, 2008; Bijvank, Bhulai, & Huh, 2015; Coelho & Laporte, 2014; Martino, Fera, Iannone, & Miranda, 2017; Novotna & Varysova, 2015; Pan, Leung, Moon, & Yeung, 2009), with some splitting the focus to transportation (Qu, Wang, & Li, 2015).

A distinct focus is also on different issues, but the related problem of supply and demand. For example, scholars such as Fera, Fruggiero, Lambiase, Macchiaroli, and Miranda (2017) highlight the problem of optimal order penetration against demand volatility. Grewal, Enns, and Rogers (2015) offer great insight into issues of demand subject to seasonal variation, and Zhu (2013) extends an understanding of demand problems relative to price sensitivity. In 2009, Fernie and Sparks reported of an Auton survey that explicitly pursued various stakeholders regarding retail logistics challenges and found three top issues: (1) shows extensive voids in availability due to in-store Internet picking, (2) the cost of radio frequency identification (RFID) reduction, (3) and increased factory gate pricing reduction. Kee-hung and Cheng (2016) also point towards the challenges of balancing demand, cost reduction and the quality of products. Scott and Scott (2008), as well as Fernie and Sparks (2009) highlight, few but significant footprints towards a category of managing roles and responsibilities. Upon close observations, the footprint appears to reinforce findings related to managing roles and responsibilities, which lean heavily to possible links of human elements as offered by Fruggiero, Riemma, Ouazene, Macchiaroli, and Guglielmi (2016).

The lack of a systematic analysis of e-grocery challenges across all logistics tasks and evenly through the three broader categories of challenges, provide a good reason to argue that there is a need to work out more precisely the points at which the e-grocery challenges can be distinguished from the three categories and across all e-grocery logistics elements, and other industries such as retail fashion. This article builds on the findings of previous studies that corresponds to the variability and distinctiveness of the three broader categories of challenges, with specific attention to the context of e-grocery logistics elements. Turban et al.'s (2015) framework provides a platform to demonstrate how e-grocery retailers respond to the challenges posed by the complex landscape of managing logistics tasks or elements against the market, economic, technological and societal pressures.

**Table 1. Categories of major challenges in managing retail logistics tasks from 2008 to 2017**

Sources	Year	Author	Description	Category		
				Managing inventory	Supply vs. demand	Managing roles and responsibilities
Journals	2017	Martino et al.	Analytics network process identifies material flow risky area	•		
		Fera et al.	Optimal order penetration point problem and demand volatility		•	
	2016	Martino et al.	Problem of allocating inventory and balancing demand with cost	•	•	
	2015	Bijvank et al.	Lost sales in replenishment policies	•		
		Novotna and Varysova	Issues of replenishing perishable products	•		
		Grewal et al.	Seasonality of demand and replenishment problem	•	•	
	2014	Qu et al.	Replenishment and delivery to different locations	•	•	
		Martinez-de Albeniz and Boeda Collado	Market demand affected by the availability of products in the stores	•	•	
		Lanzilotto et al.	Short product life span, product variety and unpredictable demand	•	•	
		Coelho and Laporte	Replenishment and inventory problem	•		
		Zhu	Unpredictable supply and demand in price sensitive context		•	
	2012	Anul et al.	Grocery items requiring different storage temperatures	•		
	2011	Agatz et al.	Complex planning problem in balancing marketing and operational consideration		•	
		Aastrup and Kotzab	Effect of online grocery shopping to in-store logistics and on-shelf availability	•		
	2009	Fernie and Sparks	Picking assortment of different temperatures	•	•	
		Asdemir et al.	Balancing utilisation of delivery capacity against time and thin profit margin		•	
		Pan et al.	Market changes, economic order quantity and replenishment	•		
Books	2008	Abbott and Palekar	Single store multi product problem, shelf availability and space	•		
	2016	Scott and Scott	Substitution, handlings, sensory and temperature	•		•
		Kee-hung and Cheng	Balancing demand, cost reduction and quality of products	•	•	
	2014	Fernie and Sparks	Logistical challenges: delivery times	•	•	
	2009	Fernie and Sparks	On-shelf availability, RFID and factory gate pricing	•	•	•



An expansion of the content analysis from retail/ e-retail to e-grocery research, reveals an interesting canvass of studies published from 2008 to 2017 (see Table 2). A significant body of e-grocery research focus on three major areas of:

- e-grocery fulfilment models (see Ehmke & Campbell, 2014; Hagberg & Holmberg, 2017; Iwan, Kijewska, & Lemke, 2016; Pan et al., 2017; Saskia, Marei, & Blanquart, 2016; Wang, Mao, O'Kane, & Wang, 2016);
- e-grocery shopping behaviour (see Harris, Riley, Riley, & Hand, 2017; Kang, Moon, Kim, & Choe, 2016; Mortimer, Hasan, Andrews, & Martin, 2016; Sreeram et al., 2017);
- omni-channel or multi-channel perspectives (see Breugelmans & Campo, 2016; Hubner et al., 2016; Ishfaq, Defee, Gibson, & Raja, 2016).

Other noticeable e-grocery research is observed in technology application (see Cagliano, De Marco, & Rafele, 2017), and the future and critical success factors of e-grocery business (see Anu, Mervi, & Markku, 2012; Aspray, Royer, & Ocepek, 2013; Colla & Lapoule, 2012). It is not entirely clear why most reviewed challenges are skewed towards order delivery (supply vs. demand) and order stock elements of logistics (managing inventory), considering that online grocery retail has not lived up to its promise of convenience for all top ten global grocery markets and retailers (see Figures 1 and 2). This inevitably widens the gulf between theory-based and practically based remedies.

A literature analysis of these challenges from 2008 to 2017 shows a wide spectrum of persistent and continuous research-focus on the issues of order delivery (transportation) and order stock (inventory) elements of logistics, with scant attention being paid to other logistical elements (see Table 3). Although there is considerable literature exploring various aspects of e-grocery research, little is available that explored the e-grocery challenges and the way top grocery e-retailers manage or address them. This is besides the works of Pan et al. (2017), which introduces a two-stage approach to schedule transportation plans, and Asdemir, Jacob and of Krishnan (2009), which presents the Markov decision process-based model to assist e-grocers achieve efficient and effective utilisation of deliveries against thin margins of profit and time. Further, scholars such as Azi, Gendreau, and Potvin (2007) also introduce an elementary algorithm that attempts to solve a routing challenge subject to limited resource and time windows. It is instructive to note though, that most of the suggestions and solutions proffered are theory-based, rather than practice-based solutions. Notably, the challenges covered by previous studies are skewed towards supply vs. demand and managing inventory categories as depicted in Table 3. Of particular interest is the correlation between the quantity of research on e-fulfilment (see Table 2), and the challenges in managing the e-grocery logistics tasks (see Table 3), which explains some of the skewed coverage of challenges and theory-based solutions towards managing inventory and supply vs. demand challenges.

**Table 2. Analysis of e-grocery research focus from 2008 to 2017**

Categorisation	Year	Author	E-grocery research focus	Category						E-grocery future and critical success factors	Theft and security	
				E-grocery retailer fulfilment models	E-grocery shopping behaviour	E-grocery technology application	E-grocery: from a multi/omni channel perspective	Ethics and social responsibility				
E-grocery research: Retailer perspective	2017	Cagliano et al.	E-grocery supply chain management enabled by mobile tools			.						
			E-grocery specific focus: Increment of e-grocery supply chain efficiency supported by mobile devices management strategies									
		Hagberg and Holmberg	Travel modes in grocery shopping	.								
			E-grocery specific focus: Travel modes related to online in grocery shopping addressed									
	2016	Hubner et al.	Last mile fulfilment in Omni-channel grocery retailing				.					
			E-grocery specific focus: Planning framework for last mile order fulfilment in Omni-channel grocery retailing									
		Ishfaq et al.	Redignment of the physical distribution process in Omni-channel				.					
			E-grocery specific focus: Multi-channel of information and functionality across Omni-channels.									
	Wang et al.	Exploration of e-retailers home delivery	.									
		E-grocery specific focus: Online grocery delivery options										
	Breugelmans and Campo	Cross-channel effects of price promotion					.					
		E-grocery specific focus: Analysis of the multi-channel grocery retail sector										
	Iwan et al.	Parcel locker efficiency as the last mile delivery option	.									
		E-grocery specific focus: Usability and efficiency of parcel locker system										

(Continued)



**Table 2. (Continued)**

Categorisation	Year	Author	E-grocery research focus	Category						Theft and security
				E-grocery retailer fulfilment models	E-grocery shopping behaviour	E-grocery technology application	E-grocery: from a multi/omni channel perspective	Ethics and social responsibility	E-grocery future critical success factors	
		Saskia et al.	Innovations in e-grocery and logistics solutions for cities	•						
			E-grocery specific focus: Innovative concepts in e-grocery and their consequences to transport and logistics							
			Vehicle routing problem for city logistics	•						
	2015	Cattaruzza et al.	E-grocery specific focus: Less truck load (LTL) logistics flow							
			Customer acceptance mechanism for home deliveries	•						
	2014	Ehmke and Campbell	E-grocery specific focus: Challenges associated with attended home deliveries due to the congestion and tight delivery time window							
			Choice-based demand management and vehicle routing in e-fulfilment	•						
			E-grocery specific focus: Attended home delivery challenge							
	2013	Aspray et al.	Anatomy for dot.com failure						•	
			E-grocery specific focus: Rise and fall of Webvan							
	2012	Rotem-Mindali and Weitevreden	Transport effects of e-commerce	•						
			E-grocery specific focus: Home grocery shopping and associated travel effects							
			Vehicle routing for attended home delivery	•						
		Ehmke and Mattfield	E-grocery specific focus: Home attended deliveries including food=perishable products							

