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**MANAGERIAL APPROACHES AND SOCIOTECHNICAL
IMPLICATIONS OF THE ADOPTION OF CONSUMER-FACING
IN-STORE TECHNOLOGY IN ORGANIZATIONAL PROCESSES:
THE CASE OF FASHION RETAIL**

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**MANAGERIAL APPROACHES AND SOCIOTECHNICAL IMPLICATIONS OF
THE ADOPTION OF CONSUMER-FACING IN-STORE TECHNOLOGY IN
ORGANIZATIONAL PROCESSES: THE CASE OF FASHION RETAIL**

Abstract

Purpose

Fashion retailers have increasingly adopted consumer-facing in-store technology (CFIT) to enhance customer experience/service provision. This paper explores managerial experiences and sociotechnical implications of introducing these technologies into organizational working processes.

Design/methodology/approach

This study draws on interpretive analysis of semi-structured interviews with 74 senior fashion retail industry practitioners, technology providers and consultants to understand managerial perspectives on technological innovation issues.

Findings

Endogenous and exogenous factors act as drivers or barriers to CFIT adoption, which are influenced by strategic and tactical motives. Key issues that retail managers encounter include challenges in aligning technology implementation with retailer brand image to manage risk and reputation, with additional complexity arising from different internal and/or external actors involved, as well as required levels of change in organizational structure.

Originality/value

This study contributes an empirically derived framework identifying reasons for – and the drivers/barriers influencing – fashion retailers' CFIT adoption, classifying three broad approaches to CFIT adoption: embedded, transformative and opportunistic.

Keywords

Retail innovation; fashion retail; retail technology; qualitative; technology adoption

Article classification: Research paper

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1. Introduction

Organizations must embrace technological innovation to survive and thrive in a rapidly changing environment (McKinsey & Co., 2022). In fashion retail, this has catalyzed the merging of digital and physical operations (Alexander and Kent, 2022; McKinsey & Co., 2022). Many retailers have introduced digital elements in-store (Grewal *et al.*, 2020; McKinsey & Co., 2022) to improve customer experience/service provision (Bonetti *et al.*, 2022; Huang and Rust, 2017; Inman and Nikolova, 2017), adopting various consumer-facing in-store technologies (CFIT) - including interactive screens, i-beacons, QR codes, tablets, digital signage, augmented reality (AR), virtual reality (VR), mixed reality (MR), push communications, smart speakers, chatbots, Wi-Fi provision, virtual fitting rooms, digital price tags, service robots and avatars (Bonetti and Perry, 2017; Shankar *et al.*, 2020). Fashion companies are expected to double their technology investments by 2030 to boost competitive advantage and keep up with customers who are increasingly digital natives (McKinsey & Co., 2022).

Existing research on retail technology adoption (Grewal *et al.*, 2020; Inman and Nikolova, 2017; Patten *et al.*, 2020; Shankar *et al.*, 2020) largely adopts a consumer perspective or is conceptual. Empirical insights into the factors influencing - and the sociotechnical implications of - retailers’ (non-)adoption of new technologies into organizational working processes (Manfreda and Štemberger, 2019) from an overt *managerial* perspective (Alexander and Kent, 2022; Javornik *et al.*, 2021; Pantano *et al.*, 2018; 2022; Roggeveen and Sethuraman, 2020; Verhoef *et al.*, 2009) remain lacking. With the multiplicity of technologies at their disposal, “retailers are understandably overwhelmed by the options and may adopt technologies without a clear picture of how they fit into their strategy” (Inman and Nikolova, 2017, p. 7). Managerial

guidance focuses on business opportunities of existing and emerging technologies (e.g. McKinsey & Co., 2021) but disregards sociotechnical implications of organizational technology adoption, which are critical for successful implementation (Berg et al., 2005; Bonetti et al., 2022; Kaarst-Brown and Robey, 1999; Manfreda and Štemberger, 2019; Naicker and Van Der Merwe, 2018). Digital transformation is not only about technological solutions but also requires consideration of business strategy, people, and existing processes, as well as potential managerial reluctance and change apprehension in employees (Lawson, 2022). Richer understanding of how managers formulate strategies and mitigate CFIT-related challenges from a sociotechnical perspective is needed to complement understanding of how CFIT shapes consumer behavior. This motivates the following research questions:

RQ1. What type(s) of CFIT have been adopted by fashion retailers?

RQ2. What are the drivers/barriers to implementing CFIT in the organizational working processes of fashion retailers from a managerial perspective?

RQ3. What are the reasons for - and sociotechnical implications of - CFIT adoption in the organizational working processes of fashion retailers?

2 Theoretical background

2.1 Consumer-facing in-store technologies in retailing

Consumer-facing in-store technology - also termed “shopper-facing retail technology” (Inman and Nikolova, 2017), and “consumer-facing retail technologies” (Riegger *et al.*, 2021) - consists of technology devices with which the consumer interacts, or experiences directly, in

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the physical store (Bonetti and Perry, 2017; Grewal *et al.*, 2020). These technologies are defined variously, encompassing multiple applications (see Table 1).

[Insert Table I here]

Such devices work alongside back-end integrative infrastructure, incorporating less visible technology elements (Grewal *et al.*, 2020) where data is stored and organized. CFIT blends the physical store with the online world to deliver a pleasant and functional shopping experience (Alexander and Kent, 2022; Hult *et al.*, 2019; Riedel and Mulcahy, 2019; Roggeveen *et al.*, 2017) and create a more personalized consumer experience (Grewal *et al.*, 2020; Ogunjimi *et al.*, 2021; Patten *et al.*, 2020). Research on in-store technology focuses primarily on consumer-facing aspects, often disregarding back-end operations, notwithstanding their acknowledged importance (Alexander and Kent, 2021; 2022; Grewal *et al.*, 2020; Ogunjimi *et al.*, 2021).

2.2. Drivers and barriers to CFIT adoption in retailing

Internal drivers and barriers to CFIT adoption

Various company characteristics influence IT adoption - size, ownership, managerial structure, growth imperatives, employee expertise and level of technological education (Bruque and Moyano, 2007; Olsson *et al.*, 2019; Naicker and Van Der Merwe, 2018), and specific to retailing, market positioning and store formats (Alexander and Kent, 2021; Antéblian *et al.*, 2014; Hult *et al.*, 2019; Javornik *et al.*, 2021). Crucially, senior management support, and the relationship between senior management and employees across business and IT departments (Bonetti *et al.*, 2022; Manfreda and Štemberger, 2019) have a fundamental role (Olsson *et al.*, 2019).

External drivers and barriers to CFIT adoption

Market characteristics influence CFIT adoption decisions (Grewal *et al.*, 2020; Riegger *et al.*, 2021), incorporating industry characteristics (i.e. industry type and structure, degree of technological innovativeness); micro and macro market trends; competitor actions concerning technological innovation; presence and type of business partners (e.g. technology suppliers, business consultants, investment partners) and the inter-organizational relationships across internal and external actors (i.e. alignment amongst actors involved or interaction barriers - Manfreda and Štemberger, 2019; Montecchi *et al.*, 2022); government regulations (e.g. support for organizational R&D, privacy policies, regulations to attract skilled labor); and technology infrastructure support. Consumer responses to CFIT are influenced by factors such as perceived benefits, interest, convenience and understanding (Ogunjimi *et al.*, 2021; Pantano *et al.*, 2022; Riegger *et al.*, 2021; Shankar *et al.*, 2020).

