Consumer-facing technologies in stores: A longitudinal study of their impact on customer experience

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Abstract: This paper presents a longitudinal study of instore shopping technologies (ISTs) and their contribution to the phygital fashion store. It builds on studies of store design in an omnichannel environment and the use of ISTs for distinctive customer experiences (CX). The aim is to understand changes in fashion retailing brought about by ISTs and the extent to which retailers innovate and the extent to which they influence CX in the customer journey. The research was undertaken in three stages, in 2014, 2019 and 2024 in three of London's West End shopping streets. The methodology was replicated in each stage, using observations of store interiors and in-depth, qualitative interviews with 25 consumers. The findings provide retail designers with new knowledge about consumer-technology interactivity, retail sectoral differences and the rate of change in the use of ISTs. In conclusion, the paper highlights the evolving relationship between retailers and consumers, consumer agency and the shopping experience.

Keywords: Technology, retail, experience, phygital

1. Introduction

The retail store, defined as "a physical space that consumers enter and that facilitates, directly or indirectly, customers' progression along the shopping journey by providing them with benefits" (Breugelmans et al. 2023, p. 532) is under increasing pressure. Stores are no longer constrained by four walls but increasingly form part of an integrated offline, online and mobile customer journey. This combination of online and offline channels of communication and distribution, along with the convergence of commerce, service, leisure and culture have contributed to the emergence of a hybrid, 'phygital' store (Alexander and Kent 2017). Within this environment, new customer experiences (CX) are determined by shopper-facing digital tools and instore technologies (IST) (Batat 2019; Inman & Nikolova,

2017). These are co-created between customers and retailers that are both store-owned, and customer-owned (Alexander & Varley, 2025; Naeem 2025). Technologies owned by the store must be leveraged to enhance connectivity, enable seamless services and elevate phygital experiences. The implications for retail design are spatial, material and visual. The functional elements include the layout and signage, and aesthetic elements of colour, scale, texture/pattern, style and merchandise presentation, and atmospheric elements through the senses (Quartier, 2018; Roggeveen et al. 2020). Moreover, in the phygital store retail designers need to understand digital developments and how digital solutions can be integrated into the store environment (Quartier, 2020). These are particularly significant in the CX of fashion retailing, where luxury, designer and mid-market brands compete for higher value customers and mass market brands seek high sales volumes. Thus, the aim of this paper is to advance theory about the creation of CX through retailers' ISTs combined with customers' own technologically enabled devices. The practical contribution is to demonstrate how technologically-enabled changes take place in fashion retail; the relative importance of different IST over time - a consideration for investment decisions - and how they affect CX.

2. Literature Review

The literature of consumer-facing technology and its integration into physical stores falls into three main categories. First, transformational change of traditional retailing and the implementation of omnichannel touchpoints (Högberg, 2019; Pantano & Vannucci, 2019; Mosquera et al., 2018; Pantano & Dennis, 2019; Pantano et al., 2018a, 2018b; Poncin et al., 2017). The second, explores the rate of innovation in the field and the extent to which these technologies are accepted by retailers and customers. However, the review failed to find any research that that tracked IST diffusion among retailers over time. This is significant due to the rate of change in online digital technologies and software development and their connectivity with consumers.

The third group of studies focus on consumer intention to use certain technologies including self-checkouts and interactive points of sale displays (Kim & Forsythe, 2008; Pantano & Vannucci, 2019; Perry, 2016; et al., 2017). Research underscores the potential of ISTs to augment CX, yet most studies focus on specific ISTs rather than examining their combined influence on the overall CX (Qiu et al., 2024). Studies have examined various store-owned technologies, including virtual fitting rooms (Lee et al. 2022), humanoid service robots (Mende et al., 2019), artificial intelligence (AI) applications (El Abed & Castro-Lopez, 2024), Augmented Reality (AR) (Pfeifer et al., 2023; Rejeb et al., 2023), digital signage (van Giesen & Leenheer, 2019), in-store tablets (Chattaraman et al., 2024), self-checkouts (Kim & Yang, 2018; Qiu et al., 2024) and beacons (Shankar et al., 2021; Van de Sanden et al., 2022), as well as consumer-owned technology often used for in-store engagement, including mobile devices and apps (Darvasi, Spann & Zubcsek, 2024). This project aims to understand how consumers perceive these ISTs in store environments and how they integrate with their own devices, typically smartphones.

2.1 Experience

Experiences arise from the process of engaging with stimuli (Schmitt, 1999; Hoyer et al., 2020) and delivering superior CXs has become a critical point of differentiation for retailers (Verhoef et al., 2009; Vatsa, Agarwal & Gupta, 2023). For example, Clarks Cloudsteppers stores, launched in 2025, are designed as relaxed, experiential spaces in which to showcase lightweight sneakers and casual shoes. CX is a holistic phenomenon, encompassing cognitive, affective, social, sensory and behavioural responses (Lemon & Verhoef, 2016). *Cognitive dimensions* refer to mental activities related to acquiring, processing and retaining information (Tseng, 2021). The *affective dimension* involves emotional responses, such as enjoyment and satisfaction, which can significantly influence customer engagement. The *social dimension* focuses on interactions with others, contributing to the process of socialisation through influences from family, peers, and media. *Sensory experiences* engage customers by stimulating each of the five senses.

