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Factors Influencing Digital Customer Experience Transformation in the Retail Industry

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Abstract
Retailers are losing ground to fellow competitors as they fail to meet customer expectations. With customers spread across multiple markets, locations, and platforms, having the right product at the right time has never been more important. This study investigates the technological, organisational, and environmental (TOE) factors that influence digital supply chain. The study adopted systematic literature review to explore factors that influence digital customer experience transformation in the retail industry. The systematic literature review used content analysis to assess 80 published articles on digital customer experience from 2014 - 2019. The study adopted the TOE framework as a lens to explore factors that influence digital customer experience transformation in the retail industry. The results indicated that all three TOE framework factors influence digital customer experience transformation in the retail industry. The study results suggest that retailers must consider the possible impact of the technology based organisational and environmental factors. The study contribute to the body of knowledge to the factors that influence digital customer experience transformation in the retail industry.

Keywords: digital supply chain, customer experience, retail industry, supply chain, customer satisfaction

Introduction

Machines are taking over! The fourth industrial revolution (industry 4.0) is upon us, as seen below and this has disrupted the industry as a whole. Historically the evolution of the industry has involved optimizing processes and a shift in jobs. However, industry 4.0 brings about the advent of the Internet of Things, robotics, and complex big data analytics (Alicke, Rachor, & Seyfert, 2016). These 21st-century inventions have the capabilities to improve performance by using sensors, automation, and advanced analytics. However, the feasibility and sustainability of these digital technologies are not always clear.

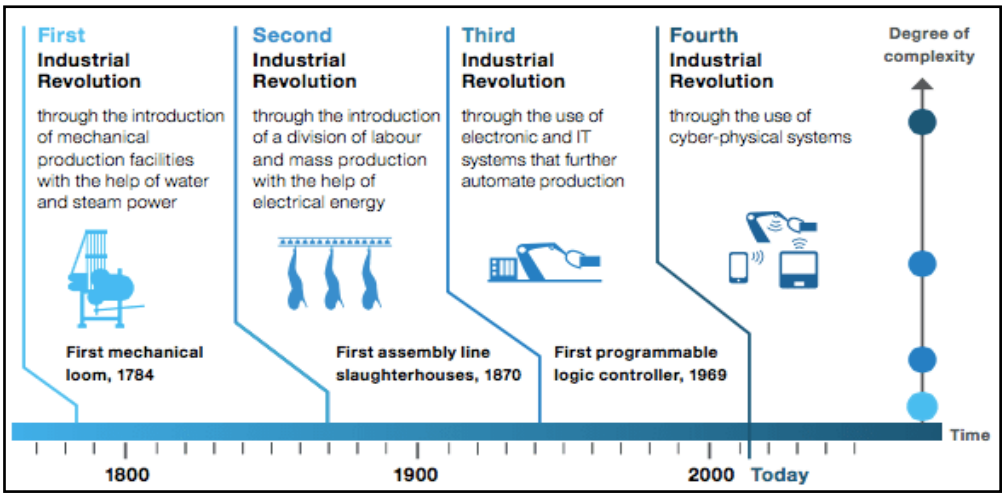

Figure 1: The journey of the Industrial Revolution, adopted from Morrissey (2018)

The 4th industrial revolution (Figure 1) sees technology changing the way we live and work (Moavenzadeh, 2015). The changes see the growth of digital ecosystems, the transformation of industry operations, and the transformation of the supply chain. Traditionally supply chain is seen as the moving of products through the entire value chain, from sourcing to getting the final product to the customers (Ivanov, 2018). Ensuring that raw materials, transformation, and delivery of the product flow through the different channels (Esfahbodi, Zhang & Watson, 2016). It has since evolved and digital technology can support the supply chain. Digital supply chain boasts the potential to improve customer experience. It hinges on a worldwide makeover of the process with the inception of digitalization and the Internet (Tjahjono, Esplugues, Ares, & Pelaez, 2017). This is a welcome transformation as currently, there is a failure to meet the retailers' need for a seamless process and visibility, which negatively influences the customer experience.