Characteristics of the technology impacting on CFIT adoption

Technology can be internal (e.g. technologies already in use, developed by internal departments), or external to the retailer (e.g. developed by IT providers) (Baker, 2011; Montecchi *et al.*, 2022). Key factors influencing the degree of CFIT adoption include: perceived benefits and associated risks (Javornik *et al.*, 2021; Pantano and Vannucci, 2019); costs and expected return on investment (Inman and Nikolova, 2017; Ramanathan *et al.*, 2017; Shankar *et al.*, 2020); purpose (including hedonic and/or functional - Bonetti *et al.*, 2019; Javornik *et al.*, 2021; Ogunjimi *et al.*, 2021); complexity (i.e. perceived ease of use - Naicker and Van Der Merwe, 2018; Shankar *et al.*, 2020); and compatibility with the retailer's characteristics (i.e. existing infrastructure and technological systems - Ramanathan *et al.*, 2017).

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Literature on the drivers and barriers to technological transformation in retailing (and associated implementation processes) tends to be dispersed across different disciplines. There is a need to delineate these factors from the perspectives of retail practitioners vested in the change.

2.3 Strategic reasons for - and implications of - CFIT adoption in retailing

Strategic management literature outlines different levels of organizational decision-making (Machuca *et al.*, 2007; Pintelon and Gelders, 1992), which resonate with decision-making for organizational technology projects (Gunasekaran *et al.*, 2006). Technology can be embedded in the company mindset and modus operandi (Olsson *et al.*, 2019), often involving long-term investment (including back-end, invisible technology infrastructure - Ghobakhloo *et al.*, 2012). This approach can be considered strategic and longer-term in orientation, involving senior management leading a new, shared vision, communicating and sponsoring change, and demonstrating commitment to technology initiatives. By contrast, an intermediate-term approach incorporates objectives that are narrower in scope, resulting in the adoption of more consumer-facing forms of CFIT, albeit with less developed back-end integrated systems (Shankar *et al.*, 2020), leading to more tactical impacts on organizational performance, rather than changing the way the business is run (Ghobakhloo *et al.*, 2012). Finally, short-term approaches focus explicitly on operational considerations, relating to implementation and evaluation of organizational performance (Olsson *et al.*, 2019). Operational considerations should reflect the company’s strategic vision of how business is done (Gunasekaran *et al.*, 2006). However, existing empirical research on organizational decision-making tends to focus

on other industries, leaving an empirical lacuna relating to managerial understanding(s) of key issues influencing organizational technological transformation in retailing.

CFIT implementation into organizational working processes involves various sociotechnical implications related to the integration into back-end system infrastructure and operations, to support the provision of the front-end technology and service. Several actors vested in the change - e.g. senior managers, employees and external partners such as technology providers and consultants - and their interrelationships impact on CFIT adoption and implementation (Bonetti *et al.*, 2022; Manfreda and Štemberger, 2019; Montecchi *et al.*, 2022; Olsson *et al.*, 2019; Shankar *et al.*, 2020). The role of senior managers can entail involving and empowering relevant individuals to engage in processes of CFIT co-creation (Bonetti *et al.*, 2022). This can incorporate internal and external actors, motivating and educating employees to accept technological change through training and peer support (Manfreda and Štemberger, 2019; Shankar *et al.*, 2020).

Whilst retailing literature has started to uncover implications regarding the adoption and implementation of innovative technologies from practitioner perspectives (Bonetti *et al.*, 2022; Manfreda and Štemberger, 2019; Montecchi *et al.*, 2022; Olsson *et al.*, 2019), it has not yet investigated how reasons for their introduction and consequent sociotechnical implications relate to each other.

3. Methodology

An interpretivist approach facilitates the acquisition of an in-depth understanding of managerial thinking concerning complex phenomena from the perspective of the actors involved (Hackley, 2001; Rowlands, 2005). Consequently, and consistent with previous studies investigating the

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management of IT in organizations (Kaarst-Brown and Robey, 1999; Orlikowski and Baroudi, 1991), qualitative research was undertaken to investigate why managers act the way they do concerning technology (non-)adoption, and relevant strategic implications.

Data were collected through semi-structured interviews with a purposive sample of 74 industry practitioners drawn from fashion retail and a wider community of technology providers/consultants, as retailers often rely on external partners for strategic advice or CFIT outsourcing (Grewal *et al.*, 2020; Olsson *et al.*, 2019). The sample comprised 46 senior retail professionals (from 14 global fashion retailers across various head office functions and at store level), 13 technology providers, and 15 senior consultants, shown in Table II. The first author’s experience in the fashion industry, personal network of contacts, attendance at industry events, and use of professional networking site LinkedIn facilitated contact with respondents, who were asked to suggest others within the same and other organizations, using a ‘snowballing’ approach (Clark, 1988).

[Insert Table II here]

The interview protocol design was derived from the literature review and was clearly linked to the purpose of the research (Pope *et al.*, 2000), whilst allowing participants to elaborate on unexpected insights to uncover new details regarding their experiences with CFIT (see Appendix 1). Participants were assured of anonymity to encourage frank and open responses. Interviews lasted 60 minutes on average (minimum 45, maximum 120), with over 66 hours of interview recordings transcribed. Manual data analysis was conducted to be as close to the data as possible (Spiggle, 1994).

Thematic analysis followed an inductive process (Guest et al., 2012). Initial coding labels based on the literature were revised as data collection and analysis proceeded iteratively (Spiggle, 1994), which permitted flexibility in identifying emergent themes. Axial and selective codes were refined to reveal an overarching set of core themes (CFIT types, drivers and barriers, reasons), which frame a narrative structure to guide the discursive presentation of findings. Member checks (Iivari, 2018) were conducted with available participants by discussing preliminary analysis results. This ongoing dialogue checked that researchers' interpretation(s) resonated with participants. Figure 1 provides a visual representation of the inductive coding process with themes (in ovals) and sub-themes (in boxes), showing how they relate to each other (Guest *et al.*, 2012; Spiggle, 1994).

[Insert Figure 1 here]

4. Findings

4.1 CFIT types and related back-end implications

CFIT adopted within the fashion retail companies in question is outlined in Table III, classified into three main usage modes, depending on their visibility to the customer:

1. *Technologies with a high level of back-end system integration*

This includes technologies such as RFID, footfall counting, staff operations apps and devices, payment processes, Wi-Fi, etc., as expressed by Retailer 19's Customer Director:

“We rolled out RFID for stock availability. That's improved our stock accuracy massively. It's also much, much, more efficient for the store staff to run stock counts;

particularly for a business like us where we've got a very fast-moving stock and loads of items."