Sensory experiences are defined by the store's atmosphere, which affects customers' emotions and behaviour through aural stimuli, including music, olfactory stimuli, tactile stimuli and visual stimuli, including lighting sources and level, colours, fixtures and fittings (Parsons, 2011). However, previous research has provided limited insights into IST and CX, rather than focusing on holistic experience.

This review highlights gaps in existing research about the use of customer-facing IST instore and their rate of adoption by retailers. As many of these studies are located in time, researchers have little understanding of their trajectory from introduction to acceptance by customers and how IST may evoke different responses in customers' CX. However, it is less clear how the integration takes place to improve CX, leading to three research questions addressed in the paper, first to investigate how ISTs are adopted by fashion retailers, second to understand the changes that have taken place between 2014-2024 and third, how ISTs operationalised collectively, shape CX of the fashion retail store.

3. Methodology

In this study a longitudinal approach was used, extending over 10 years with three data gathering points in 2014, 2019 and 2024. Longitudinal studies repeatedly observe the same subjects over an extended period to track changes. They enable the observation of developmental trends, life events, and long-term changes and the analysis of change in the variables and patterns. Further, they allow the researcher to explore the influence of earlier circumstances on later outcomes, providing deeper insights than a single snapshot in time. To achieve these objectives, a mixed methods approach was used at each stage that combined observations with interviews.

The interview questions remained the same at each stage of the research, although some subsidiary questions changed in the light of findings and updated literature reviews. In 2014, the researchers aimed for an understanding of the phygital store environment and the ways ISTs facilitated online and offline convergence - omnichannel retailing - to explore the CX of converged phygital fashion store environments. While the research literature had shown the potential of ISTs to advance omnichannel retail, the findings demonstrated considerable variance in their adoption and customer CX (see Table 1). This informed the research in 2019, which continued to explore CX but also aimed to find out to what extent fashion retailers

were innovating in terms of ISTs and what types of in-store technologies were diffused across different fashion retail value segments. Further refinements in the research focus were undertaken in 2024, again to explore CX with participants but also, the place of the phygital store in the context of the customer journey.

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The unit of analysis was fashion retail that included clothing, footwear, sportswear, beauty, accessories, and lingerie across all market levels, from value to luxury (Business of Fashion, 2019). London, as a global fashion capital with a highly digitally engaged consumer base, offers a leading context for studying retail innovation (Alexander & Kent, 2022). The study was conducted on Oxford Street, Bond Street, and Regent Street, central London's high-footfall shopping destinations. These prestigious streets are internationally recognised as benchmarks of retailer success, characterised by a high density of flagship, experiential, and technologically advanced stores (Alexander & Kent, 2021, 2022). Observations were made of instore technology that included BOPIS and WIFI as facilitators of cross-channel integration, digital screens on instore mobile devices and installed screens. Each street was visited by two researchers between January and March in 2014, 2019 and 2024. From 319 fashion stores counted across the three streets, ISTs were observed and recorded in 78 stores in 2014, 134 in 2019 and 243 in 2024, at which time 95 were reported on Bond Street, 87 on Oxford Street and 61 on Regent Street. The stores were in every market sector from mass-market to luxury and the variance in observations over the period was in part due to technology adoption but also site redevelopment, refurbishment and closures.

3.1 Observations

Unobtrusive observation was used to systematically record the prevalence, types, and use ISTs, including interactions between ISTs, customers, and frontline staff (FLS). Observational methods offer key advantages over surveys by capturing "microanalytical glimpses" (Jonsen & Jehn, 2009: 136) of real-time behaviour in natural settings (Wells & Sciuto, 1966), providing objective, non-disruptive insights. Prior research affirms their value in assessing in-store environments and shopper behaviour (Alexander & Kent, 2021; 2022). Following Seiler and Pinna's (2017) four-step observation protocol; first, the researchers acted as co-observers, upon store entry, researchers adopting a mystery shopper role, interacting with the space and staff to simulate a typical CX. ISTs were photographed via smartphone; if questioned, researchers disclosed their purpose, which often led to spontaneous staff IST insights. Over 300 photographs were taken and analysed at each stage.

3.2 Interviews

Interviews were undertaken with 25-30 male and female participants, age 20-30 (Millennials and Gen Z), students and young professionals. The sample was replicated in each stage. Semi-structured interviews were replicated in 2014, 2019 and 2024, with each interview taking around 30-45 minutes. The interviews were analysed using NVivo for textual coding and thematic development by two independent researchers and the results were cross-checked for thematic alignment. Photographs and field notes were coded and tabulated in Excel and qualitatively analysed in NVivo. Braun and Clark's (2006) thematic analysis approach was applied to the findings. The initial stage of analysis coded the technologies by their street location, year of data collection and application to channel integration. Ethical approval for each stage of the project was given by University of the Arts Research Ethics Committee.