Customer experience is the inner and personal response customers have when they interact with the business (Schwager & Meyer 2017; Mishra, et al. 2017). Retailers value this, as they must provide goods and services to their consumers at a given time and place (Chavez, Yu, Jacobs, Feng, & Mengying, 2017). Otherwise, they risk losing their customers to competitors and bad publicity. Most retailers fail to provide a smooth and unified customer experience in the last mile of the process (Wright, 2018). This speaks to the supply chain, which digital technology has the capabilities to optimize.

The traditional retail supply chain isolates processes and works in a silo-based environment which often makes it inefficient (Price Water House Cooper, 2016). This leads to issues like, orders delivered late, loss of sales, customer dissatisfaction, and no transparency, which negatively influences the customer experience. Inventions in quicker delivery are a necessary investment, given that consumers have higher expectations, and satisfying them will increase market share (Wright, 2018). Inefficient supply chains cause delays in deployment and lengthy lead times will affect the delivery time. Forbes conducted a survey that identified that 86% of customers would pay more for an improved customer experience, yet 1% of state suppliers already meet

their needs (Crandell, 2019). The need for a better customer experience is apparent. Poor warehouse management systems begin this knock-on effect, which affects final delivery times. The visibility of orders as they move through the supply chain is of paramount importance as retailers can plan around that information and make contingency plans if need be (Nash, 2014). With the advent of digital technology, retailers can enhance the customer's experience, moving from inefficiency and sub-standard services that drive away customers.

Poor customer experience will cause any business to lose customers. With a wide variety of alternatives, organisations must consider using digitalizing their supply chain. While such solutions are available, they are not always viable. There are technological, organisational and environmental factors to consider. Although a solution may seem imminent, these factors taken into account. These factors often hinder the implementation of the digital supply chain. Careful consideration made as retailers consider the implications of the digital supply chain. Hence, the research objective is to explore factors that influence the adoption of a digital customer experience transformation in the retail industry. What factors influence the adoption of a digital supply chain to improve customer experience in the retail industry?

Literature Review

Industry 4.0 is said to have originated in Germany to optimise processes, it is also known as the Internet of things or smart industry (Tjahjono, Espluguesb, Arec, Pelaez and Pelaez, 2017; Bukova, Brumercikova, Cerna & Drozdiel, 2018; Kovacs, 2018). This 21st-century invention has brought with it an innovation that has improved business processes. Its disruptive nature forces firms to rethink the design of their supply chain (Alicke et al., 2016). This is to keep up with emerging technologies and trends. These are what make organisations stand out and meet the ever-increasing demands of the 21st-century customer. Industry 4.0 brings with it numerous benefits that make businesses more successful (Cheng & Foley, 2018; Naveed, Watanabe, & Neittaanmäki, 2018; Yesner, 2017). The major benefit being visibility throughout the whole supply chain. However, there is a dark side to it that Kovacs draws on in the article, "The dark corners of Industry 4.0" (Kovacs, 2018). This article touches on security issues and the implications of automation. Hence, while new technologies optimise existing processes, concerns related to security of the digital economy still exists.

Digital Economy

The strong interconnection of innovations is set to digitize the economy. A digital economy can be defined as an economy based on information technology (IT) and the internet (Vaidya, Ambad, & Bhosle, 2018). A report showed that transformation in industry and infrastructure are driving the digital economy as people adapt to this new way of life (Schneider Electric, 2019). The technological shift has driven a change to digital products and services (Naveed, Watanabe, & Neittaanmäki, 2018). This coupled with the abrupt progression of the Internet has activated the digital economy in a way that has disrupted businesses and daily activities (Watanabe, Tou, & Neittaanmäki, 2018). The digital economy is disrupting industry norms and its

implications go everywhere. The major focus is placed on transmitting the various social and economic activities by using the Internet-based domain which encompasses e-commerce, e-learning, and e-government (Berdykulova, Sailov, Kaliazhdarova, & Berdykulov, 2014). These factors touch on all functions within an organisation, from operations through to finance and the other departments, but for the sake of this study, the focus will be on digitalizing the supply chain.