The emphasis of these technologies was primarily on facilitating smoother staff operations and improved customer service.

2. *Combination of back-end technology and CFIT*

This combines different technologies, such as back-end technology integrated with and evident through CFIT, to support staff operations, offer improved customer service and, importantly, enhance customer experience. Retailer 13 adopted RFID *"first of all to know this store has this product. And then to bring in some theatre"* (Director of Global Real Estate). This retail 'theatre' took the form of smart fitting rooms, where customers entering the fitting room would see videos of settings relevant to the product being tried. More recently, RFID was used to enhance customer service through enabling customers *"to pass [their] product request to a sales associate via an interactive display in the fitting room"*.

3. *Visible front-end CFIT (with limited systems integration)*

This incorporates more visible (and potentially temporary) CFIT types, such as interactive screens, digital signage, AR, VR, mobile apps, etc. with a primary purpose of enhancing customer experience/engagement:

"The technology that we have available in some of our stores are magic mirrors where they will display content depending on the items that you place in front of them. It is something that we put in when we opened our Regent Street store few years ago, to do something cool and exciting stuff to add to the customer experience." (Retailer 11, VP, Customer Analytics)

These CFITs are not supported by back-end system integration for checking stock availability or to support staff operations.

[Insert Table III here]

4.2 Drivers and barriers to CFIT adoption

Three key factors - *senior management, company characteristics* and *external environment* - influenced CFIT adoption, contingent on their demographics/characteristics and prior experience with technology.

Senior management

Senior management demographics influenced receptiveness towards innovation. Several participants referred to senior management's lack of digital experience, impeding their ability to formulate an innovative organizational vision and culture to support tech adoption. Younger retail leaders were perceived as more likely to embrace technological innovation, due to their greater exposure which usually comes with being a digital native. In contrast, boards of directors in larger, established retailers tended to comprise older executives, which could generate barriers to CFIT adoption if they were predisposed to traditional ways of working and had little exposure to digital environments, as expressed by Retailer 1's Multi-Channel Manager:

"There must be a strong commitment [to technology adoption] by the stakeholders. So probably all the fashion companies that were founded in the 60s, 70s or 80s... and there hasn't been a kind of a renewal of the generations in charge of the companies – so without a renewal the owners and stakeholders in general are still stuck to old models."

Various issues and challenges of technology transformation were acknowledged by senior management, mainly relating to fears of being overtaken/confined to another role, or being made redundant, due to changes in organizational structures and roles requiring greater technological competence. Some technology providers acknowledged a reluctance to change, as people prioritize job security and are wary of change-related risk. Some larger, well-established retailers faced difficulties in changing their perspective. As Technology Provider 9 explained, *“everyone has their own job”, so “they don’t want to take the risk”* to propose something new that might destabilize the organization’s equilibrium, and which might be perceived as higher risk: *“New can be a problem. So... if you have your job on performance and you’re proposing something that is not going to be successful, you’re losing the job, so... it’s a risk.”*

Senior management experience with technology also influences CFIT adoption. In some cases, senior managers were innovative, visionary, risk-taking tech-minded leaders, or managers of technology projects within the organization with a predilection towards innovation. This was the case for Retailer 11, where *“[the CEO at the time] was the absolute catalyst for all that change. She is a visionary; she is an incredible leader”* (Consultant 12), demonstrating the critical leadership role of driving innovation embracement and the necessary large-scale shifts in organizational culture and vision. This also involves significant resource commitment, as outlined by Retailer 12’s Product Owner – Retail Technology, explaining that they *“just develop the software and build it. We’ve got a function... and this is where we’ll try and build the technology, see if it works.”*

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3 In contrast, more risk-averse senior managers may not perceive the potential benefits of CFIT
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5 adoption, and may attempt to perpetuate ‘business as usual’, thereby representing a barrier to
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7 investing in CFIT resources, as seen in Retailer 4:

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12 “We are not setting up innovative teams... In the past we had a Director that was
13 responsible for E-comm and IT; we no longer have that level ... we’ve got the Head
14 of Finance who looks after IT and Digital. Our CEO is responsible for retail and
15 trading. But the thing is at the minute we just don’t have the capacity or the money to
16 be really innovative when it comes to technology.” (*Retailer 4, Head of Trading*
17 *Strategy*)
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23 Senior management commitment in technological innovation has important consequences on
24 how innovation is spread among all employees, as highlighted by Retailer 5’s Management
25 Information System (MIS) Director: “*For new technologies, for these kinds of transformations,*
26 *the push really needs to come from the top, otherwise it wouldn’t work.*” Most participants
27 stressed the importance of clear communication, especially relating to reasons for changes in
28 employees’ tasks by bringing in technology to increase efficiency and effectiveness. As
29 Retailer 1’s Retail Supervisor stated, “*When we first introduced iPads in the stores, I spent a*
30 *lot of time in the stores, showing the staff the value it [the iPad] would add to their tasks ...*
31 *[how] this could really save their time, help them place orders from the stores, thus attributing*
32 *sales to the store.*”
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48 The relationship between senior management and external actors (i.e. technology providers/
49 consultants) concerning their ability to ‘speak the same language’, and thus collaborate more
50 effectively, was perceived as fundamental to success. Technology Provider 4 described the
51 tender process for new technologies between technology providers and retailers as being “*quite*
52 *painful, where a retailer has an idea of what they want, and you come in and present some*
53 *ideas based on what it is that we think they want*”. Because the retailer is not a technology
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company, *“they can’t articulate exactly what they want, or they are articulating something that probably can’t be done for another 10 to 15 years”*.

This language barrier and difficulties in managing the relationship between parties involved often leads to mismatch between retailer expectations and what technologies can provide. Most participants stressed the importance of relationships among internal actors, working together across IT and other departments with hybrid roles to lead digital transformation projects. Although perceived as necessary by most technology providers and consultants, several noted that *“people with mixed expertise on tech and fashion and retail are really hard to find, and they tend to sit isolated in different departments and do not speak the same language”* (Consultant 4).

Company characteristics

Company demographics are key factors influencing CFIT adoption. There was a perception that smaller, younger retailers tended to be more exploratory, innovative and proactive, whereas larger, more established companies *“are just a bit more hesitant to take risk [and] go for anything that is not a hundred percent ready”*, changing very slowly when it comes to CFIT, as they require *“more evidence of the tech”* (Consultant 2). This was especially true of representatives from long-established brands, who felt a strong need to protect the reputation of an established brand name, brand image and heritage – a factor often exacerbated by a more conservative company culture.