4. Findings

The findings from the 2014 stage of research demonstrated that retailers were working towards multichannel integration and this merging of channels highlighted sensory and affective dimensions in the shopping experience (Figure 1). Technology was found to be at the service of the consumer but also, particularly video and photo screens offered other enjoyable and different experiences as well. However, some found them less enjoyable; as one respondent observed, they were "bored by the time the stuff is in the stores as you've seen the clothes so many times before… (it) takes away charm, excitement, surprise". The human service element instore was welcomed by some for advice and information because shop staff were able to help by looking up item availability on their tablets because the store's "stock is so huge".

Nevertheless, the implementation of IST was found to be very variable. Four categories of instore technology were defined, level 1 stores had no IST; at level 2, the technology was an element of instore design, primarily through the use of photo and video screens; level 3 ISTs were evident as in level 2 but also as a facilitator for customer information gathering and at level 4 ISTs were integrated in to the stores as a means to merge the physical and virtual channels, the most integrated form of phygital store. At this level, there were only a limited number of stores spread across different fashion sectors, exemplified by New Look, Selfridges, Nike and Burberry. In these stores, themes highlighted the role of ISTs in cognitive as well as sensory and affective experience (Figures 1 and 2).

Figure 1 ISTs: Sensory and affective experience dimensions (Author's own)

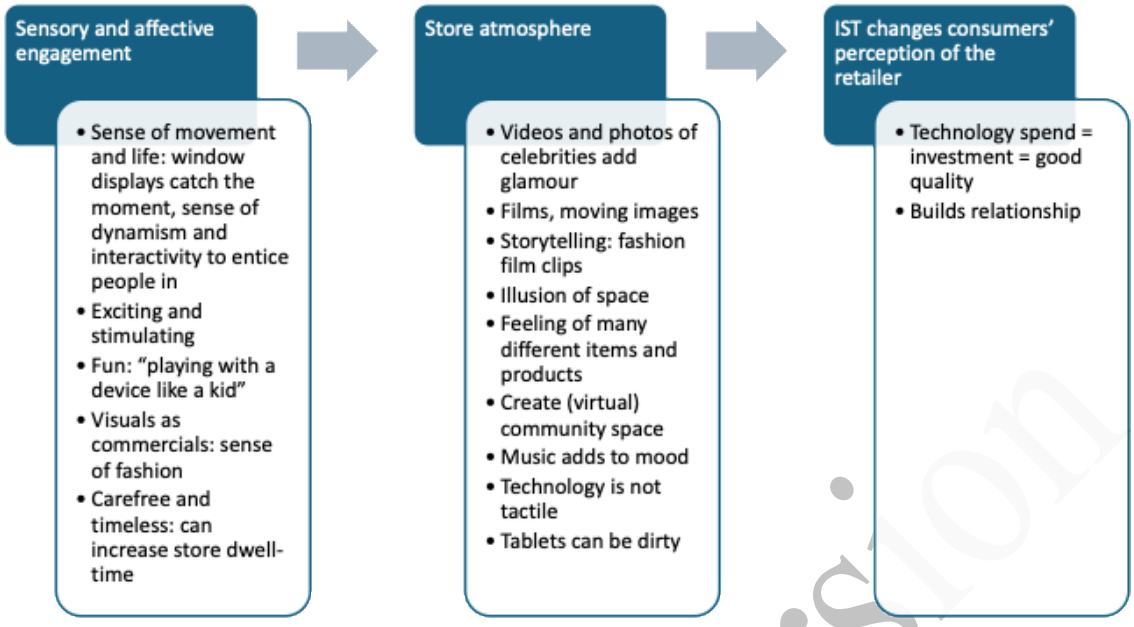
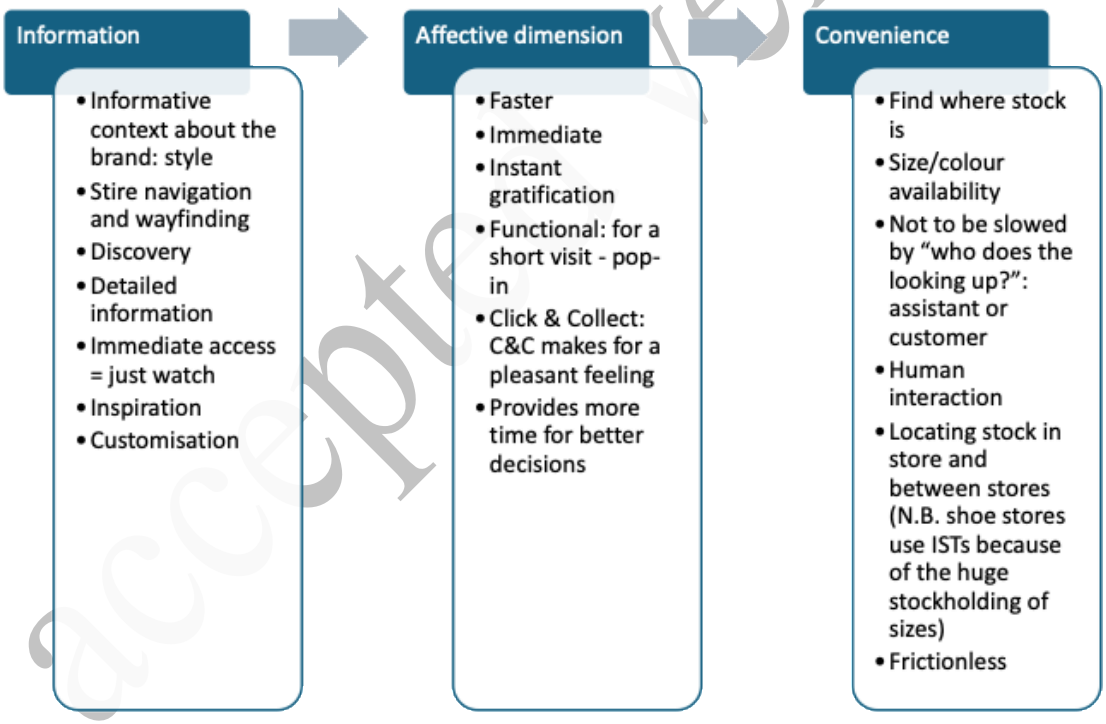


