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Review Article



Integrating industry 4.0 and 5.0 technologies in luxury fashion retail interiors: A systematic review of digital transformation, sensory design, and brand storytelling

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ABSTRACT

Emerging developments in Industry 4.0 and Industry 5.0 are transforming the cultural, sensory, and experiential character of luxury fashion retail interiors. These changes, driven by artificial intelligence, the Internet of Things, augmented and virtual reality, influence how individuals perceive space, form emotional connections, and engage with brand narratives across both physical and digitally enriched environments. Against this backdrop, this review aims to systematically synthesise how Industry 4.0 and Industry 5.0 technologies intersect with sensory experience, spatial design, and narrative expression in luxury fashion retail interiors, addressing the tendency of prior reviews to examine digital technologies or experiential aspects of retail in isolation. The study adopts a systematic literature review approach guided by the SPIDER framework and the PRISMA protocol. Fifty peer reviewed publications published between 2014 and 2025 were analysed to examine how digital transformation, sensory experience, and narrative expression intersect within luxury retail culture. The thematic analysis identified three closely connected areas: branding and customer experience, the interior environment of luxury stores, and the integration of advanced technologies within retail spaces. Together, these themes illustrate how contemporary luxury interiors operate as culturally expressive and emotionally charged settings shaped by new forms of technological mediation. Building on these insights, the study introduces the Multi-Layered Integration Framework, which explains the interaction between digital systems, spatial atmospheres, and brand storytelling in the creation of culturally responsive and human-centred retail interiors. The review contributes to the social sciences and humanities by demonstrating how emerging technologies reshape sensory engagement, symbolic identity, and cultural expression in luxury retail settings, while offering an expanded understanding of human experience within digitally influenced interior environments.

1. Introduction

Shopping today unfolds across a landscape where physical presence and digital interaction blend into a single continuous experience. This transformation is especially visible in luxury fashion, a sector that has long relied on sensory richness, symbolic meaning and curated atmospheres to express exclusivity and heritage. As digital technologies reshape everyday cultural practices, luxury brands increasingly adopt what has come to be described as phygital retail, a mode of interaction that softens the boundary between tangible environments and digitally mediated experiences (Guzzetti et al., 2024; Iannilli & Spagnoli, 2021; Alexander and Varley, 2025; Kapferer, 2017; Lawry, 2023). Although these developments are often framed as innovations in marketing or service delivery, they reach far deeper, altering the cultural and experiential foundations of luxury itself (Klaus, 2022).

This review focuses specifically on luxury fashion retail interiors because these environments often operate at the forefront of experiential retail innovation. Luxury retail spaces place exceptional emphasis on sensory richness, spatial atmosphere, and narrative expression as core elements of brand identity, making them particularly sensitive to the integration of advanced digital technologies. As a result, luxury fashion retail interiors provide a critical context for examining how Industry 4.0 and Industry 5.0 technologies interact with sensory experience and spatial storytelling, justifying the targeted scope of this review.

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Historically, luxury interiors conveyed meaning through material abundance, dramatic display, and carefully choreographed spatial experiences. These qualities continue to shape luxury environments; however, since the early 2010s, the emergence of Industry 4.0 has introduced new digital capabilities that extend traditional spatial expression through automation, data-driven systems, and immersive technologies. In retail interiors, Industry 4.0 has enabled the integration of artificial intelligence, augmented and virtual reality, and the Internet of Things, giving rise to smart mirrors, adaptive layouts, responsive lighting, and immersive media installations that enhance sensory engagement and experiential intensity (Park & Zhang, 2019; Bonetti et al., 2025; Grewal et al., 2020; Shankar et al., 2021). These technologies do more than streamline operations, as they increasingly mediate how individuals perceive, interpret, and emotionally connect with luxury spaces, strengthening the relationship between spatial cues, atmosphere, and brand identity (Joy et al., 2014; Hagtvedt and Chandukala, 2023).