The Digital Supply Chain

Traditionally, the supply chain is seen as moving through the entire value chain, from sourcing, all the way to getting the final product to the customers (Ivanov, 2018). The digital supply chain disrupts nearly all the areas of traditional processes. These disruptions bring about improved operational efficiencies, which allow the organisation better serve its clients. The digital supply chain brings transparency, efficiency, and innovation (Harrington, 2017; Agrawal & Narain, 2018; Wright, 2018). By being more transparent, gives customers visibility of their product, which currently is a basic demand from customers. It also helps them plan better. Furthermore, efficiency and innovation must be driven from within the organisation to reduce costs, wastage, improve quality, and ultimately better serve the end-user (Rodriguez & Da Cunha, 2018). Firms that effectively digitalize their supply chain digitalization see great benefits. Accenture, a pharmaceutical manufacturer who boasts over $10 billion in annual sales revenue, saw themselves save over $387 million in their production and supply processes by leveraging their end-to-end proficiencies utilizing a digital supply network (Moavenzadeh, 2015). This attests to the firm being able to have a superior product or service delivered and therefore the customer experience is seen as improved.

Customer experience

Customer experience is what sets businesses apart from their competitors. It can be further defined as incorporating each facet the firm offers, from the quality of customer care, promotion, wrapping, service features, ease of use, and reliability (Lemon and Verhoef, 2016). The journey that the consumer goes through must be pleasant enough for them to want to endure it again. In recent times, it is seen as a priority to create a positive customer experience (Lemon and Verhoef, 2016). This stems from the interconnectedness of today's customers where social media and the internet at large can make or break the business. Therefore, by optimizing the supply chain, the organisation has the means to provide superior service.

Inventions in faster and seamless delivery help retailers gain market share (Wright, 2018: 43). While from a marketing and individual customer perspective, socio factors are vital considerations (Ordenes, et al., 2014; Yakhlef, 2015; Bèzes, 2018). A 2017 study by Maklan, Antonetti, and Whitty, 2017) on the Royal Bank of Scotland came down to four essential aspects to better manage customer experience. These being customer experience itself, cost, revenue, and process improvement. These elements are seen from varying points of view, yet have a massive bearing on measuring customer experience. This study considers these factors from a broader organisational perspective and the variables can therefore become even greater. While literature from

a supplier-retailer perspective in improving Cx is limited, Lemon and Verhoef, (2016); Cao, (2018); Wright, (2018), concur that shortening delivery times is a vital aspect of improving Cx for retailers. This is often the challenge for warehouse management systems used by retailers in the industry.

Related Studies

Technology has been seen to be tool retailers have used to improve their customer experience. The use of customer feedback saw Maklan, Antonetti, and Whitty,(2017) draws learnings from the bank of Scotland using customer feedback. While Rodriguez, Campdesuner, Vidal, and Vivar, (2017) used Big Data, and Cao, (2018) utilized e-commerce platforms to research fashion retailers. These studies drew on models that measured external customer satisfaction. This enabled them to optimize their processes thus improving their service delivery. While the study by Panigrahi, Kar, Fen, Hoe, and Wong (2018) focuses on the increased customer expectation, where retailers have been seen to explore cost reduction techniques to enrich customer experience and satisfaction. This study used a problem-driven content analysis methodology to reach its conclusion. Moreover, this study utilizes the TOE framework to explore the technological, organisational, and environmental factors, which affect the adoption of the digital supply chain in the pursuit of improving customer experience.

T.O.E Framework

The Technology-Organization-Environment (TOE) framework was originally developed by Tornatzky, Fleischer, and Chakrabarti in 1990 (Rahayu & Day, 2015). It is based on these three factors to assess the adoption of innovation. This model, although it was developed nearly 30 years ago, its dynamic nature and inclusion of new factor as time has gone is what makes it appropriate for this study. TOE is proven to be a powerful lens in understanding the technology adoption process (Cruz-Jesus, Pinheiro, and Oliveira, 2019). It has been used successfully by several authors in recent times including, Rahayu and Day, (2015); Tsou and Hsu, (2015); Aboelmaged and Hashem, (2018); Cruz-Jesus, Pinheiro, and Oliveira, (2019), showing its relevance. While it hosts numerous benefits, it is said to not consider individual factors that affect employees and also managers (Rahayu & Day, 2015). Therefore, to mitigate this, this study will also consider some individual factors within its exploration of the technological, organisational and environmental factors affecting the adoption of the digital supply chain to improve customer experience. Below is an overview of framework.