(Continued)

**Table 2. (Continued)**

Categorisation	Year	Author	E-grocery research focus	Category						Thrift and security
				E-grocery retailer fulfilment models	E-grocery shopping behaviour	E-grocery technology application	E-grocery: from a multi/omni channel perspective	Ethics and social responsibility	E-grocery future critical success factors	
	2012	Colla and Lapoule	Critical success factors in e-commerce						•	
			E-grocery specific focus: Key success factors of the grocery “click and drive” option							
	2011	Anul et al.	E-commerce logistics						•	
			E-grocery specific focus: Future research on solutions for secure deliveries and grocery items requiring different storage items							
	2011	Gevaers, Van de Voorde, & Vanelander	Characteristics and typology of the last mile logistics	•						
			E-grocery specific focus: Innovative concepts to urban distribution and the “last mile”							
	2010	Agatz et al.	Time slot management in attended home delivery	•						
			E-grocery specific focus: Complex planning in balancing marketing and operational consideration of delivery time slots							
	2010	Fernie, Sparks, & McKinnon	Retailers logistics in the: Logistical challenges: delivery times, picking assortments of difference temperatures	•						
			Ethics and social responsibility in grocery shopping					•		
		Williams et al.	E-grocery specific focus: Ethical and social responsibility factors identified							
			Persisting out-of-stock issues posy forty years	•						
		Aastrup and Kotzab	E-grocery specific focus: Role of backroom areas in fulfilling online home grocery delivery							

(Continued)

**Table 2. (Continued)**

Categorisation	Year	Author	E-grocery research focus	Category						Thft and security
				E-grocery retailer fulfilment models	E-grocery shopping behaviour	E-grocery technology application	E-grocery: from a multi/omni channel perspective	Ethics and social responsibility	E-grocery future critical success factors	
E-grocery research: Customer perspective	2009	Fernie and Sparks	Emerging issues and new challenges in retail supply chain	•						
			E-grocery specific focus: Options for picking the last mile delivery							
		Asdemir et al.	Dynamic pricing of multiple home delivery options	•						
			E-grocery specific focus: Markov decision processed-based pricing model							
	2008	Scott and Scott	Online grocery order fulfilment trade-offs	•						
			E-grocery specific focus: Challenges for e-grocers to overcome							
	2017	Harris et al.	A typology of grocery shoppers		•					
			E-grocery specific focus: Profiling e-grocery shoppers							
		Sreeram et al.	Factors affecting satisfaction and loyalty in online grocery shopping		•					
			E-grocery specific focus: Conceptualisation and testing of integrated model of online grocery shopping behaviour							
		Pan et al.	Using customer-related data to enhance e-grocery home shopping	•						
			E-grocery specific focus: Optimisation of e-grocery home shopping							

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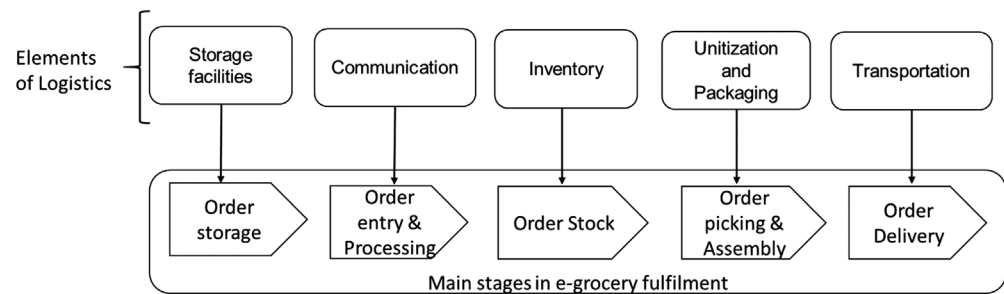
**Table 2. (Continued)**

Categorisation	Year	Author	E-grocery research focus	Category						E-grocery future critical success factors	Theft and security
				E-grocery retailer fulfilment models	E-grocery shopping behaviour	E-grocery technology application	E-grocery: from a multi/omni channel perspective	Ethics and social responsibility			
	2016	Mortimer et al.	Shopping frequency on perceived risk	•							
			E-grocery specific focus: Online shoppers' experience, purchasing frequency and perceived risk between trust and online repurchase intention of groceries								
	2016	Breugelmans and Campo	Cross channel effect of price promotions in multi-channel grocery retail sector	•							
			E-grocery specific focus: Effects of price promotions in buying behaviour across offline and online channels								
		Kang et al.	Consumers' motives for online grocery	•							
			E-grocery specific focus: Factors affecting the adoption of online grocery shopping								
	2015	Melis et al.	Impact of multi-channel retail mix on online store choice	•							
			E-grocery specific focus: Correlation of online grocery shopping experience with loyalty, assortments and multi-shoppers' juxtaposition								
		Verhoef et al.	Management of customers across multi-channels	•							
			E-grocery specific focus: Combination of the retail mix across channels								
	2013	Freathy and Calderwood	Impact on internet adoption on shopping behaviour	•							
			E-grocery specific focus: Online grocery retailing in rural areas (Islands perspective)								

**Table 3. Analysis of e-grocery challenges from 2008 to 2017**

Categorisation	Year	Author	E-grocery challenges	E-grocery logistics tasks				
				E-grocery order delivery	E-grocery order entry and processing	E-grocery stock	E-grocery order pricing and assembly	E-grocery order storage
Supply vs. demand	2017	Pan et al.	Suitability of online grocery delivery options	•				
	2016	Hubner et al.	Logistics, store space and store layout	•		•		
		Ishfaq et al.	Network complexity Cost to delivery process :Omni-channel perspective	•	•			
	2015	Verhoef et al.	Management of customers across multi-channels		•			
		Cattauzza et al.	Vehicle routing problem for city logistics	•				
	2014	Ehmke and Campbell	Attended home deliveries due to congestion and tight time window	•				
		Yang et al.	Attended home delivery challenge :additional expense for transportation, handling and shortage of undelivered home groceries	•				
	2013	Aspray et al.	High cost and complexity of fulfilment for groceries bought online	•				
	2012	Ehmke and Matfield	Cost-efficient consumer-orientated deliveries and congestion issues	•				
	2011	Gevaers et al.	Making the last mile efficient and ecological friendly considering limited order volumes	•				
Managing inventory		Agatz et al.	Complex planning problem in balancing marketing and operational consideration	•				
	2010	Fernie et al.	Logistical challenges: delivery times	•				
	2009	Fernie and Sparks	Options for picking the last mile delivery	•				
		Asdemir et al.	Balancing utilisation of delivery capacity against time and thin profit margin	•				
	2008	Hand et al.	Retaining online grocery shoppers		•			
		Scott and Scott	Delivery	•				
	2016	Hubner et al.	Replenishments for online volume to store and keeping track of inventory			•		
	2015	Melis et al.	Impact of multi-channel retail mix on online store choice			•		
	2012	Anul et al.	Grocery items requiring different storage temperatures			•		
	2010	Aastrup and Katzab	Effects of online grocery shopping to in-store logistics and on-shelf availability	•		•		
Managing roles and responsibilities		Fernie et al.	Picking assortments of different temperatures			•		
	2008	Scott and Scott	Substitution, sensory and temperature			•		
	2008	Scott and Scott	Handling			•		

**Figure 3. E-grocery stages fulfilment and elements of logistics.**



Managing the fundamental elements of logistics or supply chain (such as storage facilities, inventory, transportation, communication, unitisation and packaging), is recognised as a key success factor and core competitive strategy in almost every business industry (Hubner et al., 2016; Rushton, Croucher, & Barker, 2014). E-grocery management requires contextualising the logistics from an e-grocery viewpoint: transportation of supplies (such as chilled, ambient, frozen and fresh-produce groceries) geographically, packing them into units and taking them from the stores to the customers' homes. Information flows from the point of the customers' order through the elements of logistics, to the delivery of the groceries as shown in Figure 3.

These logistics elements are critical in e-grocery retailing because as observed by previous scholars (Colla & Lapoule, 2012; De Marco, Cagliano, Margano, & Perfetti, 2014; Reiner, Teller, & Kotzab, 2013; Turban et al., 2015) excellence in transportation, distribution and inventory management holds the key to profit and success in e-retail. Moreover, literature (Anu et al., 2012; Hubner et al., 2016; Wang et al., 2016) indicates that the management of logistical operations that relate to the online food retail business is more complicated than in any other retail sector. This is because, for example, the "physical" nature of food (the relatively short period of freshness), the trade-off between cost and service, the high expectations of on-time delivery and the need to maximise order-accuracy pose challenges in the overall management process and organisation. An overarching theme emerging throughout the grocery literature reviewed is the inconclusiveness of the extent of challenges envisaged. The theoretical and practical analysis of these challenges and consequent remedies are of prime interest to this research.

