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Technology-Aided Customer Experience Innovation: Implementation Modes in Retail

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ABSTRACT

Retailers are increasingly leveraging emerging digital technologies to enhance and deliver memorable and timely customer experiences. However, more research is needed to understand how these technologies are being implemented. Therefore, we conducted an fsQCA analysis of 32 retail cases of early adopters of beacon technology. Our findings reveal three main modes of implementation of emerging digital technologies in the retail customer experience: *automation*, *augmentation*, and *customization*. These modes can be interpreted as enablers that enhance the value of utilitarian and/or hedonic experiences, rather than as drivers of innovation per se. Our study adds a new perspective to the debate about the role of digital technologies in driving innovation. Moreover, the three modes identified provide managers with practical guidelines for the implementation of emerging digital technologies in retail environments.

1 | Introduction

In the wake of competition from online players, physical retail is increasingly seeking to deliver exceptional customer experiences (Grewal, Levy, and Kumar 2009; Schneider and Kokshagina 2021). Digital technologies are often used to surprise and delight customers. Stores are filled with sensors and digital devices in an effort to match the ease and speed that characterize online environments (Parise, Guinan, and Kafka 2016). Amazon Go,[1] the chain of stores Amazon launched in 2018, is emblematic of a network of digital technologies that control every aspect of the in-store experience. At Amazon Go, everything is based on sensors: scanning devices at the entrance, visual (e.g., cameras) and proximity sensors (i.e., beacons) along the shelves and digital payment systems. Artificial intelligence algorithms then manage all these devices to track customer preferences and behaviours. Amazon Go is a powerful example of a store equipped with new digital technologies, where brick walls serve only as physical boundaries to keep the experience within the same space. As such, at the time of writing, it is the most advanced realization of what has long been advocated as the shift towards delivering omnichannel experiences. Despite being a success story of technology implementation in a retail experience, little is known about why these digital technologies were chosen over others and what activities were pursued to improve the customer experience. These understudied areas motivate our research.

Delving deeper into the customer experience literature, the utilitarian dimension (satisfying functional needs) and the hedonic dimension (engaging the senses and creating pleasurable memories) emerge as fundamental in different retail settings (Babin, Darden, and Griffin 1994). Designing a fast and effortless experience is a way to meet functional needs in the age of omnichannel retailing (Brynjolfsson, Hu, and Rahman 2013). The use of digital technologies as well as the integration across different channels can streamline the path to purchase (Parise, Guinan, and Kafka 2016). However, utilitarian engagement is only one dimension of the customer experience. In the last decades, consumer expectations evolved

from the purely utilitarian factors to emotional and symbolic engagement (Holbrook and Hirschman 1982; Pine and Gilmore 1998; Schmitt, Joško Brakus, and Zarantonello 2015). The literature about customer experience in retail has primarily focused on how to integrate technologies in retail stores (Blázquez 2014; Parise, Guinan, and Kafka 2016) and how to use them to improve overall customer satisfaction (Roy, Raju, and Mandal 2017). Indeed, digital technologies have traditionally served the purpose of solving pain points by speeding up the payment process (Artusi et al. 2020). In some cases, retailers use digital technologies not only to satisfy utilitarian needs but also to enable broader experiences and enhance multisensory engagement, as some beauty retailers are doing by connecting people around the world (Koetz 2019). However, it remains unclear what perspective to take when technological opportunities arise and how to implement them to innovate the customer experience.

In addition to the different customer experience perspectives, the rise of emerging digital technologies is completely reshaping not only the way we interact with products (Fitzgerald et al. 2014; Wetzels 2021) but also the way we communicate and even work (DuBravac 2015). The literature on digital technology shows that discovering opportunities in technology is not easy (Magistretti, Dell'Era, and Verganti 2020a) and needs to be evaluated and understood before it can be adopted (Danneels and Frattini 2018). In particular, the integration of technology into consumer products requires an understanding of the embedded capabilities and the context (Iansiti 1996). Nevertheless, an increasing number of technologies emerge as potential breakthroughs (Verganti 2011) or as improvements to existing solutions (Adner and Kapoor 2016). What is still debated is how emerging technologies, characterized by five attributes—radical novelty, fast growth, coherence, prominent impact and uncertainty and ambiguity (Rotolo, Hicks, and Martin 2015)—can be explored to reveal their potential. As Iansiti and Lakhani (2020a) discuss with respect to data and analytics, developers can have a weak or strong perspective on the implementation of emerging technologies. A weak perspective means implementing the emerging technology to linearly replace what previous technological solutions or humans were doing, while a strong perspective means enabling the discovery of opportunities and creating new potential (Iansiti and Lakhani 2020b). Given the complexity of managing emerging digital technologies (Gama and Magistretti 2023) and the dyadic view of the customer experience, this article explores alternative modes of implementing emerging digital technologies to innovate. Modes are defined as the ways in which firms, in this case retailers, have implemented beacon technology to innovate the retail customer experience. Specifically, we seek to answer the following question: *How can retailers implement emerging digital technologies to innovate their customer experience?*

To this end, we analyse 32 cases of the early implementation of a specific emerging digital technology in the retail environment, beacon. As a Bluetooth-based system, beacon technology allows detecting and communicating with nearby devices (e.g., smartphones). Considered as one of the most promising technologies for improving the customer experience in recent years (Parise, Guinan, and Kafka 2016), beacon can be classified as an emerging digital technology according to Rotolo, Hicks, and Martin's (2015) attributes. Beacons have since become increasingly common and have had a significant impact on the retail landscape (e.g., Amazon Go). At the time of their introduction, they enabled proximity relationship management, something no previous technology could do.