Despite some hesitation in well-established retailers to innovate and change, certain technology-related pioneering activity was evident. This tended to be supported by visionary

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3 leaders, who perceived this as an opportunity rather than a risk, and who held an appropriately
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5 senior position to initiate such change:
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10 “The good thing is that there are these pioneers in retail who start to come out, willing
11 to look at things. And you are seeing CEOs and C-levels... where people are keen to
12 be the pioneers within the organization. So that is more important, not just the
13 company being that, but having certain champions within who are willing to take these
14 steps, willing to take on some risk, because it’s a bit of risk to their reputation. But if
15 they are willing to take that on, they can potentially help their business out a lot,
16 because they see it not just as risk but as opportunity, for the next promotion, for the
17 next step in their life.” (*Technology Provider 7*)
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23 Greater embracing of innovation associated with strategic reasons for technology adoption was
24 more likely to be found in younger companies with tech-oriented leaders. Moreover, different
25 speeds of change were apparent, especially for traditional bricks-and-mortar retailers that were
26 not originally born with digital technology and consequently were less advanced in their
27 technological innovation journey, such as Retailer 2:
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37 “We’re just in a different place in the timeline versus some other brands. I think what
38 happens is fashion brands and retail companies grow, grow, grow – you know, it’s a
39 creative business, it’s not necessarily built on a technology platform that can handle
40 the speed in which technology is developing, so putting things in that might be needed
41 or customers are expecting that although might take longer than usual.” (*Retailer 2,*
42 *VP European Stores and Operations*)
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47 Retailer 2 prioritized creativity in product innovation to grow its business rather than investing
48 in marketing channel technology, which explained its position of being slower than competitors
49 on digital innovation.
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56 **Company experience with technology** in terms of prior systems implementation and
57 compatibility with newer technology applications were key factors which could act as drivers
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or barriers to CFIT implementation. Several technology providers felt their retail clients were “very slow moving and have got legacies in the other world and it’s very brutal and inflexible and slow to change, that infrastructure piece” (Technology Provider 12). Other retailers had started to integrate new CFIT but realized the challenge of dealing with existing legacy systems, as stated by Retailer 9:

“I think our issue at the moment is related to our maturity as a technical business. We’ve grown so rapidly that a lot of our back-end systems aren’t integrated, so for us at the moment it is quite a challenge for us to be confident on stock levels, or be confident on availability of products and timing of product. That’s probably our biggest challenge as opposed to adopting new technology, it’s making sure that what we do put in is accurate for the customer, because you really only get one chance to let them buy or they won’t be back.” (*Director of Technology & Logistics*)

Despite the challenges, Retailer 9 realized the importance of keeping up with new technology to provide customer service and experience through accurate product availability.

External environment

Consumers’ demographics influenced the degree of acceptance and usage of CFIT, depending on market context. Consultant and technology provider respondents felt that luxury retailers (especially brands reliant on heritage and craftsmanship) tended to be hesitant about how their clients might perceive and respond to innovative in-store technology:

“I think luxury retailers just worry how the luxury clients would respond to that, whereas high street target market is younger, they’re just open to it, whereas the luxury brands who often rely on that heritage and craftsmanship, they then worry how the technology would sit with that. Someone I met with recently, they were looking to do in-store VR experience and he was saying that he worries that his customer doesn’t want to come to the store and look stupid wearing the headset and leave the store.” (Consultant 2)

This demonstrates how consumer demographics impact on retailers' decisions concerning technology adoption, linking to the next external environment characteristic relating to **consumers' experience with technology**, which needed to be balanced against brand values (especially luxury brands):

"It's balancing that, because they [luxury retailers] still need to satisfy the fact that you've got very tech savvy consumers... So, it's kind of figuring out how you do the heritage piece with the future piece, which to them I'm sure [does] not feel like [it] particularly sits hand-in-hand, even if the customers are already there." (*Consultant 3*)

Consultant 3 stressed that experience of - and familiarity with - a particular technology influences a company's market positioning. Thus, luxury retailers have started to adapt their technology strategies to those groups of consumers for whom technology is important. Moreover, the nature of the technology itself could influence these issues. For example, the technology lifecycle stage that a particular technology was at and its suitability for the customer and client organizations were perceived as important:

"Technology is timely; if it is too early or too late, you'll lose... You cannot obtain enough attraction. Nowadays you can see this for AR solutions, they are still quite early for fashion, that's why they cannot reach enough attraction to be a real working product. [...] Every technology has its own maturity curve." (*Technology Provider 10*)

Thus, a technology that is in the early stages of its lifecycle might represent a perceived barrier to organizational adoption. This may be related to organizations not being ready to adopt, due to the technology being too innovative for their strategic objectives, or incompatible with current technological activities, or because organizations might be unprepared to invest in 'unproven' technology, preferring to "go for more secure tech innovators and technologies that are really proven to be working" (Consultant 4). She further explained that "when big

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brands look for technology, they can't put anything with their brand name attached to it unless it's really proven to be working." The characteristics of the technology in terms of perceived usefulness and ease of use influence consumers and users' degree of acceptance and adoption, informing technology acceptance and implementation by retailers. Several retail participants felt the rapidly changing nature of technology represents a barrier to change embracement, as retailers may feel overwhelmed by the degree of updates required by the technology.

4.3 Reasons for CFIT adoption

Drivers/barriers to CFIT adoption involve senior management, company characteristics and the external environment, each of these aspects incorporating common themes of demographics/characteristics and experience with technology. The particular alignment of these factors impelled different reasons for CFIT adoption, classified as (1) *strategic reasons* (supported by an innovative vision and organizational culture); (2) *mixed reasons* (consisting of a combination of strategic and tactical reasons); and (3) *tactical* short-term marketing reasons.

Strategic reasons

This category relates to: (1) innovative vision and mindset as part of the company's longer-term business strategy; and (2) an internal driver, where technology is perceived as a strategic component and key enabler of innovation. These reasons are consistent with the company strategy (especially in terms of an innovative vision/culture) and can involve considerable changes to corporate mindsets. This approach resulted in high levels of technology adoption, filtered across multiple departments and influencing various aspects of the business. Technology (e.g. RFID, footfall counting, staff operational apps and devices, operational

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3 systems for inventory and payment processes, Wi-Fi, etc.) is fully integrated into back-end
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5 system infrastructure and operations, as part of a long-term plan to improve the business or
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7 redefine certain processes, thereby improving staff operations and enabling better front-end
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9 technology and consistent customer service. This was evident in Retailer 8, characterized by a
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11 strong innovative vision embedded into organizational culture:
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17 “Once [technology]’s been rolled out, it’s been rolled out. It’s not a choice to have it,
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19 but the general mentality [in Retailer 8] is how well are you able to adapt to anything.
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21 Because that is already the base assumption of all staff, there’s constant changes.”
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23 (*Product Manager Online Retailing*)

24 25 *Mixed reasons*

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27 Some reasons articulated by respondents combined both strategic vision and tactical motives,
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29 thereby combining back-end technologies and CFIT. This was the case for Retailer 13, which
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31 adopted RFID from an operational point of view, connecting it to magic mirrors for the
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33 consumer-facing side of the technology. Similarly, Retailer 11 implemented back-end
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35 technology to connect to CFITs, creating a strong back-end infrastructure to facilitate more
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37 effective front-end service and customer experience by knowing what was available in stock
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39 and where it was located:
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46 “We have technology more on the back-end side. We want to facilitate sales anywhere
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48 where the customer wants, so today you are online and you may decide that you want to
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50 buy that sweater, but you want to collect it in store. So, in the back of the house, we have
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52 a way of seeing the customer journey. This is a huge investment for this organization,
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54 and we have technologies that allow the customer to do whatever they want to do from
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56 anywhere. This is an operational view in terms of moving products, even if the customer-
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58 facing is about where that product is and your relationship to it, if you want to go to the
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60 store and reserve or pick it up or something like that and that’s where we really, really
focus.” (*Retailer 11, Role Anonymous*)