Scholarly efforts are scanty as they relate to addressing e-grocery challenges from the perspective of top global leaders in the e-grocery business. Similarly, not too many studies on the e-grocery retail market have adopted a practice-based approach, which focuses on all the logistical elements in the e-grocery business. The few attempts made to address the challenges focus especially on order delivery (transportation) and order stock (inventory) issues. With respect to order delivery, for instance, Hagberg and Holmberg (2017) focus on travel modes related to online grocery shopping, Wang et al. (2016) address delivery options, Iwan et al. (2016) assess the usability and efficiency of the parcel locker system, and Cattaruzza, Absi, Feillet, and González-Feliu (2015) address vehicle routing problems. Although all issues are emphasised differently and focus on specific e-grocery delivery problems, the common theme is customer-centric and leans towards order delivery of the e-grocery sector, rather than towards the conclusive understanding of challenges across the different elements of logistics. Building on the literature, the current study addresses this gap by taking a practical approach from the grocery e-retailers' perspective, rather than a customer-centric approach.

### 3. Methodology

From a critical realist stance, an exploratory research design was deemed to be appropriate for understanding the challenges, the remedies and the trade-offs of e-grocery operations. Advocates of exploratory research design endorse the case-study as a complementary strategy for gathering an in-depth understanding of the phenomena (Saunders, Lewis, & Thornhill, 2015; Sekaran & Bougie, 2010; Yin, 2013). More specifically, the current study deployed a multiple case-study research

strategy beginning with the identification of a relevant e-grocery sector. Thereafter, a two-way approach was adopted, which comprised a literature review and primary research of organisations.

A purposive sample of four e-grocery retailers was identified. The rationale for using these particular companies was firstly that they could all be considered leaders in e-grocery as three appeared in the top ten online global grocery ranks, while the fourth is listed in the top five national ranks (Institute of Grocery Distribution, 2015). Secondly, all four companies are evolving rapidly, and they are likely to employ more potent remedies to supply and distribution challenges.

Interviews were held with managers at the strategic, tactical and operational levels of the four major e-grocers to gain a specific understanding of the industry. *Strategic* managers are generally focused on long-term planning (Bocij, Greasley, & Hickie, 2015), which has a major influence on business operations, as it defines the strategy to be implemented on the other levels of management. *Tactical* managers are responsible for implementing the strategy in medium-term plans for the organisation. They do performance monitoring and also control resource allocation (Bocij et al., 2015), especially at regional levels. *Operational* managers are responsible for short-term planning and day-to-day management of business operations at individual stores. E-grocery operational managers are in charge of daily supply and distribution operations, from picking to delivery, in each store or distribution centre (DC).

The respondent profile (Figure 4) shows that most of the participants were operational managers. This means that the findings of the current study are reflective of daily practices at operational level. All participants were purposively sampled, based on their experience in the sector under investigation.

**Figure 4. Interview participants' profile.**



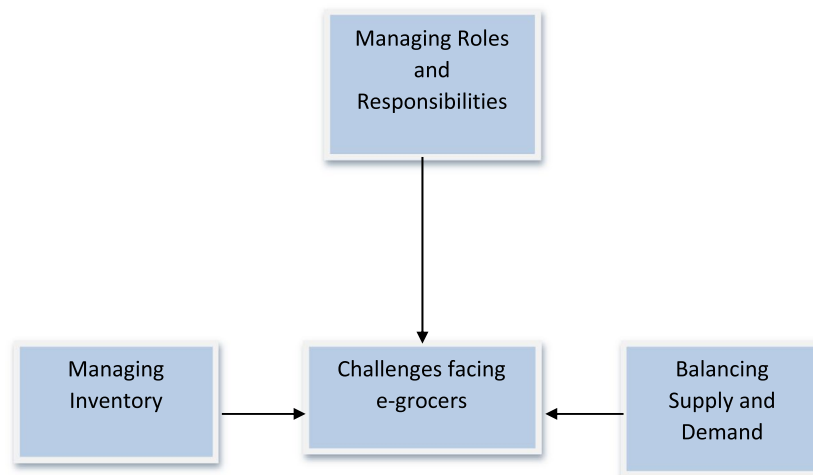
The qualitative data collected was transcribed and coded using a non-hierarchical axial coding approach to identify emerging themes. Axial coding is described as the creation of themes or categories by grouping codes given to words or phrases (Babbie, 2015). Non-hierarchical axial coding was undertaken because the data did not reveal any emerging hierarchy or order. This was later analysed using content analysis. Content analysis is a qualitative technique well-suited for interpreting meaning from the content of text data using three distinct approaches: conventional, direct and summative (Hsieh & Shannon, 2005). The approach used for this study was conventional content analysis, since it enables categories or themes to be derived from data and allows for the track and trace of rich qualitative responses.

#### 4. Presentation of findings

In line with the framework by Turban et al. (2015), the study found that challenges facing e-grocers are fuelled by the digitalisation of the grocery channel, consumers' buying powers and intense competition pressures. As much as such digitalisation presents an opportunity, it also creates challenges that fit Turban et al.'s (2015) view and findings from literature that could easily be aligned into a three-component category comprising the areas of managing inventory, balancing supply and demand as well as managing roles and responsibilities (see Figure 5).



**Figure 5. A framework for challenges in e-grocery businesses.**



#### 4.1. Challenges in managing inventory

With respect to the area of managing inventory, the interviewees highlighted six specific challenges. From a company perspective, the challenge of availability of products, substitute products and costs as well as dependence on other departments were, respectively, faced by 3, 4 and 2 of the companies surveyed. Challenges posed by the freshness of products and pricing efficiency, managing customer expectations and congestion on the shop floor were experienced by 3, 3 and 2 of the companies, respectively (see Table 4).

**Table 4. Challenges in managing inventory**

Category	Main challenges	Company A	Company B	Company C	Company D	Total number of managers
Managing inventory challenge	Availability of products	1 Op; 1 Op /T	None	2 Op	1 S; 1 T	6
	Availability of products vs. substitution and costs	2 Op; 1 Op /T	1 Op	1 Op	1 T	6
	Dependence on other departments	2 Op	None	None	1 T	3
	Freshness of products against picking efficiency	2 Op; 1 Op /T	1 Op	1 Op	None	5
	Managing customers' expectations	1 Op	1 Op	1 Op	None	3
	Congestion in the shop floor	2 Op	None	1 Op	None	3

Notes: Op – managers at the operational level; T – managers at the tactical level; S - managers at the strategic level.

#### 4.1.1. Availability of products

Six out of the 15 interviewees identified this as a critical challenge of e-grocers. It is the only challenge that cuts across all of the levels of management given that it was identified by a mix of respondents bearing operational, tactical and strategic responsibilities in their organisations. There were two strands of opinion related to why the challenge persists in e-grocery businesses. First, respondents suggested it exists because of customer volume expectations. With the general inclination towards lowering investment in inventory items, organisations refrain from carrying too much inventory. Unfortunately, the unpredictability of online shopping exposes the organisation to a situation where quantities from online orders may exceed the regular inventory levels of specific grocery items kept by an outlet. This according to the respondents may, be because of large quantities required by a customer or the cumulative quantities across orders received within a specific timeframe outrun quantities of the grocery item available at the store. The consequence of this, in the main, is an inability to fulfil customer orders.

Secondly, respondents opine that the challenge is linked to the issue of store replenishment, particularly of refrigerated groceries. Responses obtained from the interviews allude to the fact that the short shelf-life of such groceries has profound ramifications for personal shoppers (pickers), when the items are not replenished timeously prior to picking. Respondents contend that customers prefer to receive such products at the beginning of their full shelf life, not mid-way or later into it. Chances are that if the grocery stock is not replenished early in the day when most of the picking is done, the groceries available in-store may well have longer shelf-lives, having benefitted from the late stock replenishment.

Respondents from two of the four e-grocers allude to the fact that the issue of “availability of products” is addressed principally by a system of “picking in waves”, as informed by proactive and innovative thinking. This remedy relies on personal shoppers to apply discretion that is responsive to the nuances of the moment. For instance, they contend, “... in cases where fresh produce has not yet been delivered, personal shoppers tend to shop in other areas and return to the fresh produce section later”. The challenge of the availability of products across the four e-grocers, is also addressed through “product substitution”. For this to be effective though, a respondent argued that they usually “... rely on the knowledge and advice of a staff member (section-expert) that works in the area of the shop where the unavailable product and possible substitutes are usually stocked”. According to the respondents, this pattern is followed “... to ensure that any substitutes provided to the customer match or exceed the standards of the unavailable product”. The last way in which the challenge of product unavailability is handled by the large e-grocers is preventative in nature. This remedy entails the use of regularly updated electronic data management systems, particularly for signalling replenishment needs.

