Knight Frank LLP

Impact of Disruptive Trends on Logistics & Supply Chain Management Practices

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1 Key Statements

Sector	Key Statement
All sectors	Brexit related issues (e.g. free movement of goods; operating costs), shortage of highly skilled labour, requirements for significant investments in manufacturing technology and information systems appear as dominant trends that can potentially disrupt the supply chains of various sectors in the future.
Retail	Demand driven customer proximity is expected to have an impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector.
Automotive	High investments are expected in infrastructure to locate suppliers close to automotive manufacturers.
Pharmaceutical	Manufacturing technology will continue to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the pharmaceutical sector.
FMCG	Lack of appropriate supply chain infrastructure is expected to motivate enhanced investments regarding the supply chain infrastructure and capital/asset of firms operating in the FMCG sector.
Logistics	The growing emphasis on the role of Omni channel will make a significant portion of the current physical retail space redundant and logistics companies are planning to re-locate their operations closer to their customers in order to reduce response time and to increase the productivity of their operations.
Electrical Goods Manufacturing	There is a shortage of road infrastructure and intermodal connections related to Electrical Goods Manufacturing.

2 Executive Summary

2.1 Across All Sectors – Key Takeaways

- *Sustainability:* The unavoidability of establishing a sustainable business approach is acknowledged in general. However contradictory to extant research (Kavakeb et al., 2015; Bechtsis et al., 2017) yet sustainability is not considered an important disruptive trend. This carries implications for supply chain infrastructure investment decisions of companies in the future.
- *Omni Channel:* Driven by consumer demand for enhanced convenience shopping experience, Omni Channel is expected to put a significant stress on how supply chains managers incorporate the associated costs without compromising the customer convenience shopping experience (Bernon et al., 2013; Dholakia et al., 2015).
- *City Liveability:* A potential ban on (diesel) vehicles by city councils could significantly disrupt how supply chains manage the movement of goods in cities and urban areas (Xia and Tang 2011; KPMG, 2015).
- *Decline of Globalisation:* The emergence of Brexit/Nationalism has put a spot light on the decline of globalisation. Consequently, the restricted movement of goods and skilled labour may significantly increase the cost of conducting business thereby forcing companies to invest heavily in automation and robotics now to control their costs later (Sobern et al., 2014; Gomex et al., 2015;).
- *UK Policy / Regionalisation:* Incoherent national and regional policies are a major hurdle in establishing an integrated response that synchronises the national supply chain infrastructure and capital investment initiatives with the Government policy (SMMT, 2015; JLL, 2016; PWC, 2016).

2.2 Retail sector – Key Takeaways

- Future outlets must be designed to handle smaller volumes and should be located closer to the customer (Verhoef et al., 2015; Hubner et al., 2016a).
- Demand driven customer proximity is expected to have an impact on the supply chain infrastructure and capital/asset investments decisions of firms

operating in the retail sector (McKinsey & Company, 2014; Bain and Company, 2016).

- Brexit will increase the costs of conducting "business as usual" putting more pressure on the margins of businesses operating in the retail sector.
- Shortage of high quality skilled labour is going to push companies towards automation.
- Manufacturing technology is expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector (McKinsey & Company, 2015b; DHL, 2016).

2.3 Automotive Sector – Key Takeaways

- Manufacturing technology is a core concern for auto manufacturers in order to react as quickly as possible to the need for high levels of customisation and keep labour costs down. Brexit can impact trade terms and increase tariffs which will make the UK less competitive (Dang and Nguyen 2016).
- Growth of the sector leads to skill shortages which are further enforced by an ageing workforce and potentially by the impact of Brexit (SMMT; 2015).
- Companies will be forced to re-engineer their supply chain in favour of operational efficiency and effectiveness rather than tax efficiency (Gelareh et al., 2013).

2.4 Pharmaceutical Sector – Key Takeaways

- Sustainable and ethical activity in all aspects of operations in this high margin sector will continue to drive change (Raju et al., 2016).
- Omni channel has a high impact on over the counter pharmaceutical products and a low impact on licenced pharmaceutical products (Low et al., 2016).
- Critical components are frequently sourced from the Far East and are hence dependent on a global supply base (Huq et al., 2016).
- Sourcing raw materials at the right quality and cost of supply continues to challenge the sector (Huq et al., 2016).

2.5 FMCG Sector – Key Takeaways

- Omni channel is changing the way supply chains for fast-moving consumer goods (FMCG) need to be planned and operated (Sathya and Nandagopal, 2016).
- Customer proximity is expected to have an important influence on the supply chain infrastructure and capital/asset investments decisions (e.g. purposeful distribution centres) of firms operating in the FMCG sector (Burgess, 2016).
- Currently there is lack of availability of supply chain infrastructure to meet the future requirements of FMCG sector (Burgess, 2016).
- Lack of appropriate supply chain infrastructure is expected to motivate increasing investments into infrastructure and assets of firms operating in the FMCG sector (Kumar et al., 2013).

2.6 Logistics Sector – Key Takeaways

- Omni channel is the biggest factor that is affecting the supply chains of retailers, i.e. logistics companies' customers (Hubner et al., 2016b).
- Automation and robotics may convert fixed costs to variable costs (PWC, 2013; Gomex et al., 2015).
- A centralised UK wide strategy for infrastructure on transportation is lacking (Sheffi, 2012).
- Most logistics operators in UK rely on large quantities of cheap and well-trained EU labour. Brexit may lead to significant shortages of such labour and potential increases in costs which may in turn drive UK based companies to invest in automation and robotics (Sheffi, 2012; Gelareh et al., (2013)).

2.7 Electrical Goods Manufacturing – Key Takeaways

- There is an opportunity to develop road infrastructure and intermodal connections to decrease the operating costs and to enhance the efficiency and flexibility of supply chains related to Electrical Goods Manufacturing (Dang and Nguyen, 2016).
- There is an acute shortage of commercial property/land in the UK which is hindering future development and expansion plans related to supply chains.

2.8 Core Disruptive Trends – Cross Sector Mapping

Sector	Mapping of Key Disruptive Trends Across Sectors				
	Information Systems	Manufacturing Technology	Omni Channel	Sustainability	Customer Proximity
Retail	Quality of decisions will depend on credible, auditable, and robust real time data	To maximise benefits from Manufacturing Technology a significant initial capital investment is required.	Brick and mortar shops will be designed to handle less volume and will be located closer to the customer.	Important element yet not considered a major disruptive factor in the next 5 years	The pressure to deliver smaller volumes to dispersed locations to meet convenience needs
Automotive	Digitalisation aimed at improving productivity in supply chains	Pressure on auto manufacturers to react quickly to meet high level of customisation	Direct sales and rental/driverless provision will revolutionise car buying and ownership	Legislation related to fuel efficiency and emissions will drive design and customer acceptance	High investments in infrastructure to locate suppliers close to manufacturers
Pharmaceutical	Heavy investments expected in information system to enhance delivery speed	Importance of investments in manufacturing technology is significant	Will have a very high impact on over the counter products but low impact on licenced products	Opinion is divided: Consider irrelevant in some cases while critical in others	Opinion is divided: Consider irrelevant in some cases while critical in others
FMCG	Significant investments required to increase visibility around the front and back end of SC	This will have a significant impact on comparative buying	Cost efficiency needs to be achieved without compromising on customer experience	No significant disruptive impact in the next 5 years.	Large purposeful distribution centres will replace mega retail stores
Logistics	Will have a major impact on how to enhance operational productivity	Investment in manufacturing technology required to reduce reliance on manual labour	Omni channel will make a significant portion of the current physical space redundant	Agile operations required to manage demand while using environment friendly technology	Re-locate operations closer to customers in order to reduce response time

3 Research Background

3.1 Research Aim

The aim of this exploratory research is to unravel the potential impact of disruptive trends on the following 4 dimensions related to logistics and supply chains in the next 5 years:

1) Supply Chain Practices
2) Business Strategies
3) Supply Chain Infrastructure and Capital Asset Decisions
4) Managerial Role

3.2 Research Scope

This research is focused on the logistics and supply chain operations of leading national and global companies conducting their business within UK in the following arena:

1) Retail sector
2) Automotive sector
3) Pharmaceutical sector
4) Fast Moving Consumer Goods (FMCG) sector
5) Logistics sector
6) Electrical goods manufacturing

3.3 Disruptive Trends

This research aims to uncover trends and developments as identified by supply chain experts. Additionally, five common trends affecting supply chains across various industries were identified through relevant literature. A brief description of each of these five core trends that hold the potential to disrupt supply chain practices in the next 5 years is presented subsequently:

3.3.1 Manufacturing Technology

Manufacturing Technology refers to the ever-increasing influence of disruptive technologies (such as 3-D Printers), automation (such as robotics) and dispersed production (such as smaller production factories) on businesses operating in both

the manufacturing and service sectors (Bocewicz et al., 2014; Dang and Nguyen, 2016).

3.3.2 Information Systems

Information Systems signifies the role of digitisation, smart networks, big data and cloud logistics on the way business operate and coordinate with their supply network partners (Bechtsis et al., 2017; Vendrell-Herrero et al., 2017).

3.3.3 Customer Proximity

Customer Proximity highlights the importance of locating businesses close to your customers. This trend encapsulates the role of near shoring, re-shoring, crowd-sourcing and shared service platforms to increase the delivery speed of orders to the customers (Kumar (2016); Lim et al., 2017).

3.3.4 Sustainability

Sustainable development aims to balance environmental, social, and economic considerations. A sustainable business should meet the needs of its direct and indirect stakeholders (such as shareholders, employees, clients, communities, etc.), without compromising its ability to meet the needs of future stakeholders (Kannegiesser et al., 2015; Lim and Jones, 2017).

3.3.5 Omni Channel

Omni-channel is a seamless approach that offers a single and unified shopping experience across all retail channel formats including traditional stores formats, e-commerce, online and mobile stores. Omni-channel relies on information exchange, joint operations, logistics and inventories across all channels (Hubner et al., (2016a; 2016b; Sathya and Nandagopal, 2016).

3.4 Respondent Detail

A series of interviews was conducted with domain experts. The details of the anonymised respondents along with a brief description of their business are presented in Table 1. Based on "Respondent Number" allocated in Table 1, the direct quotes are anonymised in the remaining sections of this report.

Table 1: Details of the respondents

No*	Sector	Respondent Company Business Description
1	Retail	A leading online fashion and beauty retailer
2	Electrical Goods Manufacturing	A major electrical goods manufacturer with a well-established brand in UK for home appliances
3	Logistics	A key third party logistics provider with an in house fleet of 250+ commercial vehicles
4	FMCG	A leading British department store with over 60 stores across the UK and Ireland.
5	Logistics	A primary high-value garments and fashion logistics provider
6	Automotive	A major automotive industrial cluster that develops innovative strategies that promote value creation
7	Retail	One of the largest chain of department stores operating throughout UK
8	Logistics	A key membership organisation for logistics and transport professionals involved in movement of goods, people and their associated supply chains.
9	Pharmaceutical	One of the largest multinational pharmaceutical company by both market share and sales
10	Pharmaceutical	One of the world's largest American global research-based pharmaceutical corporation
11	Retail	A leading British multinational grocery and general merchandise retailer.
12	Automotive / Other	A leading time-critical freight transport and logistics specialist operating in the automotive sector
13	Automotive	A global procurement and supply chain consultants working with key players in the automotive sector

*Respondent Number

3.5 Cross Sectoral Mapping

There were 3 companies from each of the following sectors: a) Automotive sector; b) Retail sector; and c) Logistics sector. A further 2 companies represented the Pharmaceutical sector. In addition, there was 1 company from each of the following sectors: a) FMCG; and 2) Electrical Goods Manufacturing. A mapping of each respondent company across the respective sectors is presented in Table 2:

Table 2: Cross Sectoral Mapping of Respondent Companies

	Respondent Companies													
Sector	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
Automotive						X						X	X	3
FMCG				X										1
Pharmaceutical									X	X				2
Retail	X						X				X			3
Logistics			X		X			X						3
Electrical Goods Manufacturing		X												1
												Total Interviews		**13**

The representation of sectors in this research is portrayed in Figure 1:

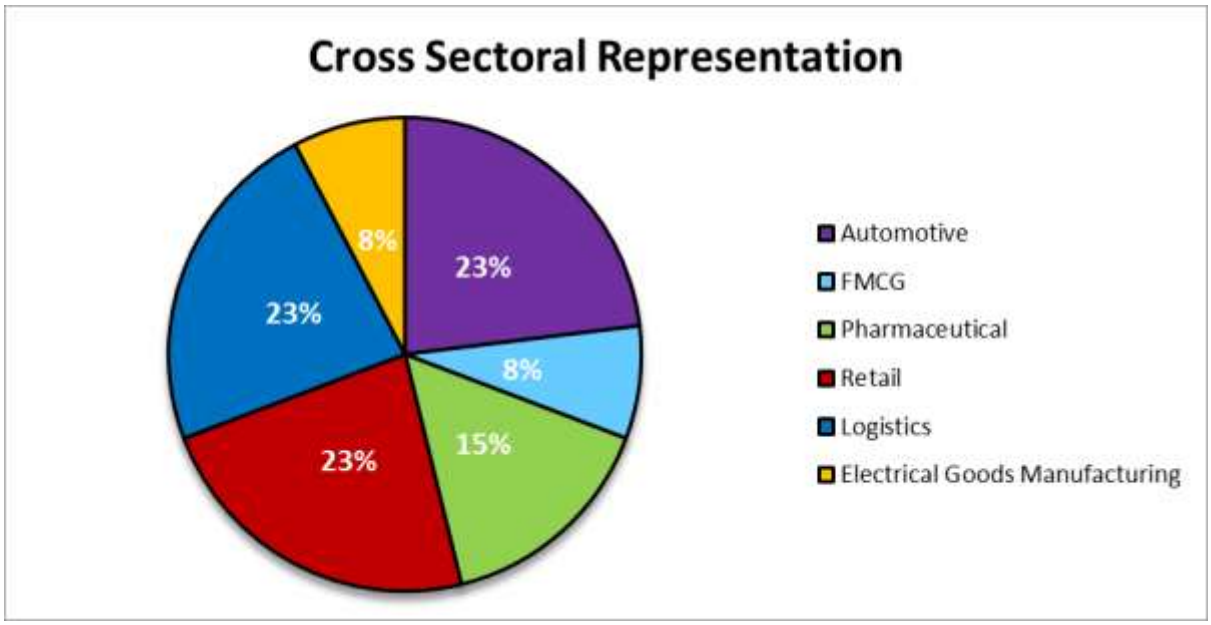

Figure 1: Cross Sectoral Representation of Respondent Companies

4 Cross Sector Disruptive Trends

4.1 Teaser Statement across all Sectors

Brexit related issues (e.g. free movement of goods; operating costs), shortage of highly skilled labour, requirements for significant investments in manufacturing technology and information systems appear as dominant trends that can potentially disrupt the supply chains of various sectors in the future.

A ranking of core trends that influence overall sectors, business strategies, infrastructure investment decisions, and managerial roles are presented in this section.