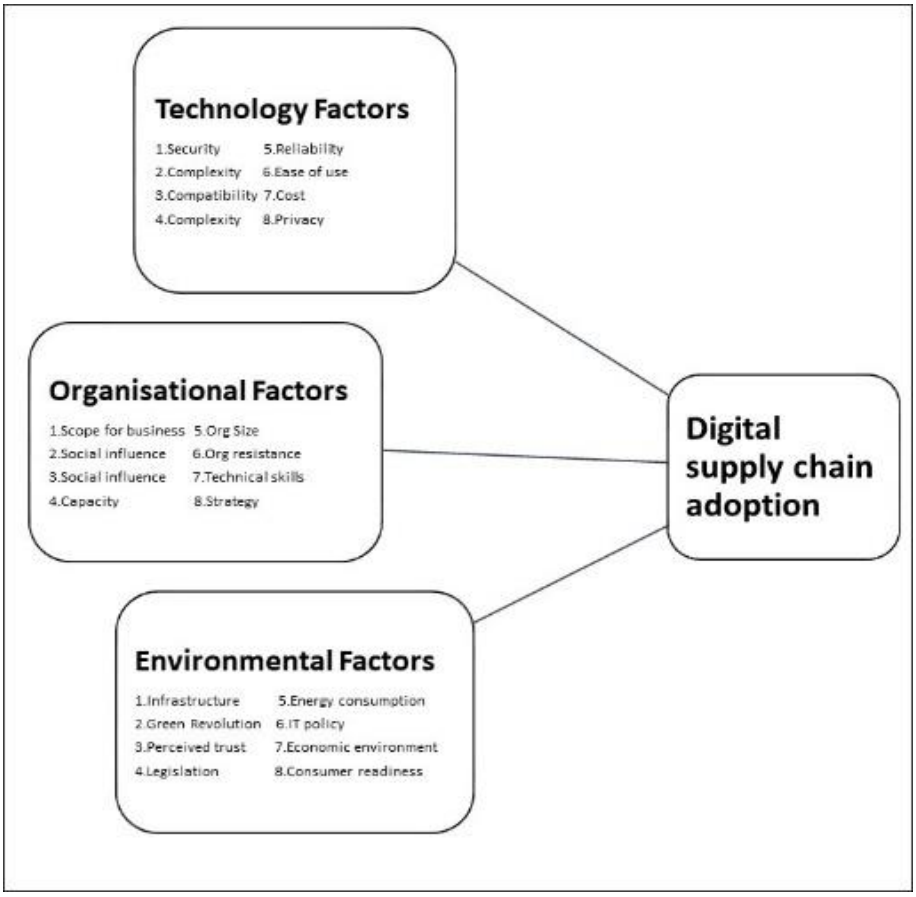

Figure 2: Adapted from(Gutierrez, Boukrami and Lumsden (2015)

Technological Factors

Several technological factors must be considered when adopting the technology. Security and privacy are major talking points in recent times as data is loaded on cloud servers. Subramanian and Abdulrahman, (2017) cite (Bose, Luo, and Liu 2015; Morsy, Grundy, and Müller 2015) who concur that the adoption of cloud servers pose a threat to the security of businesses data. Technologies like Radio-Frequency Identification (RFID), Smart Sensor Technology (SST), to mention a few, require specialist consultants and engineers to aid implementation (Abhari and Abhari, 2019). This sentiment is shared by Abhari and Abhari, (2019))who also weigh in on the availability of such skills, complexity hardware, and software costs, compatibility, ease of use, service quality and reliability, and the cross-technological function of digital solutions in developing countries. Finally, the cost factor is one that cannot be ignored, especially in developing countries which Agrawal and Narain, (2018) weigh in on. On an individual basis, the ability to use this technology could be limited as employees could see it as hugely complex or as a threat to their future.

Organizational Factors

Retailers have their dynamics to consider. These include organisational size, organisational resistance, norms, the organisations mission, social influence, and the scope for business (Cruz-Jesus, Pinheiro and Oliveira, 2019). For the adoption of technology, firstly the technical skills within the business are key (Larson & Chang, 2016). This goes hand in hand with the capacity and quality of their systems. Factors

to especially consider are, how user-friendly they are, availability, dependability, response time, and their adaptability (Hung-Joubert & Erdis, 2019). Other researchers focussed largely on the financial aspect of the business (, Esfahbod et al., 2016); Cao et al., 2017). Drawing on not breaking the bottom line as a priority. Most importantly, Cruz-Jesus, Pinheiro, and Oliveira, (2019) state that without the support of top management, no strategy will succeed.

