

E-Commerce, E-Fulfillment, Last Mile Delivery and CX

Drd. Ioan Matei PURCĂREA



Abstract

It's the real time now for e-commerce business to better understand the role of e-fulfillment within the sociotechnical complexity, considering the sequential nature of the order process within omnichannel landscape. There is no doubt about the need to pay attention to the chain of circumstances of the many challenges confronted by the last mile delivery, identifying affordable delivery alternatives for SMEs. Last mile delivery remains a key differentiator in ensuring the success of integrated omnichannel retailing, improving CX.

Keywords: E-commerce, E-fulfillment, Last mile delivery, SMEs, CX

JEL Classification: D83; L81; L86; M15; M31; O32; O33

Better understanding the role of e-fulfillment within the sociotechnical complexity, considering the sequential nature of the order process within omnichannel landscape

According to Kernstock et al. (2023), as at the center of advances in the e-commerce domain (for instance, receiving live updates about the delivery process via the so-called push notifications) are now new developments in the Information Systems (IS) area, it is important to consider – beyond the pivotal construct in IS research – experience as a more encompassing construct complementing satisfaction, by including the entire challenging order process. Based on a comprehensive literature review, they showed, among other aspects, that possibly core to the functioning of e-commerce are both multiple touchpoints and IS acting together, and the

understanding of contemporary IS (which can also take appropriate action with sociotechnical complexity, not only generate competitive advantage, as argued by Benbya et al., 2020) can be updated and extended by investigating the affective response to the e-commerce system (digital technology, purchasing process, delivery of goods and services), following the whole user experience assessment. Going beyond pure online processes, it is important to consider the sequential nature of the order process within omnichannel environment (as argued by Bijmolt et al., 2021), connecting this way the customer journey to the product flow, as shown in figure below.