Figure 2 ISTs: Cognitive and affective experience dimensions (Author's own)



At the next stage of the research in 2019, more detailed themes about IST emerged from the findings. The first, information and product display technologies continued to highlight the widespread use of instore photoboxes, which displayed single images or limited number of photographs and video screens. But these had moved on from 2014, with more, larger screens in store that used dynamic images or film. These signage technologies were more apparent in sports and to some extent outdoor branded outlets, where they enabled consumers to discover the brand and its products. Large interactive screens remained

relatively underused throughout the period and were restricted to solus sites and department stores that had enough space to implement them.

The second category was defined by technologies that enhanced the shopping experience. The research found very limited evidence of Augmented Reality (AR) and Virtual Reality (VR) from both the observations and interviews. However, there was growth in new forms of in-store personalizing technologies including monogramming and product customisation. Information search technologies formed a third category. Mobile devices became more prevalent with a functional role for inventory lookup for availability, to demonstrate products, e-commerce (sales) and surveys. These were used for data collection and feedback: more consistent and less error-prone e.g. staff check size or stock and register customers. Interconnectivity through customer smartphones and QR codes was found in only a small number of stores.

A fourth category was payment technologies. Although the use of mobile devices for payment has been discussed there was little evidence of their widespread adoption. During this period of study, it had only been introduced into seven stores. Self-checkout was not available in 2014 and was only marginally adopted by the end of this period. However, there were advances in the implementation of BOPIS facilities, although they tended to be available through brands that were domiciled in the UK and in WIFI provision as a link to e-commerce but also to store communications for the possibility of real-time, personalized sales.

In the third stage of the research in 2024, most interview participants had to be prompted for IST examples of non-interactive ISTs. Screens, now found in most stores, usually showed video and still images of the latest fashion shows, runways and new product launches. However, they were perceived as commonplace, lacking innovation and, as such, were often ignored by customers, challenging prior research findings (van Giesen & Leenheer, 2019). At best they contributed to the atmosphere of the store and were appreciated for their insights into the latest looks and trends.

A few participants highlighted the negative effect ISTs had on their in-store experience. From a social dimension, they created an impersonal, sterile atmosphere; from a sensory dimension, that a messy and cluttered store made it difficult to search for specific items and from a cognitive one, where lack of advice on how to use in-store ISTs was intimidating. These obtrusive and undesired aspects of the store led some customers to ignore ISTs and others to avoid them altogether.

Among the shopping experience technologies, there was significant growth in the relatively low cost branded app used on customers' mobile devices. The least evident were the more complex interactive AR and VR technologies; customers were aware of these technologies but associated them with pop-up temporary stores and short-term promotional initiatives. Other technologies had greater significance for CX. BOPIS was very widely found in fashion retail by 2024, while self-checkout was the most highly valued IST for its convenience, significantly reducing the time taken in line to pay, a finding similar to Qiu et al. (2024). The technology was recognised as contributing to an efficient, seamless process where shoppers

could complete their store visit *"in hopefully 5 to 10 minutes"* rather than wait up to *"an hour"* to pay for purchases. More recent IST that were liked for a convenient but more personalised service were interactive screens that scanned items at the entrance of a fitting room. These automatically detected what products customers were carrying, checked the availability of a fitting room and directed them to the next available one. This speeded up the physical trying-on experience, as well as the ability to request other items, a process that left the customer more time for shopping in the store. For customer enjoyment rather than convenience, another type of interactive screen had embedded features such as customisation for selfies where *"people try on clothes and customise screen backgrounds for selfies"*.

Radar charts (Figures 3, 4, 5 and 6) show change in ISTs over the 10-year period across all fashion retailers observed and differences in retailer IST adoption by market level.