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Tactical reasons

Tactical reasons relate to marketing and brand promotion, to generate ‘buzz’, word-of-mouth and media attention from a PR/marketing perspective. Thus, CFIT implementation may be a short-term initiative (particularly with more visible technology, such as interactive screens, digital signage, magic mirrors, AR, VR, etc.), without back-end system integration. This was evident in Retailer 6, where marketing imperatives led to temporary but highly visible CFIT activities for publicity and word-of-mouth:

“As a brand we want to buy into giving you memorable, valuable, unique experiences that you wouldn’t have had before, which is why we did the VR event. Also, a big part of that is about having your brand spoken about, and that would be where we have the linkage with Snapchat lens for example, which reached millions of people. So, for that reason we are always looking at how we innovate with that.” (*Head of Retail of Global Flagship*)

5. Discussion

Addressing RQ1, this study categorizes three main modes of CFIT usage in fashion retail. These range from a more strategic-oriented back-end technological system integration, to a combination of back-end technology and CFIT, to more tactically-oriented visible front-end technologies with limited system integration (summarized in Table III). Building on literature acknowledging the importance of integration between front-end and back-end systems (Alexander and Kent, 2021; 2022; Grewal *et al.*, 2020; Ogunjimi *et al.*, 2021), this study brings together the direct experiences of the front-end and back-end actors involved to build a rich description of real-world opportunities and challenges therein.

Addressing RQ2, identified drivers and barriers to CFIT adoption include *senior management* (see also Bonetti *et al.*, 2022; Manfreda and Štemberger, 2019; Olsson *et al.*, 2019), *company characteristics* (see also Bruque and Moyano, 2007; Olsson *et al.*, 2019; Naicker and Van Der Merwe, 2018) and *external environment* (see also Grewal *et al.*, 2020; Riegger *et al.*, 2021). However, this study also emphasizes the sociotechnical implications of organizational technology adoption that are critical for successful implementation of a broad range of retail technologies that are directly experienced by consumers, building on previous work that had begun to highlight these key interrelationships (see Berg *et al.*, 2005; Bonetti *et al.*, 2022; Kaarst-Brown and Robey, 1999; Manfreda and Štemberger, 2019; Naicker and Van Der Merwe, 2018). In particular, this study identified how sociotechnical implications are influenced by the contrasting demographics/characteristics and experience with technology of the various actors involved in the adoption decision and implementation processes, building on previous work by Bonetti *et al.* (2022), Manfreda and Štemberger (2019), Montecchi *et al.* (2022), Olsson *et al.* (2019) and Shankar *et al.* (2020),

Addressing RQ3, CFIT types, and the related drivers/barriers and reasons, lead to different approaches to CFIT adoption decisions; termed *embedded*, *transformative* and *opportunistic*, (outlined in Table IV), which develops a categorization of sociotechnical implications identified in practitioner literature (e.g. Lawson 2022). In the *embedded approach*, the technological element is part of the organizational culture and long-term vision and strategy, embedded across front-end and back-end operations. The *transformative approach* relates to an incremental assimilation of technological strategy due to mixed reasons. The *opportunistic approach* involves retailers temporarily adopting technology to gain visibility and be perceived as innovators. This relates to more tactical reasons, translated into short-term, highly visible CFIT adoption, but not part of a long-term service provision plan or organizational vision.

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[Insert Table IV here]

A summary framework for fashion retailers’ approaches to CFIT adoption decisions in response to a rapidly changing environment is presented in Figure 2, which explains how the different approaches are guided by contextual factors and reasons for CFIT adoption. Various contextualizing factors (including senior management, company characteristics and external environment, as discussed above) act as drivers and barriers for CFIT adoption, which in turn influence the adoption of different types of CFIT (and the associated back-end technology infrastructure), resulting in different approaches to CFIT adoption decisions. This is the first study bringing together key reasons, factors and implications for CFIT and the respective back-end technology for successful implementation, derived from empirical investigation from the perspectives of those vested in the change.

[Insert Figure 2 here]

Furthermore, identified sociotechnical implications of CFIT adoption in fashion retailing are related to the three implementation approaches, which revolve around three interrelated aspects of *culture, collaboration* and *communication*.

First, a *culture* embracing change and technological innovation across all parts of the organization is fundamental for nurturing an innovative vision, thereby leading to integrated, holistic technology use (Bonetti *et al.*, 2022; Manfreda and Štemberger, (2019). This appeared to be the optimal situation for CFIT adoption, in contrast to more tactically oriented CFIT (e.g. for marketing and PR purposes) informed by market positioning and senior management

attitude towards technology, resulting in more visible but potentially more temporary forms of CFIT that tend to be limited to specific departments. This extends the literature on internal drivers of technology adoption and business transformation (Olsson et al., 2019; Alexander and Kent, 2021; Bonetti et al., 2022; Manfreda and Štemberger, 2019) by outlining how different approaches to technology adoption decisions are informed by corporate mindsets/organizational cultures around change triggered by cutting edge technology, and whether that type of change is embraced or resisted.

Second, CFIT implementation is influenced by relationships across teams and how teams (re)structure and *collaborate* across departments, both internally as well as with external stakeholders (e.g. technology consultants and suppliers), to acquire resources/competences consistent with the adopted technological approach (Baker, 2011; Bonetti *et al.*, 2022; Montecchi *et al.*, 2022). This study identifies aspects of organizational culture that support change embracement, rather than resistance, namely being receptive to rapidly changing external trends, anticipating and/or adapting where appropriate, and language congruency to articulate technological wishes and demands to technology providers/consultants. Additionally, challenges relating to users' inability to articulate their mobile technology needs are not limited to ordinary users of technology (e.g. Berg et al, 2005) but also manifest in professionals/industry practitioners.

Thirdly, *communication* is key to obtaining employees' acceptance and consequent adoption across the organization. This involves senior management demonstrating a strong technological orientation, and the creation of organizational structures and processes to deliver training/support to employees, as well as tracking performance and delivering incentives where appropriate. Involving people in the processes of co-creation of practice change helps achieve

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buy-in. This resonates with Bonetti *et al.* (2022), Manfreda and Štemberger (2019), Montecchi *et al.* (2022), and Olsson *et al.* (2019), situating the need for implementation of technology depending on the adopted technological approach, as illustrated in Figure 2.

6. Conclusions

This study reveals the challenges inherent in the rapid pace of technological development needed to achieve success. Technological capability has enabled fundamental changes in fashion retailing; technology is thus a key driver for business model formation and transformation within the sector. By analyzing the complex, dynamic and varied elements of technology adoption within more traditional point-of-sale formats, it builds understanding of ways in which issues of technological change can be managed while balancing the organization’s strategic requirements.