#### 4.1.2. Substitution and related costs

The four organisations in the study emphasised that the need to satisfy customers (in cases where their desired items are unavailable) with close substitute products often has cost implications for operations. To illustrate, if a product from an online order priced at £1 is unavailable, the e-grocer may offer a substitute product, though originally priced at £1.50 for the price of £1. This means the e-grocer absorbs the 50p difference as the company policy states that customers should never pay more than the price of the product they originally chose.

The challenge of costs associated with substitution is a recurrent one for e-grocers and responses suggest that there is only one way in which the e-grocers deal with this. All the respondents affirm that the e-grocers restrain themselves from passing on costs associated with providing substitute products to the customer. The peculiarity in how this remedy is implemented across the e-grocers is tied to how they treat the additional substitution-induced cost. According to some respondents, this cost is usually passed on to whatever department was responsible for ensuring stock availability of the product of interest. To illustrate, “... if a customer orders a tin of baked beans that costs 30p and due to its unavailability, the store substitutes it with beans that cost 40p, the store will take 40p from

the sales department, but the head office is made to absorb the 10p difference. While in certain respects, the specific store may appear to have gained extra 10p sales from the transaction, the company as a whole has suffered a loss, which is magnified with recurrent substitution costs. Consequently, a "... culture of common-sense around substitution is promoted, so as to ensure that price-matching that is beneficial to both the customer and the e-grocer remains a prime consideration".

#### *4.1.3. Dependence on other departments*

Some respondents are of the view that in order to fulfil online customer orders, there is a need for the cooperation of other store departments. Online operation is usually coordinated with in-store operation to ensure availability of products. This reliance on the rest of the teams in the store means that if deliveries are running late from the depot, or the night team is running behind schedule, picking of online orders would be adversely affected. This has less to do with those who work in the on-line section and more to do with other departments upon which they rely.

This challenge is unavoidable, according to respondents and there is yet no pre-determined remedial approach for overcoming it, across all the e-grocers. This may be because the unpredictability of order volumes that is characteristic of online grocery shopping makes it particularly difficult to keep a large number of employees dedicated to servicing only online transactions.

#### *4.1.4. Freshness of products and picking efficiency*

Fresh products have a short shelf-life. Therefore, the policy is to pick the longest-dated product. However, at 5:00 in the morning, when the picking processes usually starts, some of the produce and fresh-chilled items may not have been delivered. This means personal shoppers could be picking deliveries from the previous day, thus creating a problem with date and quality of the products. Late deliveries result in substitution and congestion on the shop floor, as personal shoppers are trying to pick fresh produce at the same time as customers shopping in the morning. The timing also poses a challenge to the night manager, who has to make sure that the store is set up by 5:00. Typically, the difficulty of managing inventory freshness is related to the desire for an optimum trade-off between quality and service delivery. This influences the ability to meet customer expectations.

The remedy that is commonly used to address the challenge of freshness is the usage of refrigerated containers for chilled and frozen items, after they had been picked. With respect to ensuring that fresh produce remains fresh upon delivery to the customer, some respondents argued that picking-in-waves substantially helps to address the issue. In other cases, the overwhelming opinion is that fresh produce, by an existing rule, is picked last, just-in-time for the departure of the delivery van. In order to deal with the issue of picking efficiency, responses show that the idea of multi-picking (one picker being made responsible for a multiple of customers) is commonly adopted by e-grocers. Hand-held technological devices that direct the pickers on what, how much, where and when to pick often facilitate this approach.

#### *4.1.5. Managing customers' expectations*

Respondents were of the opinion that the quality expectations of customers are very high and they require the right products to be picked and delivered at the right time by drivers who are smart and presentable. There was agreement among interviewees that bananas and strawberries give rise to most quality issues in e-grocery businesses. In addition, responses indicate that e-grocers have to manage customer expectations, which are sometimes unclear and this can be a cardinal challenge.

Most respondents believed that this challenge is very difficult to address. Some were indeed of the opinion that it falls outside of the direct span of influence of the organisation. While this may be the case, the respondents were of the opinion that e-grocers attempt to address this challenge through vibrant communication channels with the customers. According to respondents, e-grocers make "... use of alert messages when deliveries are unlikely to be made at the pre-agreed times", so that the

customer is not waiting for too long. Responses gathered also suggested that a repository of customer-feedbacks are kept and utilised for review purposes in an attempt to create a better sense of the broad spectrum of expectations that customers have.

#### 4.1.6. Congestion on the shop floor

The study found that the volume of customers in bigger operations is a challenge, especially during weekends when some customers prefer to shop in person early in the morning. At the same time, in some cases, personal shoppers are also working on the shop floor to meet online orders. This tends to cause some congestion, which results in complaints from offline customers, partly owing to their lack of understanding of the online operations.

As a remedy for this congestion challenge, all the e-grocers studied have made it mandatory for those involved in online operations to wear legible badges that state, “We deliver to home shopping”, while on the shop floor. This, they say, elicits some understanding from offline customers and also allows the personal shoppers to act quickly as they are easily distinguishable from offline shop staff who can physically attend to customer queries. The speed and professionalism demonstrated by online personal shoppers reduce the congestion on the floor. In addition, some e-grocers are beginning to commence picking for online-orders earlier than used to be the case. The hope clearly is that a large part of the picking would have been completed before regular offline shoppers begin to arrive the shop in numbers.

Also, a high-ranking employee of one the e-grocers claimed that the organisation was “... currently working on the design and layout of the trolleys used by online staff on the shop floor to explore the possibility of making them slimmer but deeper”. The new design according to the respondent “... will ensure that such trolleys take up less space on the shop floor”. Furthermore, in a bid to ameliorate the congestion challenge, e-grocers are deploying the “... one best way” model. This is a system, which guides personal shoppers in terms of when, where and in which sequence to pick to attain optimal levels of efficiency without inconveniencing offline customers.

#### 4.2. Challenges in supply vs. demand

The interviewees highlighted issues that were similar to the business challenges of supply and demand identified in the broader supply chain industry by previous scholars (see Table 1), Turban et al.’s (2015) view, and Scott and Scott (2008). However, their interesting insights extend what may already be known by taking into account specific challenges of supply and demand confronting e-grocers. Table 5 shows a summary of these specific challenges.

**Table 5. Challenges in supply vs. demand**

Category	Main challenges	Company A	Company B	Company C	Company D	Total managers
Supply vs. demand	Managing competitive delivery window against demand and cost	1 Op	None	1 S; 1 Op	1 T	4
	Balancing congestion on the road, on time deliveries and set targets	1 Op	2 Ops	1 Op	None	3
	Logistical problems	1 Op	None	1 Op	None	2

Notes: Op – managers at the operational level; T – managers at the tactical level; S - managers at the strategic level.

#### *4.2.1. Managing competitive delivery windows against demand and cost*

The opinions of the interviewees suggest that maintaining competitive delivery windows against demand and cost is a challenge for all four e-grocers. This is to be expected as Punakivi and Saranen (2001) contend that whenever the customer influences the delivery service and time window, actual delivery cost and mileage increases. In line with this view, pressure from the customer and competitors has forced some e-grocers to adopt one-hour delivery slots. While this is considered an effort to improve customer satisfaction, it is accompanied by the logistical challenge of delivering within the window.

Even though the e-grocers studied have introduced vehicle routing systems to schedule delivery, a challenge arises because there are a finite number of vans and the delivery locations are far apart, yet the same number of drivers has to deliver every order within the predetermined one-hour slot. The dilemma of balancing deliveries with costs is real. In essence, prioritising on-time delivery over travel costs would deliver customer value at an increased cost to the e-grocer, while prioritisation of fuel considerations would minimise costs, but jeopardise customer perception of service delivery. This challenge is exacerbated by the fact that the e-grocers studied, have to plan with unknown order volumes, because of insufficient demand data.

This challenge is being tackled by all the e-grocers with the use of routing technology. The technology allows the companies to know the state of the routes in terms of traffic congestion and otherwise, in real time. With this information, it becomes possible to ascertain the specific routes for drivers to use in making deliveries and also the optimal sequence of the deliveries to follow. This remedy, going by the responses obtained was commonly applied across all the e-grocers. Apart from this, some of the respondents also volunteered the information that their organisations have implemented a system of “differentiated pricing”, which is largely dictated by the times that customers wish for their deliveries to be made. The general rule adopted when this system is deployed is that customers who want deliveries to be made during peak times/rush hours are made to pay higher charges. Furthermore, according to one respondent, the challenge is being addressed by the offer of free deliveries for high-value online purchases that exceed a certain pre-determined amount.

#### *4.2.2. Balancing traffic congestion on the road, on-time deliveries and set targets*

The reality of disparate delivery locations means that traffic conditions matter. Achieving set targets is also a challenge, because heavy products or larger orders could mean that drivers can only pack a few orders into a van, relative to orders for lighter products or smaller orders. According to a respondent, “... the average hourly drop rate for some stores is 3.3, so sometimes when drivers have five to six deliveries scheduled within one hour, this is unachievable”. Another factor that affects the drop rate, in the view of an interviewee, is that “drivers are often expected to take the deliveries to the customers’ kitchens rather than simply dropping them at the doorstep and this can be time consuming”.

