Smart mirror fashion technology for better customer brand engagement

Mian Wang, Jamie Marsden & Briony Thomas

Published online: 16 Aug 2023.

Submit your article to this journal ⬈

Article views: 176

View related articles ⬈

View Crossmark data ⬈

Taylor & Francis
Taylor & Francis Group

Smart mirror fashion technology for better customer brand engagement

Mian Wang, Jamie Marsden and Briony Thomas

School of Design, University of Leeds, Leeds, UK

ABSTRACT

The emergence of new technology provides fashion retailers with innovative ways to deliver the shopping experience and engage with customers. One innovation is smart mirror fashion technology (SMFT) which enables customers to virtually try-on products and have a more pleasing experience within physical retail stores. This kind of technology is considered a powerful decision tool for online customers because it enables them to more readily experience clothing merchandise and as a result engage with the brand in a unique way. Previous research on SMFT in retail settings have been limited to online retail formats, and seemingly ignore the relationship between SMFT and customer brand engagement. Drawing from three case studies, featuring interview data, we explore how SMFT could enhance customer brand engagement in-store. We discuss the impact of SMFT on customer brand engagement and advance a new conceptualisation for managing SMFT in physical retail stores. We synthesise these findings into three actionable points.

1. Introduction

Digitalisation and new technology have had a transformational influence on retail formats and driven customers to embrace online retailing in greater numbers. This has been accelerated by the Covid-19 pandemic, which forced retailers to seek out new solutions beyond their usual strategies and explore a broader range of service innovations (Heinonen and Strandvik, 2020). However, physical stores account for the majority of sales and therefore remain relevant for the majority of customers. (Stott & Walker, 2018). The physical store, especially for the fashion industry, provides consumers with the advantage of testing products before they buy, thus avoiding the inconvenience of returning items. Technology innovations play a prominent role in the retail landscape, particularly for innovative in-store technology, as customers tend to explore novel touch points to obtain a deeper, more engaging, integrated shopping experience (Savastano, Barnabei, & Ricotta, 2016). This is culminating in the retail industry gradually becoming smarter because technological advancements like smart mirror fashion technology (SMFT) improves the shopping experience for customers in brick-and-mortar stores (Dacko, 2017; Lee & Xu, 2020).

Equally the brand plays a significant role in the customer decision process, as customers learn to trust their preferred brands when strong brand loyalty has been established (Lam & Shankar, 2014). It is the behavioral, emotional and cognitive dimensions of brand interactions that form the concept of customer brand engagement (Hollebeek, 2011). Previous research has examined customer brand engagement in technology contexts (Algharabat, Rana, Alalwan, Baabdullah, & Gupta, 2020; Hollebeek, Glynn, & Brodie, 2014; Hughes, Swaminathan, & Brooks, 2019), but these studies are limited to online technologies and social media platforms. Similarly, other academic studies have explored various online fashion technologies, generally focusing on customer adoption of specific technologies (Kim, 2022; Kim, Lee, Mun, & Johnson, 2017; Lee & Xu, 2022; Li & Xu, 2020). Meanwhile, a related stream of studies has focused on distinct technologies, such as the use of virtual fitting rooms and augmented reality used in online channels or in mobile applications, predominantly focusing on functional properties (Adikari, Ganegoda, Meegama, & Wanniarachchi, 2020; Beck, 2022; Hernández, Mattila, & Berglin, 2019; Song, Tong, Du, Zhang, & Jin, 2018).

More recently studies have started to explore whether SMFT had the potential to enhance customer experience (Blázquez, 2014; Lee & Xu, 2020), however, these studies overlooked the importance of the broader impact on customer brand engagement, especially the interactive and pleasure engagement with brand.

CONTACT   Mian Wang ✉ sdmwa@leeds.ac.uk ▣ School of Design, University of Leeds, Leeds LS2 9JT, UK

Customer participation in services has been found to have two primary benefits: utilitarian and hedonic (Dabholkar, 1996). Retail shopping produces both utilitarian and hedonic value: utilitarian value refers to obtaining products efficiently, while hedonic value is related to emotional experiences like excitement and enjoyment (Babin, Darden, Griffin, & Darden, 1994). The evidence suggests that SMFT can balance both utilitarian and hedonic aspects of shopping by providing a convenient and enjoyable way for customers to try on clothes and explore fashion options. Although there are a variety of SMFT used in brick-and-mortar retail stores, the question of how SMFT can enhance customer interaction and foster deeper engagement with fashion brands in the retail sector is yet to be explored. To address this issue our study explores: (1) how customers interact with SMFT in physical stores, and (2) how SMFT might change the way customers engage with the brand as a result of the SMFT.

2. Literature review

2.1. Smart mirror fashion technology in retail

SMFT is a technology that provides an interactive experience that simulates the actual fitting experience of clothes shopping but without the physical need to remove clothing. This technology enables customers to browse a variety of clothing quickly and conveniently via the mirror's screen (Blázquez, 2014; Lee & Xu, 2020). The integration of a mirror with an electronic display that allows customers to access different clothing options has been referred to as a magic mirror, virtual fitting room, interactive mirror, digital mirror and SMFT (Dongare, Devale, Dabadge, Bachute, & Bhingarkar, 2020; Lee & Xu, 2020; Ogunjimi, Rahman, Islam, & Hasan, 2021). For example, fashion brands like Ralph Lauren and Lily have implemented SMFT in stores to offer visitors the opportunity to request different sizes, colours, and styles of clothing without leaving the fitting room, and Nike uses AR technology to measure shoe size and help customers to find the right fit.

Previous research in the area has focused on the functional performance of virtual reality technologies, initially within the fields of health and obesity research, to estimate body size with 3D body scan data (Loker, Ashdown, Cowie, & Schoenfelder, 2004; Pepper, Freeland-Graves, Yu, Stanforth, & Xu, 2010), and self-administered body measurement (al-Qerem, 2016). The benefits of this technology became recognised in retail and fashion with studies exploring the real-time simulation of 3D clothes (Adikari et al., 2020) and the extent of customer adoption of simulation technology, with Lee

and Xu (2022) arguing that the value of an online virtual fitting room (VFR) lies in the functional benefit of enabling customers to better evaluate garments (Lee & Xu, 2022). As this latter study focused on the use of VFR technology within online retail settings, the findings do not directly translate into physical settings.