For this study, we created a database on the early adoption of this digital technology, collecting technical information ranging from the product categories distributed by retailer to the geographic location of stores, from the price position of the goods sold to the capillarity of the store network. All of these data were enriched and complemented with information on the strategic objectives addressed by the early adoption of beacon technology and the modalities used to implement it. Given the large amount of qualitative data and the equifinal nature of the problem (Meyer, Gaba, and Colwell 2005), we conducted a fuzzy set qualitative comparative analysis (fsQCA) to identify the main configurations (Sukhov et al. 2021; Greco et al. 2022) of different modes that inform the implementation of emerging technologies in the retail industry, such as beacon. From this analysis, three main modes of implementing beacon technology in retail to innovate the customer experience emerged: *automation*, *augmentation* and *customization*.

Our study makes three main contributions to the literature. First, we respond to recent calls for a deeper understanding of digital transformation and the value that digital technologies can bring to society (Iansiti and Lakhani 2020a), especially in customer experience innovation (Parise, Guinan, and Kafka 2016). Second, we extend current knowledge on the role of digital technologies in customer experience innovation (Bolton et al. 2018; Schneider and Kokshagina 2021). Third, we enrich the body of knowledge that emphasizes the enabling role of emerging technologies (Rotolo, Hicks, and Martin 2015) in the pursuit of experience innovation (Magistretti, Dell'Era, and Verganti 2020b). In addition, we inform practitioners on the different modes of implementing emerging digital technologies to innovate the retail customer experience.

2 | Theoretical Background

Given our focus on the role of emerging digital technologies in retail customer experience innovation, we draw on three literature streams. First, we review the literature on customer experience innovation. Second, we summarize current understanding of emerging digital technologies. Finally, we analyse the literature on the role of digital technologies in retail environments.

2.1 | Customer Experience Innovation

The concept of experience in marketing and innovation management literature is multifaceted (Kumar, Townsend, and Vorhies 2015), encompassing both how customers interact with products and/or companies (Schmitt 1999; Klaus and Maklan 2013) and how customers engage with brand-related stimuli, such as a brand's identity (Brakus, Schmitt, and Zarantonello 2009). Each interpretation highlights different

aspects of how individuals perceive and interact with organizations and their product-service offerings, emphasizing the importance of designing meaningful experiences (Verganti 2009). As a well-established construct in the marketing literature (Voorhees et al. 2017), customer experience relates to the more interactional and phenomenological aspects of the value customers assign to a market offering (Vargo and Lusch 2008). Building on the foundational work of Holbrook and Hirschman (1982), several studies have identified two essential dimensions of customer experience (Gentile, Spiller, and Noci 2007; Voss, Spangenberg, and Grohmann 2003; Chitturi, Raghunathan, and Mahajan 2008). On one hand, the *hedonic* dimension refers to the emotional, sensory and experiential aspects of consumption, associated with pleasure, enjoyment, fantasy and feelings of satisfaction or excitement (Candi, Van Den Ende, and Gemser 2016). On the other hand, the *utilitarian* dimension pertains to the practical, functional and goal-oriented aspects of consumption, associated with the usefulness, efficiency and necessity of a product or service (Candi, Beltagui, and Riedel 2013). Creating memorable customer experiences allows brands to compete on the hedonic dimensions of consumption (Pine and Gilmore 1998) and differentiate from competitors (Meyer and Schwager 2007). These insights have significant implications for studying innovative retailers that adopt new digital technologies to design radically new customer experiences both in-store and beyond (Schneider and Kokshagina 2021). First, the nature of retail service is evolving from its initial role as a channel for product distribution to a dynamic platform that curates personalized experiences (Beltagui, Darler, and Candi 2015), fosters deeper customer engagement (Prahalad and Ramaswamy 2004) and seamlessly integrates with digital innovations (Bonfrer, Chintagunta, and Dhar 2022). Pine and Gilmore (1998) argued that retailers are no longer merely intermediaries selling goods but are now creators of experiences. Their work has inspired research on how innovative retail practices curate unique consumer experiences that transcend simple transactions, adding value through immersive environments and personalized services (Lusch, Vargo, and O'brien 2007; Bellini et al. 2017; Klaus and Kuppelwieser 2022). Second, the extensive literature on different typologies of customer experience (Gentile, Spiller, and Noci 2007) and brand experience (Brakus, Schmitt, and Zarantonello 2009) suggests that innovative retailers must balance two dimensions of value co-creation (Sachdeva and Goel 2015; Bustamante and Rubio 2017): on one side, the meaningfulness of new symbolic value drivers (e.g., hedonic, emotional, sensorial, spiritual, affective and behavioural aspects of the experience); on the other side, the enhancement of functional value drivers (e.g., utilitarian, rational, physical, sensorial and aspects of the experience).