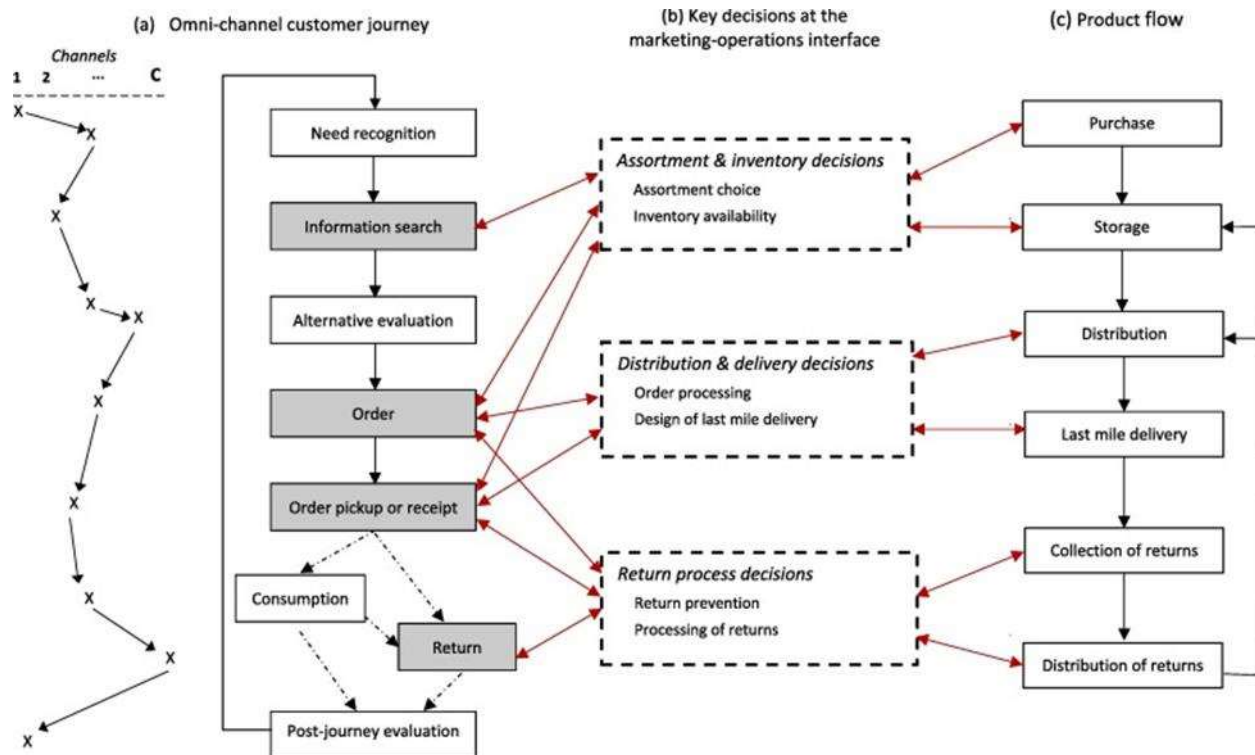


Figure no. 1: Connecting the omni-channel customer journey to the product flow: Key decision areas at the marketing-operations interface. Panel (a) depicts the omni channel customer journey: consumers migrate between channels throughout their journey, between and within stages. Panel (c) depicts the firm's product flow. The two panels are interconnected through firm decisions that affect both journey (panel (a)) and product flow (panel (c)). These decisions, indicated in panel (b), are located at the marketing-operations interface. The red bidirectional arrows indicate how the decisions interact with the customer journey on the one hand (between panel (a) and (b)) and with the product flow on the other (between panel (b) and (c)). The dotted-dash lines in panel (a) indicate that multiple paths are possible.

Source: Bijmolt, T. H. A., Broekhuis, M., Leeuw, S. d., Hirche, C., Rooderkerk, R. P., Sousa, R., & Zhu, S. X., 2021. Challenges at the marketing-operations interface in omni-channel retail environments. *Journal of Business Research*, Volume 122, January 2021, p. 866 (Work cited)

Coming back to Kernstock et al., it is useful to show that they underlined the lack of: clear consensus with regard to the conceptualization of the constructs of the order process (see

figure below), while appearing multiple times the themes with regard to the operationalization of these constructs, satisfaction, outcome, and their relationship; consensus regarding the most important elements from a customer perspective; knowledge on the most important order process aspects for consumer reactions.

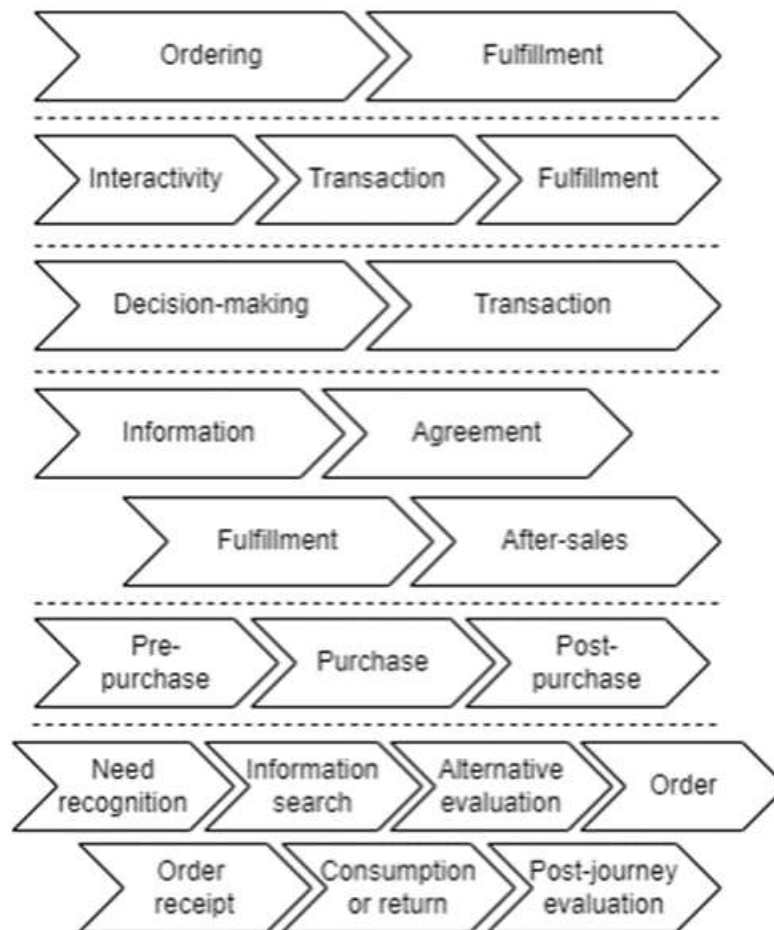


Figure no. 2: Overview of order process concepts

Source: Kernstock, P., Przybilla, L., Thatcher, J.B., Krcmar, H., 2023. "Can't Get No Satisfaction?" – The Case for Broadening Information Systems Research on E-Commerce. [pdf] *Proceedings of the 56th Hawaii International Conference on System Sciences*, p. 3800 (Work cited)