Figure 3: IST type change over 10 years (Author's own)

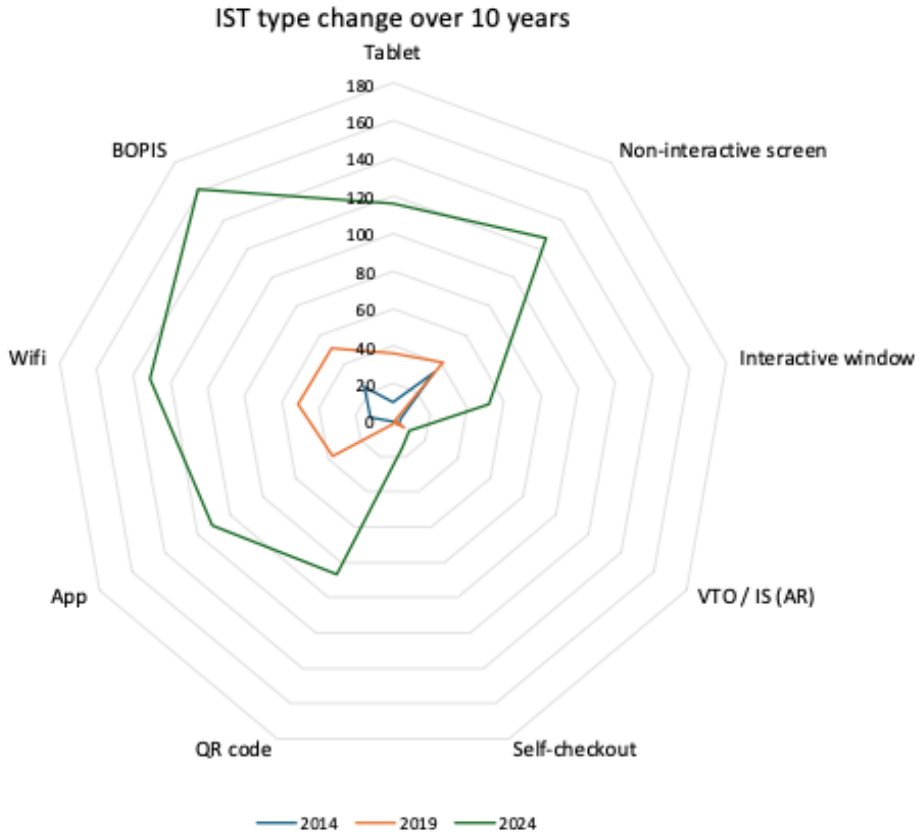


Figure 4: IST type change over 10 years: mass market (Author's own)

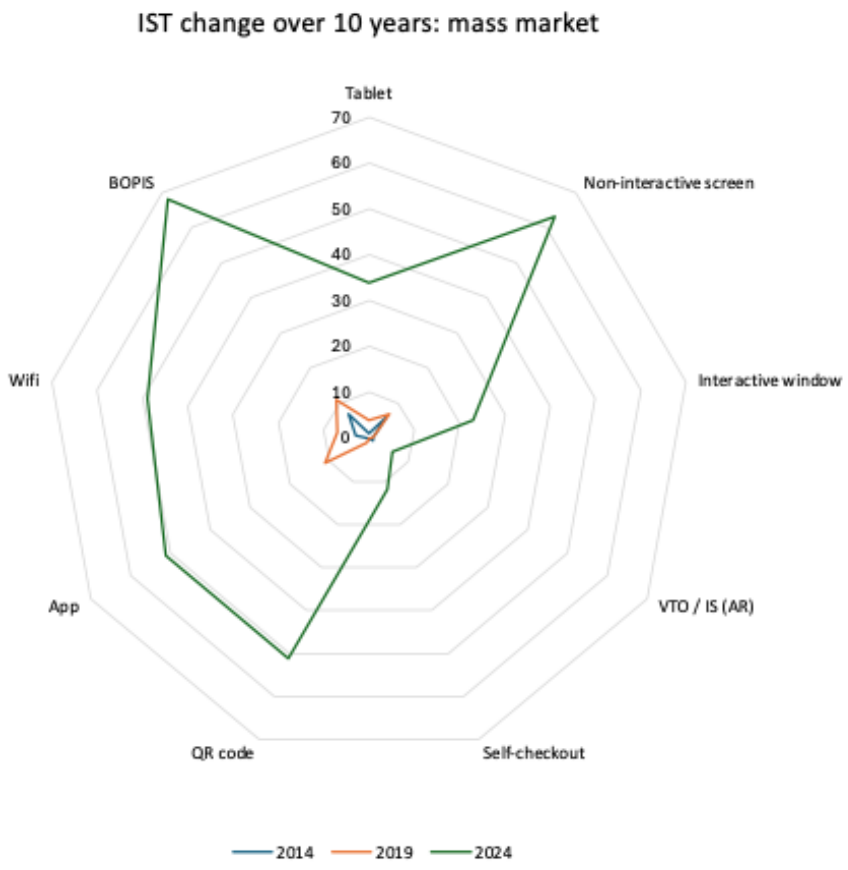


Figure 5: IST type change over 10 years: mid/premium market (Author's own)