6.1 Theoretical contributions

This study contributes a comprehensive framework for retailers’ approaches to CFIT adoption, building on prior research and existing theories on retail innovation in several ways. First, it extends the literature on CFIT in retailing (e.g., Grewal *et al.*, 2020; Inman and Nikolova, 2017; Riegger *et al.*, 2021; Shankar *et al.*, 2020), by identifying three main modes of CFIT usage (see Table III). In particular, this classification encompasses the requisite level of back-end technological infrastructure connected to, and involved in, CFIT integration, as motivated by enhancing the customer experience and/or staff operations (Bonetti *et al.*, 2022). Second, this study extends prior research (Berg *et al.*, 2015; Bonetti *et al.*, 2022; Manfreda and Štemberger, 2019; Montecchi *et al.*, 2022) by revealing in-depth insights on the sociotechnical implications

of the introduction of rapidly-evolving technologies into organizational working processes, concerning relationships with internal and external stakeholders, language issues, and support in the digital transformation process. Third, this study extends literature concerning drivers/barriers to technology adoption (Antéblian *et al.*, 2014; Bonetti *et al.*, 2022; Bruque and Moyano, 2007; Hult *et al.*, 2019; Javornik *et al.*, 2021; Olsson *et al.*, 2019) through in-depth managerial insights concerning internal and external factors determining organizational technology adoption and implementation processes. It unpacks technology adoption factors that impact strategic decisions and implementation processes. Findings also outline the importance of retailers' strategic objectives concerning CFIT adoption, which may lead some to balance technology innovation with brand heritage and craftsmanship, thereby leading to brand repositioning and targeting new or changed consumer segments. Finally, this study identifies the multiplicity of reasons for retail technological innovation from a managerial perspective, thus contributing to existing literature on strategic reasons for - and implications of - CFIT adoption in retailing (see Grewal *et al.*, 2020; Javornik *et al.*, 2021; Olsson *et al.*, 2019; Verhoef *et al.*, 2009; 2015), classified into strategic, mixed and tactical reasons, while mapping out the respective types of technology involved.

Overall, this study combines these various aspects to develop a comprehensive multi-stakeholder understanding of managerial experiences and sociotechnical implications of CFIT adoption by retailers, culminating in a classification of CFIT types that encompasses the extent of back-end technological infrastructure involved in CFIT implementation. It extends previous studies on the consumer-facing side by contributing a critical understanding of the strategic responses, type(s) of technology, processes, key actors and implications involved in CFIT implementation and the related back-end technological operations within a retail context.

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6.2 Managerial implications

This study provides fresh managerial insights on sociotechnical implications of technology adoption within more traditional point-of-sale formats, providing guidance to managers for making informed decisions, overcoming transformational barriers, and mapping progress. Managers could use the framework to assess their internal resources and ambitions, choose the most appropriate type of CFIT adoption, anticipate potential barriers to success, and benchmark their progress. Reasons for retailer technological strategy should be fully embraced by senior management, to motivate and support staff to manage sociotechnical implications of technology adoption. Managing internal and external relationships is also important; for example, by setting up hybrid roles across departments vested in the change to co-create change at holistic level and enhance language congruency to support successful digital transformation. Technology providers and consultants should consider providing a full coaching service to help retailers through strategic innovation transitions, broadening technology provider and consultant roles to incorporate guidance on inter-organizational relationships between retailers, technology providers and consultants.

6.3 Limitations and future research

While this study offers new perspectives to increase understanding of a novel phenomenon in retailing, it has some limitations that may offer directions for future research. The research focused on well-established global fashion retailers of Western origin, but did not consider smaller, localized brands, newer entrants, or non-Western retailers. Further research could investigate such companies to reveal other potential sociotechnical implications of organizational approaches to CFIT adoption. Moreover, future research could encompass a

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3 more overt critical evaluation of the processes of implementation for such strategies, and
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5 related implications such as the degree of co-creation amongst parties involved, how actors
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7 communicate and how inter-organizational language barriers may be resolved. Such research
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9 could be case-study-based, to provide rich data from different types of organizations.
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14 This research focused on senior management perspectives but did not incorporate perspectives
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16 from consumers or consumer-facing store employees, which could provide additional insights.
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18 Future research could elicit a holistic view by triangulating managerial perspectives with
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20 consumer perspectives and/or those of consumer-facing retail store staff; for example by
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22 interviewing frontline retail employees, measuring consumers' reactions to CFIT through
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24 surveys or experiments, analyzing retailers' EPOS data in terms of conversion for ROI and
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26 KPIs, or using eye-tracking technology, to link technology adoption to sales conversion.
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33 Further research should explore how organizational structures have been evolving, in terms of
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35 (re)structuring of internal teams, and acquisition of new/external actors with technology-
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37 related skills, as well as collaborating with external stakeholders more broadly. Research on
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39 identifying the necessary skillsets for practice changes due to technology adoption is also
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41 timely.
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Appendix 1 Interview protocol

Topic area	Themes covered and questions
Introduction	Participant's role in the retailer/ consultancy/ tech provider, duration, whether the role has changed within the organization, previous roles
Type(s) of CFIT and related back-end technological activities adopted by retailer and more broadly by the fashion retail industry	Invite participant to tell the story of their experience of CFIT and related back-end technological activities. Which type(s) of technology have been adopted by the retailer? Which retailer has adopted which type(s) of technology? Which type(s) of technology does the participant deal with/ provide/ advise on?
Drivers/barriers to CFIT adoption and implementation	Please comment on the way in which decisions are taken internally to the organization regarding CFIT adoption: who is involved, how these decisions come about, influences on decisions. What is the level of priority of CFIT and related back-end technological activities? Please comment on the organizational culture regarding technological innovation. Please discuss the role that company characteristics play in influencing technology adoption. What are external drivers and motivations influencing CFIT adoption? What are the barriers that retailers may encounter in the adoption of CFIT? What are the means used to overcome those barriers (if any)?
Reasons for – and sociotechnical implications of – CFIT adoption	What are the reasons moving the retailer's decisions for adopting (or non-adopting) CFIT? What is the retailer hoping to achieve through CFIT adoption from an operational perspective? What is the expected contribution of CFIT to the retailer's strategy? What are the processes and sociotechnical implications involved in CFIT adoption and implementation?
Wrap-up	Retailer's future/ upcoming plans for CFIT/ observed trends? Future implications? Any other comments about CFIT?