One of the values offered to customers lies in eliminating barriers, and streamlining the whole process quicker and more efficient (Bhalla 2014). However, the experience lived by customers during the visit to a store or the relationship with a brand cannot be fully controlled. Being inherently personal (Holbrook 2006), customer experience is heavily influenced by individuals past experiences, to which they tend to compare it (Verhoef et al. 2009). It is common for people to relate to a standard and evaluate experiences based on what they refer to as a good realization, even from totally unrelated fields (Pine and Gilmore 1998; Verhoef et al. 2009). In addition to that, part of the evaluation of an experience depends on situational factors, as the socio-cultural movements and market institutions (Vargo, Wieland, and Akaka 2015; Becker and Jaakkola 2020). As a last important external factor, customer experience is also influenced by other customers' behaviour in the store (Kim and Baker 2020). Despite the emergence of different types of customers experience innovation, utilitarian or hedonic (Grewal, Levy, and Kumar 2009) and the growing relevance of digital technologies to pursue such innovation in retail (Parise, Guinan, and Kafka 2016), scholars still lack a clear understanding on how retailers can exploit the maximum potential from the implementation of technologies in innovating the customer experience.

2.2 | Emerging Digital Technologies

Emerging technologies are characterized by their potential to impact the economy and society (Porter et al. 2002), their broad applicability (Martin 1995) or the uncertainty inherent in their development (Boon and Moors 2008). According to Rotolo, Hicks, and Martin (2015), they have five distinct characteristics: radical novelty, relatively fast growth, coherence, significant impact and inherent uncertainty and ambiguity. Indeed, due to their internal characteristics, emerging technologies require a specific approach for their development (MacCormack and Verganti 2003). Technology development is an extensively researched field, encompassing various approaches, including disruptive technology (Danneels 2004), technology push (Di Stefano, Gambardella, and Verona 2012) and technology epiphanies (Verganti 2011). Although these approaches emphasize the radical improvement of the technological dimension (Adner and Kapoor 2016), they do not significantly differentiate emerging technologies and their specific characteristics (Rotolo, Hicks, and Martin 2015) from existing and mature technologies (Haleem et al. 2019). Therefore, more research is needed on the role of the development approaches in supporting the growth of emerging technologies (Danneels 2006). While researchers have shown that experimentation and iteration can lead to the discovery of new technological opportunities (Thomke 2003), the role of emerging digital technologies inside and outside of organizations is still under debate.

According to Iansiti and Lakhani (2020a) and their research around data and analytics, the implementation of digital technologies can be classified as weak or strong. Weak implementation refers to the replacement of linear activities that do not require human presence, while strong implementation puts technology at the service of people to empower and support them in strategic decision-making (Iansiti and Lakhani 2020b). The development of emerging digital technologies can vary in scope: weak implementation in response to market demand, in a more technology substitution logic (Adner and Kapoor 2016); strong implementation in response to a more strategic perspective, in searching for hidden values in technologies that foster radical innovation (Verganti 2011). Despite our understanding of the different roles technology can play in innovation (i.e., weak or strong), it remains unclear how firms, in this investigation retailers, can use technologies to pursue different goals in their innovation endeavours.

2.3 | Digital Technologies in the Retail Environment

Retailers have significantly adopted advanced digital technologies, reshaping the scope of their service innovation (Artusi et al. 2020). The store as a mere distribution channel for products and services designed and produced elsewhere has changed profoundly in response to the socioeconomic and technological challenges driving this retail transformation (Gupta and Mukherjee 2022; Klaus and Kuppelwieser 2022). In the early stages, the proliferation of e-commerce, which offers consumers unparalleled convenience and access to a wide variety of products, forced retailers and manufacturing brands to improve multi-channel shopping satisfaction (Baier and Rese 2020). Subsequently, the emergence of new technological solutions prompted brick-and-mortar retailers to adopt omni-channel strategies that seamlessly integrate online and offline channels (Cai and Lo 2020). This integration involves leveraging multiple platforms, such as e-commerce, mobile commerce, mobile apps and social media, to create a cohesive and unified customer experience (van de Sanden, Willems, and Brengman 2020; Schrage et al. 2022; Liang, Lee, and Workman 2022). The evolution from omni-channel to omni-experience retailing has shed light on how retailers integrate and enhance customer interactions in different contexts of their lives, enriching studies on the heterogeneity of modern store typologies (Artusi et al. 2020). This heterogeneity consists of a nuanced interplay of different forms of integration of different experiences, variations in intrinsic attributes that contribute to a dynamic and intricate milieu of empirical events. Each store typology can be analysed as specific organizational configurations adopted by manufacturing brands with proprietary stores, specialized retailers focused on single product categories and multi-brand retailers distributing products and services across multiple merchandise categories (Alexander and Cano 2020; Bonfrer, Chintagunta, and Dhar 2022).