More recently, Industry 5.0 has emerged as a complementary evolution, shifting attention from technological efficiency toward human-centred values such as intimacy, craftsmanship, well-being, and cultural expression within digitally enriched environments (Mourtzis et al., 2022; Pantano et al., 2022; Raddi-Mira et al., 2024). This perspective is particularly relevant to luxury fashion contexts, where experiential quality and emotional resonance are central to brand meaning. Related fashion-sector research has also proposed operational frameworks that align Industry 4.0 technologies with Industry 5.0 principles (e.g., "Lean 5.0"), illustrating how advanced digital systems can support craftsmanship, well-being, and people-focused outcomes while preserving luxury values (Fani et al., 2024)

This review is particularly timely considering the recent emergence of Industry 5.0 and the accelerated digital transformation of retail environments following the COVID-19 pandemic. While Industry 4.0 initially prioritised automation, efficiency, and data-driven optimisation, Industry 5.0 introduces a human-centred paradigm that foregrounds values such as well-being, intimacy, craftsmanship, and human–machine collaboration. Within luxury fashion retail interiors, these principles are only beginning to influence spatial design approaches, sensory atmospheres, and experiential strategies. At this early stage of adoption, there is a clear need to consolidate interdisciplinary knowledge to understand how advanced digital technologies can be integrated in ways that enhance experience while preserving the cultural and sensory foundations of luxury retail.

As a result, interior design takes on a critical role, serving as the medium through which light, acoustics and materiality interact with intelligent systems to produce immersive sensory experiences (Tirabeni et al., 2019; Joy et al., 2014).

Over the past decade, research on luxury fashion retail interiors has evolved through several interconnected stages. Early studies focused on store atmospherics and experiential design grounded in materiality, spatial composition, and sensory cues. This was followed by the emergence of omnichannel and phygital retail concepts, which sought to integrate physical environments with digital interfaces. More recent work has emphasised the adoption of Industry 4.0 technologies—such as artificial intelligence, immersive media, and connected systems—to support personalisation, interaction, and engagement within retail interiors. Emerging Industry 5.0 perspectives now extend this trajectory by re-centring human experience, craftsmanship, and well-being within technologically mediated retail spaces. Together, these developments reflect a shift from technology as a functional retail tool toward technology as an experiential and cultural mediator embedded within interior space (Bonetti et al., 2025; Iannilli & Spagnoli, 2021; Joy et al., 2014; Pantano et al., 2022).

Despite the momentum of digital transformation in retail environments, several gaps in the existing literature remain evident. Research in this area spans multiple disciplinary domains, including interior design, marketing and consumer experience, digital technology, and cultural and humanities-based studies. While a growing body of research has examined digital technologies in luxury retail, studies and review-based accounts tend to address Industry 4.0 technologies, experiential or sensory dimensions, or luxury retail contexts largely in isolation. Research on technological innovation in fashion and retail often prioritises operational, marketing, or consumer behaviour perspectives, whereas design-oriented studies focus more closely on spatial qualities, sensory engagement, and emotional atmosphere, with limited intersection between these traditions (Rayburn & Voss, 2013; Ballantine et al., 2015; Kim et al., 2020). In parallel, Industry 4.0 and Industry 5.0 are frequently discussed as distinct frameworks rather than as complementary approaches linking digital capability with human-centred values, craftsmanship, and cultural meaning (Mourtzis et al., 2022; Pantano et al., 2022). Moreover, much of the existing scholarship is concentrated in Western and East Asian contexts, with comparatively limited attention to regions such as South Asia, where cultural practices and retail environments differ in important ways (Appiah-Nimo et al., 2024; Kostritsa et al., 2020; Wu et al., 2015). As a result, there remains limited systematic synthesis that integrates Industry 4.0 and Industry 5.0 perspectives with the sensory, spatial, and narrative dimensions of luxury fashion retail interiors.