One of the reasons cited for the lack of uptake in such technology among retailers was due to potential concerns in the accuracy of simulation (Gao, Petersson Brooks, & Brooks, 2014). Connected to this, retailers seemed reluctant to have simulation technology in physical stores if its purpose was to solely serve utilitarian fitting needs. Kim et al. (2017) demonstrated that for smart in-store technology, perceived enjoyment is more important to consumers than perceived usefulness. In the deployment of simulation technology, therefore, it is critical to consider the role separately across different channels. While Lee and Xu (2020) classified the available smart technologies from an online customer experience perspective, there has been less of a focus on the impact of SMFT employed in-store.

Fashion brands are using smart technology in stores to offer customers digital experiences that blend with the physical store (Bonetti & Perry, 2017). This integration can potentially enhance the overall consumer experience (Alexander & Alvarado, 2017) and generate a new kind of interaction between the brand and consumers (Armstrong & Rutter, 2017). Interactivity serves as a defining feature that differentiates interactive technology, such as SFMT, from non-interactive in-store technologies, for example, digital signage. Such technology offers store visitors an enhanced experience by providing additional content and enabling them to actively engage with its elements, much like personal devices (Siregar & Kent, 2019).

This heightened level of interactivity has the potential to provide numerous benefits for store visitors, including improved confidence and familiarity in utilising the technology, which can ultimately contribute to an enhanced overall in-store experience (Siregar & Kent, 2019). The notion of 'peak experience' is a crucial aspect of technology interaction, as it is considered to evoke strong emotions and reactions in users, resulting in a profound impression in the memory (Blythe & Hassenzahl, 2018 McCarthy & Wright, 2004;). When consumers use SMFT in fashion stores the multi senses, such as visual, auditory, tactile and olfactory senses, may be triggered (Siregar & Kent, 2019). This higher state of perception is claimed to lead to a better quality of the overall experience (Wright & McCarthy, 2010).

While there is a growing convergence between customers, brands, and technology, due to the digital revolution, there is a paucity of research that specifically

examines this convergence in the context of in-store SMFT (Kent, Vianello, Cano, & Helberger, 2016; Zha, Foroudi, Melewar, & Jin, 2022). We therefore do not know how customers engage with SMFT within physical retail settings, and how this might enhance customer brand engagement. In the following sections, we consider how the different technologies play a role in SMFT and then discuss how the customer experience of SMFT is connected to brand engagement.

2.1.1. Augmented reality (AR) technology

Augmented Reality (AR) is a type of technology that overlays digital content, such as images, text, or 3D models, onto the real world (Kipper & Rampolla, 2012). AR technology, therefore, combines the real world with virtual information, creating an experience that allows users to interact with digital objects in a natural and intuitive way (Radu & Schneider, 2019). SMFT takes AR innovation a step further by integrating AR technology into a physical display. By combining AR with a mirror display, SMFT enables customers to virtually try on the augmented products on the display screen without the need for removing clothing. This technology layers the virtual objects over the actual environment to mix the virtual world with reality, simulating a realistic fitting experience. AR technology, therefore, provides brands with a dynamic opportunity to engage with customers by conveniently projecting brand products upon customers' bodies within the physical retail environment.

Research within this area has mostly been limited to exploring the impact of AR usage on consumers' shopping via mobile devices and online channels (Javornik, 2016; Rauschnabel, Felix, & Hinsch, 2019 Rese, Baier, Geyer-Schulz, & Schreiber, 2017; Watson, Alexander, & Salavati, 2018). One study conducted by Watson, Alexander, and Salavati (2018) investigated the potential benefits of AR in online retail applications (apps) in the context of hedonic shopping motivation. This study argued that incorporating experiential AR elements into online retail could enhance consumers' positive affective responses and influence their purchasing intentions.

However, more recently, studies have demonstrated the benefit of AR technology as offering an efficient way to try on clothes without queuing up for the fitting room or needing the attention of sales associates, which translated a utilitarian feature into a hedonic shopping experience for customers (Lee & Xu, 2020; Ogunjimi et al., 2021). Collectively these studies imply that a range of enhanced environmental features can transform how consumers feel, particularly in terms of their enjoyment and excitement levels. In such retail settings, consumers are more likely to actively engage with

and control objects within their environments to acquire value beyond simply evaluating online content (Siregar & Kent, 2019). By incorporating digital information in the form of text or graphics, AR technology enhances the overall brand experience for customers, catering to both their functional and emotional needs (Cuomo, Tortora, Festa, Ceruti, & Metallo, 2020).

It is this type of use of AR technologies that is increasingly seen as a catalyst for retail innovation (Moorhouse, tom Dieck, & Jung, 2018). The key considerations behind the effective incorporation of AR, according to the Technology Acceptance Model (TAM), is the perceived usefulness and ease of use of the technology (Davis, 1993; Davis & Venkatesh, 1996; Lee & Xu, 2022). In emphasising the usefulness and ease of use, retailers are likely to create an environment that facilitates interactions between customers with varying technological abilities and psychological needs. By doing so, retailers can study the cause-and-effect relationship between the store's ambience, the customer's level of interest in gathering information, and their resulting behavior. This insight can help retailers target groups that were previously difficult to reach through traditional marketing methods (De Keyser, Schepers, & Konuş, 2015).