Also emerging in the retail industry are the different competitive environments that influence the implementation of advanced forms of multi-channel, omni-channel and omni-experience retailing. For example, luxury retailers, after an initial period of resistance to adopting technological solutions, increasingly recognize the strategic importance of digital innovation (Pantano, Pedeliento, and Christodoulides 2022). On the other hand, food retailers have shown a natural propensity to adopt digital solutions that enhance the convenience and efficiency of processes, as well as the effectiveness of customer access to products, pricing information and promotions (Weyer et al. 2020; Fagerstrøm, Eriksson, and Sigurdsson 2020). Premium retailers, such as bookstores, and premium manufacturing brands with direct-operated stores, such as those in the coffee or automotive sectors, adopt a different innovation strategy, focusing on a new meaning of the retail experience (Pinto et al. 2017; Artusi et al. 2020). Given this diversity, it is important to identify constructs for empirical research that can capture the different positioning of retailers with respect to digital innovation (Bellini et al. 2017). Their positioning can be influenced by the different dynamics of pricing decisions and the evolving trajectories designed to learn through trial and error as they implement innovative solutions (Pedota and Piscitello 2022). Overall, innovation in the retail industry appears to be rooted in either the type of store (e.g., multi-brand) or the propensity to implement technology (e.g., luxury brand or convenience store). Given our limited theoretical understanding of how emerging technologies can enable different customer experiences and how the retail industry can innovate with these technologies, this study explores how retailers can implement emerging digital technologies to innovate the customer experience.

3 | Methodology

3.1 | Empirical Setting

To explore the alternative modes of implementing emerging digital technologies to innovate the retail customer experience, we conducted a retrospective analysis of beacon technology implementation across multiple cases (Eisenhardt 1989) between 2013 and 2016, when the technology was more advanced and prevalent in the industry (Parise, Guinan, and Kafka 2016). Our focus on beacon technology allows us to look back at the entire implementation process from the early days of technology hype to the retailer's decision to fully integrate it (or not) into their retail experience.

Beacon takes its name from iBeacon, the Bluetooth communication standard developed by Apple in 2013, a hardware device that uses Bluetooth Low Energy (BLE) or Smart Bluetooth technology to transmit data over short distance by broadcasting a unique signal multiple times per second, allowing other devices to recognize them. Like any basic communication, it requires two parts, a transmitter (beacon device) that sends the signal and a receiver (smartphone) that listens to the signal and translates it to trigger an action. Because Bluetooth Smart does not require pairing, a smartphone can listen to many beacons simultaneously. As a result, it can be precisely located in a small area and take advantage of the power of the signal. The main differences from standard Bluetooth are lower power consumption and cost: Beacons can last up to 2 or 3 years on a single battery. Beacons have become increasingly popular since 2013. They are used in various industries, from retail to healthcare, and the relatively low cost of the device, from $10 to $25, makes implementation affordable for small businesses. Beacons can detect when a device enters a monitored area and determine its precise location, similar to GPS coordinates. This allows various actions to be performed at specific times and locations, engaging and interacting with the mobile Bluetooth device, typically a smartphone, through the functionalities enabled by mobile apps. These actions are therefore contextual because they are triggered depending on physical location and time of visit.

Our sampling strategy aimed to include as many cases of early pioneers as possible, namely, retailers that experimented with beacon within 3 years of the first mass-market solutions. We searched for cases in trade magazines and publications, academic articles and industry-specific rankings and awards (e.g., Interbrand). For each of the selected cases, we relied on secondary data from multiple sources, such as the retailer's website (e.g., general information about the services offered), the beacon vendor's website (e.g., technological features of the beacon) and various technology magazines (e.g., insights into

the use of beacons, interviews). This process led to the identification of 52 cases, which we reviewed to verify the depth and trustworthiness of the secondary data sources, ultimately resulting in a final set of 32 cases based in the United States and Europe.

3.2 | fsQCA

Given the large number and heterogeneity of cases, we relied on fsQCA as the method to analyse our data. In particular, we recognize the complexity of retail services, which are characterized by multiple resources combined to deliver the service (Lusch, Vargo, and O'brien 2007), and the impossibility of performing standard cross-case analysis. Moreover, the successful introduction of a new technology in such a complex system depends on the combination of several explanatory factors that need to be taken into account. Given their high heterogeneity and the very different experiences of retailers, we also recognize the possibility of equifinality (Meyer, Gaba, and Colwell 2005). Therefore, we use fsQCA to find the possible different pathways (recipes) that lead to the successful implementation of beacon technology.

As a mixed methods approach (Ragin 1987; Fiss 2007), fsQCA allows for case comparison when the number of cases or the number of conditions is high (Ragin 1987). It is based on Boolean algebra and aims to provide complex explanations to an outcome-based phenomenon (Misangyi et al. 2017). As a mixed method that relies heavily on the qualitative interpretation of the researchers, it requires an iterative approach at each stage to ensure maximum validity and reliability (Furnari et al. 2020). The method allows capturing the three principles of causal complexity: conjunctural causation, equifinality and causal asymmetry (see Misangyi et al. [2017] and Sukhov et al. [2021] for more details). In particular, fsQCA is based on identifying the different relevant conditions that can lead to the outcome and assigning a membership score (Rubinson et al. 2019) to each condition and each case. This enables understanding that combinations of conditions are more frequently observed when the outcome is present, leading to the definition of recipes as alternative paths to the same outcome. Thus, fsQCA allows to consider the inherently complex phenomenon under study and to capture all the facets and different paths that might contribute to its explanation. As fsQCA has gained popularity in recent years and has been applied in several innovation studies (e.g., Sukhov et al. 2021; Stanko 2020; Malherbe and Simon 2022; Løbner and Goduscheit 2022), we based our application of fsQCA on the guidelines of Sukhov et al. (2021) and the steps suggested by Greckhamer et al. (2018), which we describe next.