The remedy found to have been adopted by the e-grocers to address this challenge, is essentially the same as the one for managing competitive delivery windows. This refers to the use of effective routing mechanisms. Respondents contend that routing information is utilised from the beginning and through the course of the delivery trip. Specifically, a respondent alluded to the fact that “...the Descarte system, is invaluable for choosing the best possible route to follow in making deliveries, at any time”. Respondents from two of the e-grocers also suggested that they currently use schedules with “early despatch” times, usually 15–20minutes prior to normal times so that drivers get a head start.

#### *4.2.3. Logistical problems*

The logistics behind e-grocery operations appear to be problematic from the operational point of view. Challenges span from van safety, vehicle breakdowns and legal compliance to malfunctioning freezers. The latter is critical because chilled and frozen products rely heavily on the functionality of freezers inside the vans. According to respondents, other contributing factors include unexpected

circumstances such as bad weather, roadblocks, system breakdown and accidents, which all affect on-time deliveries.

Respondents were of the opinion that most of the logistical problems encountered, are addressed by the development and enforcement of the use of checklists. For instance, a respondent said that “... the routine of utilising a checklist to ascertain that all key items such as the fridge and indeed the van are in good working condition has been made mandatory” by the organisation. Accordingly, the respondent added “... many of the previous logistics-related problems unlimited to the malfunctioning of fridges are now manageable”. The logistical issues are also substantially lessened through “... the constant monitoring of drivers, involved in making deliveries with specific respect to routes followed and delivery times for orders”.

#### 4.3. Managing roles and responsibilities

Interviews with the respondents revealed that in the area of managing roles and responsibilities, there are eight specific challenges faced by e-grocers. As with earlier challenges, the overbearing response was that the challenges in the category of managing roles and responsibilities were prominent at the operational level and minimal at the strategic level. Table 6 shows specific e-grocer challenges alongside the current positions of interviewees who identified them as existing challenges.

**Table 6. Challenges in managing roles and responsibilities**

Category	Main challenges	Company A	Company B	Company C	Company D	Total managers
Managing roles and responsibilities	Specialist skills and reliance on few people	1 Op; 1 Op/T	1 Op	2 Op	1 S; 1 T	7
	Balancing costs with labour hours	1 Op	None	1 Op	None	2
	Staffing and retention of drivers	1 Op	1 Op	2 Op	None	4
	Human error in picking process	1 Op	None	1 Op	1 Op	3
	Limited operational capacity	None	None	1 Ops	1 T	2
	Technological challenges	None	None	None	1 Op	1
	Differentiation	None	None	None	Tactical	1
	Engagement with other departments	2 Op	None	None	None	2

Notes: Op – managers at the operational level; T – managers at the tactical level; S – managers at the strategic level.

##### 4.3.1. Specialist skills and reliance on a few people

Responses across the four companies suggest that e-grocery operations are run with a limited number of staff with the requisite expertise especially for the positions of managers, personal shoppers and drivers. The problem of staff absences due to sickness or other reasons is particularly felt when schedules have been created to achieve certain targets and then there is a sudden influx of unanticipated orders. In the case of driver-absenteeism, finding a substitute driver can be problematic due to the necessary pre-requisite that delivery drivers must be licensed, following a driving test training offered by the e-grocer in partnership with the Automobile Association (AA), which is nationally and internationally recognised.

The common position across respondents was that the online operations of the companies studied would benefit from a larger complement of staff. Faced with the challenge of insufficient human resources, the most often adopted recourse seemed to be the utilisation of staff drawn from other departments at times when the online operations are under pressure. Respondents assert though that this recourse is sometimes problematic because employees from other departments are not exactly knowledgeable about e-grocery picking, packing and delivery activities. All of the companies, going by responses obtained, are deeply involved in continuous staff training so as to up-skill current staff and a selected number of employees from other departments with the necessary know-how to support e-grocery operations. According to a respondent the training is usually "... in the form of on-the-job training, graduate programmes and pairing with managers". As another remedy, in one of the companies, respondents said that the organisation always maintains a pool of specialist staff at the head-offices who can be called up at short time notices to help with e-grocery operations in locations where it is required.

#### *4.3.2. Balancing costs with labour hours*

Respondents from two of the studied companies identified balancing cost with labour hours as a challenge. To illustrate this, the respondents indicated that, "... for example, £60 000 may give e-grocers 600 h of labour. However, if £10 000 worth of sales is lost in a period where £60 000 was expected, it would result in a loss of 100 h. Reduction in sales results from a reduction in customer orders and the implication of this would be fewer requirements for delivery drivers. In order to manage the reduction in demand, employees are often asked to take some time off work in order to contain labour-related costs".

Unfortunately, as argued by respondents, this action lowers staff morale considerably. A mix of poor leave management planning, poor wage forecasting and a weak understanding of periodic demand trends can worsen the situation significantly. This is because these all cause the e-grocer to plan the schedule incorrectly, which would result in shortages of staff during high-demand periods or excessive staff numbers in periods of low demand. All of these, according to some respondents, "... engender customer dissatisfaction".

Some respondents claim that their organisations manage this challenge by using an improved leave-management system which allows them almost to compel staff to go on leave during periods where huge sales are not anticipated and to refuse employees' request for leaves during busy periods. While this may not particularly match the interests of all employees, a respondent argued that "... employees have accepted it because they respect the fact that more hours of work are required at busy periods rather than stable periods". Some other respondents claimed that a "... more drastic approach of laying-off staff temporarily is followed" by their organisations. This "... is more easily applicable though, in the case of non-permanent employees". The general opinion of the respondents was that the remedies bear negative implications for employee morale.

#### *4.3.3. Human error in the picking process*

In three of the grocery e-retailer, human error is considered the biggest challenge they face in the area management of roles and responsibilities. Errors, they argue, occur commonly with the picking of chilled and frozen products. A personal shopper's failure to check product expiry dates can mean the driver has to spend more time at a customer's door. This could also lead to a customer complaint, which the driver is compelled to attempt to resolve. In some cases, the driver refunds the cost of the items from a palmtop or alternative system.

Since this challenge is largely attributed to employees, respondents agreed that organisations were responding to it with the institution of regular training interventions. A virile performance management system that allows for on-going performance evaluation and feedback was also touted as a remedy. In addition, organisations are tending towards reducing the extent of reliance on human



judgement to guide activities in the picking process. To this end, "... e-grocers are making extensive use of technological devices that guide the entire picking process".

#### *4.3.4. Staffing and retention of drivers*

During the interview, staffing was identified as a major challenge for e-grocers as they often require hardworking, reliable staff. The issue, it was gathered, is more prominent among drivers. Many drivers do not want to work for six days a week, and so managers have to grapple with the challenge of striking the right balance between work demands and staff preference. Furthermore, drivers prefer to have full-time rather than part-time jobs offered by e-grocers and this heightens driver turnover.

E-grocers seem to be addressing this challenge by encouraging stores with substantial online operations to retain an optimal pool of full-time drivers. While this may seem more expensive, the respondents argued that this remedy allows the e-grocer to eliminate the cost of recruiting and training drivers on an impromptu basis and it also enhances stability in the delivery aspect of e-grocery operations.

#### *4.3.5. Limited operational capacity*

Interviewees claimed that many of the stores that were set-up for offline sales, but which are involved with online orders of groceries have limited capacity to function satisfactorily with both streams of sales at the same time. An increase in online patronage usually leads to increased congestion on the shop floor, as personal shoppers have to do more picking for online customers. This contributes to dissatisfaction among customers shopping in-store.

Going by responses at the interview sessions, the study found that some organisations had set-up distribution centres that were exclusively dedicated to the service of online customers. This of course, eliminates competition for groceries with regular off-line customers on the shop floor. In cases where this approach has not been adopted yet, respondents were of the opinion that "... personal shoppers dealing with online orders are instructed to pick at staggered times, though very early in the morning before offline shoppers become very visible on the shop floor". Some respondents recognise that this challenge of limited operational capacity can also be linked to the size of the shop floor and the width of shopping aisles and so they are of the opinion that the use of narrower trolleys would lend themselves to addressing this challenge.

#### *4.3.6. Technological challenges*

The rapid changes in technology are also viewed by some e-grocers as a challenge. For example, they contend, if an e-grocer has one web browser (e.g. Internet Explorer 6), which is not supported by some sites, this creates difficulty in finding some postcode areas, thereby making it difficult for deliveries to be made with an expected timeframe.

Respondents said their organisations realising how much the adoption of technology could contribute to the enhancement of operational efficiency. Their organisations continue to invest in new technology. While this, according to the respondents "... is commendable, it nevertheless creates its own challenge, principally the fact that employees take a while to get used to technologically induced changes to methods of work and are therefore sometimes resistant to change".

#### *4.3.7. Differentiation*

This challenge relates to the inability of customers to differentiate between the product-offerings of competing organisations, especially when they belong to the same supply chain. For example, if a national grocery e-retailer (A) supplies products to a competitor (B) while also selling directly to customers concurrently, the tendency is that customers are unable to distinguish between the companies and think of them as being the same. Therefore, when customers want to purchase those specific goods, they might go to the competitor without realising they are two separate companies. The grocery e-retailer supplying the competitor has to help its loyal customers to differentiate between the two companies through loyalty schemes and marketing communications.