4.2 Supply Chain Practices

The core trends that will influence supply chain practices across all sectors include: a) Labour; b) Brexit; c) Information systems and d) Manufacturing technology (see Figure 2).

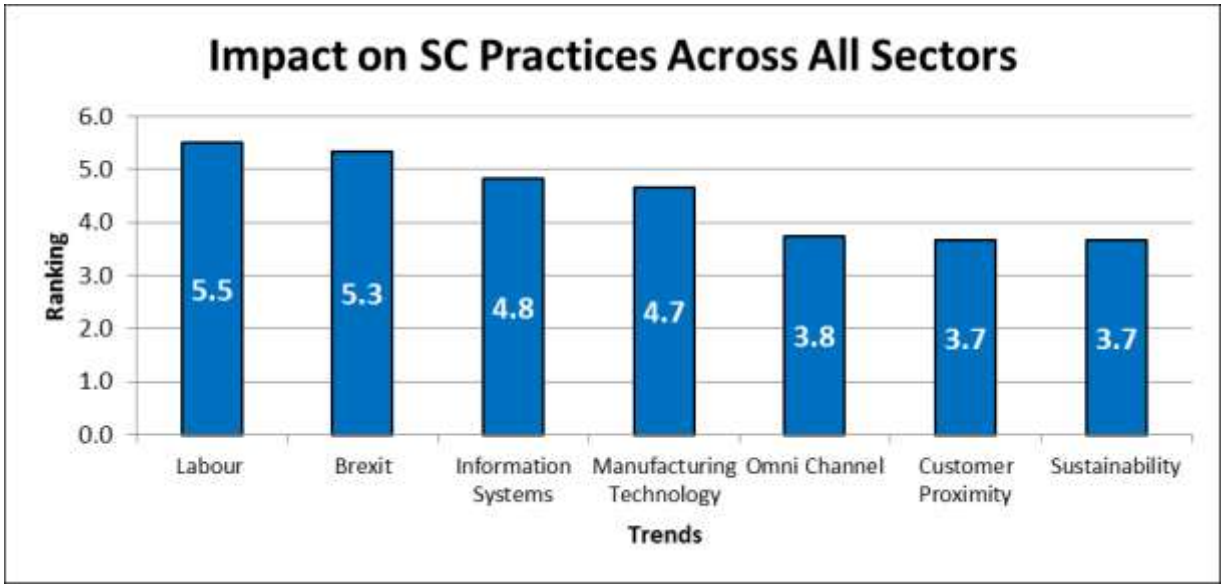

Figure 2: Core disruptive trends influencing overall sectors

4.3 Business Strategy

The core trends that will influence business strategies across all sectors include: a) Labour; b) Brexit; c) Information systems and d) Omni Channel (see Figure 3).

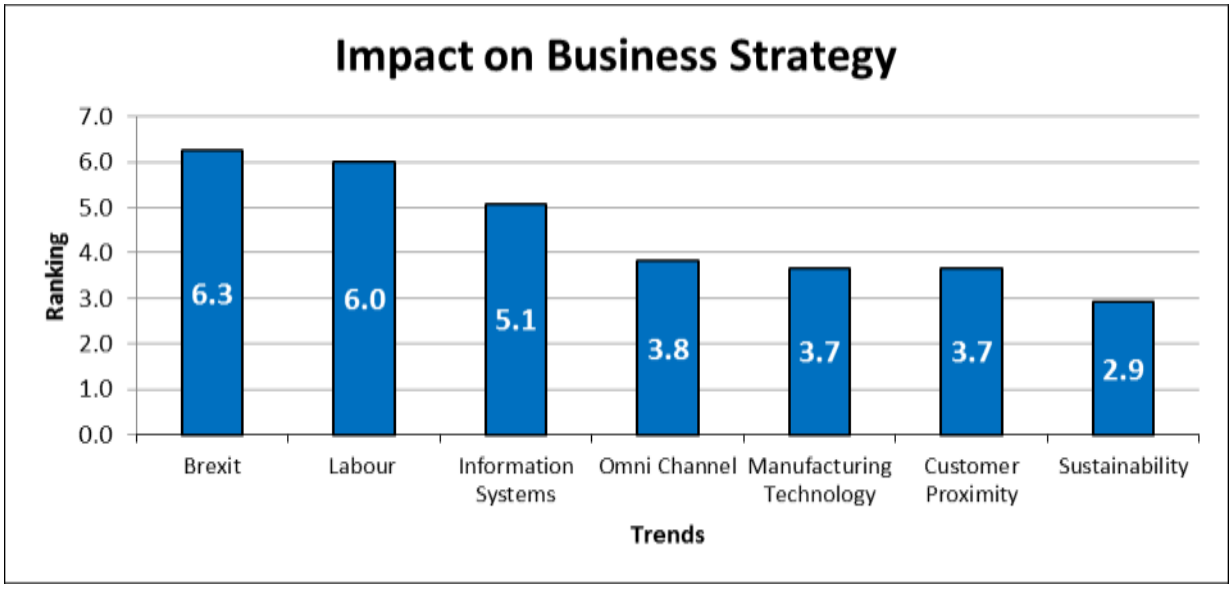

Figure 3: Core disruptive trends influencing business strategies across sectors

4.4 Investment Decisions

The core trends that will impact the supply chain infrastructure and capital asset decisions across all sectors include: a) Brexit; b) Manufacturing technology; c) Labour; and d) Information systems (see Figure 4).

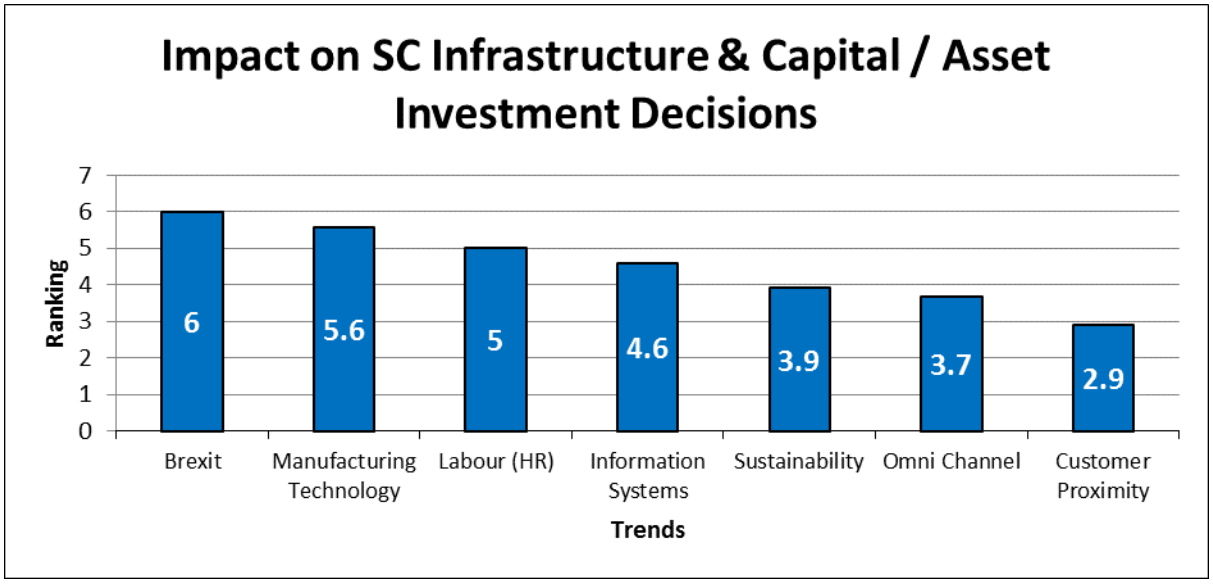

Figure 4: Core disruptive trends influencing supply chain infrastructure and capital asset decisions across sectors

4.5 Managerial Role

The core trends that will impact the role of the managers across all sectors include: a) Brexit; b) Labour; c) Information systems; and d) Manufacturing technology (see Figure 5).

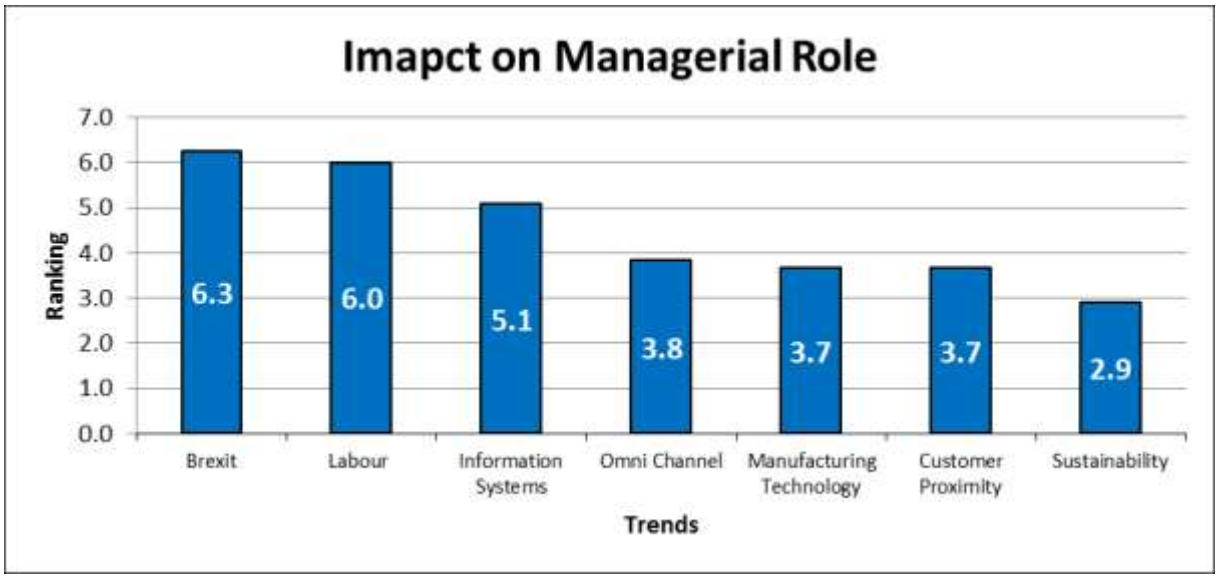

Figure 5: Core disruptive trends influencing managerial roles across sectors

4.6 Key Takeaways across all Sectors

- Across all sectors, the core trends that are likely to consistently influence the future logistics and supply chain related practices include:
  - Brexit
  - Labour /Human Resource / Personnel related issues
  - Manufacturing Technology
  - Information Systems
- Companies are concerned about the uncertainty surrounding the Brexit decision and are expecting an increase in the cost of doing “business as usual”.
- Companies are bracing themselves to counter the impact of Brexit through e.g. additional tariffs on movement of goods across UK borders and the shortage of skilled labour.
- The main focus of future investments regarding supply chain infrastructure and capital asset decisions will be primarily towards: a) Manufacturing technology - in order to minimise the reliance on human resources; and b)

Information systems – in order to establish a reliable and credible platform for information exchange and performance assessments across supply chain partners that enables a clear alignment between their business strategies.

5 Retail Sector

5.1 Teaser Statement for Retail Sector

Demand driven customer proximity is expected to have an impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector.

5.2 Key Shifts in Supply Chain Dynamics

The key shifts in retail sector related supply chain dynamics are as follows:

1) Information Systems: Due to the 24/7 nature of retail business, quality of decisions will depend on credible, auditable, and robust real time data.
2) Manufacturing Technology: To maximise benefits from Manufacturing Technology a significant initial capital investment is required.
3) Omni Channel: Transition from mass customisation to mass personalisation is on the horizon.
4) Sustainability: It is an important element yet not considered a major disruptive factor in the next 5 years.
5) Customer Proximity: To meet the customers' expectations of convenience shopping, supply chains will be under significant pressure to deliver smaller volumes to dispersed locations.

5.3 Trend Radar for Retail Sector

Figure 6 portrays the trend radar for retail sector. The trend radar indicates that manufacturing technology will be the most important disruptive trend for retail sector in the next five years. This is followed by information systems, customer proximity and Omni channel respectively. Interestingly, although sustainability is considered relevant in the next five years yet it is expected to have a low disruptive impact on the logistics and supply chain management practices in the retail sector.

Figure 6: Trend radar for retail sector

5.4 Core Disruptive Trends

From the perspective of the retail sector, the core disruptive trends are ranked as follows (See Figure 7):

- Manufacturing Technology
- Information Systems
- Customer Proximity
- Omni Channel
- Sustainability

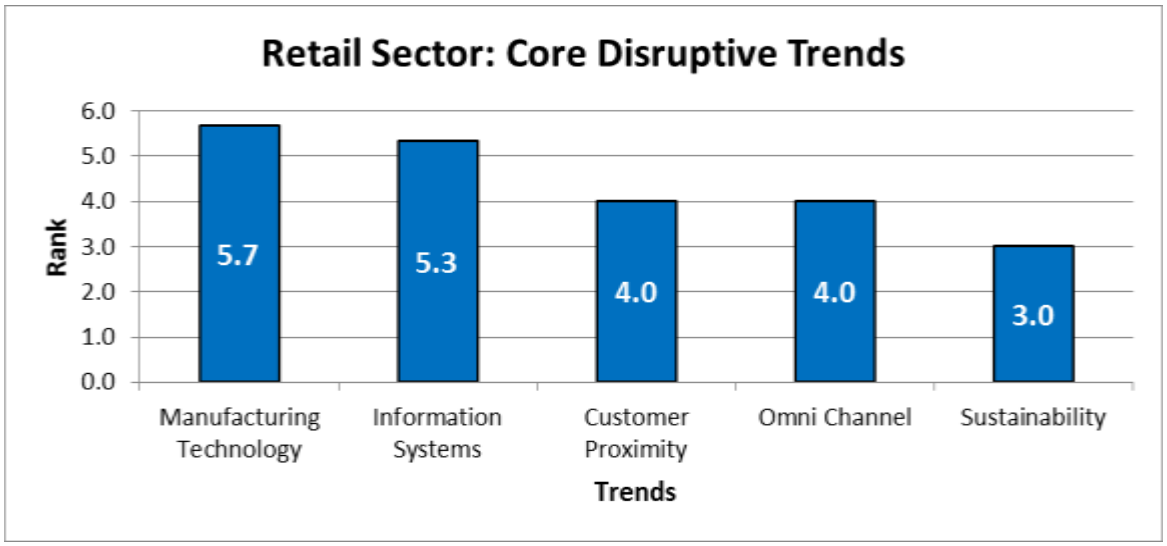

Figure 7: Core disruptive trends in retail sector

5.4.1 Manufacturing Technology

In the retail sector, firms are cognizant of the importance of automation in order to attain global competitiveness. However, the initial capital investment is a major concern. Because of the high stakes (costs vs. benefits) involved in investments regarding manufacturing technology, this trend will potentially have the highest impact on retail supply chains (Anagboso, 2009; Alkaya et al., 2015; McKinsey & Company, 2015b).

"[There is an] increased focus on the automation of the business and entire supply chain. These are upfront costs and definitely growing."

Respondent 1

Manufacturing technology is expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector (Ferdows et al., 2004; Bechtsis et al., 2017).