Figure 1. Inductive coding process

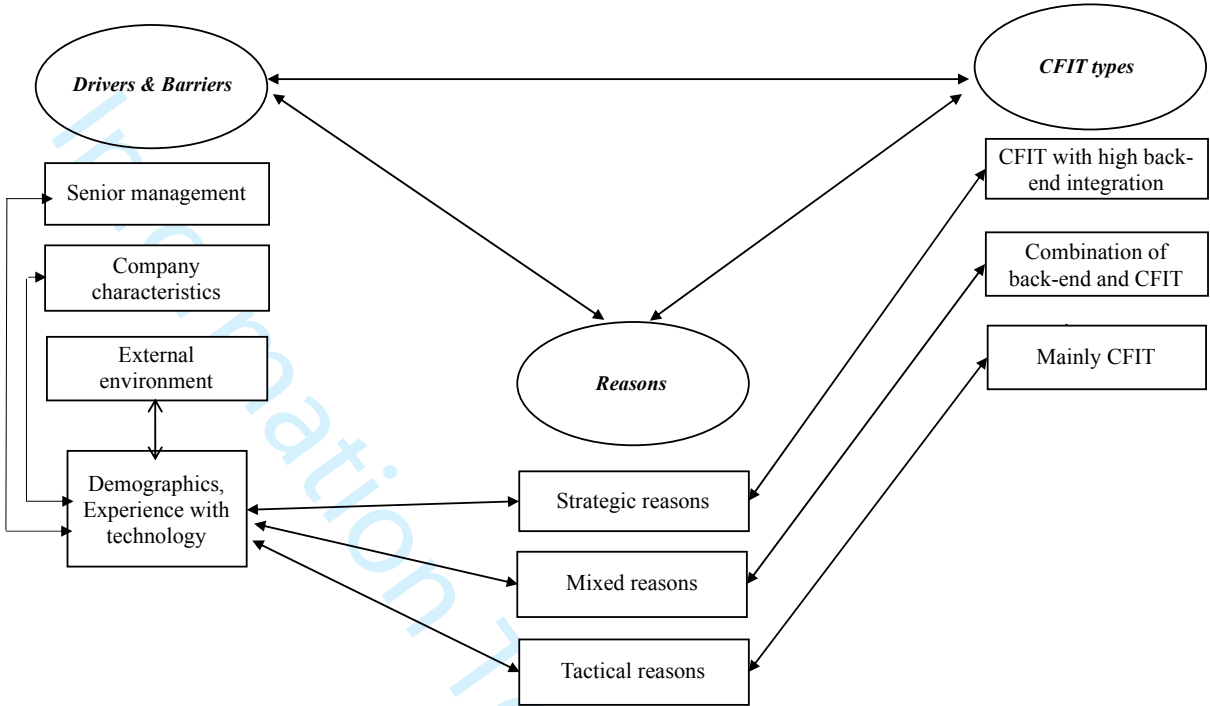


Figure 2. Framework for retailers' approaches to CFIT adoption decisions

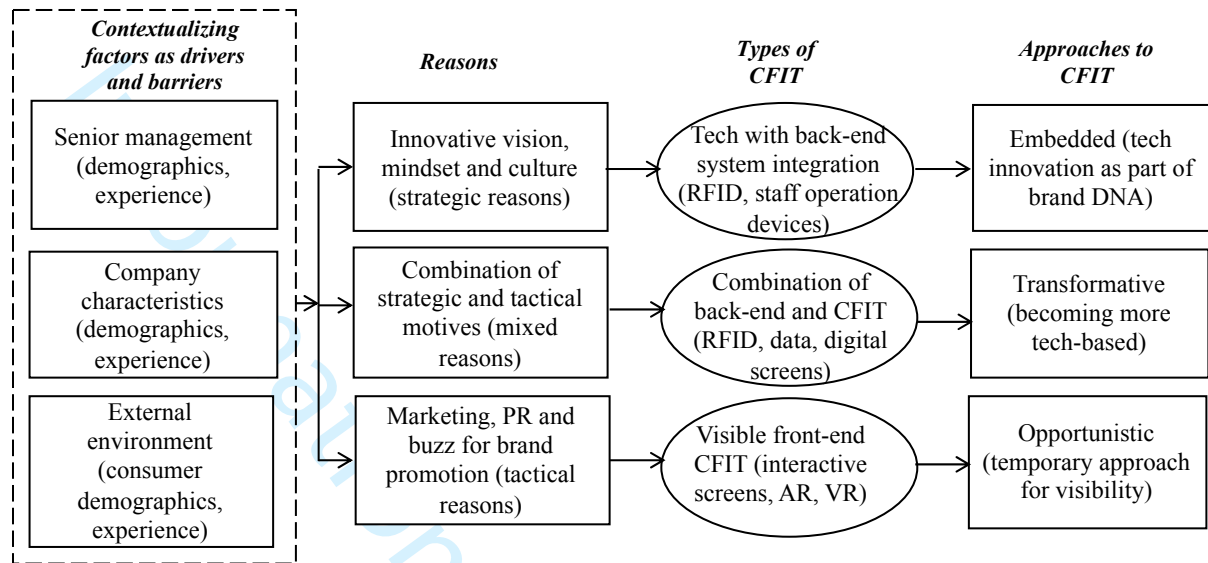


Table I. Definitions and examples of CFIT in the literature

Term	Definition and key characteristics	Examples of applications	Citation
Customer-facing/ shopper-facing technologies	Technologies used by customers/ shoppers and facilitated by retailers to enhance customer engagement with products, services or brands	Mobile devices, wearables, smart speakers, AR, VR and MR systems, chatbots, smart mirrors, payment technologies	Shankar et al. (2020)
Innovative in-store technologies	Classification of futuristic technologies based on the technology level of convenience and social presence for the consumer	Digital price tags, self-checkout, AR, VR, in-store kiosks, smart displays, robots, avatars	Grewal et al. (2020)
Shopper-facing retail technology	Customer-oriented retail technologies, including an array of back-end and front-end technologies	Mobile apps, self-scanning checkouts, smart shelves, scan and go	Inman and Nikolova (2017)
Consumer-facing retail technologies	Smart technologies that allow brick-and-mortar retailers opportunities to introduce amenities of online retailing into physical interactions for consumers, including technology-enabled personalization	Data driven personalization, smart shelf, touch screens, mobile apps, service robots, AR, VR	Riegger et al. (2021)
In-store technologies	Consumer-facing devices that facilitate the shopping process in the physical store and that consumers can interact with	Tablet, interactive screen, AR mirrors, self-checkouts, digital window, digital photobooth	Alexander and Kent (2021; 2022)