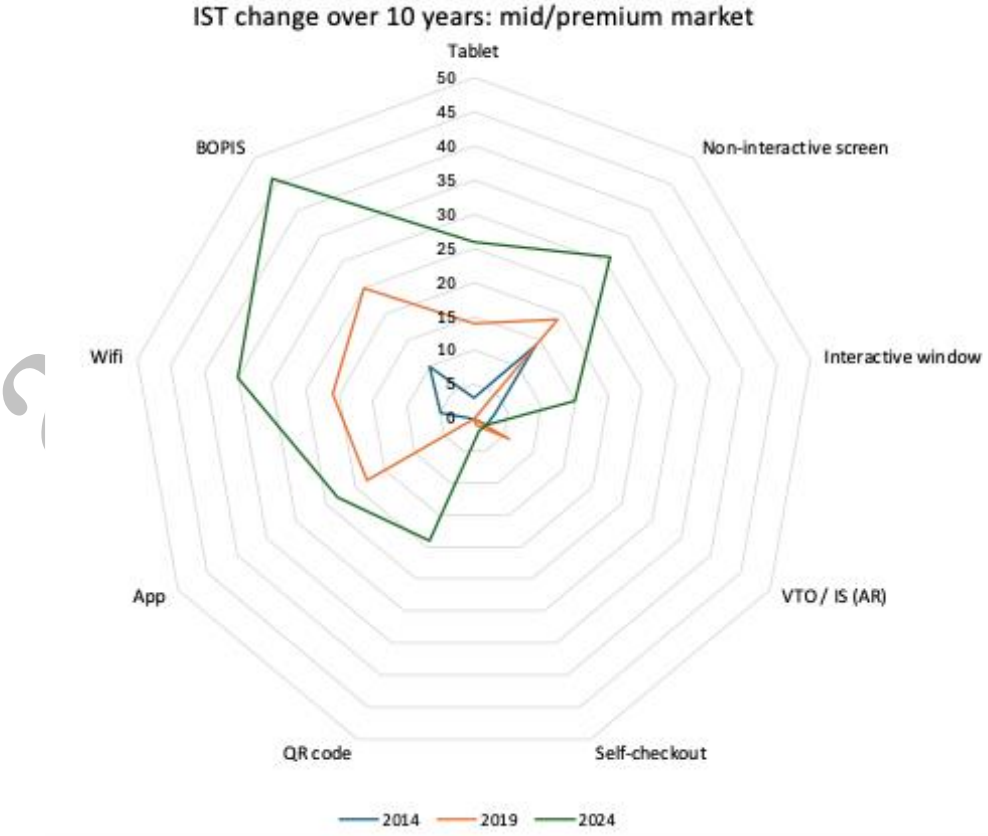
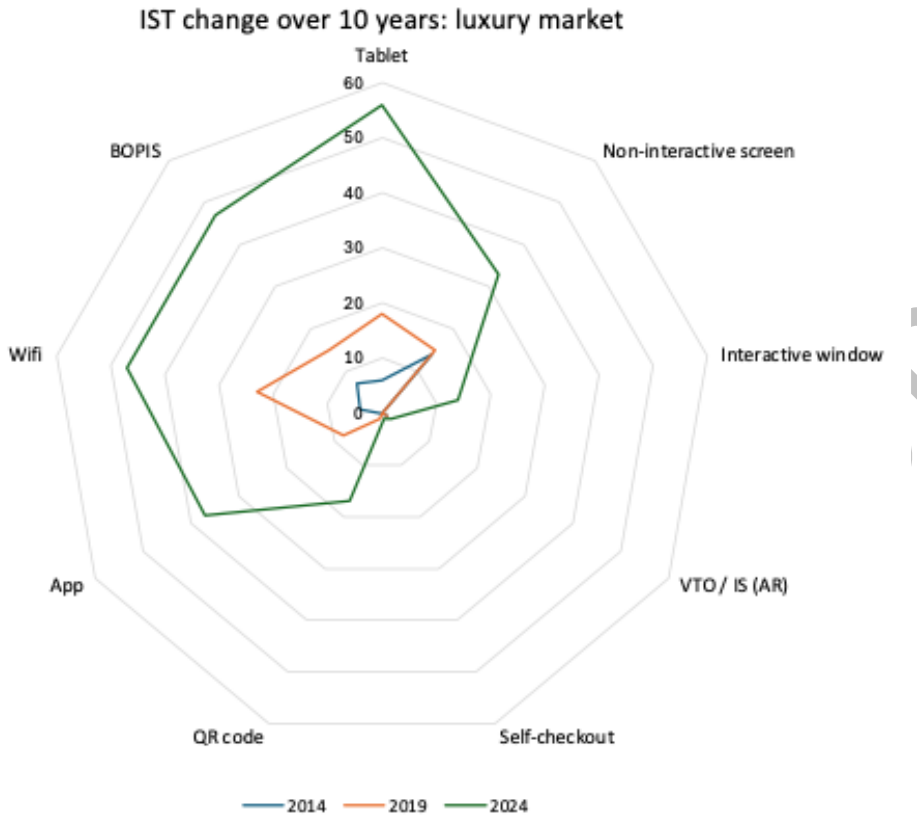


Figure 6: IST type change over 10 years: luxury (Author's own)