3.2.1 | Building the Configurational Model

In the first step, we set the boundaries of our problem by first defining the outcome and then the conditions. Since our study aims to understand how to successfully introduce new technologies in the retail experience, we defined the positive outcome as the long-term implementation of beacon technology, a crisp outcome condition referred to as 'OUT'. We then went back to the literature to understand and agree on all the different conditions that could lead to this outcome. Since the interpretive knowledge of the researchers is crucial in this stage to identify meaningful conditions (Fiss 2011), we went through several rounds of individual reflection and discussion of the literature, refining the identified conditions until agreement was reached (Grandori and Furnari 2013). The analysis of the literature on customer experience, emerging technologies and retailing led to the definition of four causal conditions that, in combination, could explain the outcome.

- *Store typology*: Whether the store can be considered a focused or a generalist/department store (Alexander and Cano 2020). We define focused stores as those that either offer a single product category (e.g., sporting goods) or are mono-branded and the others as generalist/department stores, thus a crisp condition that takes value 0 or 1. This is critical because focused stores have been shown to have a higher degree of control over the customer experience (Lusch, Vargo, and O'brien 2007; Artusi and Bellini 2020), which could influence the success of new technology introduction initiatives. We call this condition 'TYP'.
- *Positioning*: The degree to which the store is perceived as offering a premium price or not compared to competitors. Given the wide range of differences observed and the multiple rounds required to reach agreement among the research team, we map this dimension through a fuzzy condition. This is important because price is known to affect customers' perceived service quality (Hu, Kandampully, and Juwaheer 2009) and their experience expectations. We call this condition 'POS'.
- *Technology implementation*: Whether the introduced beacon technology can be defined as weak or strong (Iansiti and Lakhani 2020b). This allows to explain the extent to which the introduction was an incremental change (weak beacon, adding functionalities to existing activities) or a more intrusive change (strong beacon, replacing some activities). This reflects the risk taken, as a more intrusive change is inherently riskier (Ibrahim and Obal 2020). We call this condition 'WEASTRO' and define it as crisp.
- *Experience*: The final condition we identified relates to the nature of the experiential aspects that stores sought to innovate through the introduction of beacons. This is a crisp condition that refers to more utilitarian or hedonic applications of the technology. As the literature shows, this condition is critical in that it leads to two different paths of conceiving the customer experience and the value offered (Holbrook 2006). We call this condition 'UTHED' and also define it as crisp.

Table 1 summarizes the defined conditions, their mapping along a synthetic explanation and the membership scores assigned.

3.2.2 | Constructing the Empirical Sample

To identify our sample, we looked at retail reports and awards from 2013 to 2017 and discussed whether the technology introduction was significant or not. This resulted in an initial sample

TABLE 1 | Conditions for the analysis.

Name	Short description	Membership scores
TYP	The stores are generalist or focused	0 = generalist/department store 1 = focused store
POS	The degree to which retailers adopt a low-end vs. high-end positioning	0 = low-end 0.25 = medium-low 0.5 = crossover point 0.75 = medium-high 1 = high-end
WEASTRO	The type of beacon technology	0 = weak beacon technology 1 = strong beacon technology
UTHED	The new experience provided by beacon technology	0 = utilitarian experience 1 = hedonic experience

of 52 cases. The reasons for excluding cases were related to the introduction of beacons in only one trial location or a general lack of information related to the specific case (16 cases were excluded for these reasons). In addition, we excluded 4 cases that were highly controversial and for which the assignment of their membership scores to the different conditions was too subjective. We continued to iterate between this and the next step to understand which cases to exclude and arrived at the final set of 32 cases after several iterations among the research team.

3.2.3 | Calibrating the Data

Data calibration consists of assigning membership scores to each case, condition and outcome (Fiss 2007). This is a highly interpretive phase of the methodology and requires experience and iteration to arrive at meaningful results. Given the highly qualitative nature of this study, we opted for indirect calibration (Basurto and Speer 2012), relying on our interpretation of the data rather than quantitative measures. This is generally the preferred approach, as it allows fully grasping the complex nature of the problem (Rubinson et al. 2019). Thus, we followed a 3-step iterative approach that we repeated several times to ensure its validity. First, we mapped all cases individually and independently. Second, we met to discuss our calibration of the data and to highlight and discuss the instances where we had not reach full agreement. Third, we allowed some time to pass and went back to reflecting individually on our calibrations. We repeated this process until we reached 100% agreement on all the dimensions. As a result, 4 trivial cases were also excluded.

Another key aspect is the definition of the crossover point, which we set at 0.5, and is defined as the point of maximum ambiguity (Pappas and Woodside 2021). Essentially, setting a condition at 0.5 means that this particular case-condition match is excluded from the analysis because it is impossible to determine whether the case belongs more to one end of the spectrum. In our analysis, all the crisp variables are well represented at one of the two ends of the spectrum, 0 or 1, resulting in no cases at the crossover point. Instead, the fuzzy-set variable—POS—shows some cases that are exactly in the middle between low and high price.

These steps allowed us to define our final dataset. Table 2 shows the calibrated dataset, and Table 3 provides an example of case calibration.