2.1.2. Information and communication technology (ICT)

SMFT has the potential to revolutionise the fashion industry by leveraging ICT innovation to provide a more personalised, efficient, and engaging shopping experience for customers (Amendola, Calabrese, & Caputo, 2018). SMFT that feature ICT devices enables customers to access a range of information, such as the ability to compare prices, level of inventory on products across channels, and customers' reviews on social media (Kent, Dennis, Cano, Helberger, & Brakus, 2018; Kim, Lee, Cho, & Jung, 2020). Allowing customers to access such information via interactive touch screens and digital displays in physical stores improves communication and engagement with customers (Kent et al., 2018; Kim et al., 2020). Savastano et al. (2016) argue that ICT devices linked with social networks augment the in-store shopping experience by creating new layouts and making products easier to identify and purchase. Through the incorporation of ICT interfaces, the customer experience of the physical store becomes increasingly similar to the experience of an online purchasing environment, culminating in a more seamless omni-channel experience.

Some SMFT integrate passive, often invisible, technologies that have a significant impact on the in-store experience. As an advanced identification technology,

RFID enables the tracing and locating of products throughout the store by remotely reading the information on product tags (De Marco, Cagliano, Nervo, & Rafele, 2012). The sensors in RFID can be used to gather data on customer behavior, such as how long they spend in a particular section of the store, which products they interact with, and what items they purchase. This data can then be used to optimise store layouts and product placement, as well as to develop targeted marketing campaigns that are more likely to resonate with customers (Rallapalli, Ganesan, Chintalapudi, Padmanabhan, & Qiu, 2014). The advantage of RFID is that it enables retailers to manage inventory, analyse customers' consumption habits and patterns, reduce transaction errors, as well as reducing lengthy queues by quickening the checkout procedure (Roussos, 2006). The benefit of RFID to consumers is that it can optimise the payment process by allowing customers to scan product codes prior to queuing at the payment point, enables consumers to check the availability of different sizes and locate the items instore conveniently via the SMFT touchscreen, and enhances the overall customer experience (Roussos, 2006).

2.2. Customer brand engagement (CBE)

Customer brand engagement is a multi-dimensional construct that emphasises specific interaction between a target customer and specific brand stimuli (Hollebeek, 2011; Hollebeek et al., 2014 Kumar et al., 2010;). Scholars initially suggested that CBE is based on the cognitive, emotional, and behavioral dimensions of customer engagement, primarily conceptualised in an off-line context (Hollebeek, 2011). However to accommodate CBE within an online context and unify both physical and virtual domains, a revised set of dimensions emerged: cognitive processing (CP), affective reactions (AF), and behavioral responses (AC) (Algharabat et al., 2020; Hollebeek et al., 2014).

The key distinctions between offline and online CBE relate to the nature and extent of customer investment in brand interactions, and the degree of customer control over the engagement process (Algharabat et al., 2020; Hollebeek et al., 2014). In offline contexts, customers may invest more time and effort in brand interactions, but have less control over the engagement process than in online contexts. In contrast, online contexts offer more opportunities for customers to engage with brands and to control the engagement process, but customers typically invest less time and effort in brand interactions. SMFT, therefore, has the potential to bridge the gap between offline and online CBE by offering a seamless and integrated experience that leverages the benefits of both contexts. For example, SMFT can offer a personalised and interactive experience for customers, facilitate social sharing and peer feedback and so on.

Although CBE has been established as a multi-dimensional concept, fusing features like attention, communication, interaction, emotions, sensory pleasure and instant activation (Gambetti, Graffigna, & Biraghi, 2012), it is the interactive experience that is the key characteristic of CBE (Brodie, Hollebeek, Jurić, and Ilić ,2011). It follows that, as empirical research has established that interactivity is the key characteristic of CBE (France, Merrilees, & Miller,, 2016), the highly interactive aspect of SMFT has the potential to play an instrumental role in CBE within the instore retail experience. To this end, we explore the complementary relationship between SMFT and customer brand engagement, and use the following section to describe our approach for capturing data.

3. Methodology

This study adopted a case study approach to develop an understanding of how the use of SMFT could influence and enhance the customer brand engagement of physical fashion retail stores. Case studies are particularly suited to nascent research areas where the aim is to uncover research insights in areas that have deficient existing theory (Eisenhardt, 1989). Specifically we examined three cases that had successfully incorporated SMFT within a retail setting, these cases being Mark Fairwhale, Lily, and Ralph Lauren (see Table 1). The three cases were selected informed by three considerations: (1) it was important for the case to have a reputation for successful and innovative fashion retailer, including the use of SMFT in physical retail stores; (2) the cases should represent different segments of fashion retailers (i.e. high-end premium brand versus mid-range fast fashion brand) to provide a range of perspectives on the use of SMFT in fashion retail; (3) the willingness to participate in the study.

We collected data via semi-structured interviews with the experts directly involved in the design, development and delivery of the three selected cases. As such, we followed a purposive sampling strategy of interviewing 23 individuals directly involved in the cases, resulting in a minimum of six interviewees for each case (Yin, 2015). Participants who have domain expertise were contacted and interviewed between December 2020 to March 2021. We used network analysis tools to visualise the connections between team members and identify those who were most closely involved in the project. To ensure that we had a representative range of roles for each case, we targeted the designers, planners, and

Table 1. Selected cases and features of SMFT.

Brand name	Tiers of brand	Store format	Store location	Features of SMFT

Mark Fairwhale	Fast fashion brand	Flagship store	China	- Connect with online store
				  - Select colour, size
				  - Virtual try-on without change clothes
				  - Get personal recommendation
				  - Receive responds and items without leave the fitting room

Lily	Fast fashion brand	Flagship store	China	- Get personal recommendation
				  - Shown all information about the product that users bring in front of the mirror, including material, price, related products and buying link
				  - Virtual try-on without change clothes
				  - Take pictures and share on social media

Ralph Lauren	Premium brand	Flagship store	United States	- Set light
				  - Choose language
				  - Scan and display the chosen clothes
				  - Select colour, size
				  - Receive responds and items without leave the fitting room
				  - Get personal recommendation
				  - Text products information to cell phone

technicians responsible for the development and delivery of each of the cases. We also included the respective store managers and retail staff, who had first-hand experience of the delivery of the retail experiences within the stores.