Environmental Factors

The environment in which a retailer operates dictates most of its operations. Shifts in the business environment, have meant that to remain relevant, businesses must not only focus on what happens within their business but the market as a whole (Taherdoost and Brard, 2019). The factors to consider include the IT policy, energy consumption, the Green revolution, consumer readiness, and available infrastructure. A major talking point currently is adopting environmentally friendly processes (Hottenrott, Rexhäuser & Veugelers, 2016). Governments have also been seen to adopt such policies into their legislation which Woodard, (2016) and Sabolić, (2018) allude to in their articles.

Method

This study utilises the quantitative content analysis method. This method enriches research by identifying the occurrence of thematic or rhetorical patterns and allows for one to examine numerical data by statistical inference (Boettger and Palmer, 2010). The data for the research will be collected using a desk research technique which will see the use of existing literature, also known as secondary data. Data collection follows the below guide, ***Table 1***, by Siddaway (2014). The data collected will be analysed by the PSSP tool, which incorporates graphs and tables to establish relationships between variables. The data must be converted from qualitative to quantitative to make it more meaningful and quantifiable by the chosen statistics package.

Table 1: Data collection journey

No.	Stage	Application
1.	Scoping	Formulating the research question and reading up on the topic (Topic Discovery Assignment).
2.	Planning	Dendrogram and Mind mapping technique which was done in class helped come up with keywords.
3.	Identification	Utilizing Boolean technique to narrow down articles and also using a respectable database and advanced search function.
4.	Screening	Screened using the appearance of keywords in the title and/or abstract.
5.	Eligibility	Screen using date and align to subtopics, thus: Preliminary Literature Review Framework.

Unit of analysis

This is typically known as the unit of observation and also referred to as the what of the study (Babbie and Mouton, 2005). The recognised problem for this study is the poor customer experience encountered by retailers. The primary question strives to identify factors that influence the adoption of technology to improve customer experience. Therefore, the unit of analysis is customer experience.

Design

According to, Nodine, (1963), a systematic literature review classifies, assesses, and combines research evidence from separate studies based on a strict procedure and makes a valued source of evidence. This design is appropriate as it makes sure that relevant research has been looked at and that a true analysis of the original studies has been made. The study is focused on the stated topic, hence this design is best suited for it. The strengths include reduced bias, a holistic view obtained from previous studies, and results. While possible limitations could be the fact that it summarises only existing literature. Sources of error include selective interpretation of the article and misunderstanding the source. Overall, given the options and available time, a systematic literature review design was adopted.

Materials

T.O.E (Technology, Organisation, and Environmental) Model as previously discussed was used as the basis of systematic literature review. The framework set the basis of how the extraction of information from the literature will be done. These three factors are seen to influence the adoption of digital technology in a bid to improve the customer experience. The research will draw out dominant themes from the overarching TOE factors as seen below.

Table 2: TOE themes to be considered

	Technological	**Organisational**	**Environmental**
1.	Security	Scope for business	IT policy
2.	Reliability	Size	Energy consumption
3.	Complexity	Resistance	Green Revolution
4.	Ease of use	Organisational resistance	Consumer readiness
5.	Compatibility	Social influence	Infrastructure
6.	Cost	Technical skills	Economic environment
7.	Complexity	Capacity	Perceived trust
8.	Privacy	Strategy	Legislation

Procedure

Journal articles were sourced from Science Direct which is a platform on Elsevier. This was the chosen source as it provided peer-reviewed articles from recognised authors. The source is highly regarded in their field and provide peer-reviewed articles from top authors. This was done using the UWC database and inputting relevant keywords. This study utilized sampling criteria which served as a guideline in article selection. Table two, on the next page, depicts the criteria that were used:

Table 3: Inclusion and exclusion criteria

No.	Criteria	Inclusion Criteria	Exclusion Criteria
1.	Language used	English	Non-English
2.	Time frame	2014-2019	Pre-2014
3.	Relation to digital supply chain	Apparent link to digital supply chain	Poor link to digital supply chain
4.	Relation to chosen keywords in the article	The occurrence of selected keywords	No occurrence of selected keywords
5.	Type of study	Peer-reviewed journal articles	Opinions and blogs

Research Results

The study utilised articles published between 2014 and 2019. As seen in figure 3 below, the majority of articles, 31%, were published in 2018. It is noted that between 2017 and 2018, 69% of the articles selected were published then, hence the dominant themes being fairly new and relate to emerging technologies.