#### 4.3.8. Engagement with other departments

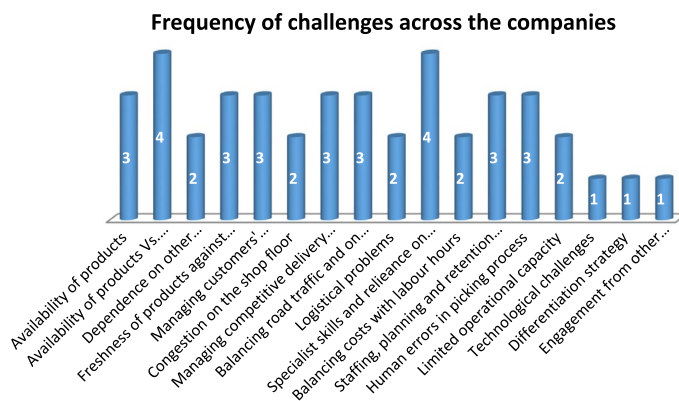
E-grocery shopping is still a relatively new concept, and the understanding of its operation is in its infancy. Many grocery stores have only introduced online orders that are satisfied through in-store operations over the past five to ten years. Therefore, some online operations managers seem to find it challenging to engage closely with other store departments. The store manager may expect the online manager to share some resources with the in-store operations (for example, by sharing staff when on-line demand is low).

This challenge appears to be person-specific and is closely related to the nuances of employees and the way they manage relationships in the workplace. While some of the organisations are investing in the enhancement of employees' interpersonal skills through training, others create team-building platforms from time-to-time. These remedies are driven by a belief that they would enhance the levels of cooperation across departments.

To summarise, the frequency of challenges across the four major e-grocers is presented in Figure 6. The figure shows that the availability of products vs. substitution and costs and specialist skills and the reliance on few people are the most common challenges for all four companies. Additionally, three out of the four e-grocers experienced issues around availability, freshness of products against picking efficiency, managing customers' expectations, managing competitive windows against demand and cost and an issue regarding balancing traffic congestion on the road with on-time deliveries and set targets. Furthermore, five (5) of the identified challenges were experienced by two (2) of the four (4) companies studied. Three (3) of the challenges, all of which are in the category of managing roles and responsibilities, appeared to be peculiar to individual companies. In effect, the basket of challenges facing the four e-grocers contains both peculiar and common challenges.

**Figure 6. E-grocery challenges.**

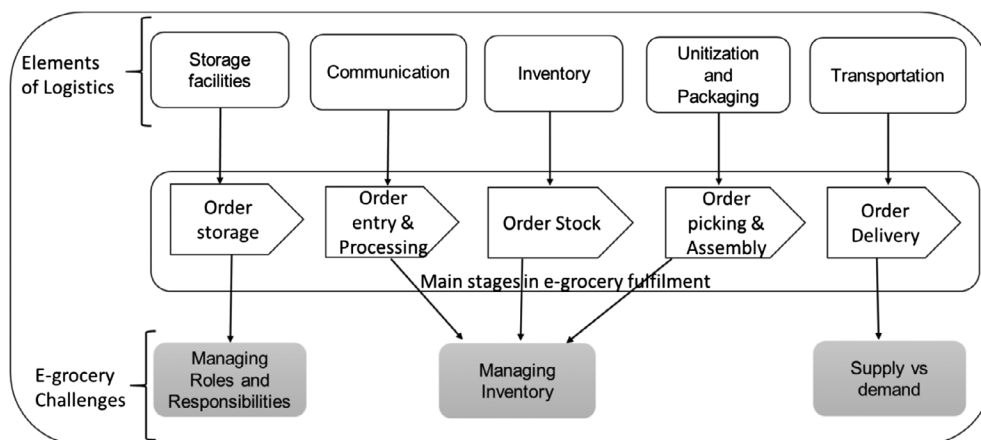
Notes: A value of 4 means that the challenge was common in all four companies, a value of 3 means that the challenge was common to three out of the four, a value of 2 means two out of the 4 companies identified the challenge and a value of 1 means that the challenge was only identified by one company.



## 5. Discussion and conclusions

In order to create an enhanced understanding of the identified challenges from a practical perspective, it may be pertinent to attempt to identify the stages in the order fulfilment process where these challenges may arise. Knowledge of these, it is believed would enable e-grocery managers to anticipate and prepare to deal with the challenges. As shown in Figure 7, the challenges relating to supply vs. demand of e-grocery goods affect the stages of order transportation and order delivery, which are crucial to good customer service. However, only three challenges were identified in this category, namely a competitive delivery window, balancing traffic and logistical problems. Two of these challenges are internal in origin, so they can be managed effectively by the e-grocers by changing internal policies or practice. The next category, managing inventory, which affects the order assembly process, also concerns product availability, product quality and shop-floor congestion, among others. All of the six challenges identified in this category are internal challenges that can be resolved by refining the e-grocers' work practices.

**Figure 7. E-grocery stages fulfilment and e-grocery challenges.**



The majority of challenges identified fell under the category of managing roles and responsibilities, which relates to order processing, the first stage of the order-fulfilment process. This means that most challenges associated with e-grocery supply are faced in the first stage of order processing. It is pertinent to note that most of the challenges in this category are also internal and need to be addressed by management through measures aimed at reviewing and improving its e-grocery operations. Cost management, reduction of picking error and technology would also require effort from senior managers, middle managers and the personal shoppers to work together to overcome these challenges. In general, the nature of the challenges also has wider implications for different departments within the store. For example, the human resource department would be concerned with ensuring that staffs develop the skills required to meet the operational needs of the company. This department would also be responsible for hiring and retaining those with the specialist skills required for delivering the company's operations. Interestingly, the findings of the study show that the majority of challenges are experienced at an operational level and most are internal, rather than external challenges. The significance of this is that most are therefore within the locus-of-control of managers in e-grocer companies. In order to address these challenges adequately, there needed to be a focus on the broad area of the supply chain that breeds the challenge. As shown in Table 7, there are five major sources of all the identified challenges. These are the areas of storage, inventory, utilisation and packaging, transport and communication. This study therefore suggests that current and prospective e-grocers consider the recommendations as shown in the Table 7, as a systematic and strategic way of addressing the challenges.

**Table 7. Recommendations for addressing supply and distribution challenges**

Three top categories	Main challenges	Source of challenges	Recommendations	Anticipated benefit
Managing inventory	Availability of products	Inventory and storage	Utilisation of all stores will ensure an even distribution of products and minimise stock outs in some stores	<ul style="list-style-type: none"> <li>Different replenishment cycle for on-line operation could help improve product availability</li> <li>Utilisation of all stores to ease congestion and picking efficiency</li> <li>Opportunity for all stores to increase growth, scale and on-line operation capacity and increase access without the extra set-up cost</li> </ul>
	Availability of products vs. substitution and costs	Inventory and storage	Utilising of all stores and better training of staff to ensure reasonable substitution	
	Dependency on other departments	Storage	Consider a different replenishment cycle for online operation from offline operation	
	Freshness of products against picking efficiency	Storage	Consider a different replenishment cycle for online operation from offline operation	
	Managing customers' experience	Utilisation and packaging	Collaboration with suppliers to ensure better quality and presentation of products to improve customer satisfaction	
Supply vs. demand	Congestion in the shop floor	Storage	Utilisation of all stores for online operations	
	Managing competitive delivery windows against demand and cost	Transport	Four-tier transport system to include: bicycles, electric cars, van, partnership with customers for delivery purposes	<ul style="list-style-type: none"> <li>Intermodal transportation might help to increase on-time and improve customer satisfaction while avoiding the cost of legal fines, fuel and additional vans</li> <li>Improved customers' satisfaction, on-time delivery would help to increase levels of sales, customer loyalty and market share</li> </ul>
	Balancing traffic congestion on the road, on time delivery and set targets	Transport	Four-tier transport system to include: bicycle, electric cars, van, partnership with customers for delivery purposes	
	Logistical problems	Transport	Four-tier transport system to include: bicycles, electric cars, van, partnership with customers for delivery purposes	
	Specialist skills and heavy reliance on few people	Inventory and shortage	Personal Shopper training for all staff	<ul style="list-style-type: none"> <li>The training would enable all staff to be multi-skilled, leading to better utilisation of labour without the need to recruit more staff</li> <li>New comprehensive IT systems for offline and online operations would help to improve efficiency, speed and order delivery by minimising picking errors</li> </ul>
	Balancing costs with labour hours	Storage	Training of offline staff to be multi-skilled and flexible in both operations. This will eliminate the need for hiring new staff and ensure better utilisation of human resources.	
	Staffing, planning and retention of drivers	Storage	Consider full time employment and better policies with HR	
	Human errors in picking process	Inventory and storage	Training and technological support	
	Limited operational capacity	Storage	Utilisation of all Stores for online operations	
	Technological challenges	All tasks or elements	Managers to invest and adjust to technological demands	
	Differentiation strategy	Storage	Integrated marketing communication	
	Engagement from other departments	Storage	Communication/Policy and Procedures	

In practical terms, organisations in the e-grocery business would have to try invariably to ensure that incidents of stock-outs, often owing to unappreciable demand patterns are addressed. This can be achieved by ensuring an appropriate distribution of stock across its outlets while enforcing a system approach that guarantees that outlets can support one another with required stock. This would shorten the lead time for stock replenishment and improve availability. To ease the delivery process, organisations may be served by the adoption of a 4-tier transport system. There is no gainsaying the fact that investment in the development of the skills of staff to enhance the chances of better customer service can be vital. Issues related to the adoption of responsive communication procedures and an integrated marketing approach should prove beneficial as well.