In total, we conducted 23 interviews with the selected participants. To comply with local distancing restrictions during the pandemic, the interviews were conducted online using Microsoft Teams software, each interview lasting approximately 60 min. In the Ralph Lauren case interviews were conducted in English language, whereas for the Lily and Mark Fairwhale cases, interviews were conducted in Chinese. The interviews were recorded, transcribed and translated into English. The transcriptions were cross-checked by a second coder, to ensure accuracy, and a translation-back-translation process was employed, as recommended by Harpaz, Honig, and Coetsier (2002). This process involved two bilingual experts who were fluent in both English and Chinese.

Our interview guide was designed based on the emergent issues from the existing literature, where the emphasis was on open questions relating to the strategic intentions of the projects, the key considerations in the design of their respective retail spaces, and their evaluation of the project within the context of a retail space. We primarily used open questions to explore experts' views of SMFT in relation to its enhancement of physical fashion retail stores and its potential for strengthening the relationship between brands and customers (see Table 2). We followed many of the initial responses with a series of specific probes, clarifications and confirmatory questions (Gubrium, Holstein, Marvasti, & McKinney, 2012).

All interview data were recorded to aid the transcription and analytical processes, with the permission of the participants. The data in this study were analysed using a thematic analysis approach, which involved a detailed examination of key aspects of the data using Braun and Clarke (2006) six-phase analysis method. The phases included data familiarisation, initial code generation, searching for themes, reviewing themes, defining and naming themes, and producing the report. The aim was to systematically identify themes and patterns of meaning, summarise categories, and add key quotes to gain interpretive understanding (Ridder, 2014).

To ensure trustworthiness and authenticity, Guba and Lincoln (1994) criteria for evaluating qualitative research were used, which involved seeking respondent validation through iterative questioning, obtaining rich descriptions from each interview, and keeping detailed records of the research process. The researchers also used objective probing and minimised personal bias to generate different viewpoints on the topic (Elo et al., 2014). Inter-researcher reliability was conducted in the data analysis phase to add rigour and quality to the codes and themes deduced (Olson, McAllister, Grinnell, Gehrke Walters, & Appunn, 2016).

Table 2. Topics discussed with participants.

The design strategy and process
The understand of CBE and the factors that influences CBE
Discuss the benefit of SMFT
Experiences with SMFT in store
How can SMFT enhance customer experience and CBE
The main perceived impacts of SMFT

4. Findings

These findings emerged from the linguistic devices employed by each expert to express their own experiences and views of the relationship between SMFT and customer brand engagement. From the analysis of

interview data, the findings were divided into core categories and sub categories (see Table 3). To orchestrate the primary phenomena into key themes, we extracted core categories from sub-categories by separating native phrases from contextualised phrases, enabling us to further define the implicit and explicit boundaries of the categories. The emergent themes were distilled into five core categories: (1) SMFT enhances customer engagement, (2) SMFT encourages experience sharing, (3) SMFT personalises the retail experience, (4) SMFT enables flexibility, and (5) SMFT facilitates greater optimisation. These categories are discussed in detail in the next section.

4.1. SMFT enhances customer engagement

Providing customers with the option to select and manipulate content, via SMFT, was considered a key factor in evoking an emotional response. By offering customers an increasingly immersive experience, as

Table 3. Core categories identified in the research analyses.

Core categories	Sub-categories	Central phenomena that relate to core categories
SMFT enhances customer engagement	• Emotional response • Immersive • Game experience	Spend more time in store Special feelings and memorable experiences like playing video games
SMFT encourages experience sharing	• Increase brand exposure • Social interaction • Attract new customers and returning customers	Provide potential benefits Brands will keep the connections with customers Customers familiar with the products and brand
SMFT personalises the retail experience	• Increase in average order value • High efficiency • Customer centricity • Enhance customers' satisfaction and brand loyalty	Customers want to feel special Convenience to locate the products Customers are more likely to buy more
SMFT enables flexibility	• Create sustained engagement with customers • Integrate channels and increase efficiency	Send the item information to themselves Fulfil orders across touchpoints
SMFT facilitates optimisation	• Optimise services • Gather information (volume, duration, and conversion) to identify customers' expectation • Obtain the advantage of online channel	Alter the marketing to echo popular preferences Customers find what they want easily

well as simulating a game-type experience, retail experts believed this would help foster customer brand engagement. It was evident that one of the primary aims of retailers was to embrace mechanisms that attracted consumers into retail stores:

> We want to attract our customers back to the retail store … smart technologies are able to grab their full attention, comparing and selecting products or virtually trying on the clothes, and so on. They are more likely to spend more time in-store.

By finding entertaining ways to increase the length of time visitors spend instore, it was believed there would be an increased likelihood of customer expenditure. In this way, SMFT enabled customers to immerse themselves in the retail environment and engage high levels of concentration in their interaction with the technology by manipulating the SMFT. It was assumed by retailers that, by engaging with the SMFT, customers would build a psychological connection with the brand, thus leading to a greater emotional attachment to the brand. The interactivity of SMFT elements into the shopping experience, such as virtual try-on, light setting, and taking pictures, was considered an enjoyable means of engaging customers:

> It is like a magic mirror that could offer customers the special feelings and memorable experiences, like playing video games.

4.2. SMFT encourages experience sharing

It became clear from the responses that SMFT encouraged customers to share pictures of the products being modelled through the capturing of selfies and the sharing of these images on customers' social media profiles. This sharing of the experience has the potential to stimulate social interaction, indirectly increasing brand exposure, and attracting new and existing customers to the store. As one respondent stated:

> [SMFT makes it] easy to share pictures on their social media, which could be the potential benefit, for example, in attracting new customers.

Respondents cited the ease in which the technology facilitates the sharing of the experience, and therefore presents an opportunity to establish a dialogue with customers:

> Customers could leave their comments below the pictures, we could also use this space to keep the connections with our customers.

Customers' digital behavior encouraged connectivity across a community of like-minded individuals as well as with brands. This social interaction was considered

to play an important part in the relationship development between customers and brands, as can be seen in the following statement:

> The pictures can leave people with a good impression, and if they like them, get to know our products and our brand.