Beyond theoretical fragmentation, these gaps carry practical implications for luxury retail designers and brand practitioners. Luxury fashion brands are increasingly experimenting with artificial intelligence, immersive media, and connected systems within physical store environments, yet guidance on how to integrate such technologies without undermining sensory richness, spatial atmosphere, and brand storytelling remains dispersed across disciplines. By consolidating interdisciplinary knowledge, this review responds to a practical need for integrative insight that can support more informed, culturally sensitive design and strategic decision-making in digitally enriched luxury retail environments.

Given the inherently interdisciplinary nature of this topic, a systematic literature review is particularly suited to bridging disciplinary silos by synthesising insights across design, marketing, technology, and cultural studies, thereby offering a holistic perspective for both academic research and professional practice. In this context, the aim of this review is to systematically synthesise how Industry 4.0 and Industry 5.0 technologies intersect with sensory experience, spatial design, and narrative expression in luxury fashion retail interiors, addressing the fragmented treatment of these dimensions across design, retail, and technology literature.

This study responds to these concerns by exploring how Industry 4.0 and Industry 5.0 technologies shape the sensory, spatial and narrative qualities of luxury fashion store interiors. It investigates how intelligent systems support sensory engagement and brand storytelling and how these systems become embedded within design strategies that seek to preserve atmosphere, meaning and emotional depth. This study adopts a systematic literature review approach to analyse fifty peer reviewed studies, allowing a comprehensive view of the conceptual, experiential and cultural issues at stake.

Three guiding questions structure the inquiry. These guiding questions are as follows.

RQ1: How do Industry 4.0 and 5.0 technologies enhance sensory engagement in luxury fashion store interiors?
RQ2: How are these technologies integrated into brand storytelling and spatial design strategies?
RQ3: What challenges and contextual factors influence adoption in emerging markets such as Sri Lanka?

Together, these questions address the experiential, design-driven, and contextual dimensions through which digital technologies are reshaping luxury fashion retail interiors, with particular sensitivity to cultural and regional variation.

The remainder of the paper is structured as follows. Section 2

presents the research methodology, including the search strategy, review protocol and thematic analysis procedures. Section 3 offers a descriptive overview of publication trends and disciplinary orientations. Section 4 introduces the thematic framework developed through analysis, and Section 5 discusses how the themes converge into the Multi-Layered Integration Framework. Section 6 concludes with reflections on theoretical contribution, practical relevance and future research directions.

2. Methodology

This study used a Systematic Literature Review to examine how technologies associated with Industry 4.0 and Industry 5.0 influence sensory experience and brand storytelling within luxury fashion retail interiors. Because this topic spans design, technology, psychology and consumer studies, a systematic and transparent review process was essential. To maintain rigour and clarity, the review followed the PRISMA protocol developed by Moher and colleagues in 2009 and was guided by the SPIDER framework introduced by Cooke, Smith and Booth in 2012. These two approaches together provided a structured foundation suited to qualitative, interpretive and concept driven research.

2.1. Study design and selection strategy

The SPIDER framework was selected because it supports the analysis of experiential, emotional and spatial topics, which are not easily captured through traditional clinical review models such as PICO. SPIDER allows for diverse forms of qualitative evidence and is therefore appropriate for a review that addresses sensory engagement, cultural meaning and technologically mediated interior environments.

The five SPIDER elements guided the selection process. The Sample element restricted the review to peer reviewed journal articles that explored luxury fashion retail interiors, sensory qualities or brand related experiences. The Phenomenon of Interest focused on artificial intelligence, augmented and virtual reality, the Internet of Things and related technologies that influence sensory and narrative dimensions in retail spaces. The Design element included qualitative, mixed method and conceptual studies. The Evaluation element emphasised emotional interpretation, sensory perception, symbolic meaning and experiential expression. The Research Type allowed empirical, conceptual and review studies to be included.

A summary of how SPIDER informed the selection criteria is presented in Table 1, which outlines each element and its operational definition in this review.

Table 1
SPIDER framework for study selection.