Current research contributes to existing literature on e-grocery operations by identifying the challenges of supply and distribution in the e-grocery sector. The study was conducted with evidence from four of the top ten online global and national grocery e-retailers. While the findings of the study in terms of challenges align with the three major areas that emerged from previous studies in fitting with Turban et al.'s (2015) framework, the study extends knowledge by focussing on specific issues relevant to the e-grocery sector. For industry practitioners, the paper provides a comprehensive list of challenges being faced by top online global retailers in particular and associated remedies that are being deployed. Future studies exploring the challenges faced by a wider range of e-grocers across top ten online global grocery markets could help to identify a wider range of challenges as well as the mitigation strategies that e-grocers are employing. This would help to inform e-grocers moving into new markets, or existing retailers who are considering moving into e-grocery operations.

#### Funding

The authors received no direct funding for this research.

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#### Citation information

Cite this article as: E-grocery challenges and remedies: Global market leaders perspective, Marcia Mkansi, Chukuakadibia Eresia-Eke & Oyetola Emmanuel-Ebikake, *Cogent Business & Management* (2018), 5: 1459338.

#### References

- Aastrup, J., & Kotzab, H. (2010). Forty years of out-of-stock research – And shelves are still empty. *The International Review of Retail, Distribution, and Consumer Research*, 20(1), 147–164. <https://doi.org/10.1080/09593960903498284>
- Abbott, H., & Palekar, U. S. (2008). Retail replenishment models with display-space elastic demand. *European Journal of Operational Research*, 186, 586–607. <https://doi.org/10.1016/j.ejor.2006.12.067>
- Agatz, N., Campbell, A., Fleischmann, M., & Savelsbergh, M. (2011). Time slot management in attended home delivery. *Transportation Science*, 3(2011), 435–449. doi:10.1287/trsc.1100.0346.
- Anu, B., Mervi, L., & Markku, T. (2012). E-commerce logistics: A literature review and topics for future research. *International Journal of E-Services and Mobile Applications*, 4(3), 1–22.
- Asdemir, K., Jacob, V. S., & Krishnan, R. (2009). Dynamic pricing of multiple home delivery options. *European Journal of Operational Research*, 196(1), 246–257. <https://doi.org/10.1016/j.ejor.2008.03.005>
- Aspray, W., Royer, G., & Ocepek, M. G. (2013). Anatomy of a dot-com failure: The case of online grocer Webvan. In W. Aspray, G. Royer, & M. G. Ocepek (Eds.), *Food in the internet age* (pp. 25–35). Boston, MA: Springer. <https://doi.org/10.1007/978-3-319-01598-9>
- Azi, N., Gendreau, M., & Potvin, J. (2007). An exact algorithm for a single-vehicle routing problem with time windows and multiple routes. *European Journal of Operational Research*, 178(3), 755–766. <https://doi.org/10.1016/j.ejor.2006.02.019>
- Babbie, E. (2015). *The practice of social research* (14th ed.). Boston, MA: Cengage Learning.
- Bijvank, M., Bhulai, S., & Huh, W. T. (2015). Parametric replenishment policies for inventory systems with lost sales and fixed order cost. *European Journal of Operational Research*, 241, 381–390. <https://doi.org/10.1016/j.ejor.2014.09.018>
- Bocij, P., Greasley, A., & Hickie, S. (2015). *Business information systems: Technology, development and management for the e-business* (5th ed.). Harlow: Pearson.
- Breugelmans, E., & Campo, K. (2016). Cross-channel effects of price promotions: An empirical analysis of the multi-channel grocery retail sector. *Journal of Retailing*, 92(3), 333–351. <https://doi.org/10.1016/j.jretai.2016.02.003>
- Cagliano, A. C., De Marco, A., & Rafele, C. (2017). E-grocery supply chain management enabled by mobile technologies. *Business Process Management Journal*, 23(1), 47–70. <https://doi.org/10.1108/BPMJ-01-2016-0002>
- Cattaruzza, D., Absi, N., Feillet, D., & González-Feliu, J. (2015). Vehicle routing problems for city logistics. *EURO Journal on Transportation and Logistics*, 6(1), 51–79.
- Centre for Retail Research. (2014). *Online retailing: Britain, Europe and the US*. Retrieved from <http://www.retailresearch.org/onlineretailing.php>



- Close, A. G., & Kukar-Kinney, M. (2010). Beyond buying: Motivations behind consumers' online shopping cart use. *Journal of Business Research*, 63(9–10), 986–992. <https://doi.org/10.1016/j.jbusres.2009.01.022>
- Coelho, L. C., & Laporte, G. (2014). Optimal joint replenishment, delivery and inventory management policies for perishable products. *Computers and Operations Research*, 47, 42–52. <https://doi.org/10.1016/j.cor.2014.01.013>
- Colla, E., & Lapoule, P. (2012). E-commerce: Exploring the critical success factors. *International Journal of Retail and Distribution Management*, 40(11), 842–864. <https://doi.org/10.1108/09590551211267601>
- De Marco, A., Cagliano, A. C., Margano, G., & Perfetti, F. (2014). Factor influencing logistics service providers efficiency in urban distribution systems. *Transportation Research Procedia*, 3, 499–507. <https://doi.org/10.1016/j.trpro.2014.10.031>
- Ehmke, J. F., & Campbell, A. M. (2014). Customer acceptance mechanisms for home deliveries in metropolitan areas. *European Journal of Operational Research*, 233(1), 193–207. <https://doi.org/10.1016/j.ejor.2013.08.028>
- Ehmke, J. F., & Mattfield, D. C. (2012). Vehicle routing for attended home delivery in city logistics. *Procedia – Social and Behavioral Science*, 39(2012), 622–632. <https://doi.org/10.1016/j.sbspro.2012.03.135>
- Fera, M., Fruggiero, F., Lambiase, A., Macchiaroli, R., & Miranda, S. (2017). The role of uncertainty in supply chains under dynamic modelling. *International Journal of Industrial Engineering Computations*, 8(2017), 119–140. <https://doi.org/10.5267/j.ijiec.2016.6.003>
- Fernie, J., & Sparks, L. (2009). *Logistics and retail management: Emerging issues and new challenges in the retail supply chain* (3rd ed.). London: Kogan Page.
- Fernie, J., & Sparks, L. (2014). *Logistics and retail management: Emerging issues and new challenges in the retail supply chain* (4th ed.). London: Kogan Page.
- Fernie, J., Sparks, L., & McKinnon, A. C. (2010). Retail logistics in the UK: Past, present and future. *International Journal of Retail and Distribution Management*, 38(11/12), 894–914. <https://doi.org/10.1108/09590551011085975>
- Freathy, P., & Calderwood, E. (2013). The impact of internet adoption upon the shopping behavior of island residents. *Journal of Retailing and Consumer Services*, 20(1), 111–119. <https://doi.org/10.1016/j.jretconser.2012.10.012>
- Fruggiero, F., Riemma, S., Ouazene, Y., Macchiaroli, R., & Guglielmi, V. (2016). Incorporating the human factor within manufacturing dynamics. *IFAC-PapersOnLine*, 49(12), 1691–1696. <https://doi.org/10.1016/j.ifacol.2016.07.825>
- Gevaers, R., Van de Voorde, E., & Vanelander, T. (2011). Characteristics and typology of last-mile logistics from an innovation perspective in urban context. In C. Macharis & S. Melo (Eds.), *City distribution and urban freight transport: Multiple perspectives* (pp. 56–71). Cheltenham: Edward Elgar.
- Grewal, C. S., Enns, S., & Rogers, P. (2015). Dynamic reorder point replenishment strategies for a capacitated supply chain with seasonal demand. *Computers & Industrial Engineering*, 80, 97–110. <https://doi.org/10.1016/j.cie.2014.11.009>
- Hagberg, J., & Holmberg, U. (2017). Travel modes in grocery shopping. *International Journal of Retail and Distribution Management*, 45(9), 991–1010. <https://doi.org/10.1108/IJRDM-08-2016-0134>
- Hand, C., Riley, F. D., Harris, P., Singh, J., & Rettie, R. (2008). Online grocery shopping: The influence of situational factors. *European Journal of Marketing*, 43(9/10), 1205–1219.
- Harris, P., Riley, F. D., Riley, D., & Hand, C. (2017). Online and store patronage: A typology of grocery shoppers. *International Journal of Retail and Distribution Management*, 45(4), 419–445. <https://doi.org/10.1108/IJRDM-06-2016-0103>
- Hsieh, H., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288. <https://doi.org/10.1177/1049732305276687>
- Hubner, A., Kuhn, H., & Wollenburg, J. (2016). Last mile fulfilment and distribution in omni-channel grocery retailing: A strategic planning framework. *International Journal of Retail and Distribution Management*, 44(3), 228–247. <https://doi.org/10.1108/IJRDM-11-2014-0154>
- Institute of Grocery Distribution. (2015). *UK grocery retailing*. Retrieved from <http://www.igd.com/Research/Retail/retail-outlook/3371/UK-Grocery-Retailing/>
- Internet Retailer. (2014). *U.S. online retail sales will grow 57% by 2018*. Retrieved from <https://www.digitalcommerce360.com/2014/05/12/us-online-retail-sales-will-grow-57-2018/>
- Ishfaq, R., Delee, C. C., Gibson, B. J., & Raja, U. (2016). Realignment of the physical distribution process in omni-channel fulfilment. *International Journal of Physical Distribution and Logistics Management*, 46(6/7), 543–561. <https://doi.org/10.1108/IJPDLM-02-2015-0032>
- Iwan, S., Kijewska, K., & Lemke, J. (2016). Analysis of parcel lockers' efficiency as the last mile delivery solution – The results of the research in Poland. *Transportation Research Procedia*, 12, 644–655. <https://doi.org/10.1016/j.trpro.2016.02.018>
- Kang, C., Moon, J., Kim, T., & Choe, Y. (2016). Why consumers go to online grocery: Comparing vegetables with grains. In *Proceedings of the 49th Hawaii International Conference on System Sciences, HICSS 2016* (pp. 3604–3613). <https://doi.org/10.1109/HICSS.2016.450>
- Kee-hung, L., & Cheng, T. C. E. (2016). *Just-in-time logistics*. Routledge.
- Lanzilotto, A., Martino, G., Gnoni, M. G., & Iannone, R. (2014). Impact analysis of a cross-channel strategy in the fashion retail industry: A conceptual framework. *Conference XIX Summer School, Summer School "Francesco Turco, Senigallia (AN)*.
- Martinez-de-Albeniz, V., & Boada Collado, P. (2014). *Estimating and optimizing the impact of inventory on consumer choices in a fashion retail setting*. IESE Business School, University of Navarra.
- Martino, G., Fera, M., Iannone, R., & Miranda, S. (2017). Supply chain risk assessment in the fashion retail industry: An analytical network process approach. *International Journal of Applied Engineering Research*, 12(2), 140–154.
- Martino, G., Yuce, B., Iannone, R., & Packianather, M. S. (2016). Optimisation of the replenishment problem in the Fashion Retail Industry using Tabu-Bees algorithm. *IFAC-PapersOnLine*, 49(12), 1685–1690. <https://doi.org/10.1016/j.ifacol.2016.07.823>
- Melis, K., Campo, K., Breugelmans, E., & Lamey, L. (2015). The impact of the multi-channel mix on online store choice: Does online experience matter? *Journal of Retailing*, 91(2), 272–288. <https://doi.org/10.1016/j.jretai.2014.12.004>
- Mortimer, G., Hasan, S. F., Andrews, L., & Martin, J. (2016). Online grocery shopping: The impact of shopping frequency on perceived risk. *International Review of Retail, Distribution, and Consumer Research*, 11(2), 83–90.
- Novotna, V., & Varysova, T. (2015). The application of functions of several variables analysis in an optimal replenishment policy for deteriorating items. *Procedia Economics and Finance*, 23, 1217–1226. [https://doi.org/10.1016/S2212-5671\(15\)00535-3](https://doi.org/10.1016/S2212-5671(15)00535-3)
- Pan, A., Leung, S., Moon, K., & Yeung, K. (2009). Optimal reorder decision-making in the agent-based apparel supply chain. *Expert System with Applications*, 36, 8571–8581. <https://doi.org/10.1016/j.eswa.2008.10.081>