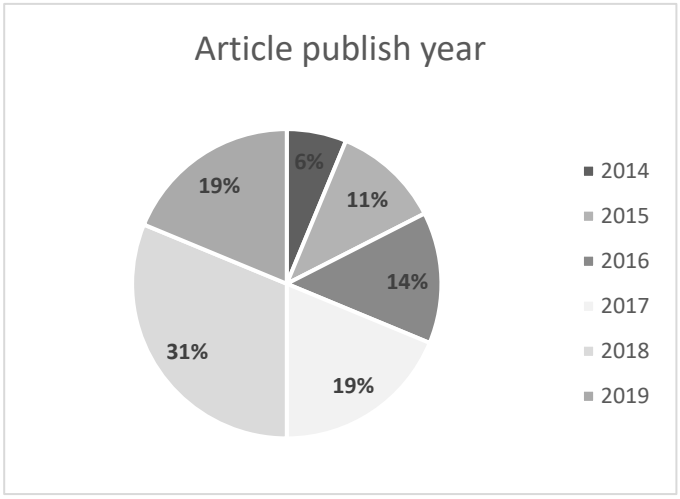

Figure 3: Articles by year of publication

Geographical Location

The articles used were published from five areas as depicted below in ***figure 4***. With Asia having the largest percentage of articles at 37% and closely followed by Europe at 34%. North America, Africa, and South America at 15%, 10%, and 4% respectively. It comes as no surprise as the search criteria largely focused on countries in developing areas.

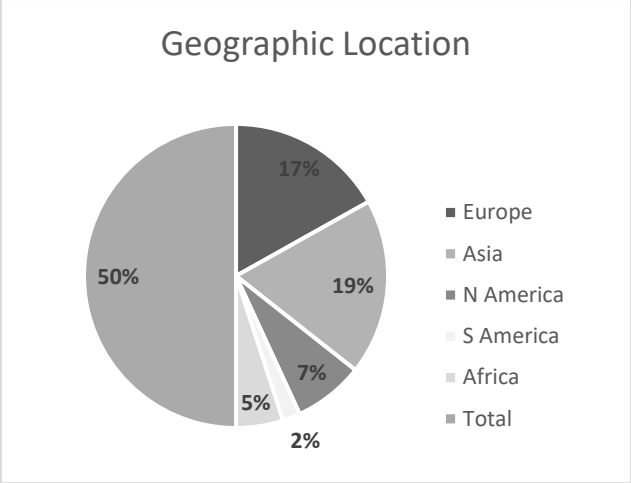

Figure 4: Articles by geographic location

Research Methods

Figure 5 illustrates the frequency of the research methods used in the selected articles. These articles were published between 2014 and 2019. Based on the results, qualitative studies are the majority at 40%, quantitative studies at 35%, and then mixed-method at 25%. The results point to qualitative studies as the most used method in exploring the TOE factors that influence the adoption of a digital supply chain to improve customer experience in the retail industry.

Figure 5: Articles by the method of research

Research Type

The below chart, ***Figure 6***, illustrates the frequency of research types used in the selected articles. The results point to systematic literature reviews as the most used research type in exploring the TOE factors that influence the adoption of a digital supply chain to improve customer experience in the retail industry. Systematic literature review stood out at 40%. It is then followed by a survey at 25%, case study at 16%, other types at 11%, and then questionnaires at 8%.