In the next section, we further apply the process suggested by Greckhamer et al. (2018) to analyse and discuss our results. We conducted our analyses using the fsQCA 3.0 software, which is recognized by the academic community as suitable for this type of analysis and has been used in several studies (Ragin and Davey 2014).

4 | Findings

Following previous research (Sukhov et al. 2021), we divide our analysis into two subsections. The first is the necessity analysis to understand whether a condition is necessary for the outcome or not. The second is the sufficiency analysis to examine which sets of conditions (recipes) are sufficient for the outcome.

4.1 | Necessity Analysis

In the first step, we conducted a necessity analysis using the fsQCA 3.0 software to identify all variables that may be necessary for the outcome (Greckhamer et al. 2018). In line with what QCA researchers prescribe (Fiss 2007), we considered necessary only those conditions that show a consistency level above 0.9 when associated with reasonably high coverage. We tested necessity for both the presence and absence of the outcome (Fiss 2007), and the results show that no condition should be considered necessary for either the presence or the absence of the outcome (see Table 4).

4.2 | Sufficiency Analysis

In the second step, we performed a sufficiency analysis to determine which combinations of configurations lead to the outcome (Ragin 1987). In line with the assumption of equifinality for complex problems (Meyer, Gaba, and Colwell 2005), the goal of this step is to capture the complexity and shed light on the

TABLE 2 | Calibrated dataset.

Case	TYP	POS	WEASTRO	UTHED	OUT
Beauty1	1	0.5	0	0	1
Apparel1	1	0.5	0	1	0
Apparel2	1	0.5	1	0	1
Apparel3	1	0.75	1	0	1
Apparel4	1	1	1	0	1
Apparel5	1	0	1	0	0
Apparel6	1	0	0	0	0
Electronics1	1	1	0	1	0
Electronics2	1	0	1	0	0
Food1	0	0.5	0	1	1
Food2	1	0.25	0	0	1
Food3	0	0	0	0	1
Food4	1	0	0	0	1
Food4	0	0.25	0	0	0
Furniture1	1	0	0	0	1
Games1	1	0.5	1	1	0
Jewelry1	1	1	0	0	1
Mall1	0	1	1	1	1
Pharmacy1	1	0	0	1	1
Pharmacy2	1	0.25	1	0	0
Sports1	1	0.75	1	0	0
Supermarket1	0	1	1	1	1
Supermarket2	0	1	1	1	1
Supermarket3	0	0.25	0	1	1
Supermarket4	0	1	0	1	0
Supermarket5	0	0	0	1	1
Supermarket6	0	0	1	0	1
Supermarket7	0	0.75	1	1	1
Supermarket8	0	0	0	0	1
Supermarket9	0	0.25	0	0	1
Supermarket10	0	0	0	0	1

multiple different paths that lead to the presence of the outcome. Among the various combinations identified, we retained those with consistency greater than 0.75 and coverage greater than 0.05 (Woodside 2013). We chose a permissive consistency cut-off of 0.75 to cover the majority of cases. Given the inherent subjectivity in assessing a retailer's technology implementation modalities, this allows not losing potentially relevant configurations due to lower achieved consistency. Accordingly, we selected the most parsimonious solutions to allow for the more general explanation to emerge. This consistency cut-off led to identifying three solutions, as shown in Table 5, indicating that each solution and the overall set of solutions have high consistency and high overall coverage.

4.3 | Robustness Tests

We conducted two robustness tests. First, we slightly varied some values in our calibration to see if the results changed significantly or remained stable (Schneider and Wagemann 2012).

TABLE 3 | Case calibration example.

Condition	Condition assessment for the Apparel1 case	Assigned membership scores
TYP	Stores sell own-branded apparel focused on a casual urban style	1 = focused store
POS	The brand has a history as a premium quality retailer and is now positioned between fast and high-end fashion	0.5 = crossover point
WEASTRO	Beacon technology helps customers learn more about their products. Products have a tag that can be tapped with smartphones to view product information, styling options and recommendations.	0 = weak beacon technology
UTHED	The focus is on styling information and personalized recommendations based on user values, rather than monetary or utilitarian value.	1 = hedonic experience
OUTCOME	The beacon in-store trial was terminated within 2 years of the first implementation	0 = trial ended after 1.5 years

TABLE 4 | Testing the necessary conditions (all values approximated to two decimals).

Test for OUT			Test for ~OUT		
Conditions	**Consistency**	**Coverage**	**Conditions**	**Consistency**	**Coverage**
TYP	0.43	0.53	*TYP*	0.80	0.47
~TYP	0.57	0.86	*~TYP*	0.20	0.14
POS	0.42	0.67	*POS*	0.43	0.33
~POS	0.58	0.68	*~POS*	0.58	0.32
WEASTRO	0.38	0.62	*WEASTRO*	0.50	0.38
~WEASTRO	0.62	0.72	*~WEASTRO*	0.50	0.28
UTHED	0.38	0.67	*UTHED*	0.60	0.33
~UTHED	0.62	0.68	*~UTHED*	0.40	0.32

Note: ~ denotes the negation of a condition or outcome.

TABLE 5 | Sufficiency analysis.