As shown by Titiyal et al. (2023), there is a real need today to better understand the role of e-fulfillment (defined as a sequence of processes, such as: customization strategies, website quality, distribution strategies, last mile delivery and return management) within the rapid increase in e-tailing (web retailing). The authors synthesized from the literature both e-fulfillment definitions and resulted components, as shown in the below table, underlining that e-fulfillment (as logistics-related activity) differs from the product's traditional delivery (Melacini et al., 2018), consisting of e-tailer website, order procurement and product return processes as shown by Jain et al. (2015) in figure below.

Table no. 1: E-fulfillment definitions and resulted components

S. no	Author	Article type	E-fulfillment definition	Article contribution	E-fulfillment component
1.	Jain et al. (2015)	Conceptual	E-fulfillment process comprises the e-tailer website order procurement, order fulfillment and product return processes	Confine the e-fulfillment under three headings: <i>order procurement, fulfillment and return</i>	Customization strategies website quality: customer order, order processing, order management, customer care and web presentation Distribution strategies: physical fulfillment, delivery process, warehouse management, picking, packaging sorting and delivery Last mile delivery: transportation management, shipping and logistics Return management: reverse logistics and return handling
2.	Isac (2014)	Empirical	E-fulfillment is the service through which an operator takes all order fulfillment process in the name of an online store, from storage, taking orders, packing and delivery or website management based on cloud systems management, reporting and track orders	The author explains the importance of website management and order tracking in e-fulfillment	
3.	Agatz et al. (2008)	Literature review	Mapped the e-fulfillment across two dimensions, supply chain stage and planning horizon. Supply chain stage comprises; purchasing, warehousing, delivery and product sale. The planning horizon consists of long-term strategic planning and short-term operational planning	The authors classified the e-fulfillment process across two dimensions: the supply chain and the planning stages. They added the planning stage in e fulfillment, which is new compared to past studies	
4.	Tam et al. (2003)	Conceptual	Described the process in fulfillment under three board heading: fulfillment center (slotting, storage, picking, sorting, packaging and delivery processes), infostructure, handling returns	The new in this definition is the addition of infostructure, which takes care of order processing and exchange of information through the internet, which is similar to website management	
5.	Pyke et al. (2001)	Conceptual	E-fulfillment consists of the following processes: customer's order, order processing, picking and packing, shipping and return handling	There is nothing new in this definition	
6.	Peters (2000)	Conceptual	Proposed five processes in e fulfillment: order management, customer care, web presentation, physical fulfillment and reverse logistics	Classified the e-fulfillment process under five dimensions, the same as earlier studies	
7.	Quillin and Duncan (2000)	Conceptual	E-fulfillment starts with the customer's order and stops with reverse logistics (if required) – in between, other processes involved in managing the transaction, warehouse management, transportation management and customer response	The author added the new processes: warehouse management, transportation management and customer response	
8.	Lang and Cleophas (2020)	Case study	E-fulfillment consists of three main steps: order acceptance, order packing and order delivery	The author explained e-fulfillment under the main three heading, which earlier studies have already demonstrated	

Source: Adapted from Titiyal, R., Bhattacharya, S., J. Thakkar, J.J. and Sah, B., 2023. Impact of e-fulfillment on consumer loyalty across different product types, *Journal of Asia Business Studies*, Vol. 17 No. 2, 2023, p. 443 (Work cited)

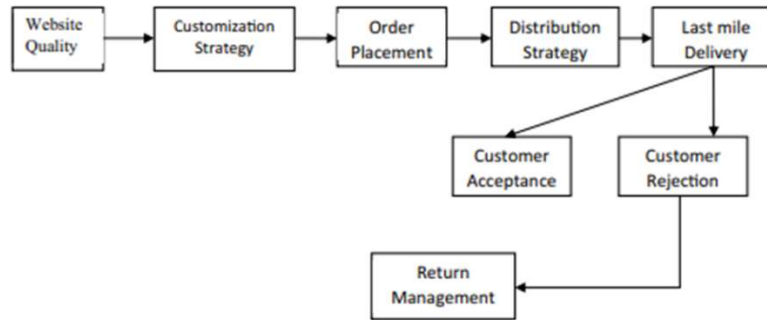


Figure no. 3: E-fulfillment process (according to Jain et al., 2015)