"We have made significant investments in automated and semi-automated UK DC Facilities. Increased automation and the complexities of implementation / optimisation and the impact on the morale and ongoing engagement of human resources."

Respondent 7

"Increased focus on the automation of the business and entire supply chain. These are upfront costs and definitely growing."

Respondent 1

5.4.2 Information Systems

Information systems will continue to provide a vital competitive edge to companies operating in the retail sector (McKinsey & Company, 2015a; Verdou et al., 2016).

"The emergence of data science and how it can be used to develop the Supply Chains will increasingly become a competitive advantage. Drive to improve the operating model will lead to significant disruption and change to our Supply Chain as we drive greater profitability."

Respondent 11

Businesses operating in the retail sector rely heavily on real time information for their strategic, operational and tactical decision making. However, information quality is a critical aspect and a primary concern for all firms involved in retail supply chains (Sandberg, 2011; Vendrell-Herrero et al., 2017).

"In Omni channel retail world, credible, auditable and robust real time data is essential. Not all organisations are in that place already and the need to get there will drive numerous IT projects / programmes and a quantity of disruption. The quality of decisions is dependent on the quality and timely availability of accurate and informative data sets."

Respondent 7

To ensure that the business strategies of all the partners are aligned it is important to firms operating in the retail sector to increase their visibility across the entire supply chain through collaborative information sharing (Knezevic et al., 2016; UPS, 2016).

"[We are] using the information systems in order to find smarter ways of operating."

Respondent 1

Because of their wider impact on the entire supply network, information systems are going to have a profound impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector (Ganesan et al., 2009; Bain and Company, 2016).

"The development and integration of improved end-to-end IT systems to aid the management and optimisation of Retail businesses operating across physical stores and on-line stores. We are making significant investment here as this is a consistent business plan agenda item."

"We are making investments in ongoing integration projects related to information systems"

Respondent 7

"Capital and infrastructure changes will be necessary to cope with this growth of on line retailing."

Respondent 11

5.4.3 Customer Proximity

With the ever increasing demands of the consumers for convenience based shopping, retailers are looking at re-organising their supply chains in order to cater to this evolving trend in the retail sector. In general, retailers foresee that future "brick-and-mortar" outlets will be required to handle smaller volumes and that these outlets will be located closer to end consumer. Consequently, customer proximity is expected to have a significant impact on the how supply chains operate in the retail sector (Kumar, 2008; PWC, 2011; Knezevic et al., 2016).

"The inefficient nature of delivering smaller volumes to more locations and more difficult locations will lead to significant changes to our Supply Chain operating model. Growth of convenience market will challenge the Supply Chain in terms of smaller volumes, more locations more urban locations."

Respondent 11

Demand driven customer proximity is expected to have an impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector (Pauwels and Neslin, 2015; Tableau, 2016).

"Demand and trend for convenience in retail sector make the impact of customer proximity more manageable (as it is essentially reflected in strategic plans) some impact of decreased customer proximity to retail stores is increased final mile delivery costs and investments."

Respondent 7

5.4.4 Omni Channel

The growing impact of Omni channel has empowered today's consumer and they enjoy high levels of personalisation while placing their orders. This transition from "mass customisation" towards "mass personalisation" has put a significant pressure on businesses operating in the retail sector (Min et al., 2006; Hubner et al., 2016b).

"[We are making] significant investment both in research and capability. The growth of on-line retail and the increasing expectations of customers are the enemy of volume efficiency in the retail supply chain – before internet retailing the retail groups would deliver directly to a store for customers to browse and purchase items (Mass standardisation. Nevertheless, the modern Omni channel retail space is one of mass personalisation with sales previously made in store and taken home by the customer now delivered directly to the customers property or alternate location driving up complexity levels in retailers supply chains but also increasing the cost and complexity of final mile customer order fulfilment."

Respondent 7

However, businesses operating in the retail sector consider the growing trend of Omni Channel an opportunity to redefine the way they manage their costs to cater to the needs of their customers (LCP, 2015; Verhoef et al., 2015).

"Growth of on line retailing will lead to innovation in order to drive cost out of the Supply chain due to the more costly operating model."

Respondent 11

"[There will be] continued impact of e-commerce (in terms of ongoing development regarding online purchase) on the retail sector. This has been identified as the trend with the maximum impact on retail sector."

Respondent 5

5.4.5 Sustainability

Although an important element of their strategic business planning, sustainability is not considered by retail firms to create any major disruption in the next 5 years. This is primarily due to the actions that retail businesses are already undertaking in order to address the growing pressure from the society in general to conduct their business in an ethical manner (Craig and Dale; 2008; CDP, 2015; Bechtsis et al., 2017).

"This is consistent and ongoing business agenda point. [Sustainability] is a big interest and agenda item in the international retail space (Particularly in terms of product). As a sector, retail is aware of the attraction of a robust sustainability and CSR strategy can place for a consumer and therefore the sector is making large steps forward in this area and this somewhat mitigates disruption."

Respondent 7

However, there was a divided opinion about the potential disruptive impact of sustainability on the future supply chains operating in the retail sector (PWC, 2012; Accenture, 2014; Bechtsis et al., 2017).

"There are many pressures on the Supply Chain such as ethical sourcing, global trade costs, and environmental considerations. The long term sustainability of supply will continue to come under significant pressure"

Respondent 11

5.5 Additional Disruptive Trends

In addition, the following additional disruptive trends were also mentioned by the respondents:

- Brexit
- Personnel (Human Resource)
- Operating cost

The frequency by which additional disruptive trends were mentioned by the respondents regarding the retail sector is shown in Figure 8:

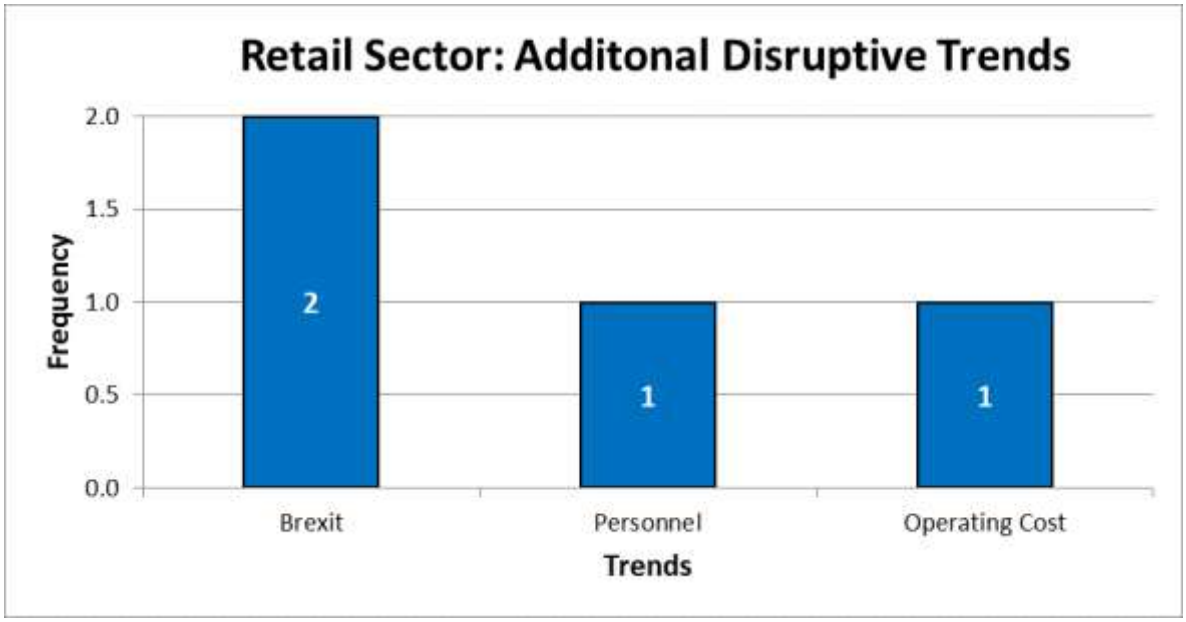

Figure 8: Frequency of additional disruptive trends for retail sector

5.5.1 Brexit

Businesses operating in the retail sector are quite concerned about the possible threat of Brexit looming on the horizon. One area of concern is that the businesses are still unsure about the actual impact on their supply chain once Brexit actually takes place (EC, 2015).

"This is a major unknown factor at the moment but will ultimately dictate how business will have to/will be able to respond. Depends on what happens with Brexit – decisions have to be taken accordingly. Could have major repercussions for companies – may have to pull out of a certain market."

Respondent 1

A view common across the retailer sector is that, because of Brexit, the cost of conducting "*business as usual*" is going to increase. Consequently, this will put a significant pressure on the margins of businesses operating in the retail sector.

"The impact of Brexit will be an economic one initially. How this economic impact will have a trickle-down effect on business other than mine depends on the ability of those businesses to maintain their staff levels to squeeze their costs if there is a squeeze in their sales. In my business what would be challenging around Brexit is the ability to control the price point and that will become a trade-off for me. OR at a senior level in our retail business it will be a trade-off between margins and sales. Because we can add to the cost of the product but then that would erode our sales. So we need to decide based on whatever happens due to Brexit, do we pass on the additional costs to our customers or do we absorb those costs and reduce our margins"

Respondent 7

5.5.2 Personnel

One of the primary concerns of business operating distribution centres in the retail sector is the potential shortage of skilled labour once Brexit takes place. This potential shortage of skilled labour is expected to cause a significant supply chain disruption in the retail sector forcing companies to shift towards automation earlier than planned.

"In the retail sector the supply of high quality personnel is a concern. The retail sector can be seen as a low payer and a less attractive vocation. This needs to be managed to avoid impact in the retail supply chain operations – Particularly in DC fulfilment centre operations where increased automation / customer demand levels and complexity are driving down the attractiveness of roles"

Respondent 7

5.5.3 Operating Cost

Another area of concern for the retail sector is how to control the operating costs as this will have a major impact on their operations (Kavakeb et al., 2015).

"Customer benefits vs. cost figures (operating costs and associated aspects like carbon foot printing). Achieving the balance is core and will continue to shape SCs. [The aim is to] utilise the assets without compromising the customer experience"

Respondent 1

5.6 Key Takeaways for Retail Sector

- Manufacturing technology is expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector.
- Corporates need to make high investments in manufacturing technology in order to remain competitive.
- Because of their wider impact on the entire supply network, information systems are going to have a profound impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector.
- Business must integrate their information systems to align business strategies across the supply chain.
- Future outlets must be designed to handle smaller volumes and should be located closer to the customer.
- Demand driven customer proximity is expected to have an impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector.
- Retailers will be required to manage the cost and complexity of final mile in customer fulfilment due to Omni channels.
- Retailers are making significant investment both in research and capability to meet the challenges posed by Omni channel.
- Sustainability is not expected to cause major disruption as firms are already pro-active in their actions.
- Brexit will increase the costs of conducting "business as usual" putting more pressure on the margins of businesses operating in the retail sector.
- Shortage of high quality skilled labour is going to push companies towards automation.

- Companies need to plan on how to decrease their operating costs without compromising on customer experience.

6 Automotive Sector

6.1 Teaser Statement for Automotive Sector

High investments are expected in infrastructure to locate suppliers close to automotive manufacturers.

6.2 Key Shifts in Supply Chain Dynamics

The key shifts in automotive sector related supply chain dynamics are as follows:

1) Information Systems: Digitalisation aimed at improving productivity in supply chains will take the centre stage in retail sector.
2) Manufacturing Technology: Significant investments will be required to ease the pressure on auto manufacturers to react quickly to meet high level of customisation.
3) Omni Channel: Direct sales and rental/driverless provision will revolutionise car buying and ownership
4) Sustainability: Legislation related to fuel efficiency and emissions will drive design and customer acceptance.
5) Customer Proximity: High investments are expected in infrastructure to locate suppliers close to automotive manufacturers.

6.3 Trend Radar for Automotive Sector

The trend radar for the automotive sector is displayed in Figure 9. This trend radar indicates that manufacturing technology will be the most important disruptive trend for automotive sector in the next five years. This is followed by information systems, customer proximity and sustainability respectively. It is worth mentioning here that while Omni channel is still considered relevant in the next five years yet it is expected to have a low disruptive impact on the logistics and supply chain management practices in the automotive sector.

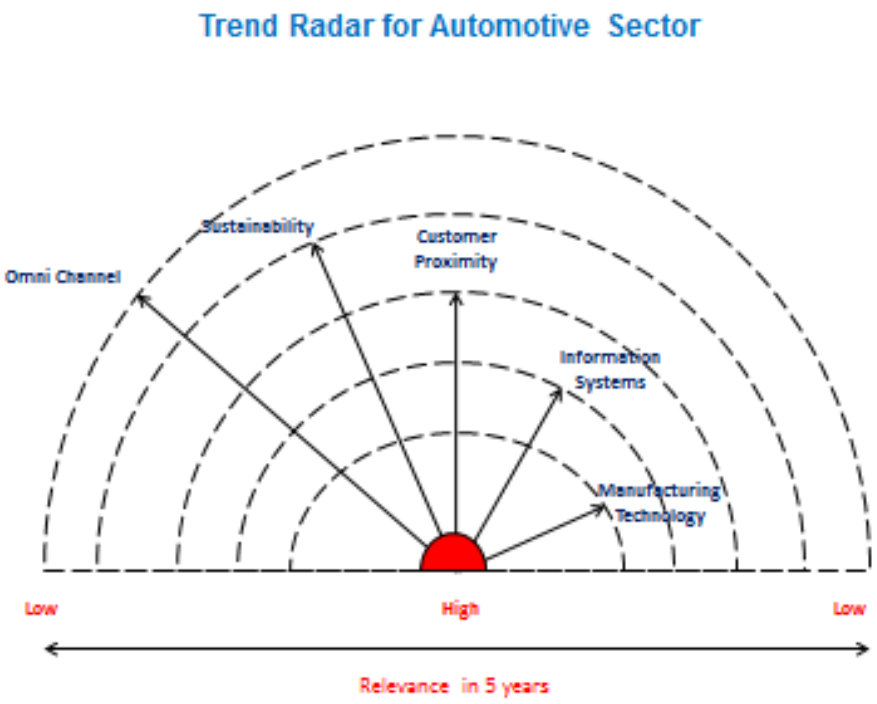

Figure 9: Trend radar for automotive sector

6.4 Core Disruptive Trends

From the perspective of the automotive sector, the 5 core disruptive trends are ranked as follows (See Figure 10):

- Manufacturing Technology
- Information Systems
- Customer Proximity
- Sustainability
- Omni Channel

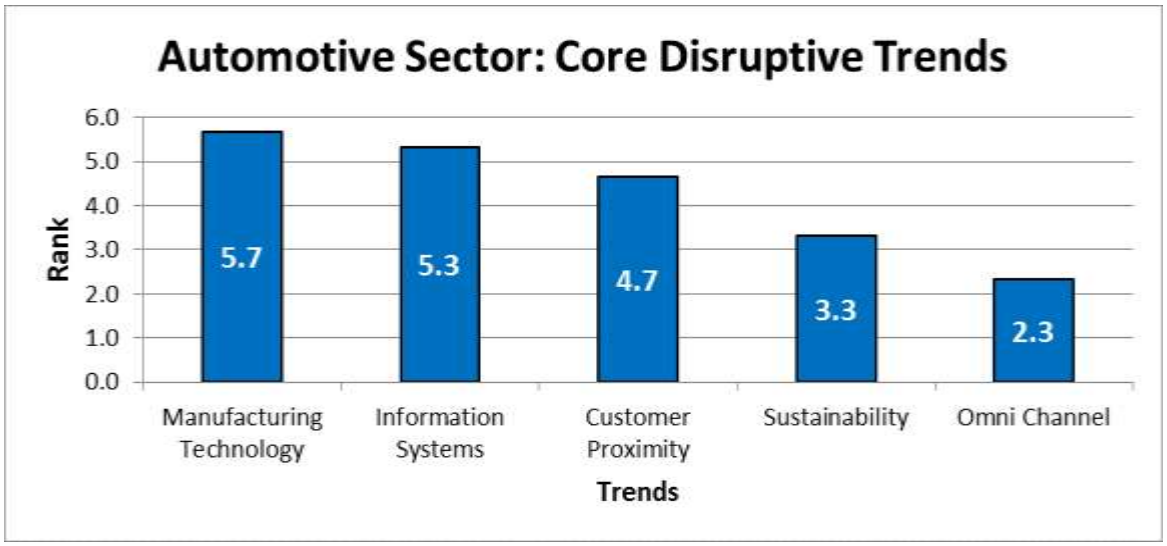

Figure 10: Ranking of core disruptive trends for automotive sector

6.4.1 Manufacturing Technology / Product Customisation

Manufacturing technology is expected to have the highest potential to disrupt the supply chains in the automotive sector. This is primarily because of the pressure on auto manufacturers to react as quickly as possible to the high level of customisation demanded by the consumers in the future (Schmidt et al., 2014; SMMT, 2015).