- Pan, S., Giannikas, V., Han, Y., Grover-Silva, E., & Qiao, B. (2017). Using customer-related data to enhance e-grocery home delivery. *Industrial Management and Data Systems*, 117(9), 1917–1933. <https://doi.org/10.1108/IMDS-10-2016-0432>
- Pantano, E., Nguyen, B., Dennis, C., & Gerlach, S. (2016). *Internet retailing and future perspectives*. Retrieved from <https://books.google.co.za/books?id=kmyuDQAAQBAJ&pg=PT71&dq=business+value+of+eretailing&hl=en&sa=X&ved=0ahUKEwiw4sGuvsDXAhVIKsAKHXFPcEMQuwUIRzAE#v=onepage&q=business%20value%20of%20eretailing&f=false>
- Punakivi, M., & Saranen, J. (2001). Identifying the success factors in e-grocery home delivery. *International Journal of Physical Distribution and Logistics Management*, 31(6), 427–439. <https://doi.org/10.1108/09600030110399423>
- Qu, H., Wang, L., & Li, R. (2015). A contrastive study of the stochastic location-inventory problem with joint replenishment and independent replenishment. *Expert Systems with Applications*, 42, 2061–2072. <https://doi.org/10.1016/j.eswa.2014.10.017>
- Reiner, G., Teller, C., & Kotzab, H. (2013). Analyzing the efficient execution of in-store logistics processes in grocery retailing—the case of dairy products. *Production and Operations Management*, 22(4), 924–939. <https://doi.org/10.1111/poms.2013.22.issue-4>
- Rotem-Mindali, O., & Weltevreden, J. W. J. (2013). Transport effects of e-commerce: What can be learned after years of research? *Transportation*, 40(5), 867–885. <https://doi.org/10.1007/s11116-013-9457-6>
- Rushton, A., Croucher, P., & Barker, P. (2014). *The handbook of logistics and distribution management: Understanding the supply chain* (5th ed.). London: Kogan Page.
- Saskia, S., Marei, N., & Blanquart, C. (2016). Innovations in e-grocery and logistics solutions for cities. *Transportation Research Procedia*, 12, 825–835. <https://doi.org/10.1016/j.trpro.2016.02.035>
- Saunders, M., Lewis, P., & Thornhill, A. (2015). *Research methods for business students*. Pearson Education.
- Scott, J. E., & Scott, C. H. (2008, January). Online grocery order fulfilment trade-offs. In *Proceedings of the 41st Hawaii International Conference on Systems Sciences* (pp. 90).
- Sekaran, U., & Bougie, R. (2010). *Research methods for business: A skill building approach*. West Sussex: Wiley.
- Sreeram, A., Kesharwani, A., & Desai, S. (2017). Factors affecting satisfaction and loyalty in online grocery shopping: An integrated model. *Journal of Indian Business Research*, 9(2), 107–132. <https://doi.org/10.1108/JIBR-01-2016-0001>
- Statista. (2016). *Global retail e-commerce sales volume from 2013 to 2018*. Retrieved from <https://www.statista.com/statistics/222128/global-e-commerce-sales-volume-forecast/>
- Statista. (2017). *Annual retail e-commerce sales growth worldwide from 2014 to 2021*. Retrieved from <https://www.statista.com/statistics/288487/forecast-of-global-b2c-e-commerce-growth/>
- Turban, E., King, D., Lee, J. K., Liang, T., & Turban, D. (2015). *Electronic commerce: A managerial and social network perspective* (8th ed.). Springer International Publishing. <https://doi.org/10.1007/978-3-319-10091-3>
- Turban, E., Whiteside, J., King, D., & Outland, J. (2017). *Introduction to electronic commerce and social commerce*. Retrieved from <https://books.google.co.za/books?id=Jmm8DgAAQBAJ&printsec=frontcover&dq=Efrain+Turban&hl=en&sa=X&ved=0ahUKEwiIsrOmu8DXAhVhBM AKHTJZCMw4ChC7BQg4MAI#v=onepage&q=Efrain%20Turban&f=false> <https://doi.org/10.1007/978-3-319-50091-1>
- Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2015). From multi-channel retailing to omni-channel retailing: Introduction to the special issue on multi-channel retailing. *Journal of Retailing*, 91(2), 174–181. <https://doi.org/10.1016/j.jretai.2015.02.005>
- Wang, C., Mao, Z., O’Kane, J., & Wang, J. (2016). An exploration on e-retailers’ home delivery: Strategic elements and their prioritization. *Business Process Management Journal*, 22(3), 614–633. <https://doi.org/10.1108/BPMJ-04-2015-0048>
- Wiengarten, F., Fynes, B., Humphreys, P., Chavez, R. C., & McKittrick, A. (2011). Assessing the value creation process of e-business along the supply chain. *Supply Chain Management*, 16(4), 207–219. <https://doi.org/10.1108/13598541111139035>
- Williams, J., Memery, J., Megicks, P., & Morrison, M. (2010). Ethics and social responsibility in Australian grocery shopping. *International Journal of Retail and Distribution Management*, 38(4), 297–316. <https://doi.org/10.1108/09590551011032108>
- Yang, X., Strauss, A., Currie, C., & Eglese, R. (2014). Choice-based demand management and vehicle routing in e-fulfillment. *Transportation Science*, 50(2), 473–488.
- Yin, R. (2013). *Case study research: Design and methods* (5th ed.). Sage.
- Zhu, S. X. (2013). Dynamic replenishment, production, and pricing decisions, in the face of supply disruption and random price-sensitive demand. *International Journal of Production Economics*, 146, 612–619. <https://doi.org/10.1016/j.ijpe.2013.08.009>



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