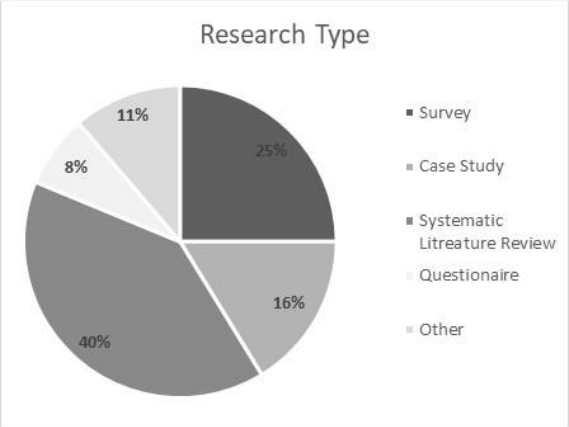

Figure 6: Articles by research type

TOE Factors

The three TOE factors each had eight themes identified. A literature review matrix was used to code the data. This involved reading articles and counting the occurrence of the theme in the chosen data set. This enabled the conversion of qualitative data to quantitative data.

Technology Factors

The factors that were explored were security, reliability, complexity, ease of use, compatibility, cost, complexity, and privacy. The presence of these eight words was searched for in the 80 research articles mentioned. Figure 7 depicts the results which show cost as the most prevalent theme at 81%, followed by complexity at 73%, and then privacy at 54%. Security and skills availability then followed at 51% and 52% respectively. While to a lesser degree, ease of use, feasibility, and compatibility were the least prevalent at 45%, 36%, and 26% respectively.

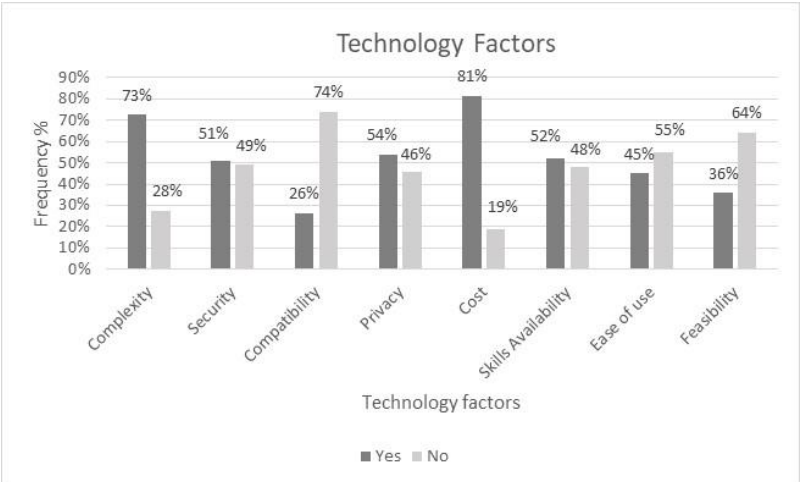

Figure 7: Frequency of Technology Factors

Organisational Factors

The organisational factors that were explored were scope for business, organisation size, organisational resistance, social influence, technical skills, capacity, social influence, and strategy. A search for the occurrence of these eight words was done in the 80 research articles mentioned. ***Figure 8*** below depicts the results which show

social influence with the highest frequency at 75%, strategy at 73%, and technical skills at 65%. Scope for business at 56% and top management support 53% are in the mid-section. While, organisation size, capacity and organisational resistance are the final three at 49%, 39%, and 33% respectively.

Figure 8: Frequency of Organisational factors

Environmental Factors

The environmental factors that were explored were IT policy, energy consumption, green revolution, consumer readiness, infrastructure, economic environment, perceived trust, and legislation. A search for the occurrence of these eight words was done in the 80 research articles mentioned. Figure 9 below depicts the results, which show the economic environment with the highest frequency at 72%, infrastructure at 58%, and perceived trust at 47%. Consumer readiness at 40% and legislation at 38% complete the top five. While, green revolution, energy consumption, and IT policy are the final three at 34%, 32%, and 31% respectively.