"The increasing level of personalisation going into the cars now and the options that are available to the consumers mean that supply chains have to be located nearby so that they can react quickly to the levels of customisation. You cannot afford to have your core suppliers - who are offering different options on interior and trims or

technology going into the cars – to be located away from the plant because of the lead times. So to be reactive and to have a shorted lead times for the consumer they need suppliers who can customise their product and supply it very quickly so there is a requirement to be local, i.e. next door to the plant"

Respondent 6

Companies operating in the automotive sector are also concerned about the wider impact of automation on the society. This includes possible job losses and its impact on costs in the local area surrounding the production and service facilities in the automotive sector. A connection to the social dimension of sustainability can be drawn here (Roh et al., 2014; Bhattacharyya, 2015).

"Less man power required brings social effects. Cost base changes relative to location."

Respondent 13

Manufacturing technology is expected to have a major impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the automotive sector (Pavlinek et al., 2009; SMMT, 2015).

"Currently there are a number of projects that are ongoing looking at automating current manual processes by making investments in manufacturing technology."

Respondent 6

6.4.2 Information Systems

Companies operating in the automotive sector are excited about the potential opportunities being created by the integration of manufacturing technology and information systems (KPMG, 2014; SMMT, 2015).

"Regarding the level of technology in terms of digitalisation of the manufacturing process, there is a huge opportunity that has been identified in a recent report by SMMT (https://www.smmt.co.uk/reports/the-digitalisation-of-the-uk-automotive-industry/) about digitalisation of the UK automotive industry. In this report they have highlighted that we could see an investment of £74 billion by 2035 if the sector fully adopted the digitalisation of the manufacturing process. This includes increasing

productivity in supply chains, preventive maintenance etc. So the manufacturing process is going to change significantly through the industry 4.0 initiative"

Respondent 6

Credible and reliable information exchange between supply chain partners is expected to be an essential ingredient in order to cater to the increased demands of consumers for customised product offerings (KPMG, 2014; Future Thinking, 2015).

"Better and faster information on demand specification changes supply chain impacts and costs."

Respondent 13

Information Systems are expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the automotive sector (Gelareh et al., 2013; KPMG, 2016a).

"Digitalisation [information systems] in automotive sector is driven by the industry 4.0 [which is the current trend of automation and data exchange in manufacturing technologies. It includes autonomous automobiles systems, internet of things and cloud computing]. However there is a lot of development still needed here."

Respondent 6

6.4.3 Customer Proximity

Customer proximity will continue to have a major influence on the supply chain infrastructure and capital/asset investments decisions of firms operating in the automotive sector (PWC, 2012b; Baily, 2014).

"For customer proximity, there is a significant development in the North East which I call the international advanced manufacturing park which is a 100-hectare site for locating supplier of the UK automotive sector. So there will be lot of investment in infrastructure and capital assets to meet the requirements of customer proximity. This is a manufacturing park / and industrial park which is near the Nissan site. The location of this park is going to play major part in attracting the right suppliers to meet the requirements of customisation which is central to the concept of customer proximity. There will be new buildings going up and there will be buying new

machinery. A number of suppliers are investing in expanding their facilitates to meet their future demands"

Respondent 6

An area of concern for the companies operating in the automotive sector is the challenge to bring down costs without compromising on customer experience (PWC, 2008; SMMT, 2015).

"Need to understand trends in customer preferences. Logistics cost both in supply chain and finished goods to be minimized."

Respondent 13

6.4.4 Sustainability

Automotive firms are keeping a close watch on the existing as well as emerging legislation as it will have a long term impact on their investment decisions on both the manufacturing process as well as the end product (Dyllick and Hockerts, 2002; Lim and Jones, 2017).

"Fuel efficiency, emissions and related legislations will drive design and customer acceptance."

Respondent 13

6.4.5 Omni Channel

The landscape of the automotive sector is expected to be influenced by novel terms of car ownership (shared user), new sales channels, and autonomous vehicles (Lee et al., 2013; Kumar, 2016).

"Direct sales and rental/driverless provision will revolutionise car buying and ownership"

Respondent 13

However, differences in opinion regarding the potential impact of Omni channel on supply chain disruption in the automotive sector could be observed (DHL, 2014a; Lim and Jones, 2017).

"Since we are representing the manufacturing [in the automotive] sector so Omni channel has more to do with the retail sector so therefore it is less important to the manufacturing sector"

Respondent 6

6.5 Additional Disruptive Trends

In addition, the following additional disruptive trends were also mentioned by the respondents:

- Brexit
- Skills (Human Resource)
- Taxation Charges
- Recession

The frequency by which additional disruptive trends were mentioned by the respondents regarding the automotive sector is shown in Figure 11:

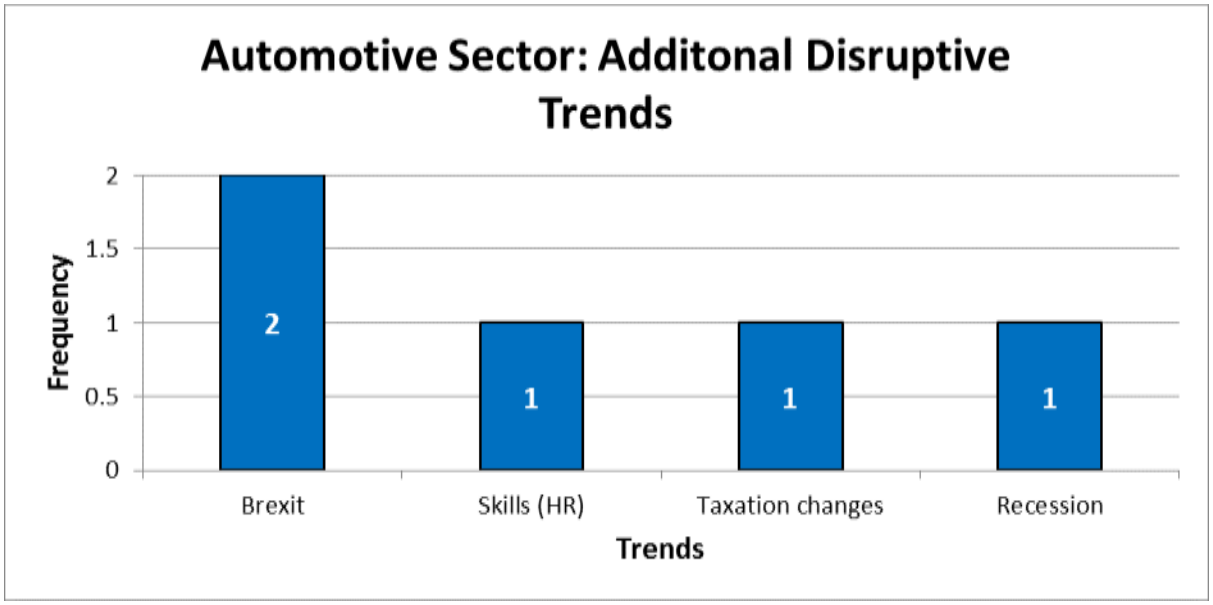

Figure 11: Frequency of additional disruptive trends for automotive sector

6.5.1 Brexit

Automotive firms are concerned about the uncertainty surrounding Brexit and consequently its impact on their investment decisions (EU, 2011).

"In terms of Brexit, the concerns are mainly around the decision regarding trade terms. For example, if we do see 10% tariffs come in the form of tax on cars exported. This would make the UK automotive sector less competitive and could result in new model allocation going elsewhere other than UK which would have a wider impact on the whole of the UK. If we are able to maintain the free trade than that would be very positive because we are a strong and very competitive sector. But the uncertainty around Brexit is making the investment decisions more difficult. However, currently this has little impact in the North East. For example, Nissan has a given an 8-10 year production plan which makes it easy for their supplier to make those investment decisions with certainty. If we are faced by tariffs then it could have a big impact on the sector."

Respondent 6

An area of concern is that automotive firms operating in the UK may lose competitiveness because of increasing costs through higher tariffs as well increased time to move supplies and finished vehicles between the UK and the rest of Europe (PWC, 2009; SMMT, 2015).

"The introduction of tariffs will add costs to products and logistics, and will add time to cross border transportation. With tariffs imposed and increased costs, products manufactured in non-free trade countries will be more expensive and less competitive than those in free trade areas."

Respondent 12

6.5.2 Skills (Human Resource)

Shortage of skilled labour from both within and outside UK can leave the automotive sector unable to meet growing demand in the future.

"The industry is going through a period of significant growth so £15 billion was invested in 2012 in the UK automotive sector. That level of investment is set to continue and should create jobs in the region of 100,000 in the UK automotive sector supply chains by 2020. We also have an ageing work force that is coming close to retirement. Most of these professionals are at a higher level of management. Unless we attend the "skills" issue now, we could end up in situation where we are unable to

meet the future demand of the sector. The reason why Skills is rated high is because of the re-location of the suppliers, finding the right skills is going to be a major challenge. So when these suppliers re-locate, they have to be up and running in a very tight time frame to meet the production schedules for Nissan vehicles."

Respondent 6

6.5.3 Taxation Charges

Environmental concerns are expected to put pressure on both logistics providers and automotive manufacturers to shift their focus from tax efficiency towards reducing their carbon foot prints.

"As tax optimisation becomes politically unacceptable and public opinion swings against companies seen to be avoiding tax, companies will be forced to re-engineer their supply chain in favour of operational efficiency and effectiveness rather than tax efficiency. Net result will be procurement and planning done closer to the markets and factories and footprint changes. Environmental concerns, notably CO_2 emissions will shape views about supply chain and attendant logistics."

Respondent 13

6.5.4 Recession

A combination of the aforementioned factors (Brexit, restriction in free movement of goods; shortage of labour etc.) could trigger a recession in the future leading to a significant reduction in demand.

"The trend towards nationalism (America first, Brexit) and national self-interest is likely to reduce global free trade, which will increase cost of products and transportation. The combined factors of the above will likely be a significant contributory factor to recession, reorganisation within large international companies and affect how they trade. The last recessions led to massive global decline in cars sold and closures of factories. The next recession would do the same i.e. this will lead to a significantly reduced demand."

Respondent 12

6.6 Key Takeaways for Automotive Sector

- Manufacturing technology is a core concern for auto manufacturers in order to react as quickly as possible to the need for high levels of customisation and keep labour costs down.
- Manufacturing technology is expected to have a major impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the automotive sector.
- Manufacturing processes are going to change significantly through the industry 4.0 initiative.
- Information Systems are expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the automotive sector.
- Customer proximity will continue to have a major influence on the supply chain infrastructure and capital/asset investments decisions of firms operating in the automotive sector.
- A key challenge is to improve customer proximity in order to meet their requirements while minimizing supply chain costs.
- Efficiency is a core concern for customers.
- Omni channel less of an issue but direct sales will have an impact on the industry.
- Brexit can impact trade terms and increase tariffs which will make the UK less competitive.
- Growth of the sector leads to skill shortages which are further enforced by an ageing workforce and potentially by the impact of Brexit.
- Companies will be forced to re-engineer their supply chain in favour of operational efficiency and effectiveness rather than tax efficiency.
- The trend towards nationalism may reduce global free trade, which will increase cost of products and transportation.

7 Pharmaceutical Sector

7.1 Teaser Statement for Pharmaceutical Sector

Manufacturing technology will continue to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the pharmaceutical sector.

7.2 Key Shifts in Supply Chain Dynamics

The key shifts in pharmaceutical sector related supply chain dynamics are as follows:

1) Information Systems: Heavy investments are expected in information system to enhance delivery speed in front end of the pharmaceutical supply chains.
2) Manufacturing Technology: Significant investments will be made in manufacturing technology in the pharmaceutical sector.
3) Omni Channel: Speed of delivery will depend on nature of the products. Omni Channel will have a very high impact on over the counter products but a relatively low impact on licenced pharmaceutical products.
4) Sustainability: The next generation of pharmaceutical sector is split over the disruptive impact of sustainability.
5) Customer Proximity: There is a divided opinion on the disruptive role of customer proximity on pharmaceutical supply chains of the future.

7.3 Trend Radar for Pharmaceutical Sector

The trend radar for pharmaceutical sector is provided in Figure 12.This trend radar indicates that information systems is expected to be the most important disruptive trend for pharmaceutical sector in the next five years. This is followed by manufacturing technology, sustainability and customer proximity respectively. It must be noted that while Omni channel is still considered relevant in the next five years yet it is expected to have a low disruptive impact on the logistics and supply chain management practices in the pharmaceutical sector.