The implication here is that by entangling branded content within customers' social interactions, SMFT is able to attract new customers and encourage existing customers to purchase again.

4.3. SMFT personalises the retail experience

The big advantage of SMFT is that it offers personalised recommendations to customers that could enhance customer satisfaction and brand loyalty. This technology is therefore considered mutually beneficial and crucial for establishing a customer centric approach, as highlighted by this respondent:

> Every customer has different requirements and they want to feel special. We want to optimize their shopping journey in-store by offering them intuitive and personalized recommendations.

By identifying the preferences of customers and recommending different clothes, as well as matching accessories according to their styles, it improves the efficiency of shopping while increasing the average order value, as expressed by this respondent:

> People find it is really convenient to locate the products they like through the mirror technology, which shortens the process of selecting products.

A different respondent echoed this point:

> Customers are more likely to buy more when they see other matching clothes or accessories.

The ability of SMFT to categorise different styles of products to target specific customers improves service quality of the brand and helps to build a stronger relationship with customers.

4.4. SMFT enables flexibility

It was clear that SMFT helped to remove the friction in the entire shopping journey and facilitated a seamless interaction across channels by providing multiple payment choices. As experts confirmed:

> Sometimes people would not directly purchase in the store, they could send the item's information to themselves through messaging, or add products into the cart on our online store.

The aim here was that SMFT was seen as promoting a smoother channel integration that can match customers' shopping behavior across brand touchpoints. This approach enables the brand to maintain sustained engagement with their customers and reduce the emphasis on competition between the different channels. The frictionless approach is further accentuated by the ability for customers to pay directly through the SMFT, thus avoiding queues at the payment point. This simplifying of the payment process improves shopping efficiency and enhances customer satisfaction, with one respondent highlighting:

> People feel annoyed when they queue for a long time, it is a useful tool, especially for busy hours.

4.5. SMFT facilitates optimisation

The ability of SMFT to capture customer data offers a unique opportunity for retailers to gather useful information about customer preferences. The level of information includes details about specific fitting room sessions relating to the volume of users, their duration engaging with the technology instore, and the subsequent conversion into transactions. The ability to offer a more personalised experience, alongside optimising the service experience was highlighted by this respondent:

> 90 per cent of customers engaged with this mirror. By seeing what people take into the fitting room, and what they buy, we can alter the marketing to echo popular preferences. Customers might not see what has changed, but when they walk into the store, they will find what they want easily.

Gathering such direct preference data, in a manner similar to online shopping, enables retailers to use the observations to identify why the products are not selling well. The collection of customer data from a physical retail store provides a much richer source of customer information, because of the physical nature of products, beyond what is possible from the browsing data gathered by online shopping channels. This technology, therefore, provided an invisible way for retailers to improve customer experience while simultaneously optimising broader brand engagement.

5. Discussion and conclusion

With technology changing the way we consume retail experiences this paper explored the role of smart mirror fashion technology and its ability to enhance brand engagement. The general pattern of findings was in line with earlier studies (Kent et al., 2018; Kim et al.,

2020) which suggested that by increasing the mechanisms for customers to interact with instore features, improved communication and engagement with customers could be expected. However, our findings provide a more direct connection between the customer journey and brand engagement, while clearly distinguishing between online and instore channels. Our paper, therefore, makes two contributions, outlined in the following section.

5.1. The function value can translate into personal experience

First, this study indicates that the functional value of technology can translate into a more personal experience than previously suggested. The value of an online virtual fitting room (VFR) lies in the functional benefit of enabling customers to evaluate garments, to see how they might look when virtually worn prior to making a purchase (Lee & Xu, 2022). Whereas in physical stores, studies have shown that retailers were reluctant to have simulation technology if its purpose was to serve utilitarian fitting needs (Kim et al., 2017). We can see how, for a physical store, it could be seen as unnecessary to have a VFR, particularly as research has indicated that perceived enjoyment is more important to consumers than perceived usefulness (Kim et al., 2017). However, our research indicates that functional features increase interaction, which readily translates into meaningful experiences that heighten brand engagement. The speed in which a consumer can virtually try options and reduce the choice for physically trying on only a few items makes the process more convenient and quicker (see figure 1). The experience, therefore, is much more enjoyable because of the functional features. SMFT, in this sense, is not intended as a replacement of physical changing rooms, but an enhancement of the overall experience.

5.2. SMFT enriching retail experience

The second contribution is that our findings suggest that the benefits of SMFT extend beyond the immediate, convenient features of the technology. There is no doubt that the SMFT creates novel forms of engagement between brands and their target audience (Armstrong & Rutter, 2017). Previous studies have demonstrated that AR technology, for instance, offers customers an efficient way to try on clothes without queuing up for the fitting room or needing the attention of sales associates (Lee & Xu, 2020; Ogunjimi et al., 2021). The focus of such studies tends to be driven by the specific application of a technology, without necessarily accommodating the broader brand experience that such technology can offer retail environments. SMFT have the potential to transform physical retail stores into highly enjoyable experiences, reflecting the lives and needs of customers by personalising the experience and facilitating the sharing of the experience on social channels. Aligned with Siregar and Kent (2019), the use of SMFT in-store is similar to personal devices, in that it enhances the customer experience by incorporating gamification content and active engagement, ultimately improving visitors' confidence and familiarity with the technology for an enhanced overall in-store experience. If we view SMFT as a means for solving practical problems, such as being a solution for eliminating queues for fitting rooms, then we risk losing sight of its potential for enriching the overall retail experience.

5.3. Implications

The managerial implications of our findings reveal that SMFT increases the interactivity between customers and the retail experience instore in five distinct ways. (1) SMFT provides a more interactive and engaging environment for instore customers, (2) it enables customers to conveniently browse items, trying different sizes and complementary items. (3) The more personalised the experience, the more likely it is to be shared by users, transforming engaged customers into brand advocates. (4) SMFT facilitates the sharing of images on social media, leading to more indirect impressions on social media sites. (5) The increased convenience of ordering, checking-out, and delivery processes, culminates in a more digitally tracked process that enables further optimisation and tailored personalisation.