4.1 Incremental change

The findings from this longitudinal study are characterised by incremental, rather than radical changes. Not all fashion sectors moved at the same speed in terms of IST adoption and CX. Some significant brands disappeared; in 2014 participants were aware of Top Shop, but by 2024 the brand was no longer evident in physical retail stores. Across the sectors, midmarket department stores declined, with the loss of two major stores on Oxford St. with a consequent decrease in reported instore information and store navigation technologies. In 2014, the luxury sector had a low level of adoption of technologies with very few brands offering a WIFI service. By 2019, luxury stores had accelerated their use of ISTs, especially for personalisation services. Burberry's store in Regent St. opened in 2012 was notable for embracing new technologies with a 22ft-high screen, 500 hidden speakers, a hydraulic stage and clothes with RFID chips that transformed 'magic mirrors' into screens. However, by 2024 there was little evidence of widespread adoption of these and similar technologies in the luxury sector and Burberry itself had pulled back from its IST commitment.

There was an ambivalence towards instore screens in 2014, although more participants enjoyed rather ignored the visual presentation of brand fashions and shows for their contribution to the store atmosphere and new knowledge about products. However, at the end of this period the contribution of this IST was more limited as fewer participants positively commented on their instore contribution or even noticed them. The role of sales

assistants changed too. In 2014, they were valued for personal service and product knowledge and advice about stock availability. Later there was a more evident aversion to shop staff and a preference for the customer to initiate interactions with them to find out about product knowledge and availability. Tablets used by sales staff became more important for product information, which limited personal contact and customers increasingly looked up stock availability on their own smartphones bypassing staff and instore ISTs altogether. For these knowledgeable customers, the design implication is that layouts, collections and garments need to be clearly identifiable and accessible without reference to shop staff but optionally through IST. Not being able to find products and crowded stores were consistently disliked through the period. However, at the end of it participants also explained their dislike of overcrowding in terms of stress and anxiety. By this time, the store's contribution to mental health and wellbeing had become part of the CX.

By 2024, the merging of offline and online CX was evident in the use of customer smartphones through all stages and locations, including the store, in the customer journey. Online searches enabled customers to curate their own 'looks', to build mood boards and outfits at a later date. They were often combined with looks captured from social media, for example *"documenting my day"* in Instagram stories. Hence, the smartphone provided a private curation space owned by the individual. Social media had a second important function, to communicate with family and friends for real-time advice. This aspect combines a social dimension with a cognitive one of information gathering techniques and price comparison, where a picture of an in-store item can inform an online search for a cheaper or second-hand alternative. Interactivity between these customers and ISTs were found to positively influence customers' affective responses to the in-store experience. The implications for design are that physical curation spaces could blend with personal online ones and that the design of the store and the presentation of clothes can 'frame the picture'. Self-checkouts and VTOs were perceived to be the most useful ISTs, supporting the role of self-service technologies in transaction convenience.

5. Discussion

The theoretical contribution of this paper is to demonstrate the changes in the diffusion and acceptance of ISTs in fashion stores and second, how ISTs contribute to the four dimensions of CX. The 2019 research highlighted problems with the integration of ISTs instore and across online and mobile channels so customer-facing stock look-up functions were often limited. An important aspect of this stage of the research concerned the consumers' use of time in the store. In the first five years, IST were mostly implemented through low-cost and well-tried technologies including the roll out of BOPIS facilities, WIFI provision, video screens, tablets and other handheld devices. However, changes in the customers' cognitive experience of gathering information changed as they used their smartphones rather than instore installations, to interact with the brand. This was evident in the case of BOPIS, where more integrated information systems enabled them to initiate product look-up, order and instore pick-up functions on their own devices at any point in their customer journey.

The purpose of non-interactive screens is to create visual and emotional interactivity with consumers. Screens were found to provide an important, and dynamic experience in their

use of rich content, narrative and moving images. Nevertheless, the findings showed that screens are often simply accepted and that instore positioning has to holistically align virtual and real spaces in the store to create affective and sensory experiences with the brand. In addition, store design should now consider their place in customer wellbeing to make the store feel less crowded and stressful.

A further temporal contribution to the concept of the customer journeying through the store is how fashion retail brands strategically used their technologies in their store design. It was clear that some ISTs had a central place in the design, but that others were used for shorter-term promotions and some were experimental. Some technologies were introduced during this period to personalize products and, in the case of photobooths, offer social media print facilities. However, the instore photobooth was also overtaken by consumer smartphone usage and by 2024 had disappeared. Related to this temporal contribution was consumer awareness of technological reliability amongst ISTs. Product breakdowns, variable WIFI signals and unreliable software can lead to consumers rejecting a technology with a consequent effect on brand reputation. The phygital store requires reliable, permanent technological installations and should strategically introduce more complex and innovative ISTs in new store concepts and control their wider implementation.

There were differences between sectors; the luxury sector showed the greatest increase in the use of functional consumer-focused technologies and a significant change in channel integration. The sports sector consistently demonstrated the most integrated use of technologies to enable consumers to enjoy all experiential dimensions, from visually experiencing sports products, to finding products, specifications and customisation. This study found that fashion brands generally create more interactive touchpoints for cognitive experiences than previous research suggests, with increasing use of QR codes to provide specific and sometimes detailed product information. By 2024, information about ethical production and product sustainability had become particularly important for Gen Z customers (see Table 1).