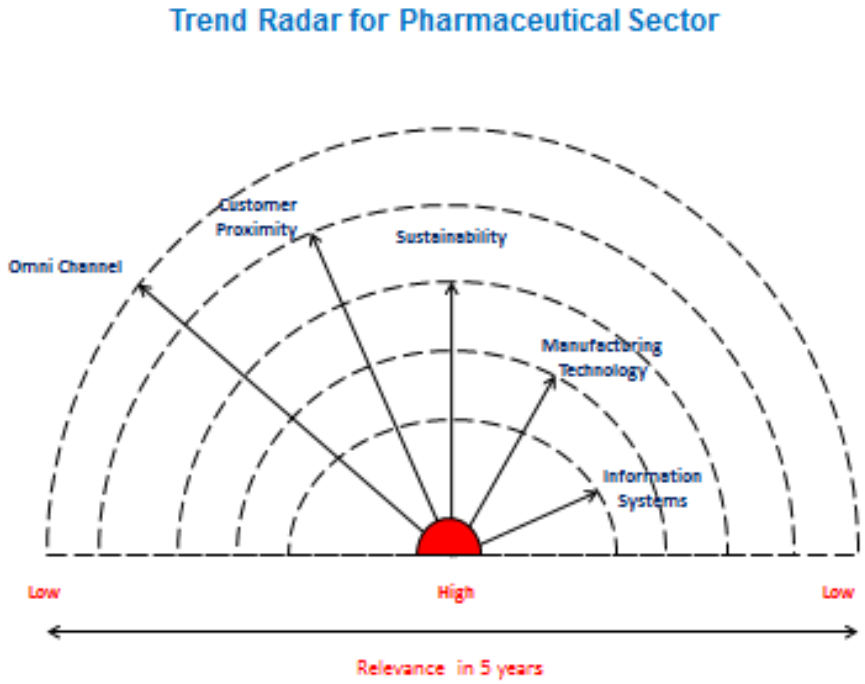

Figure 12: Trend radar for pharmaceuticals sector

7.4 Core Disruptive Trends

From the perspective of the pharmaceutical sector, the core disruptive trends are ranked as follows (See Figure 13):

- Information Systems
- Manufacturing Technology
- Sustainability
- Customer Proximity
- Omni Channel

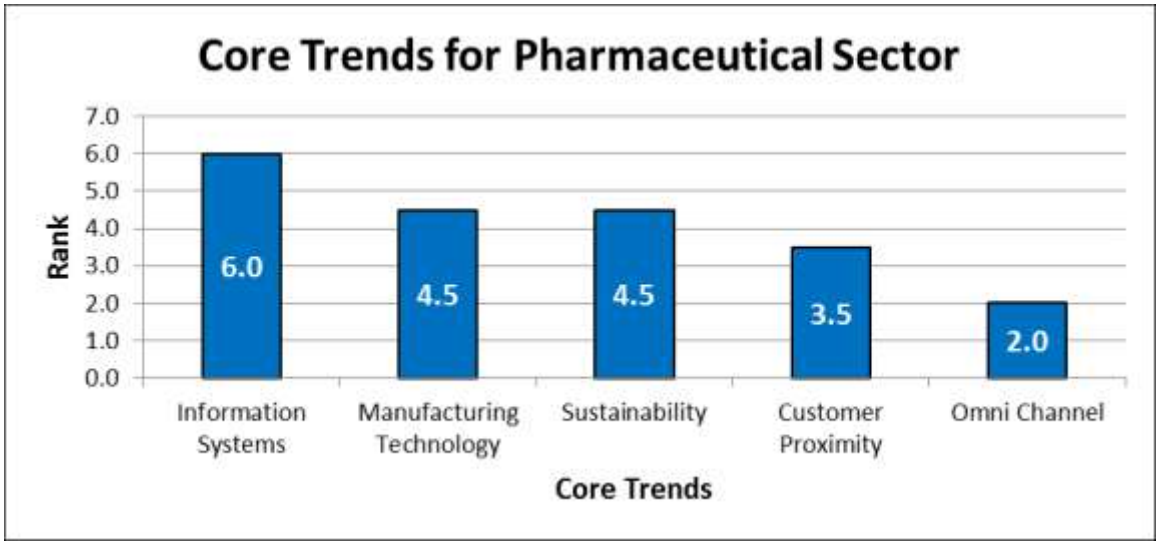

Figure 13: Ranking of core disruptive trends for pharmaceutical sector

7.4.1 Information systems

Investment in information systems to speed the delivery of goods in the pharmaceutical sectors (e.g. via drones) is expected to significantly alter the supply chains of the future (Spatz, 2010; Huq et al., 2016).

"Technological advances and delivery direct to consumer, particularly in under-developed countries by methods such as drones, is likely to be a significantly disruptive, positive development."

Respondent 12

Information Systems will continue to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the pharmaceutical sector (Smith, 2009; Kumar and Rahman, 2014).

"We invest a lot of money in information systems."

Respondent 9

7.4.2 Manufacturing Technology

Manufacturing technology will continue to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the pharmaceutical sector (Dubey and Dubey, 2010; Shanley, 2010; Huq et al., 2016).

"We invest a lot of money in manufacturing technology."

Respondent 9

7.4.3 Sustainability

Impact of the triple bottom line is expected to continue to be profound across the entire pharmaceutical sector (Lucket and Seifert; 2017).

"CSR [corporate social responsibility] and ethical activity in all aspects of operations in this high margin sector will continue to drive change."

Respondent 12

However, not everyone considered sustainability as an important factor in the pharmaceutical industry (Low et al., 2016).

"Sustainability is irrelevant to pharmaceutical sector"

Respondent 9

7.4.4 Customer Proximity

Customer proximity was ranked quite low by the respondents primarily because they looked at this dimension from the perspective of a manufacturer (Huq et al., 2016).

"[Form a manufacturer's perspective] customer proximity is irrelevant to pharmaceutical sector"

Respondent 9

7.4.5 Omni Channel

The speed of delivery for different product categories will add to the complexity of supply chains in the pharmaceutical sector. This presents an opportunity for the logistics companies to improvise their delivery mechanisms to cater to the varying needs of the customers (Huq et al., 2016).

"Omni channel has a very high impact on over the counter pharmaceutical products and a low impact on licenced pharmaceutical products"

Respondent 8

However, opinion differed with regard to the potential impact of Omni channel on supply chain disruption in the pharmaceutical industry (Sathya and Nandagopal, 2016).

"[Omni Channel is] irrelevant to pharmaceutical sector"

Respondent 9

7.5 Additional Disruptive Trends

In addition, the following additional disruptive trends were also mentioned by the respondents:

- Raw Material Supply
- Outsourcing
- Product Life Cycle
- Supplier Relationship Management

The frequency by which additional disruptive trends were mentioned by the respondents regarding the pharmaceutical sector is shown in Figure 14.

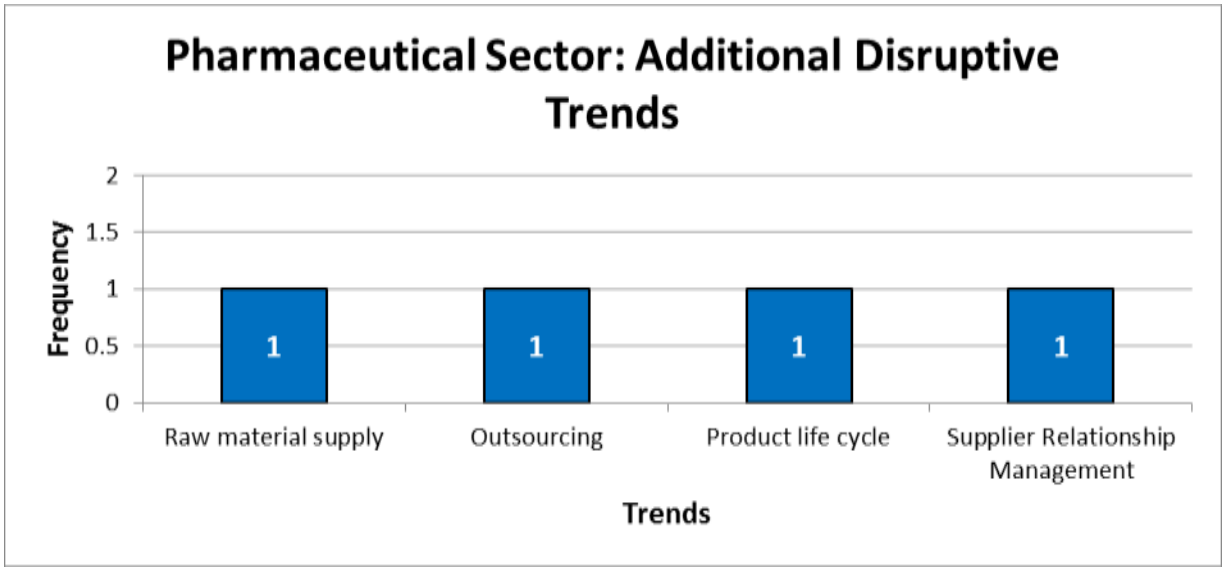

Figure 14: Frequency of additional disruptive trends for pharmaceutical sector

7.5.1 Raw Material Supply

Pharmaceutical companies find it challenging to change their critical suppliers. The primary reason behind their position of weakness is the high transaction cost (e.g. time; patents etc.) involved both in terms of leaving the existing supplier as well as developing alternative supply sources (PWC, 2012a; Lucket and Seifert, 2017).

"Critical components in pharma are typically sourced from China. This makes it very difficult to switch to other suppliers"

Respondent 9

7.5.2 Outsourcing

The risk of limited visibility regarding the quality control protocols and standards restricts the pharmaceutical firms' options to outsource part of their operations (PWC, 2010; Lucket and Seifert, 2017).

"The risk here is that you are not in complete control (e.g. quality control). This is particularly more challenging in the pharma sector"

Respondent 9

7.5.3 Product Life Cycle

The relatively long time scale involved in developing, testing and approval of new products in the pharmaceutical sectors motivates firms to optimise (diversify, focus,

expand) their product portfolio. This presents potential challenges and opportunities for their supply chain partners (Huq et al., 2016).

"Product portfolio is core to business strategy as it is all about [it directly affects] the business growth"

Respondent 10

7.5.4 Supplier Relationship Management

To develop and strengthen a long term collaborative relationship, pharmaceutical firms will be focusing towards establishing long terms supplier relationship management initiatives (Lucket and Seifert, 2017).

"Supply of raw materials is becoming more and more challenging in the pharmaceutical sector including [ensuring] the right quality and cost of supply"

Respondent 10

7.6 Key Takeaways for Pharmaceutical Sector

- Manufacturing technology will continue to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the pharmaceutical sector.
- Technological advances and delivery direct to consumer are likely to be disruptive developments.
- Information systems will continue to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the pharmaceutical sector.
- Sustainable and ethical activity in all aspects of operations in this high margin sector will continue to drive change.
- Omni channel has a high impact on over the counter pharmaceutical products and a low impact on licenced pharmaceutical products.
- Customer proximity was ranked quite low by the respondents primarily because they looked at this dimension from the perspective of a manufacturer.
- Critical components are often sourced from the Far East.
- Switch to other suppliers is challenging.

- Outsourcing increases challenges around quality control.
- Market appropriate product portfolios are at the core of business strategy and business growth.
- Sourcing materials at the right quality and cost of supply continues to challenge the sector.

8 FMCG Sector

8.1 Teaser Statement for FMCG Sector

Lack of appropriate supply chain infrastructure is expected to motivate enhanced investments regarding the supply chain infrastructure and capital/asset of firms operating in the FMCG sector.

8.2 Key Shifts in Supply Chain Dynamics

The key shifts in FMCG sector related supply chain dynamics are as:

1) Information Systems: Significant investments required to increase visibility around the front and back end of FMCG supply chains.
2) Manufacturing Technology: Comparative buying preferences of the consumers will put significant pressure on FMCG firms to invest heavily in manufacturing technology.
3) Omni Channel: Cost efficiency needs to be achieved without compromising on customer experience
4) Sustainability: Sustainability will not have a significant disruptive impact in the next 5 years.
5) Customer Proximity: Large purposeful distribution centres will replace mega retail stores.

8.3 Trend Radar for FMCG Sector

The trend radar for FMCG sector is presented in Figure 15. This trend radar indicates that Omni channel will continue to be the most important disruptive trend for FMCG sector in the next five years. This is followed by manufacturing sector, information systems and customer proximity respectively. It must be noted here that although sustainability is still considered relevant in the next five years yet it is expected to have a low disruptive impact on the logistics and supply chain management practices in the FMCG sector.

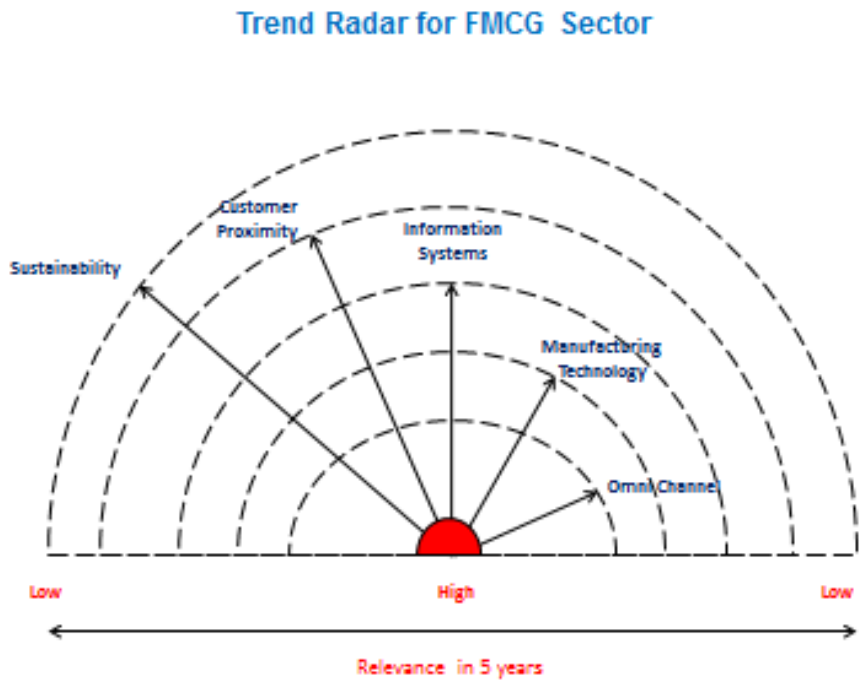

Figure 15: Trend radar for FMCG sector

8.4 Core Disruptive Trends

From the perspective of the FMCG sector, the core disruptive trends are ranked as follows (See Figure 16):

- Omni Channel
- Manufacturing Technology
- Information Systems
- Customer Proximity
- Sustainability

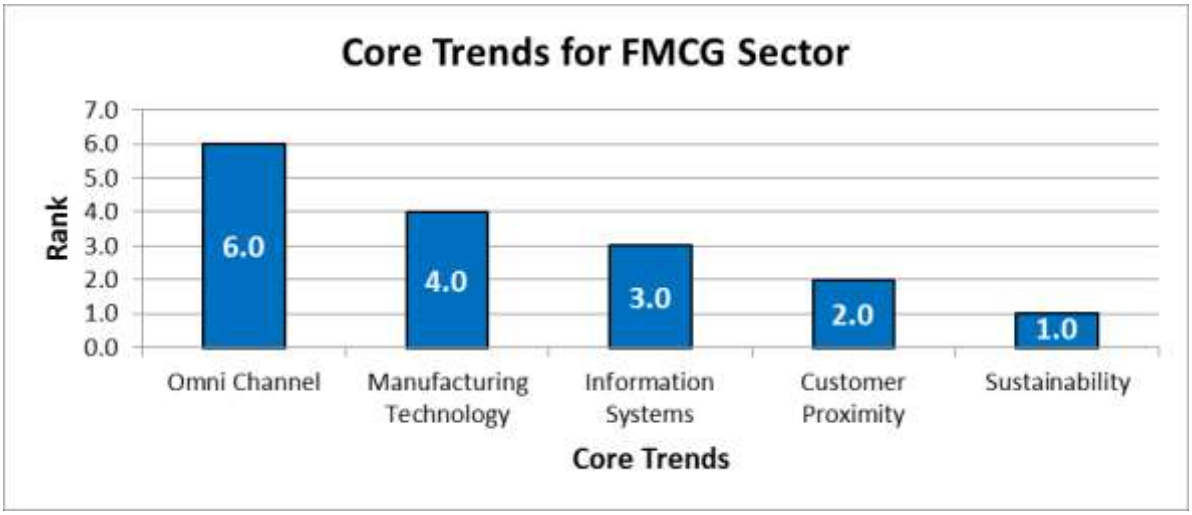

Figure 16: Ranking of core disruptive trends for FMCG sector

8.4.1 Omni channel

Companies operating in the FMCG sector are cognizant of the wider impact of the Omni channel on the way supply chains will operate in the future (Bilgen and Gunther 2010; McKinsey & Company, 2015a).