Source: Titiyal, R., Bhattacharya, S., J. Thakkar, J.J. and Sah, B., 2022. Impact of e-fulfillment on consumer loyalty across different product types, *Journal of Asia Business Studies*, Vol. 17 No. 2, 2023, p. 441 (Work cited)

According to Lang, Cleophas & Ehmke (2021), there is a direct linkage between the apparently unstoppable growth of e-commerce and the so-called attended home deliveries (AHD), which requires offering narrow delivery time slots for online booking (customers' orders being finalized by choosing from these slots). These time slots are seen as both a driver, and a result of the increasing e-commerce (a shopping basket being filled by customers who provide their delivery address on the e-commerce retailer's website). The authors showed how profitability can be maintained by planners helped by dynamic slotting decisions (the set of time slots offered to individual customers being limited), these decisions depending not only to on the current customers' request and the already accepted customers' orders, but also on the customers' orders still expected to arrive. On the other hand, as shown by Escudero-Santana et al. (2022), the logistical operators' economic benefits are depending on costs' reduction without affecting customers' perceived level of service whose quality is increased by customers' possibility to choose a preferred time slot for the delivery.

Paying attention to the chain of circumstances of the many challenges confronted by the last mile delivery, and identifying affordable delivery alternatives for SMEs

As shown in the analysis made by Ha, Akbari and Au (2023), there is no doubt about the need for a more complete and balanced definition of last mile delivery, and they choose to adopt the definition given by Motavallian (2019, p. 106): "The last transportation of a consignment in a supply chain from the last dispatch point to the delivery point where the consignee receives the consignment." The authors explained on this basis that there does not exist a fixed and definitive last mile delivery structure (many such kind structures can be generated depending on order preparation point, last dispatch point, and delivery point), and presented a general and simplified structure of the last mile delivery, as shown in the first figure below. Among other aspects, they also brought to our attention how costly is the last mile challenge, as highlighted in the relevant literature, taking into account that: the most inefficient and costly activity of the supply chain is

the last mile delivery (according to Boysen et al., 2020); there is also a routine in benefitting of free delivery and short lead-times, meaning reduced margin on delivery (according to Deloitte, 2020). And in order to exemplify both causes and effects of the many challenges faced by the last mile delivery the authors presented an Ishikawa Diagram, also known as Fishbone Diagram (see the next figure below).

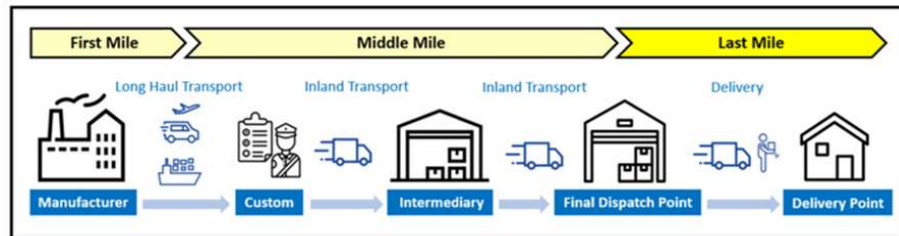


Figure no. 4: Last mile delivery structure

Source: Ha, N.T.; Akbari, M.; Au B., 2023. Last mile delivery in logistics and supply chain management: a bibliometric analysis and future directions, *Benchmarking: An International Journal*, 30(4) – Adapted from: Castillo and Jain, 2019; Motavallian, 2019 (Work cited)