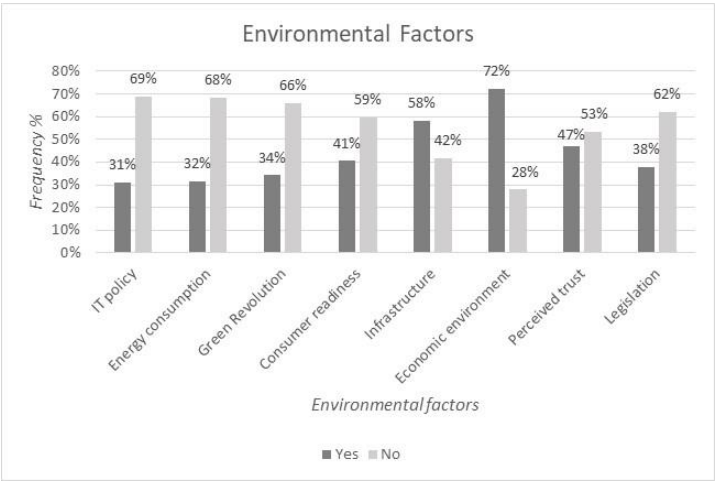

Figure 9: Frequency of Environmental Factors

Discussion

Results showed that there was an increase in research from 2014 to 2019 in the use of the digital supply chain in improving customer experience. There was an increase in articles published on the topic, at the time of data capture, 19% was at the halfway point of 2019. This comes as no surprise due to the rate of new findings and in light of the 4th Industrial revolution. The region with the highest percentage of articles published in Europe, closely followed by Asia and this is a matter of resources. Africa and South America rank very low due to this. The majority of the articles coded in the study utilised were qualitative. Lastly, the prevalence of systematic literature reviews as a research type gives a broader view as the findings of several researchers are investigating.

Retailers must consider technological factors when adopting a digital supply chain to improve customer experience. The results suggest that cost, complexity, and privacy are the most dominant technology themes. The initial expectation from the literature was for security and privacy to be the highest-ranking themes. However, cost and complexity surpassed them. Given that these two are fundamental themes and that developing countries were used as a selection criteria this was not entirely unexpected. Compatibility showed a high level of significance, given that majority of studies were based in developing countries, and this substantiates their inability to embrace a digital supply chain to improve customer experience. Hence the increase in research around this topic in recent times.

There are organisational factors retailers have to consider when adopting a digital supply chain to improve customer experience. The results from this study drew out social influence, organisational strategy, and a lack of technical skills as dominant organisational themes. The high demands, availability, and use of data have demanded that organisations better manage their customer and supplier engagement (Moorthy et al., 2015). This trend from the literature substantiates why social influence was the highest-ranking organisational theme. Technical skills and strategy within the organisation also leverage the technology hence they were the next two dominant themes.

Finally, there are also environmental factors retailers must consider when adopting a digital supply chain to improve customer experience. The economic environment and infrastructure were seen as the dominant themes in the results. This can be put down to the fact that the criteria of article selection, developing countries, was a determining factor. This theme along with four others had a greater frequency than the "green revolution". This speaks to organisations using more environmentally friendly means of operation and, surprisingly, this theme ranked in the lower half. This could be attributed to the use of "green revolution" as a keyword that is rather ambiguous. However, energy consumption having the second-highest frequency aligns with recent trends and literature. While the economic environment's high frequency is related to the selection of articles from developing countries were large, the economic environment is harsh.

Conclusion

Poor customer experience hampers operations, and a digital supply chain offered solutions, which came with various challenges. Given the breadth of alternatives available, in reality, they are not always viable. The research managed to bring out dominant themes in each of the TOE factors. In the Technological factors, complexity, privacy, and cost stood out. While in the Organisational domain, strategy, social influence, and technical skills were the three most dominant themes. Then in the environmental factors, economic environment, infrastructure, and perceived trust were considered the most dominant themes. It was interesting to see the dominant themes stem from recent trends with exception of cost and economic environment, which come as no surprise given the high implementation cost of digital solutions. The research highlighted the difficult challenge of striking the balance between maximizing profit and incurring costs to improve customer experience.

This paper seeks to help retailers to understand the factors that affect digitalizing the supply chain in an attempt to improve the customers' experience. Given the hype Industry 4.0 has caused, the findings are an effort to help organisations make an informed decision in regards to implementing a digital supply chain. Consideration of the TOE factors enables the retailer not to ignore the perceived benefit of the digital supply chain, but consider the technology they seek to use their organisational factors, and the environment in which they operate to assess if their efforts will indeed improve the customer experience while still meeting its goals. In practice, this paper contribute on improve the digital customer experience. While in theory, it can add to the body of knowledge in the emerging area of customer experience, which has limited literature on it.

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