Table II Participant profiles

Name	Job role	Further participant/organization details
Retailer 1	Head Office: Senior participant; Retail Supervisor Store Level: Store Manager	Italian luxury fashion house
Retailer 2	Head Office: Marketing Director EMEA; Vice-president European Stores & Operations; Digital Communications Manager EMEA Store Level: General Manager Global Flagships	American fashion retailer
Retailer 3	Head Office: Senior National Retail Manager Store Level: Store Manager	British clothing manufacturer and retailer
Retailer 4	Head Office: Senior participant (role anonymous) Store Level: Store Manager	British womenswear retailer
Retailer 5	Head Office: MIS (Management Information System) Director Store Level: Store Manager	British luxury brand
Retailer 6	Head Office: Head of Retail of Global Flagship Store Level: Operations Brand Manager & Talent Management Store Management	British fashion retailer
Retailer 7	Head Office: Senior participant (role anonymous) Store Level: General Manager Flagship London Store	Dutch denim retailer
Retailer 8	Head Office: Senior E-commerce Product Manager Store Level: Store Director; Department Operations	Spanish fast fashion retailer
Retailer 9	Head Office: Head of Retail APAC; Director of Technology & Logistics Store Level: General Manager London Clubhouse	British sportswear retailer
Retailer 10	Head Office: Customer Director Store Level: Deputy Manager	British fashion retailer
Retailer 11	Head Office: Global Director of Retail Experience; Group interview 3 Senior participants (roles anonymous); Group interview 2 Senior participants (roles anonymous) Store Level: Flagship Store Manager	British luxury fashion retailer
Retailer 12	Head Office: Head of Product and Digital Stores; Product Owner – Retail Technology Store Level: Store Manager; Commercial Manager	British lifestyle retailer
Retailer 13	Head Office: Director Global Real Estate; Senior participant (role anonymous) Store Level: Director Consumer Experience; Senior Store Manager	German sportswear retailer
Retailer 14	Head Office: Group interview 5 Senior participants (roles anonymous) Store Level: Store Manager	Italian luxury fashion house

Tech provider 1	Senior Product Manager	CFIT types provided: Mobile apps, Wi-Fi, analytics, RFID, beacons, CRM, smart mirrors, interactive screens; operating in Italy and Europe
Tech provider 2	Principal / Senior Technology Consultant	CFIT types: 3D body scanning; operating in Switzerland and Europe
Tech provider 3	Sales Manager UK & Ireland	CFIT types: Retail electronic dynamic pricing label, RFID, smart mirrors; operating in UK and Europe
Tech provider 4	Head of Product Management	CFIT types provided: VR experience; AR, AI, tablets, digital signage; operating in UK and worldwide
Tech provider 5	CEO	CFIT types provided: AR, virtual fitting room, magic mirror; operating in Austria and Europe
Tech provider 6	CEO	CFIT types provided: Smart mannequins; operating in Italy and Europe
Tech provider 7	Founder & CEO	CFIT types provided: 3D scanner, app; operating in UK and Europe
Tech provider 8	Co-Founder and CEO	CFIT types provided: Theft-proof scan, pay and leave shopping solution; operating in UK and Europe
Tech provider 9	CEO	CFIT types provided: 3D body scanning, VR; operating in UK and worldwide
Tech provider 10	Founder & CEO	CFIT types provided: AR, magic mirrors, VR, apps, body scanner, beacon, Bluetooth; operating in Europe
Tech provider 11	Director	CFIT types provided: 3D and virtual reality; operating in UK
Tech provider 12	Vertical Solutions Architect, Retail Sector	CFIT types provided: Networks, Mobility and Collaboration tools to Data-Centre, Cloud, IoT, Big Data and Analytics, Wi-Fi, beacons; operating in UK and Europe
Tech provider 13	Product Marketing Manager EMEA	CFIT types provided: Hololens, Kinect in-store, Bing, AR mirrors, phone apps, big data; operating in UK and Europe
Consultant 1	Co-Founder & Creative Director	Job role: Co-retail lab gathering technologists, retailers, entrepreneurs, researchers and makers; operating in UK
Consultant 2	Business Manager	Job role: Helping designers and brands innovate their business models with AR, VR, wearable tech; operating in UK and Europe
Consultant 3	Journalist and Innovation Consultant	Job role: Latest innovative tech in retailing; operating in UK and Europe
Consultant 4	Head of Fashion Innovation	Job role: Helping designers and brands innovate their business models with AR, VR, wearable tech; operating in UK and worldwide
Consultant 5	Interim Director	Job role: Payment services, POS systems, beacons; operating in UK
Consultant 6	Consultant & Business Coach	Job role: Various, CFIT in retailing; operating in Switzerland and Europe
Consultant 7	Executive Consultant and Director	Job role: Virtual reality, 3D, blockchain; operating in UK and Europe
Consultant 8	Anonymous role	Job role: E-commerce website providers, AR, IoT, wearable tech, mass-customization online; operating in UK
Consultant 9	Chief Marketing Officer	Job role: Digital signage, interactive screens, Wi-Fi; operating in UK and worldwide
Consultant 10	Creative Director	Job role: Advising on AR solutions; operating in Europe

Consultant 11	Coach, Strategic Consultant & Lecturer	Job role: Fashion and tech expert; operating in UK
Consultant 12	Managing Director and Founder, Customer Experience and Digital Transformation Consultant	Job role: Various, latest innovative tech in retailing; operating in UK and worldwide
Consultant 13	Chief Futurist	Job role: AR, magic mirrors, digital content, wearable tech, apps, holograms; operating in UK and Europe
Consultant 14	Senior Partner and Managing Director	Job role: Fashion and tech expert; operating in Italy and Europe
Consultant 15	Anonymous role	Job role: Various, latest trends in beauty and fashion; operating in UK and Europe

Table III Classification of CFIT usage modes adopted by fashion retailers

Technologies with high level of back-end system integration						Combination of back-end technology and CFIT				Visible front-end CFIT integration)					
Retailer	RFID	Footfall counting	Staff operations & devices	Payment processes	Wi-Fi	Beacons	QR codes	Mobile apps	Self-checkout	Body scanners	Digital signage	Interactive screens	Magic mirrors	AR	VR
1	✓		✓	✓	✓						✓	✓			
2			✓	✓	✓						✓	✓			
3		✓		✓											
4			✓	✓	✓						✓				
5			✓	✓	✓						✓	✓			
6			✓	✓	✓	✓		✓			✓		✓	✓	✓
7	✓	✓	✓	✓	✓						✓				
8	✓		✓	✓	✓			✓	✓		✓	✓	✓	✓	
9		✓	✓	✓	✓	✓		✓			✓				
10	✓		✓	✓	✓			✓			✓	✓	✓		
11		✓	✓	✓	✓			✓			✓	✓	✓	✓	
12	✓		✓	✓	✓			✓	✓		✓	✓	✓		

13	✓	✓	✓	✓	✓		✓	✓			✓		✓		
14		✓	✓	✓	✓						✓				

Table IV. Classification and descriptors of retailers’ approaches to CFIT

Classification	Descriptors
<i>Embedded</i>	Technological systems (front and back-end CFIT) are embedded as part of the culture and modus operandi of the retail organization. Blending of technology and brand; the technological element is part of the brand identity, both back-end and front-end (if properly integrated). Strong technology and brand interplay, where technology is embedded in all areas of the organization.
<i>Transformative</i>	Transformational strategy from previous way of operating not including a technological strategy, to a more technology-based model. This includes brands that were not born with such a strong approach but have subsequently assimilated technology. Technology empowers retail success and transforms the business model, flipping the role of the store whereby the store is there to serve the technology, rather than the technology to serve the store.
<i>Opportunistic</i>	Technology adopted as an opportunity to gain visibility amongst stakeholders and/or to be perceived as an innovator. Technology tends to be a short-term and highly visible initiative but does not tend to become part of the brand identity or strategy for integrated service provision.