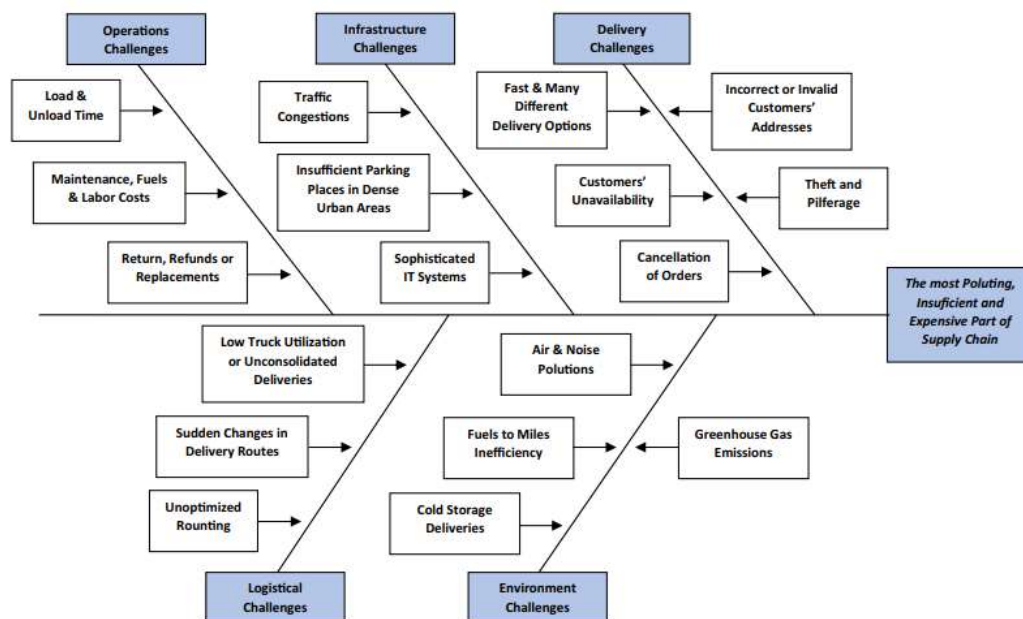


Figure no. 5: Fishbone diagram of the costly last mile delivery

Source: Ha, N.T.; Akbari, M.; Au B., 2023. Last mile delivery in logistics and supply chain management: a bibliometric analysis and future directions, *Benchmarking: An International Journal*, 30(4) – “Adapted from Aljohani, K. and Thompson, R.G., 2020” as “Adapted from Aljohani et al., 2020” (Work cited)

Risberg, Jafari and Sandberg (2023) made a rigorous fuzzy-set qualitative comparative analysis on omnichannel retailers, and provided further practical and theoretical relevance, demonstrating that *fulfilment* (in which the final part of the order fulfillment process, last mile

delivery, is seen as comprising “activities and processes involved in serving consumers by handing over the ordered parcels at their location of choice”) and *returns* (considering how complex and costly is to right manage omnichannel last mile returns flows) should be concomitantly considered when approaching the wide range of delivery options. They pledged for taking into account more meticulously the interaction between the approaches to last mile logistics and firms’ characteristics (online-oriented SMEs, store-oriented SMEs, large store-oriented retailers and large online-oriented retailers) associated with firms’ performance within the context in which retail industry is challenged in a noticeable way on the path to digital transformation. The authors resorted to a very suggestive conceptual model (see figure below), and concluded that depending on the firm characteristics could be planned in detail specific performant solutions (less-costly delivery alternatives for SMEs) by utilizing stores and warehouses for online order fulfilment (SMEs being focused on simplicity) and returns.

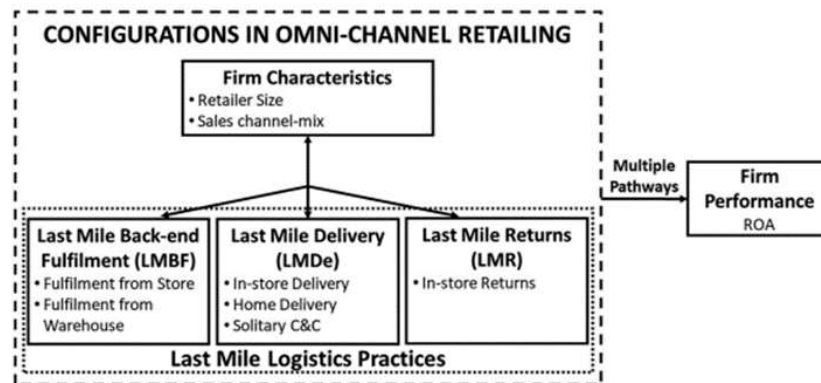


Figure no. 6: Conceptual model with parameters

Source: Risberg, A., Jafari, H. and Sandberg, E., 2023. A configurational approach to last mile logistics practices and omni-channel firm characteristics for competitive advantage: a fuzzy-set qualitative comparative analysis. [pdf] *International Journal of Physical Distribution & Logistics Management (IJPDLM)*, Vol. 53 No. 11, 2023, p. 560 (Work cited)