Table 1: Incremental changes to key themes 2014-2024 (Author's own)

Changes to key themes 2014-2024			
1. In-store connectivity			
2014		**2024**	
Tablets provided by store to look up products, staff tablets		Staff ipads + self-look up using QR codes/RFID	
Interactive screens		More self-service checkouts	
Some WIFI		More WIFI + more caution	
Some BOPIS		Accleration in BOPIS use	
Some Apps		Acceleration of smartphone and app use	
Limited QR codes		Acceleration in QR code use	
2. Sectoral change			
Distribution: importance of Top Shop		No Top Shop, decline of Department stores	
Mass market: limited IST adoption		Signicant increase in convenience driven ISTs	
Mid market: limited IST adoption		Increase in NIS, WIFI, BOPIS, apps and QR codes	
Luxury market: limited IST adoption (mostly tablets)		Increase in tablets, BOPIS, WIFU, app use	
3. Consumer / IST changes			
2014 theme	**No. participants**	**2024 theme**	**No. participants**

Research	24	Research	23
Brands	19	Brands	25
Experience	18	Experience	25
Service	23	Sales staff	18
Shopping behaviour	22	Purchasing	19
Social media	18	Convenience	19
Future technologies	17	Motivation	14
Time	14		

This research provided valuable insights into change but also categories of technology and location of the changes, for example the changing retail landscape in London's shopping streets and the number of ISTs installed. However, there is a danger in overstating potential technology use and adoption. There was little evidence of sustained implementation of shopping experience technologies and the general absence of instore AR and VR devices during the longitudinal study highlights the problem of 'absence': technological non-adoption. Although AR has become more prevalent, VR has had very limited exposure in fashion clothing. More evident is its use for cosmetics try-on where participants noted how it was understood to be more hygienic than physical samples. Other virtual try-on technologies for clothes, notably instore 'magic mirrors' have scarcely advanced. Successful adoption requires a nuanced understanding of consumer expectations and shopping habits. For instance, in large stores with extensive product ranges, consumers may find AR helps to access a specific item, while the use of IST in luxury retail stores has to complement the high levels of personalised service that customers expect (Xue et al. 2024). The implications for design are that instore AR and VR need to be cost effective, integrated into the brand and located in high value stores with a clear benefit to sales and profit with the possibility of later roll-outs to other stores.

An unexpected finding at the end of this study, was the redefinition of fashion shopping convenience in the phygital store. Convenience is accepted as a well-established element of the shopping journey, but this research demonstrated how the term has foregrounded 'easiness' and 'immediacy' in the CX. Easiness is defined as a freedom from difficulty and absence of effort on the part of the consumer which is facilitated by the simplicity and predictability of ISTs and the consumers' control over them. For young shoppers, it relates to the significance of the perceived role of technology as helpful and emotionally supportive. These affective and cognitive dimensions were evident in the convenience of predictable in-store experiences that embrace product availability and location in the store, that overcome the difficulty of finding items in the right size and quality from the displays and the problem of navigating around larger stores. During the period of study, younger consumers became less prepared to wait and highlighted their own short attention span that increased the need for immediacy to access to things or information, accompanied by a need to find exactly what is wanted in the store "in five seconds", to be there with a purpose, "laser focused" as a shopper. This temporal dimension is facilitated by the increasing use of smartphones at any time, not only to find things but to personalize a store visit, to take pictures for pleasure, or create a picture collection. In these ways the social dimension of CX has become steadily more important, a dimension facilitated but not owned by retailer owned ISTs.

6. Conclusion

Repeated studies in the same field require a consistent focus on understanding changes over time. This research demonstrates the slow and variable rate of incremental change in the use of ISTs and CX in fashion retail stores in a more integrated customer journey. The physical store has to be conceptualised within a journey in which the relationship between brand and customer has changed. Customers have more agency in creating and choosing their retail experience from their smartphone, in their own time outside as well as within the store, and through social media connections with others. These incremental changes matter as they individually and collectively contribute to new experiences, behaviours and relationships. This research demonstrates how store design should reflect the effect of such cumulative small changes and how they may lead to 'tipping points' for new design concepts.

This study has several limitations. The research was conducted on central London shopping streets, and findings may differ in larger or more fashion-oriented retail destinations where opportunities for implementing ISTs may be greater. In addition, store closures and refurbishments created some inconsistencies in observations across the three time periods. More broadly, examining the recent past proved methodologically challenging, as it sits between established historical and contemporary research approaches. Despite these limitations, the study highlights several directions for future research. First, there is a need to better understand the role of ISTs within retail strategy and operations, particularly their ability to deliver meaningful impact at scale and within cost constraints. Second, further work should explore how the placement of ISTs within the store environment can shape customer experience, enhance convenience, and reduce consumer anxiety. Finally, future research could examine the contribution of ISTs to the retail sensory environment and their potential to support sustainability agendas, particularly where digital solutions may reduce reliance on physical resources.

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