"Omni channel applies whether you are going to see someone face-to-face in the store or whether you shop on-line and it is important for example: a) how you communicate with those customers; b) how you are able to return your goods back; c) how you are able to browse i.e. whether it will be through a device or whether you have to walk with an expert in the department store. Potentially I could see a situation in which you could virtually go and visit a shop."

Respondent 4

"Omni channel is just changing the way supply chains need to think and work. I think customers' expectations of choice and convenience are pretty indifferent or agnostic about whether they are ordering online or whether they are going inside a shop. The winners will be those that support the customer choice and convenience while keeping an eye on cost efficiency. So that is why it is such a big deal in terms of FMCG."

Respondent 4

FMCG supply chains are expected to provide a supporting role in the future to enable the retailers to handle peak demand. However, while supporting retailers, supply chain partners must ensure that the role of the retailer is not undermined (KPMG, 2010; Burgess, 2016).

"[The challenge is] how to bypass retailer [and] avoid being de-listed by retailers. Looking at FMCG to provide peak capacity – pop up – Amazon set up in your warehouse to make capacity for short-term peaks"

Respondent 8

In addition, e-commerce is also expected to enhance the convenience level of the consumers thereby putting more pressure on the supply chains (Sathya and Nandagopal, 2016).

"e-commerce is transforming the way we buy and consume, moving sale of product away from the high street."

Respondent 12

8.4.2 Manufacturing Technology

Manufacturing technology is expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the FMCG sector (Farmer, 2013).

"Technology / Automation look at technology as driving customer expectations – making things lot more real time. For example, consumers want to compare things and to know where exactly things are. This is removing the barriers to entry which is driving up the comparative landscape."

Respondent 4

8.4.3 Information systems

There will be a growing emphasis on making investments in information systems to support Omni channel in FMCG sector. These investments will be towards development and implementation of the necessary software required to increase the visibility across the supply chains (Kumar et al., 2013; DHL, 2015b).

"Information systems sit higher than Omni channel because actually business—wise most of the capital and infrastructure investment in the next 5 years is very much focused around the front and back end systems of the business that will directly and indirectly benefit the supply chains. Investments [in software] are being made specifically in information systems to support Omni channel"

Respondent 4

"Sophisticated ERP [enterprise resource planning] and TMS [transport management systems] eliminate waste and increase efficiencies of supply chain networks. Big data has revolutionised understanding of buyer behaviour and product life cycles."

Respondent 12

8.4.4 Customer Proximity

Customer proximity is expected to have an important influence on the supply chain infrastructure and capital/asset investments decisions (e.g. purposeful distribution centres) of firms operating in the FMCG sector (Tixier, 2010).

"Customers increasingly want things now in a very tight time frame. Therefore, you need to be able to get close to the customers. Fundamentally, if you want to do that then you would have to build a really big purposeful distribution centre which is currently not available for retailers in my sector."

Respondent 4

8.4.5 Sustainability

Sustainability was considered to have a low potential to disrupt the future supply chains operating in the FMCG sector (KPMG, 2014; Sathya and Nandagopal, 2016).

"The company has started doing work regarding where should they source their products from. [However,] relative to the other trends, this is not that important right now"

Respondent 4

8.5 Additional Disruptive Trends

In addition, the following additional disruptive trends were also mentioned by the respondents (see Figure 4):

- City Liveability
- Labour Cost and Availability
- Lack of Availability of Supply Chain Infrastructure

The frequency by which additional disruptive trends were mentioned by the respondents regarding the FMCG sector is shown in Figure 17.

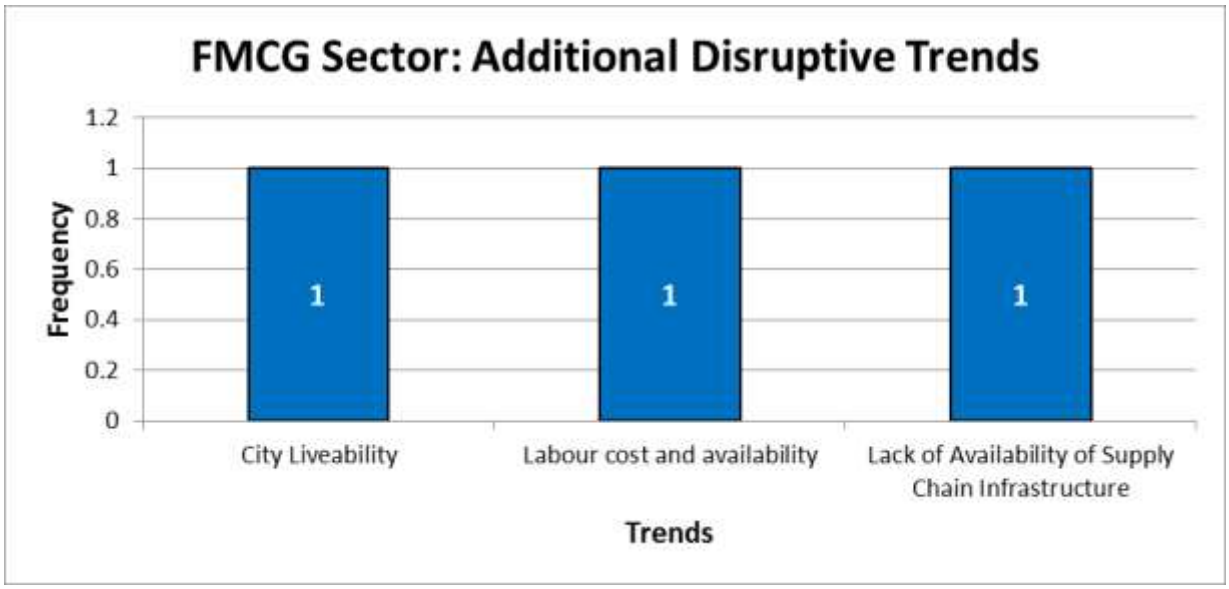

Figure 17: Frequency of additional disruptive trends for FMCG sector

8.5.1 City Liveability

A major area of concern for the logistics operators working in the FMCG sector is the stricter legislation to reduce the carbon foot print of vehicles operating in urban environments (BP, 2014; KPMG, 2015).

"It is big piece that is now being talked about a lot. I think this whole discussion about diesel and quality of air (e.g. pollution and smog) is important. I can see a situation in

the future where suddenly London and other big city councils literally start to ban diesel vehicles. This is going to really disrupt the entire supply chain"

Respondent 4

8.5.2 Labour Cost and Availability

Increasing labour related cost and decreasing availability of highly skilled labour will be among the primary drivers of automation in FMCG supply chains (Burgess, 2016).

"Labour availability and cost is ranked higher because the company is so fixated on manual supply chain operation through different tiers. Actually at the moment, a lot of supply chain investment is going in a lot of practical initiatives that is related to the underlying cost of labour. For example: a) buying a new parcel sorter; b) putting in mezzanines to be able get a more dense pick area where people walk less distance; and c) upgrading of warehouse management systems which make the processes more productive."

Respondent 4

8.5.3 Lack of Supply Chain Infrastructure

Lack of appropriate supply chain infrastructure is expected to motivate enhanced investments regarding the supply chain infrastructure and capital/asset of firms operating in the FMCG sector (BNP Paribas, 2009; 2013; Sathya and Nandagopal, 2016).

"Lack of available supply chain infrastructure like for example, for distribution centres (warehousing) and for distribution itself. The UK just does not have enough available developable land near to where it needs to be i.e. west order, where hearts of career hubs are"

Respondent 4

8.6 Key Takeaways for FMCG Sector

- Omni channel is changing the way FMCG supply chains need to think and work.

- Manufacturing technology is expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the FMCG sector.
- Communication with customers, return policies, and availability of service need to be consistent across channels.
- Much capital investment in the future is focused on the supply chains – specifically in information systems [IS] to support Omni channel.
- Customer proximity is expected to have an important influence on supply chain infrastructure and capital/asset investments decisions (e.g. purposeful distribution centres) of firms operating in the FMCG sector.
- Enterprise Resource Planning (ERP) and transportation management systems (TMS) continue to eliminate waste and increase efficiencies of supply chain networks.
- Big data has revolutionised the understanding of buyer behaviour and product life cycles.
- City councils start to ban certain (diesel) vehicles due to air quality regulations which is going to disrupt the entire supply chain.
- Industry tends to be dependent on manual labour in the supply chain
- Availability of labour in the right place is challenging.
- Investments into improvements (warehouses, equipment, infrastructure) in order to become less dependent on labour and increase efficiency.
- Currently there is lack of availability of Supply Chain infrastructure to meet the future requirements of FMCG sector.
- Sustainability was considered to have a comparatively lower potential to disrupt supply chains operating in the FMCG sector.
- Lack of appropriate supply chain infrastructure is expected to motivate enhanced investments regarding the supply chain infrastructure and capital/asset of firms operating in the FMCG sector.

9 Logistics Sector

9.1 Teaser Statement for Logistics Sector

The growing emphasis on the role of Omni channel will make a significant portion of the current physical retail space redundant and logistics companies are planning to re-locate their operations closer to their customers in order to reduce response time and to increase the productivity of their operations.

9.2 Key Shifts in Supply Chain Dynamics

The key shifts in logistics sector related supply chain dynamics are as follows:

1) Information Systems: Investment in information systems are likely to have a major impact on how to enhance operational productivity
2) Manufacturing Technology: Brexit is expected to trigger a shortfall of high skilled labour forcing investments in automation.
3) Omni Channel: Brick and mortar shops are more likely to be designed to handle less volume and will be located closer to the customer.
4) Sustainability: Agile operations will be required to manage demand while using environment friendly technology
5) Customer Proximity: Logistics operations are likely to be re-located closer to customers in order to reduce response time.

9.3 Trend Radar for Logistics Sector

The trend radar for the logistics sector is presented in Figure 18. This trend radar indicates that Omni channel will continue to be the most important disruptive trend for logistics sector in the next five years. This is followed by manufacturing sector, customer proximity and information systems respectively. It is worth pointing out that sustainability is still considered relevant in the next five years yet it is expected to have a low disruptive impact on the logistics and supply chain management practices in the logistics sector.

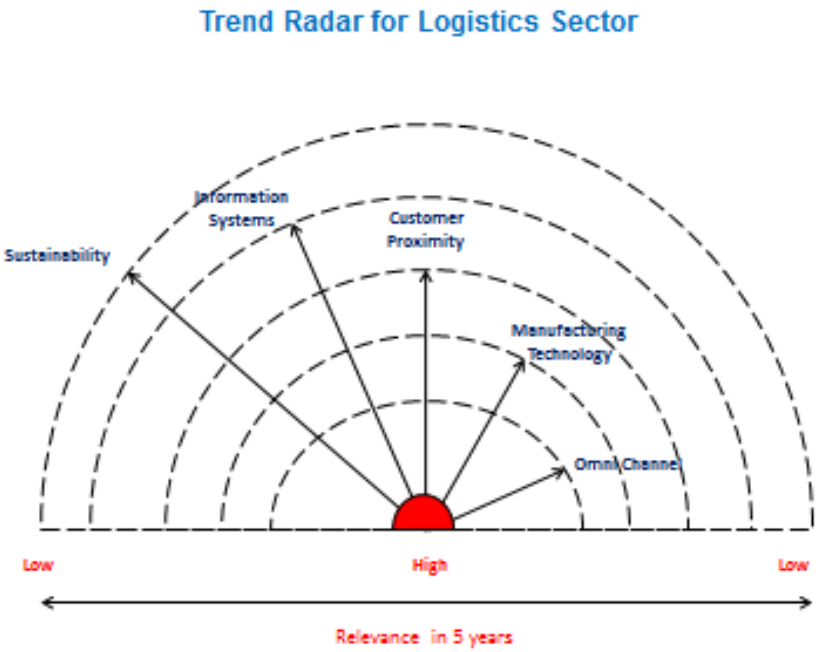

Figure 18: Trend radar for logsitics sector

9.4 Core Disruptive Trends

From the perspective of the logistics sector, the core disruptive trends are ranked as follows (See Figure 19):

- Omni Channel
- Manufacturing Technology
- Customer Proximity
- Information Systems
- Sustainability

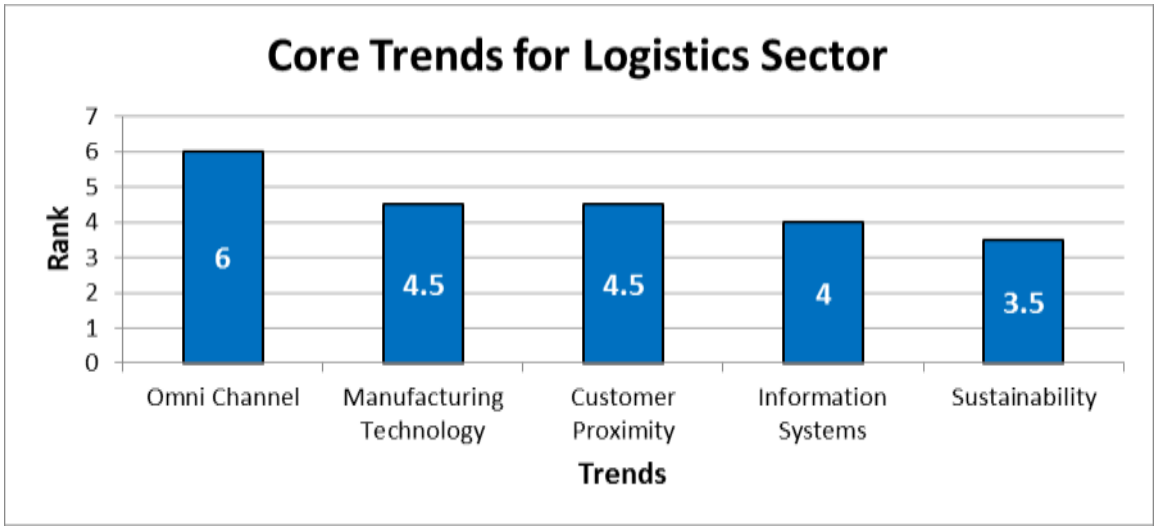

Figure 19: Ranking of core disruptive trends for logistics sector

9.4.1 Omni channel

The growing emphasis on the role of Omni channel will make a significant portion of the current physical retail space redundant. Brick and mortar shops will be designed to handle less volume and will be located closer to the customer (Kumar, 2016).