Conditions	Configuration 1	Configuration 2	Configuration 3
TYP	●	⊗	⊗
POS		●	⊗
WEASTRO	⊗	●	⊗
UTHED	⊗	●	
Consistency	0.83	1	0.89
Raw coverage	0.24	0.18	0.29
Unique coverage	0.24	0.18	0.11
Overall solution consistency	0.75		
Overall solution coverage	0.9		

Note: ● indicates the presence of the condition and ⊗ its absence. Blank spaces indicate that the presence or absence of a condition is irrelevant to the outcome.

Specifically, we slightly modified the values for the conditions for which we agreed on a crossover value, moving them to an edge when some of the research team thought it made sense. We also slightly modified the values and iterated some analyses when the research team had doubts about the level of agreement. Second, we set different consistency cut-offs: 0.75–0.85–0.9. By varying the cut-offs, we observed more or fewer outcomes in some situations. These outcomes were very similar to those reported, sometimes with significant overlap between pairs of outcomes. Therefore, we opted for a slightly more relaxed consistency threshold to include the more general configurations.

4.4 | Interpreting the Configurations

As Table 5 shows, the problem we studied is multifaceted, with different paths and configurations of conditions leading to the outcome. In particular, the fsQCA analysis reveals three alternative modes of implementing beacon technology to improve the retail customer experience: automation, augmentation and customization.

4.4.1 | Customer Experience Automation

Configuration 1 is associated with the implementation of weak beacon technology with utilitarian purposes in highly focused and high-end stores. This scenario is one in which the stores have a narrow target and the reason for the customer's visit is clear. This is a specific scenario where retailers compete on the basis of their strong competence in the specific product category. Therefore, knowledge and information play a key role in the experience. In this case, beacon technology needs to support the utilitarian and knowledge-based experience by making it smoother with beacon-enabled activities that perform the same function more efficiently.

An example is the case of *Jewellery1*, which uses proximity beacons to replace activities previously performed by staff in-store. In particular, the beacons provide customers with a wealth of information about the products, how to use them and how to match them to their style. In addition, the new technology allows distributing promotions and coupons. Both of these activities were previously performed by front-line staff and have been replaced by the introduction of weak beacons. In this case, beacon technology complements the highly focused product experience by automating it for the customer.

4.4.2 | Customer Experience Augmentation

Configuration 2 is the reverse scenario. In this case, successful introduction is observed when beacon technology helps make premium-priced department stores more hedonic. In this scenario, stores compete on the basis of their breadth of assortment, product quality and experience. Furthermore, the strong implementation of beacon technology in this scenario can radically improve the hedonic dimension of the in-store experience, elevate the customer experience and help strengthen competitive advantage.

In *Supermarket7*, beacons installed in 2013 opened up entirely new possibilities for customers. Traditionally a low-focus, high-cost competitor, the supermarket has implemented beacons to elevate the customer experience to a new level. Specifically, the new technology has enabled several additions to the customer experience that are hedonic activities: The beacons greet customers at the entrance, show them the path to the products they want to buy through a navigation system and provide recommendations based on trending products on Pinterest. All these activities would be extremely expensive if managed by human front-line staff. By implementing strong beacon technology, the store was able to differentiate itself from low-cost competitors by enhancing the customer experience.

4.4.3 | Customer Experience Customization

Finally, configuration 3 represents a particular but common scenario. Low-cost and low-focus competitors benefit from the implementation of weak beacon technology, regardless of the experiential aspects it may enhance. This cluster of retailers is characterized by low-price, low-margin department stores. In this scenario, it is likely that the players do not have a sufficiently robust financial structure for the implementation of strong beacons. However, the highly undifferentiated competitive parameters make any additional experiential dimension provided by weak beacons valuable and differentiating. In this cluster of cases, competitors implement weak beacon technology to enrich the customer experience.

As an example, *Food3* deployed beacons in their stores in 2014, allowing customers to receive promotions and recommendations based on their previous purchases. At the same time, beacons alert staff to the presence of customers in the store. Similarly, other stores adopt basic solutions enabled by weak beacons that allow them to offer new optimized customer experiences. In contrast to configuration 1, the purpose of the new experiential dimensions can be both utilitarian and hedonic. In fact, it seems that in such low-end stores, any experiential addition allows them to stand out from competitors.

5 | Discussion

This qualitative analysis sheds light on three modes of implementing emerging digital technologies in retail to innovate the customer experience: automation, augmentation and customization. Our study contributes to the literature on emerging technologies (Rotolo, Hicks, and Martin 2015) by showing how the implementation of emerging digital technologies can lead to customer experience innovation (Schneider and Kokshagina 2021). The three modes cover a spectrum from simple automation of the customer experience to augmentation of the customer experience. Customization is an in-between mode that allows for the pursuit of both hedonic and utilitarian values in the customer experience, but neither fully automates tasks nor augments the customer experience. In particular, our findings (i) respond to recent calls for a deeper understanding of digital transformation and the value that digital technologies bring to society (Iansiti and Lakhani 2020b), (ii) expand knowledge about the role of

digital technologies in customer experience innovation (Bolton et al. 2018; Dabić et al. 2023) by showing how different adoption modes can influence the achievement of hedonic or utilitarian customer experiences (Candi, Van Den Ende, and Gemser 2016) and (iii) enrich the literature on the enabling role of technologies in the pursuit of experience innovation (Magistretti, Dell'Era, and Verganti 2020b).