5.4. Limitations

There are of course limitations to our study. While the study of retail consumption is particularly suited to the fashion sector, the sampling of this study was limited in size, scale and restricted to the offline fashion format. While we interviewed a valid range of actors, our findings relate specifically to the fashion industry for mass-market brands. There is therefore the potential for further studies in industries where SMFT may be considered as a useful device. Moreover, given the dynamic nature of retailing and technology, it seems a suitable requirement for further investigation regarding the application of SMFT to disciplines that may need to address issues such as hygiene and accessibility.

In this study we responded to the emergence of innovative smart mirror fashion technologies by

Customers' journey in traditional physical fashion store
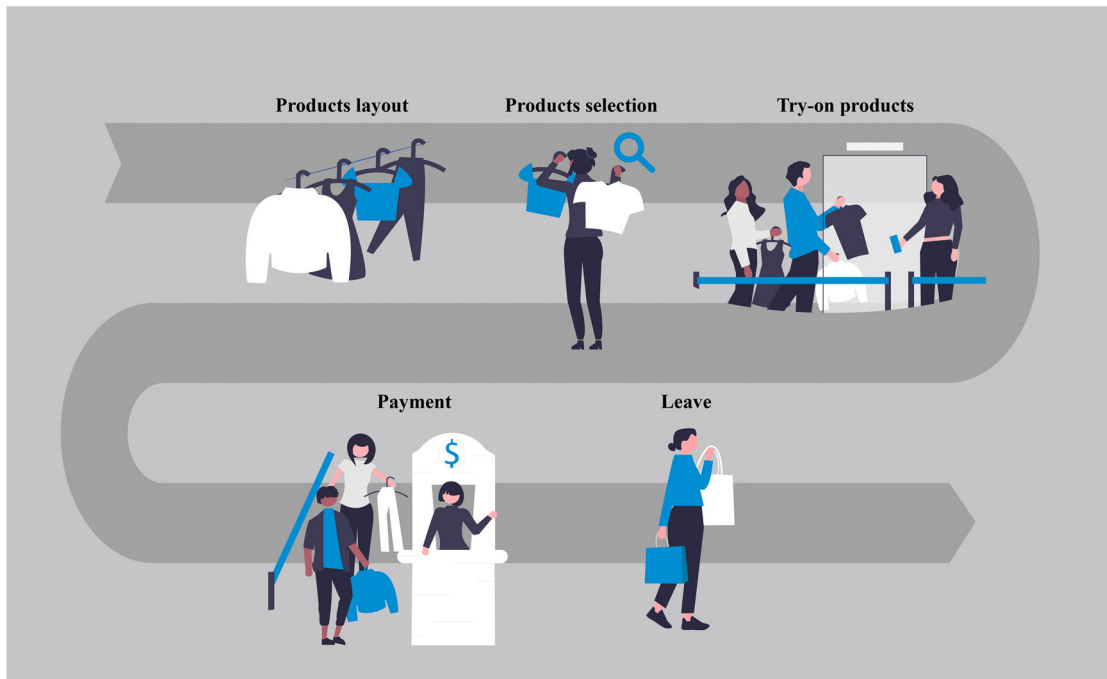
Customers' journey in physical fashion store with SMFT

Figure 1. The comparison with the store integrated with SMFT and traditional store.

asking how such technologies might transform the retail experience into a richer more engaging experience that potentially improves the relationship between customers and brands. We indicated how, through the use of SMFT, brands could transform customers' instore retail experience to one that provides greater convenience, more interactivity, closer personalisation, a memorable and easily sharable experience, and a process that creates metrics for further optimisation.

Acknowledgements

Disclosure statement

References

Adikari, S. B., Ganegoda, N. C., Meegama, R. G., & Wanniarachchi, I. L. (2020). Applicability of a single depth sensor in real-time 3D clothes simulation: Augmented reality virtual dressing room using kinect sensor. *Advances in Human-Computer Interaction*, *2020*, 1–10. http://doi.org/10.1155/2020/1314598

Alexander, B., & Alvarado, D. O. (2017). Convergence of physical and virtual retail spaces: The influence of technology on consumer in-store experience. Advanced fashion technology and operations management. *IGI Global*, 191–219.

Algharabat, R., Rana, N. P., Alalwan, A. A., Baabdullah, A., & Gupta, A. (2020). Investigating the antecedents of customer brand engagement and consumer-based brand equity in social media. *Journal of Retailing and Consumer Services*, *53*, 101767. doi:10.1016/j.jretconser.2019.01.016

al-Qerem, A. (2016). Virtual dressing room implementation using body image–clothe mapping. *Int J Eng Comput Sci*, *5*(2), 15859–15862.

Amendola, C., Calabrese, M., & Caputo, F. (2018). Fashion companies and customer satisfaction: A relation mediated by information and communication technologies. *Journal of Retailing and Consumer Services*, *43*, 251–257. doi:10.1016/j.jretconser.2018.04.005

Armstrong, K., & Rutter, C. (2017). Exploring the enigma of the happiness construct in phygital fashion experiences. Advanced fashion technology and operations management. *IGI Global*, 220–233.

Babin, B. J., Darden, W. R., Griffin, M., & Darden, R. (1994). Work and/or fun: Shopping measuring value hedonic and utilitarian. *Journal of Consumer Research*, *20*(4), 644–656. doi:10.1086/209376

Beck, M. (2022). Moderating effects of trait curiosity and self-efficacy in the effect of the online virtual booth on specific curiosity and behavioral intention. *Recherche et Applications en Marketing (English Edition)*, *37*(2), 30–46.

Blázquez, M. (2014). Fashion shopping in multichannel retail: The role of technology in enhancing the customer experience. *International Journal of Electronic Commerce*, *18*(4), 97–116. doi:10.2753/JEC1086-4415180404

Blythe, M., & Hassenzahl, M. (2018). The semantics of fun: Differentiating enjoyable experiences. In M. Blythe & A. Monk (Eds.), *Funology 2: From usability to enjoyment* (pp. 375–387). Cham: Springer.