Instead of conclusions: *Last mile delivery remains a key differentiator in*

ensuring the success of integrated omnichannel retailing, improving CX

There is no doubt about the challenging future of the last-mile delivery. Some time ago we made reference at:

- Different delivery networks for last-mile delivery (see figure below), within a very suggestive context: of the emerging challenges for the ecosystem, considering the immense economic benefits for the private sector offered by e-commerce growth, the instant and time-definite delivery allowed in the delivery segments by the technological advancements, and the new normal described by the faster delivery (WEF, 2020);

Segment		Use cases		
Parcel size	Deferred delivery – arrives some day	Normal/express e-commerce shopping and returns	Small-scale B2B shipping	C2C shipping
	Time-definite delivery – arrival next/specific day/time	(Largely international) B2B reliability shipping		Express e-commerce shopping
	Same-day delivery – arrival on same day	E-grocery shopping and returns	Same-day e-commerce shopping	
	Instant delivery – delivered right away (less than ~2 hours)	Urgent document and item delivery	Prepared food delivery	Instant e-commerce shopping
Larger than parcel size	B2B store delivery	Store delivery and replenishment		
	B2B FTL/LTL carrier	Remaining full-truckload (FTL)/less-than-truckload (LTL) carrier (items >32 kg)		
	B2C LTL/two-person handling carrier	B2C LTL/two-person handling (esp. furniture)		

* Store replenishment and freight delivery out of scope for now, estimate in later stage

Figure no. 7: Seven different delivery networks for last-mile delivery

Source: World Economic Forum, 2020. *The Future of the Last-Mile Ecosystem*. [pdf] Transition Roadmaps for Public- and Private-Sector Players, January 2020, p. 11 (Work cited)

- Last-mile delivery evolution until 2030, from autonomous delivery systems, en-route manufacturing, robotic stores on wheels, delivery lockers... to digital twins, as shown in figure below (CB Insights, 2022).

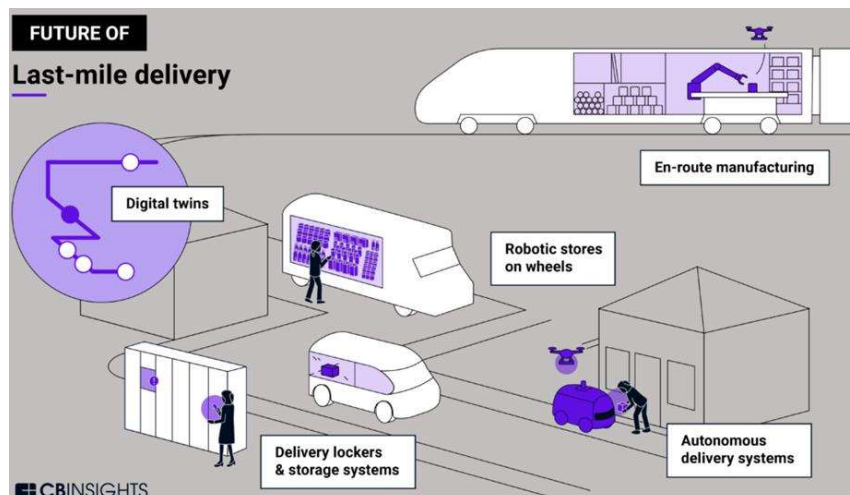


Figure no. 8: Future of last-mile delivery

Source: World Economic Forum, 2020. *The Future of the Last-Mile Ecosystem*. [pdf] Transition Roadmaps for Public- and Private-Sector Players, January 2020, p. 11 (Work cited)

We started from highlighting the importance of experience as a more encompassing construct complementing satisfaction (within the order process). Going back in time, allow us to remember how clear was that last-mile delivery is considered key to the customer experience (CX), as well as “the most expensive and time-consuming part of the entire supply chain”, being necessary “to lower the delivery cost of each order while also showing up on time consistently and keeping your customers happy”, where the pressure for the last-mile delivery optimization (Route4Me, 2021).

Allow us to end by offering a suggestive quotation to inspire new research: “*The CX journey is one littered with varied and contrasting viewpoints, a multiplicity of concurrent experiences and a clash of competing and contrasting values. How a practitioner can creatively help the customer navigate this multi-vocal consumption landscape, plant and position a set of pre-emptive touchpoints to address and respond to the three types of modular concerns, determines whether an offering can ultimately succeed or fail in the marketplace*” (Zha, Marvi and Foroudi, 2023).

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