"Because this is transforming the retail sector in which we are operating. This is the single biggest factor that is affecting the supply chains of retailers (which are our customers). There are 30% excess retails stores right now. So people don't know what they are going to do with this huge extra capacity. Traditional retailers have this far more physical capacity than is actually required to achieve the sales. It's just figuring out a way to get rid of the excess property. There is going to be polarisation. I presume the fewer attractive/convenient locations that will continue to be used by

retailers. On the other hand, in the UK the retailers are going to figure out ways on how to get out (maybe by converting shops into houses)"

Respondent 5

This evolution towards Omni channel provides an opportunity for the logistics providers to widen the range of their service offering to supply chain partners (DHL, 2015; Ivanov et al., 2016).

"[Omni channel is] a core growth area for the business. Logistics providers need to distinguish between standard FMCG and online retail and respond accordingly"

Respondent 3

9.4.2 Manufacturing technology

Logistics companies are looking for opportunities to convert their fixed costs into variable costs by investing in technology thereby enhancing the productivity of their operations (DHL, 2014b; Dang and Nguyen, 2016).

"This is important because it is directly related to labour cost. For example, if the distribution cost (considered as part of fixed costs) is going to increase by 50% then you are going to have to find areas where fixed costs can be cut. Automation and robotics may have a role to play to convert the fixed costs to variable costs"

Respondent 5

Technological advances are expected to have a major influence on the supply chain infrastructure and capital/asset investments decisions of firms operating in the logistics sector (Geerling et al., 2011; Nabarro (2016).

"Because companies are trying to incorporate automation and robotics to minimise the dependence on manual labour, there will a huge attempt to reduce the fixed costs. So the retailers will be aiming to take out more fixed costs and put them in the variable level. This is going to play out in a number of different ways. For example if you look at the UK core 4-5 retailing food groups, their margins have collapsed from 5% to just 1.2% in the past 5 years. And as logistics is the 2nd or 3rd highest fixed cost contributor, they have no option but to get rid of the fixed costs. This is probably true for M&S and NEXT as well"

Respondent 5

9.4.3 Customer proximity

Logistics companies are planning to re-locate their operations closer to their customers in order to reduce response time and to increase the productivity of their operations (Sobern et al., 2014).

"Proximity to manufacturing facilities is a big cost factor and can facilitate an increase in productivity for logistics providers. Proximity to manufacturers is core for the company."

Respondent 3

Customer proximity is expected to have a major impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the logistics sector (Essers and Vaneker, 2014).

"Most core investments are around [re-locating] property closer to our customers – biggest investment for the business, e.g. £35 million in 2016"

Respondent 3

9.4.4 Information systems

Information Systems are expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the logistics sector (DHL 2013; Zhen et al., 2013).

"Along with manufacturing technology, investments in information systems have a significant impact on logistics sector. The "metal" always works; it is the software that does not work always."

Respondent 5

9.4.5 Sustainability

Logistics companies are focusing on locating their operations closer to their customers in order to provide a more environmental-friendly service offering (Lee et al., 2014; Lin et al., 2016).

"There are direct relationships between economic and environmental benefits. Reduction of miles driven reduces also environmental impacts and benefits the bottom line of logistics providers"

Respondent 3

In future, logistics providers are planning to make their operations smaller and more agile which will enable them to manage demand in a sustainable manner (Lammgard 2012; Rudiger et al., 2016).

"Developing the network, i.e. driving synergies with other businesses is core in order to collaborate and provide competitive and sustainable solutions. This is further driven by the relatively small size of the business in comparison to other providers."

Respondent 3

Sustainability is a concern in transport and storage and may thus impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the logistics sector (Sheffi , 2012).

"The transport fleet is another big investment that relates directly to sustainability concern, e.g. truck engines, CO_2 emissions, lowest running costs, and high miles per gallon."

Respondent 3

Conversely, investments in environmental-friendly technologies were not considered high on the agenda list by other logistics companies (Hua, 2016).

"Logistics has a long history of avoiding spending money on environment friendly technology as this directly impacts P&L (profitability)"

Respondent 5

9.5 Additional Disruptive Trends

In addition, the following additional disruptive trends were also mentioned by the respondents:

- Labour shortage
- E-commerce impact

- Brexit implications
- UK policy

The frequency by which additional disruptive trends were mentioned by the respondents regarding the logistics sector is shown in Figure 20.

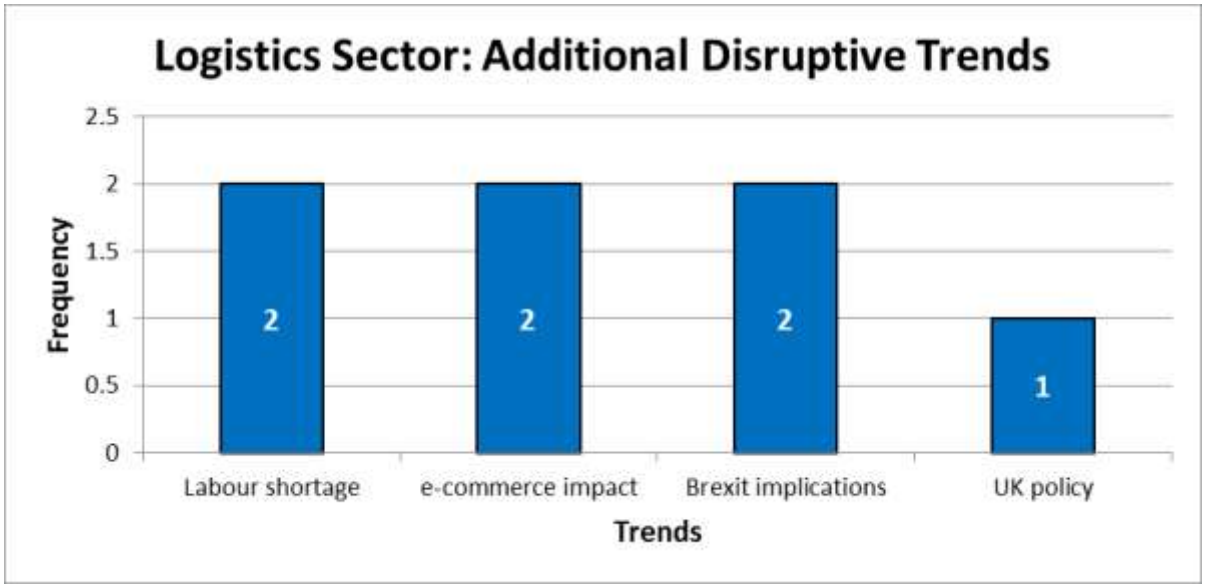

Figure 20: Frequency of additional disruptive trends for the logistics sector

9.5.1 Labour Shortage

Recruitment of highly skilled staff to meet the challenges of the future supply chains is foreseen as a major challenge by the logistics providers.

"Recruiting good people in the respective areas is challenging. A lot planning requirements and uncertainty at the moment and Brexit is a core concern for logistics customers."

Respondent 3

Logistics providers are already being challenged in their pursuit to engage highly skilled staff in their operations. This situation is expected to motivate logistics providers to reduce their reliance on manual labour by making investments in robotics and automation.

"Most logistics operators in UK rely on large quantities of cheap and well-trained EU labour. Because of Brexit there are already significant shortages of such labour. The supply of high quality Eastern European labour has already dried up. This will

increase the costs leaving the UK based companies with no choice but to invest in technology (automation, robotics). These companies will probably have to invest in staff facilities to make them more attractive for their staff"

Respondent 5

"This will increase the cost significantly. Labour shortage will force companies to invest in automation. Logistics has a huge fixed cost base and things don't change very quickly."

Respondent 5

9.5.2 E-commerce impact

A clear and significant impact on the profitability of logistics providers in the future will be the growing emphasis on e-commerce across most business sectors.

"This [e-commerce] is very important because it has a direct impact on the profitability of our company"

Respondent 5

The uncertainty faced by businesses in UK is expected to have a significant impact on the way logistics providers operate in the future.

"Many uncertainties in the market, e.g. (US) elections, trade agreements that may or may not happen/come into effect, new sourcing locations, new global players, shifting of global market powers [will have a major impact on e-commerce]"

Respondent 3

9.5.3 Brexit Implications

Uncertainty surrounding Brexit is a major source of concern for the logistics providers. However, this is also seen as an opportunity to widen their service offering.

"Could be some opportunities from Brexit but worried about economic downturn. Main customers are well positioned and resilient to the likely effects. Opportunities could be related to increased focus on export potentially and protection of the UK market. Bonded warehouses could be impacted by tariffs and regulations."

Respondent 3

It is important for both the government and the industry to work together to meet the potential challenges posed by Brexit for the UK industry.

"Foreign exchange, boarder and customs, uncertainty in investment are factors contributing towards uncertainty related to Brexit."

Respondent 8

"Shortage of labour particularly post Brexit will be a very significant trend in the next five years"

Respondent 5

9.5.4 UK Policy

Lack of a centralised policy is considered a major hurdle in establishing an integrated response that synchronises the industry initiatives with the government policy.

"[There is a] lack of centralised strategy for infrastructure on transportation – Manchester do one thing, London do the other. Hub and spoke vs restricted hours etc. [that has an] impact on last mile. We have a Policy Committee that links our organisation members with the Government"

Respondent 8

"Investments are required to provide appropriate means: a) having distribution facilities that are designed to handle e-commerce activities; and b) having the right kind of facilities at the right location."

Respondent 5

9.6 Key Takeaways for Logistics Sector

- Omni channel is the biggest factor that is affecting the supply chains of retailers, i.e. logistics customers.
- There are 30% excess retails stores right now.
- Manufacturing technology is expected to have a major influence on the supply chain infrastructure and capital/asset investments decisions of firms operating in the logistics sector.
- Automation and robotics may convert fixed costs to variable costs.
- Information Systems are expected to have a significant impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the logistics sector.
- Proximity to manufacturing facilities is a big cost factor and can facilitate an increase in productivity.
- Customer proximity is expected to have a major impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector. Reduction of miles driven reduces environmental impacts and benefits the bottom line.
- Sustainability is expected to have a divided opinion about its potential impact on the supply chain infrastructure and capital/asset investments decisions of firms operating in the retail sector.
- Driving synergies with other businesses is core in order to collaborate and provide competitive and sustainable solutions.
- Most UK logistics operators rely on large quantities of cheap and well-trained EU labour. Recruiting good people in the respective areas is challenging.
- There are many uncertainties in the market for e-commerce, e.g. trade agreements, new sourcing/selling locations, new global players.
- Brexit may lead to significant shortages of such labour. Increases in costs will force UK based companies to invest in automation and robotics.
- Bonded warehouses could be impacted by tariffs and regulations.
- A centralised UK wide strategy for supply chain infrastructure is lacking.

10 Electrical Goods Manufacturing

10.1 Teaser Statement for Electrical Good Manufacturing

There is a shortage of road infrastructure and intermodal connections related to Electrical Goods Manufacturing.

10.2 Key Shifts in Supply Chain Dynamics

The key shifts in Electrical goods manufacturing related supply chain dynamics are as follows (see trend radar below for remaining trends):

1) Commercial Property Shortage: Future expansion plans of Electrical goods manufacturing are expected to be hit hard by the acute shortage of commercial property and related supply chain infrastructure.
2) Sustainability: The economic impact of triple bottom line is likely to trigger investments in sustainability initiatives.

10.3 Trend Radar for Electrical Goods Manufacturing

The trend radar for electrical goods manufacturing is provided in Figure 21. Contrary to the rest of the sectors, this trend radar indicates that sustainability will be the most important disruptive trend for electrical goods manufacturing in the next five years. This is followed by Omni Channel, customer proximity and information systems respectively. It is worth mentioning here that although manufacturing technology is still considered relevant in the next five years yet it is expected to have a low disruptive impact on the logistics and supply chain management practices in the context of electrical goods manufacturing.

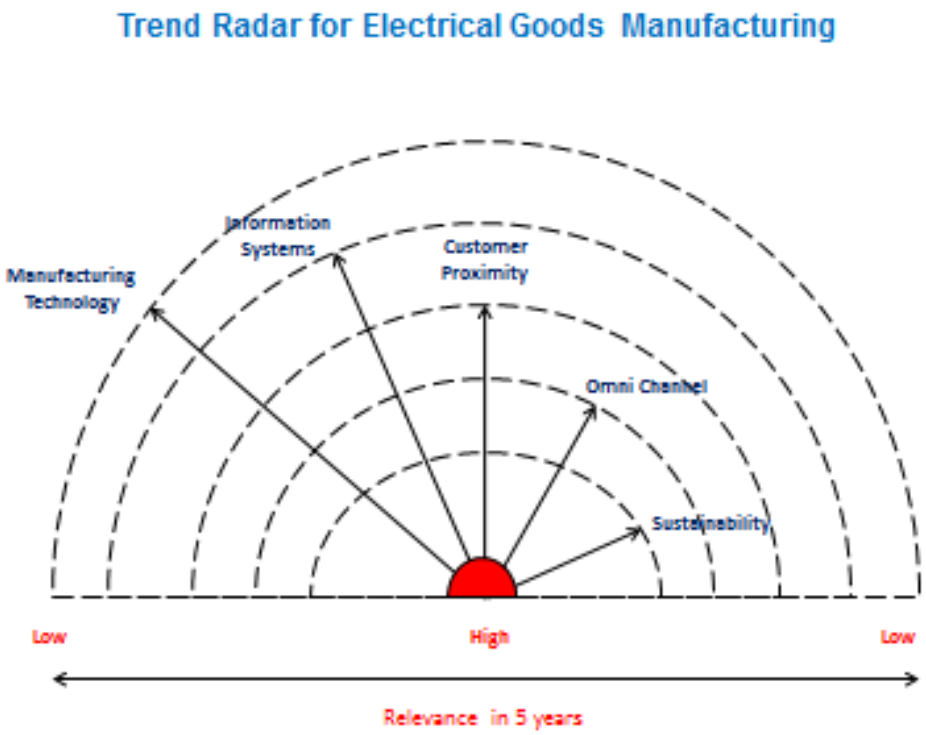

Figure 21: Trend radar for electrical goods manufacturing

10.4 Core Disruptive Trends

From the perspective of the Electrical Goods Manufacturing, the core disruptive trends are ranked as follows (See Figure 22):

1) Sustainability
2) Omni Channel
3) Customer Proximity
4) Information Systems
5) Manufacturing Technology