Bonetti, F., & Perry, P. (2017). A review of consumer-facing digital technologies across different types of fashion store formats. *Advanced Fashion Technology and Operations Management*, 137–163. doi:10.4018/978-1-5225-1865-5.ch006

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. doi:10.1191/1478088706qp063oa

Brodie, R. J., Hollebeek, L. D., Jurić, B., & Ilić, A. (2011). Customer engagement: Conceptual domain, fundamental propositions, and implications for research. *Journal of Service Research*, *14*(3), 252–271. doi:10.1177/1094670511411703

Cuomo, M. T., Tortora, D., Festa, G., Ceruti, F., & Metallo, G. (2020). Managing omni-customer brand experience via augmented reality: A qualitative investigation in the Italian fashion retailing system. *Qualitative Market Research: An International Journal*, *23*(3), 427–445.

Dabholkar, P. A. (1996). Consumer evaluations of new technology-based self-service options: An investigation of alternative models of service quality. *International Journal of Research in Marketing*, *13*(1), 29–51. doi:10.1016/0167-8116(95)00027-5

Dacko, S. G. (2017). Enabling smart retail settings via mobile augmented reality shopping apps. *Technological Forecasting and Social Change*, *124*, 243–256. doi:10.1016/j.techfore.2016.09.032

Davis, F. D. (1993). User acceptance of information technology: System characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies*, *38*(3), 475–487. doi:10.1006/imms.1993.1022

Davis, F. D., & Venkatesh, V. (1996). A critical assessment of potential measurement biases in the technology acceptance model: Three experiments. *International Journal of Human-Computer Studies*, *45*(1), 19–45. doi:10.1006/ijhc.1996.0040

De Keyser, A., Schepers, J., & Konuş, U. (2015). Multichannel customer segmentation: Does the after-sales channel matter? A replication and extension. *International Journal of Research in Marketing*, *32*(4), 453–456. doi:10.1016/j.ijresmar.2015.09.005

De Marco, A., Cagliano, A. C., Nervo, M. L., & Rafele, C. (2012). Using system dynamics to assess the impact of RFID technology on retail operations. *International Journal of Production Economics*, *135*(1), 333–344. doi:10.1016/j.ijpe.2011.08.009

Dongare, A., Devale, I., Dabadge, A., Bachute, S., & Bhingarkar, S. (2020). A study based on advancements in smart mirror technology. In *Proceedings of the international conference on information and communication technology for intelligent systems* (Vol. 196, pp. 233–240). Springer. http://doi.org/10.1007/978-981-15-7062-9_23

Eisenhardt, K. M. (1989). Building theories from case study research. *The Academy of Management Review*, *14*(4), 532–550. doi:10.2307/258557

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE Open*, *4*(1), 1–10.

France, C., Merrilees, B., & Miller, D. (2016). An integrated model of customer-brand engagement: Drivers and consequences. *Journal of Brand Management*, *23*(2), 119–136. http://doi.org/10.1057/bm.2016.4

Gambetti, R. C., Graffigna, G., & Biraghi, S. (2012). The grounded theory approach to consumer-brand engagement: The practitioner's standpoint. *International Journal of Market Research*, *54*(5), 659–687. doi:10.2501/IJMR-54-5-659-687

Gao, Y., Petersson Brooks, E., & Brooks, A. L. (2014). The performance of self in the context of shopping in a virtual dressing room system. In *Proceedings of the international conference on HCI in business* (pp. 307–315) Heraklion, Greece.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of Qualitative Research*, 2 (163-194), 105.

Gubrium, J. F., Holstein, J. A., Marvasti, A. B., & McKinney, K. D. (2012). *The SAGE handbook of interview research: The complexity of the craft*. London, UK: Sage Publications.

Harpaz, I., Honig, B., & Coetsier, P. (2002). A cross-cultural longitudinal analysis of the meaning of work and the socialization process of career starters. *Journal of World Business*, 37(4), 230–244. doi:10.1016/S1090-9516(02)00090-1

Heinonen, K., & Strandvik, T. (2020). Reframing service innovation: COVID-19 as a catalyst for imposed service innovation. *Journal of Service Management*, 32(1), 101–112. doi:10.1108/JOSM-05-2020-0161

Hernández, N., Mattila, H., & Berglin, L. (2019). Can virtually trying on apparel help in selecting the correct size? *Clothing and Textiles Research Journal*, 37(4), 249–264. doi:10.1177/0887302X19856117

Hollebeek, L. (2011). Exploring customer brand engagement: Definition and themes. *Journal of Strategic Marketing*, 19 (7), 555–573. doi:10.1080/0965254X.2011.599493

Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014). Consumer brand engagement in social media: Conceptualization, scale development and validation. *Journal of Interactive Marketing*, 28(2), 149–165. doi:10.1016/j.intmar.2013.12.002

Hughes, C., Swaminathan, V., & Brooks, G. (2019). Driving brand engagement through online social influencers: An empirical investigation of sponsored blogging campaigns. *Journal of Marketing*, 83(5), 78–96. doi:10.1177/0022242919854374

Javornik, A. (2016). 'It's an illusion, but it looks real!'Consumer affective, cognitive and behavioural responses to augmented reality applications. *Journal of Marketing Management*, 32(9-10), 987–1011. doi:10.1080/0267257X.2016.1174726

Kent, A., Dennis, C., Cano, M. B., Helberger, E., & Brakus, J. (2018). Branding, marketing, and design: Experiential in-store digital environments. Fashion and textiles: Breakthroughs in research and practice. *IGI Global*, 275–298.

Kent, A., Vianello, M., Cano, M. B., & Helberger, E. (2016). Omnichannel fashion retail and channel integration: The case of department stores. Handbook of research on global fashion management and merchandising. *IGI Global*, 398–419.