The first contribution emerges from the configurations and proposes an interesting view that emerging technologies, usually considered a lever for digital transformation (Danneels 2004), can be more than just enablers of radical or incremental innovation based on technological performance (Adner and Kapoor 2016), as they can also innovate the customer experience (Parise, Guinan, and Kafka 2016). In line with the dichotomous view of weak and strong implementation (Iansiti and Lakhani 2020a), unbundling the technology itself is not the only strategic lever that firms have at their disposal to innovate (Lanzolla, Pesce, and Tucci 2021). In fact, the 32 cases analysed show that weak implementation of beacon technology, based on less performance-oriented technological innovation, can still enhance the customer experience. This shows not only the ways companies are implementing emerging digital technologies but also that they should focus not only on the 'how'—the performance-oriented dimension of technological innovation (Iansiti 1996)—but also on the 'why' (Verganti 2009). In other words, the reason for implementing the technology and what the technology adoption enables as a new experience and set of values. This second view goes in the direction of unveiling the values hidden in technologies (Danneels and Frattini 2018; Magistretti, Dell'Era, and Verganti 2020a). Technology studies typically consider the ability of firms to innovate by focusing on the performance of the technology (Adner and Kapoor 2016), while our study shows that technology is a means and not a driver. Moreover, it enriches current knowledge by proposing a different view of technology as weak and strong, rather than incremental or radical. This may inspire future work to look more deeply into the strategy needed to unlock new opportunities across different technology considerations.

The second contribution is to customer experience innovation by proposing a different view to the traditional immersion vs. convenience dichotomy (Bolton et al. 2018). While the traditional view sees digital technologies as enablers of extremely useful and fast experiences by removing pain points (Lemon and Verhoef 2016) or deeply personalized and immersive environments (Parise, Guinan, and Kafka 2016), our study conceptualizes customer experience innovation as a broader set of solutions where even small technological implementations can innovate the experience (Xue and Swan 2020) towards a more utilitarian or hedonic customer experience. Our study, in particular, shows how different implementation modes can drive the pursuit of utilitarian or hedonic customer experience, reinforcing the literature in the field on the need to do more research on this dichotomous view of customer experience (Candi, Van Den Ende, and Gemser 2016). Based on the analysis of 32 cases, the investigation reveals that both utilitarian and hedonic customer experiences play a crucial role not only in relation to technologies that extend beyond the product itself (Chitturi, Raghunathan, and Mahajan 2008) but also in shaping the in-store experience. This understanding negates the need for retailers to constantly seek out new technologies to create 'wow' experiences (Dabić et al. 2023), suggesting instead that more conservative implementations, such as the automation and customization modes, can be effective. Rather, it proposes understanding technology as a potential enabler of small details that make the overall experience more enjoyable (Bolton et al. 2014). Thus, we propose that customer experience innovation is driven by technology rather than based on new technologies. This perspective allows reconciling the understanding of customer experience as perceived by the customer and as designed by the firm (Beltagui, Darler, and Candi 2015) in an integrated framework.

Our final contribution is the intertwined view of technology and retail customer experience innovation (Artusi et al. 2020). Our findings suggest that there are different modes to successfully introduce new technologies. This is partly in contrast with the traditional view that strong technologies are the best solution to introduce new hedonic purposes (Verganti 2011; Magistretti, Dell'Era, and Verganti 2020a). The evidence from our cases shows that it is awareness of the implementation mode that matters. The mode adopted can be more technological (Adner and Kapoor 2016) or experiential (Vargo and Lusch 2008) and can be fine-tuned based on the characteristics of the retailer (i.e., typology or positioning). Understanding the inner value of an emerging digital technology (Rotolo, Hicks, and Martin 2015), and not necessarily adopting the strongest technology (Iansiti and Lakhani 2020b), can lead to exploring the opportunities presented by the combination of technology and customer experience innovation.

6 | Conclusions

This study illustrates the modes of technology implementation to innovate the customer experience. These modes—automation, augmentation and customization—can help organizations envision not only the experience they want to deliver to customers but also the most appropriate way to implement emerging technologies. The analysis of 32 cases of early adopters of beacon technology sheds light on the debate about the implementation of emerging digital technologies when the goal is to improve the technological experience by increasing technological performance, but also that the technological dimension is only one of the dimensions for innovating the overall retail experience. Technology is a means, not an end. In weak implementations, replacing existing customer activities or salespeople does not mean that the impact on the customer experience is limited and can still be inspiring (i.e., automation). On the other hand, strong implementations of emerging digital technologies can be valuable (i.e., customization), even if the experience is innovated at the utilitarian level. Therefore, the intertwining of the two modes can be critical (i.e., augmentation).

As with all research, our study has some limitations regarding the early adoption and longitudinal development of technologies, as well as the generalizability of findings related to a single digital technology (i.e., beacons) in a specific context (i.e., retail). In addition, our study is limited to the US and European contexts. Finally, in-depth case studies with interviews would be valuable to gain deeper insights into technology implementation

from the firm's perspective. Nevertheless, we hope that our work will inspire further studies to expand our understanding of the relationship between customer experience and technology.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnotes

[1]https://www.amazon.com/b?ie=UTF8&node=16008589011.

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