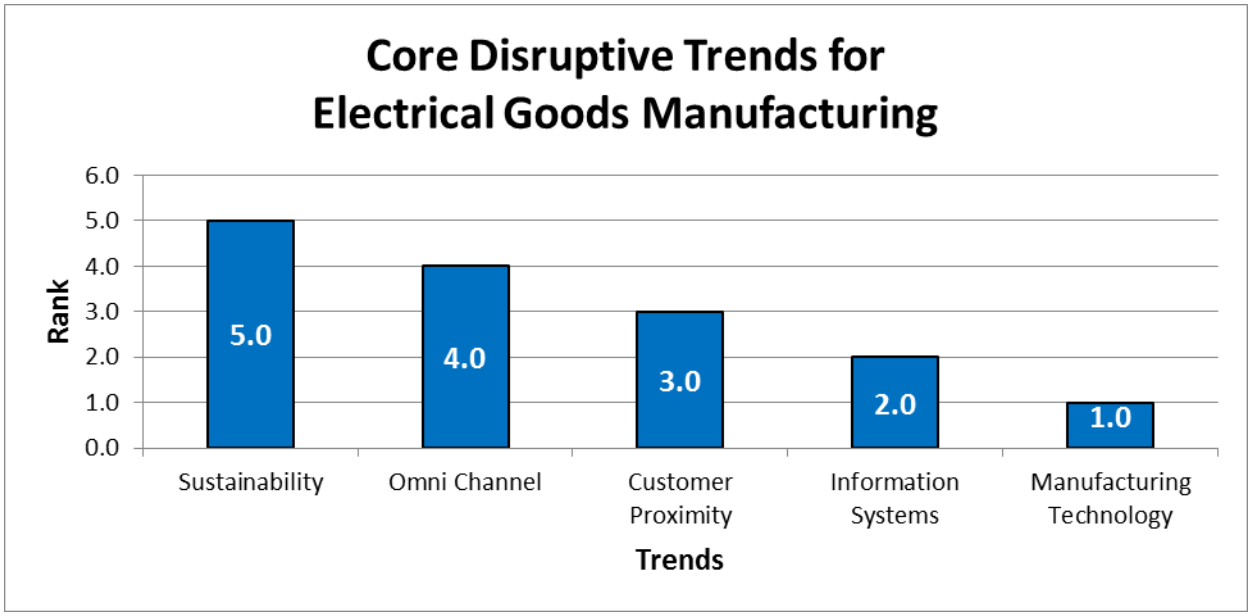

Figure 22: Ranking of core disruptive trends for Electrical Goods Manufacturing

10.4.1 Sustainability

The emphasis on sustainability is primarily driven by the economic aspect of the triple bottom line (Fang et al., 2011; Giret et al., 2015).

"Not so much environmental but rather meeting the requirements of the big retailers who are mainly focussed on economic aspects."

Respondent 2

10.5 Additional Disruptive Trends

In addition, the following additional disruptive trends were also mentioned by the respondents:

- Road Infrastructure & Intermodal connections
- Warehouse Cost

The frequency by which additional disruptive trends were mentioned by the respondents for Electrical Goods Manufacturing is shown in Figure 23.

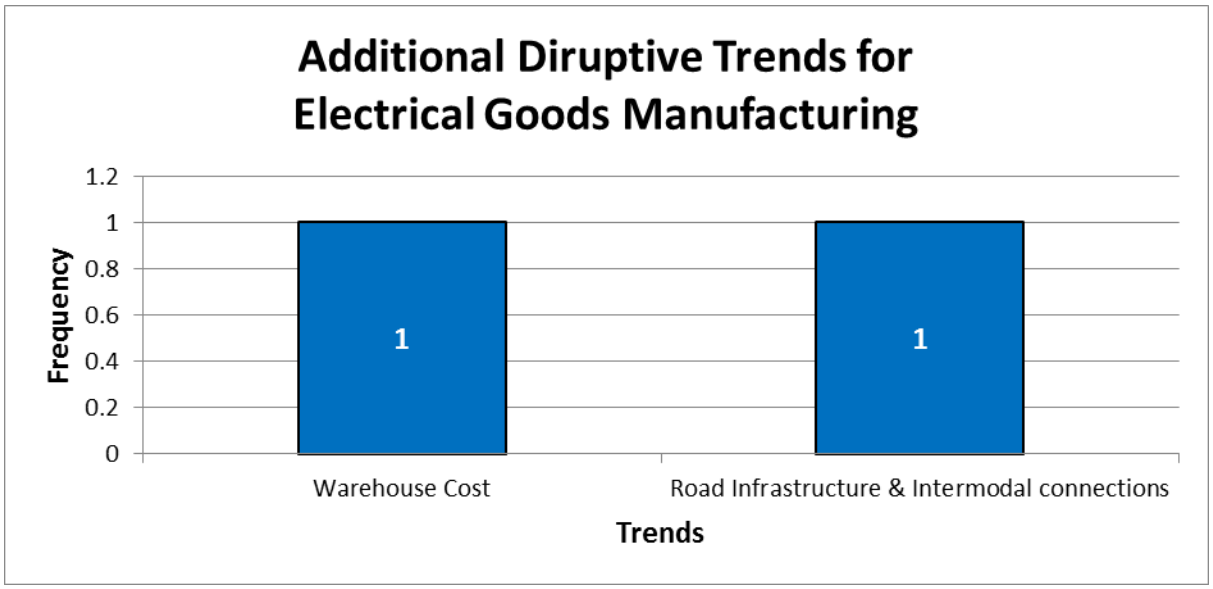

Figure 23: Frequency of additional disruptive trends for Electrical Goods Manufacturing

10.5.1 Road infrastructure and intermodal connections

There is a shortage of road infrastructure and intermodal connections related to Electrical Goods Manufacturing. This has a direct impact on the operating costs, efficiency and flexibility of supply chains (Kabe et al., 2010; KPMG, 2016b).

"Direct access from rail to road and vice versa is not given at the moment which negatively impacts costs, efficiency, and flexibility. Intermodal connections are difficult to facilitate. Often additional transport is required which causes costs and time delays. This runs directly against the demands of customers for flexibility, cost efficiency, and speed to market."

Respondent 2

10.5.2 Warehouse Costs

There is a shortage of availability of commercial property/land in UK. Consequently, this shortage significantly increases the cost of developing distribution hubs and warehouses (Wang et al., 2013).

"Commercial property/land is not released by the government. Land is very expensive (£1.0 million per acre) and UK is primarily focussed on distribution which makes warehousing a core concern overall. Warehousing costs are very high for logistics operators in the UK due to the unavailability of space – constrained by the government. At the same time this is an unavoidable cost for companies especially since the UK is primarily focussed on distribution. Warehousing accounts for 10% of costs on logistics currently and continues to be a major investment factor."

Respondent 2

10.6 Key Takeaways for Electrical Goods Manufacturing.

- There is an opportunity to develop road infrastructure and intermodal connections to decrease the operating costs and to enhance the efficiency and flexibility of supply chains related to Electrical Goods Manufacturing.
- There is a shortage of commercial property/land in the UK which is major source of hindrance in future development and expansion plans.
- Warehousing adds a significant portion of the costs on logistics operations and currently continues to be a major investment factor.

11 Conclusions

Information Systems: Investments in information systems to support exchange of credible, auditable, and robust real time data between the supply chain partners will continue to play a decisive role across all sectors (Bechtsis et al., 2017; Vendrell-Herrero et al., 2017). The goal of these investments is both tactical as well as strategic including: 1) enhancement of productivity; 2) increase in delivery speed; and 3) improvement in quality of overall decision making.

Manufacturing Technology: The importance of manufacturing technology as a major disruptive factor is recognised by both manufacturers and service providers across all sectors (Dang and Nguyen, 2016; Lim and Jones, 2017). However, high initial investments required upfront are a significant obstacle in maximising he benefits of technological advancement in the supply chains of the future.

Omni Channel: Omni Channel is likely to continue to have a major impact particularly on the retail sector (Hubner et al., (2016a; 2016b; Sathya and Nandagopal, 2016). The range of options available to the customers will expedite the transition from mass customisation to mass personalisation in the next 5 years. Firms across all sectors will be challenged on how to meet their cost efficiency targets without compromising the shopping experience of the customer.

Sustainability: Contrary to exiting research (Bechtsis et al., 2017), sustainability is not considered to act as a significant disruptive factor in the next 5 years. This theme is common through all the sectors. The general consensus is that firms are already doing enough on the sustainability front to meet/exceed the social, environmental, financial and legal requirements.

Customer Proximity: Supply Chains across all sectors are going to be challenged in the next 5 years to meet the ever increasing convenience driven demands of customer ((Kumar (2016) ; Lim et al., 2017). However, the future expansion plans across all sectors face a major hurdle due to lack of purposeful supply chain infrastructure that is geared to handle the pressure to reduce the response time (SMMT, 2015).

BREXIT: The uncertainty surrounding the impact of BREXIT is a major cause of concerns for all firms irrespective of their sector (PWC 2016). Consequently, the two main challenges that are likely to redefine the supply chains in the next five years include: a) shortage of high skilled labour; and b) restriction in free movement of goods across the UK borders. Both of these challenges are expected to increase the cost of “doing business as usual”. First, due to impending labour shortage, firms are left with no choice but to reduce their reliance on manual operations by shifting towards automation. However, high upfront investment is a major challenge here. Second, restricted movement of goods is likely to force the firms to re-arrange their supply chain architecture, for example: re-location of warehouses and manufacturing facilities and/or developing new supply chain partners (SMMT, 2015; PWC 2016).

12 Appendix A: Research Process

The details of the research process followed for this report is outlined in this section. The process consisted mainly of a development phase in order to establish a solid theoretical background for the empirical component of the study and develop research instruments like questionnaires. During the empirical phase insights from domain experts were gathered via semi-structured interviews and questionnaires. These insights were analysed subsequently by a team of researchers.

A flow chart of the full research process is presented in Figure 24.

12.1 Development Phase

First, the research objectives for this work were clearly defined. Next, a structured review of the existing literature was conducted which included academic journal articles, practitioner magazines and company/consulting reports. The reviewed literature enabled the identification of five core disruptive trends that could potentially disrupt logistics and supply chain practices across sectors in the future. Informed by both theory and practice, a data collection instrument was developed to gather the empirical data for this work. As part of the pilot study, interviews were conducted with representatives from both academia and practice to check the reliability of the data collection instrument. Based on the results of the pilot study, the data collection instrument was further refined.

12.2 Empirical Field Work Phase

As the data instrument was being finalised, the companies identified for this exploratory work were contacted to establish an interview schedule. After finalising the data collection instrument including the interview protocol, the companies short-listed were contacted prior to the interview to gather the consent of the individual respondents. Next, 13 telephone interviews were conducted that formed the basis of the empirical data gathering process for this exploratory research. The data collection process including the pilot study was completed between 15th November 2016 and 2nd March 2017.

12.3 Analysis Phase

The data collected for this work was first analysed for each individual sector including: a) retail; b) automotive; c) pharmaceutical; d) FMCG; e) logistics and d) electrical goods manufacturing. Based on this analysis, the core disruptive factors were ranked separately for each sector. Next, based on their frequency [by which the respondents mentioned them], additional disruptive factors were also analysed separately for each sector; these additional factors were suggested by the interviewees. Supporting evidence in the form of anonymised direct quotes from the interviews was added for further analytical clarity. In addition, overall ranking of trends was presented across all sectors in order to compare and contrast their potential disruptive impact on the: a) supply chain practices; b) business strategy; c) Supply Chain infrastructure and capital asset decisions; and b) role as a manager.

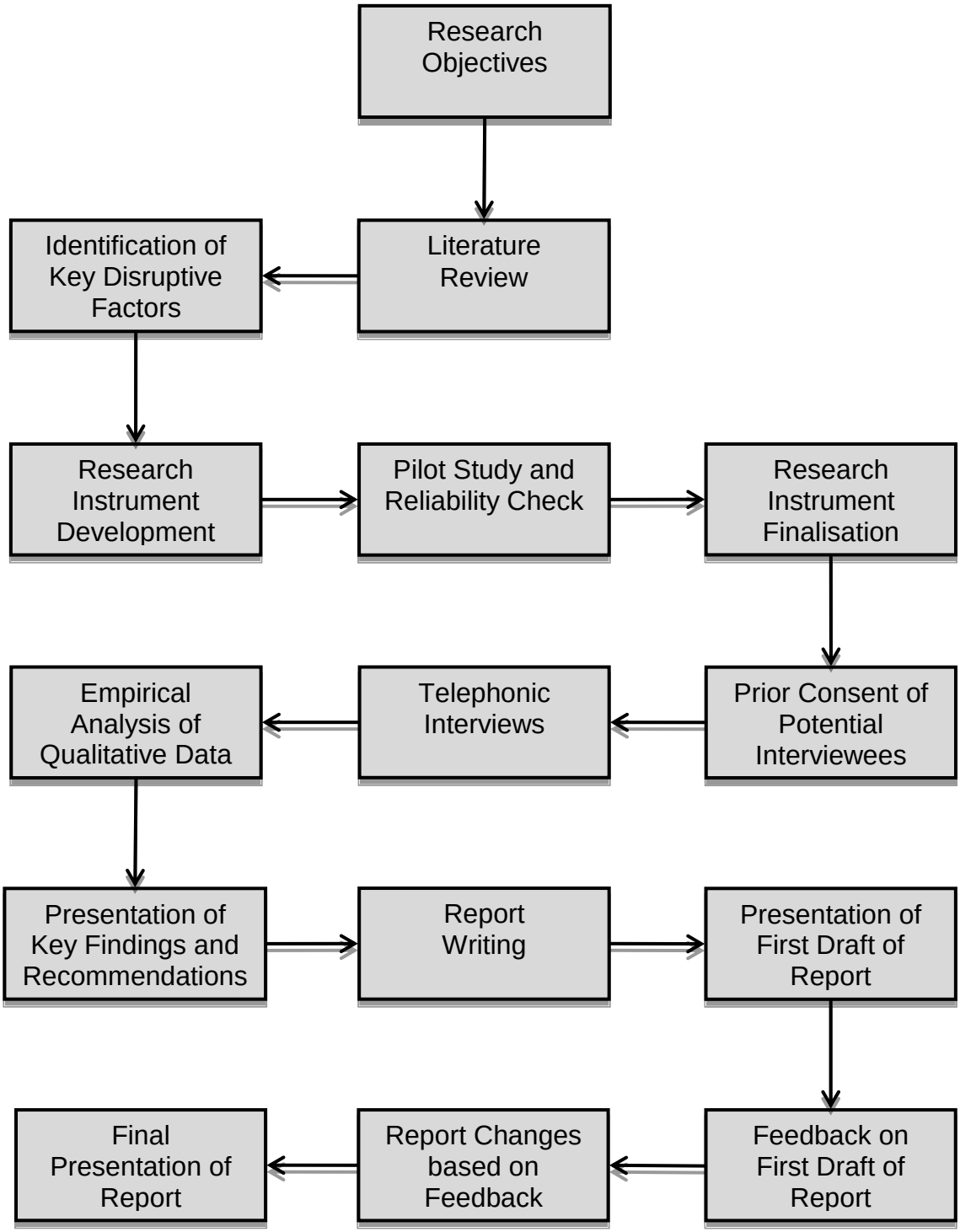

Figure 24: Flow chart of the research process

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