Kim, H.-Y., Lee, J. Y., Mun, J. M., & Johnson, K. K. (2017). Consumer adoption of smart in-store technology: Assessing the predictive value of attitude versus beliefs in the technology acceptance model. *International Journal of Fashion Design, Technology and Education*, 10(1), 26–36. doi:10.1080/17543266.2016.1177737

Kim, H. Y., Lee, Y., Cho, E., & Jung, Y. J. (2020). Digital atmosphere of fashion retail stores. *Fashion and Textiles*, 7(1), 1–17. doi:10.1186/s40691-019-0195-z

Kim, S. (2022). Retail technology acceptance model for online at offline (O@ O): comparing different generations of data analysis techniques. *International Journal of Fashion Design, Technology and Education*, 15(3), 1–13.

Kipper, G., & Rampolla, J. (2012). *Augmented reality: An emerging technologies guide to AR*. Elsevier.

Kumar, V., Aksoy, L., Donkers, B., Venkatesan, R., Wiesel, T., & Tillmanns, S. (2010). Undervalued or overvalued customers: Capturing total customer engagement value. *Journal of Service Research*, 13(3), 297–310. doi:10.1177/1094670510375602

Lam, S. Y., & Shankar, V. (2014). Asymmetries in the effects of drivers of brand loyalty between early and late adopters and across technology generations. *Journal of Interactive Marketing*, 28(1), 26–42. doi:10.1016/j.intmar.2013.06.004

Lee, H., & Xu, Y. (2020). Classification of virtual fitting room technologies in the fashion industry: From the perspective of consumer experience. *International Journal of Fashion Design, Technology and Education*, 13(1), 1–10. doi:10.1080/17543266.2019.1657505

Lee, H., & Xu, Y. (2022). Influence of motivational orientations on consumers' adoption of virtual fitting rooms (VFRs): moderating effects of fashion leadership and technology visibility. *International Journal of Fashion Design, Technology and Education*, 15(3), 297–307.

Li, A., & Xu, Y. (2020). A study of Chinese consumers' adoption behaviour toward virtual fitting rooms. *International Journal of Fashion Design, Technology and Education*, 13 (2), 140–149.

Loker, S., Ashdown, S. P., Cowie, L., & Schoenfelder, K. A. (2004). Consumer interest in commercial applications of body scan data. *Journal of Textile and Apparel Technology and Management*, 4(1), 1–13.

McCarthy, J., & Wright, P. (2004). Technology as experience. *Interactions*, 11(5), 42–43. doi:10.1145/1015530.1015549

Moorhouse, N., tom Dieck, M. C., & Jung, T. (2018). Technological innovations transforming the consumer retail experience: A review of literature augmented reality and virtual reality: Empowering human. *Place and Business*, 133–143.

Ogunjimi, A., Rahman, M., Islam, N., & Hasan, R. (2021). Smart mirror fashion technology for the retail chain transformation. *Technological Forecasting and Social Change*, 173, 121118. doi:10.1016/j.techfore.2021.121118

Olson, J., McAllister, C., Grinnell, L. D., Gehrke Walters, K., & Appunn, F.. (2016). Applying constant comparative method with multiple investigators and inter-coder reliability. *The Qualitative Report*, 21(1), 26–42.

Pepper, M. R., Freeland-Graves, J. H., Yu, W., Stanforth, P. R., & Xu, B. (2010). Evaluation of a rotary laser body scanner for body volume and fat assessment. *Journal of Testing and Evaluation*, 39(1), 1–6.

Radu, I., & Schneider, B. (2019). What can we learn from augmented reality (AR)? *Paper presented at the proceedings of the 2019 CHI conference on human factors in computing systems*, Glasgow, Scotland, UK.

Rallapalli, S., Ganesan, A., Chintalapudi, K., Padmanabhan, V. N., & Qiu, L. (2014). Enabling physical analytics in retail stores using smart glasses. In *Proceedings of the 20th annual international conference on mobile computing and networking* (pp. 115–126). New York: Association for Computing Machinery. http://doi.org/10.1145/2639108.2639126

Rauschnabel, P. A., Felix, R., & Hinsch, C. (2019). Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*, *49*, 43–53. doi:10.1016/j.jretconser.2019.03.004

Rese, A., Baier, D., Geyer-Schulz, A., & Schreiber, S. (2017). How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions. *Technological Forecasting and Social Change*, *124*, 306–319. doi:10.1016/j.techfore.2016.10.010

Ridder, H.-G. (2014). *Book review: Qualitative data analysis. A methods sourcebook*. London, UK: Sage Publications.

Roussos, G. (2006). Enabling RFID in retail. *Computer*, *39*(3), 25–30. doi:10.1109/MC.2006.88

Savastano, M., Barnabei, R., & Ricotta, F. (2016). Going online while purchasing offline: An explorative analysis of omni-channel shopping behaviour in retail settings. Proceedings of the international marketing trends conference.

Siregar, Y., & Kent, A. (2019). Consumer experience of interactive technology in fashion stores. *International Journal of Retail & Distribution Management*, *47*(12), 1318–1335. doi:10.1108/IJRDM-09-2018-0189

Song, D., Tong, R., Du, J., Zhang, Y., & Jin, Y. (2018). Data-driven 3-D human body customization with a mobile device. *IEEE Access*, *6*, 27939–27948. doi:10.1109/ACCESS.2018.2837147

Stott, R., & Walker, J. (2018). Storefront Salvation. LS: N Global 4.

Watson, A., Alexander, B., & Salavati, L. (2018). The impact of experiential augmented reality applications on fashion purchase intention. *International Journal of Retail & Distribution Management*, *48*(5), 433–451. doi:10.1108/IJRDM-06-2017-0117

Wright, P., & McCarthy, J. (2010). Experience-centered design: Designers, users, and communities in dialogue. *Synthesis Lectures on Human-Centered Informatics*, *3*(1), 1–123. doi:10.1007/978-3-031-02192-3

Yin, R. K. (2015). *Qualitative research from start to finish*. Guilford Publications.

Zha, D., Foroudi, P., Melewar, T., & Jin, Z. (2022). Experiencing the sense of the brand: The mining, processing and application of brand data through sensory brand experiences. *Qualitative Market Research: An International Journal*, *25*(2), 205–232.