Component	Description	Interpretation
Sample (S)	Peer reviewed journal articles on Industry 4.0 and 5.0 in luxury retail interiors	Restricts the review to high quality academic publications that examine digital innovation within luxury retail environments
Phenomenon of Interest (PI)	Integration of digital technologies into interior design to enhance sensory engagement and storytelling	Focuses on applications of AI, IoT, AR, and VR that generate multisensory experiences and communicate brand narratives
Design (D)	Qualitative, mixed method, and conceptual studies	Encompasses case studies, design frameworks, and thematic reviews capturing experiential dimensions beyond quantitative metrics
Evaluation (E)	Impact on customer perception, emotional connection, and brand identity	Examines how design and technology affect emotions, loyalty, and perceptions of luxury
Research Type (R)	Systematic reviews, empirical case studies, and theoretical models	Integrates both evidence based and conceptual insights for comprehensive understanding

Source: Author, adapted from Cooke et al. (2012).

2.2. Search procedure and PRISMA flow

The literature search was conducted between January and March 2025 across Scopus, Web of Science, ScienceDirect, IEEE Xplore, and Google Scholar to identify peer reviewed studies relevant to Industry 4.0 and Industry 5.0 technologies in luxury fashion retail interiors. Search terms were developed iteratively and organised into three thematic keyword clusters relating to.

(i) technological paradigms (e.g., Industry 4.0, Industry 5.0, phygital retail, smart retail),
(ii) retail and brand context (e.g., luxury fashion retail, luxury brands, flagship stores), and
(iii) interior, sensory, and experiential dimensions (e.g., sensory experience, spatial design, store atmosphere, brand storytelling).

Boolean operators (AND/OR) were used to combine these clusters and refine the search results. Searches were limited to English-language, peer reviewed journal articles published between 2014 and 2025, reflecting the period associated with the emergence of Industry 4.0 and the subsequent development of Industry 5.0 discourse. The full search strategy, example Boolean queries, applied filters, search dates, and database-specific record counts are provided in Appendix A.

The initial search identified 425 records, including 118 from Scopus, 90 from Web of Science, 84 from ScienceDirect, 55 from IEEE Xplore, and 78 from Google Scholar. Following the removal of duplicate records and clearly unrelated titles, 353 records remained for title and abstract screening. Based on relevance to the research objectives, 181 studies were retained for full-text assessment.

During full-text evaluation, 181 articles were assessed for eligibility. Of these, 57 studies were excluded because they focused on general retail, supply chains, non-luxury sectors, or lacked sufficient interior design relevance. The remaining 124 studies proceeded to quality appraisal.

At the quality appraisal stage, 74 studies were excluded due to insufficient methodological transparency or journal credibility concerns, including inadequate reporting standards or unclear peer-review practices. In total, 131 studies were excluded following full-text assessment and quality appraisal, resulting in a final sample of 50 peer reviewed studies included in the thematic synthesis.

Fig. 1 presents the PRISMA flow diagram detailing each stage of the identification, screening, eligibility assessment, and final inclusion process, providing a transparent summary of database records retrieved, duplicates removed, full-text assessments conducted, and studies excluded in accordance with PRISMA reporting standards.

2.3. Quality appraisal

Each of the fifty included studies was assessed using two established appraisal frameworks. The Critical Appraisal Skills Programme (CASP, 2006) was employed to evaluate clarity of aims, relevance to the review objectives, appropriateness of research design, and interpretive validity. In parallel, the Joanna Briggs Institute (JBI) critical appraisal guidance developed by Aromataris and and Munn (2017) was used to assess methodological credibility, transparency, and dependability across different research types.

Quality appraisal focused on the substantive methodological and conceptual robustness of each study rather than reliance on any single journal-level metric. Indicators of publication credibility, including recognised indexing status, transparency of peer-review practices, and adherence to scholarly publication standards, were considered supportive contextual factors rather than stand-alone determinants of quality. Quality appraisal informed the eligibility decisions reported in

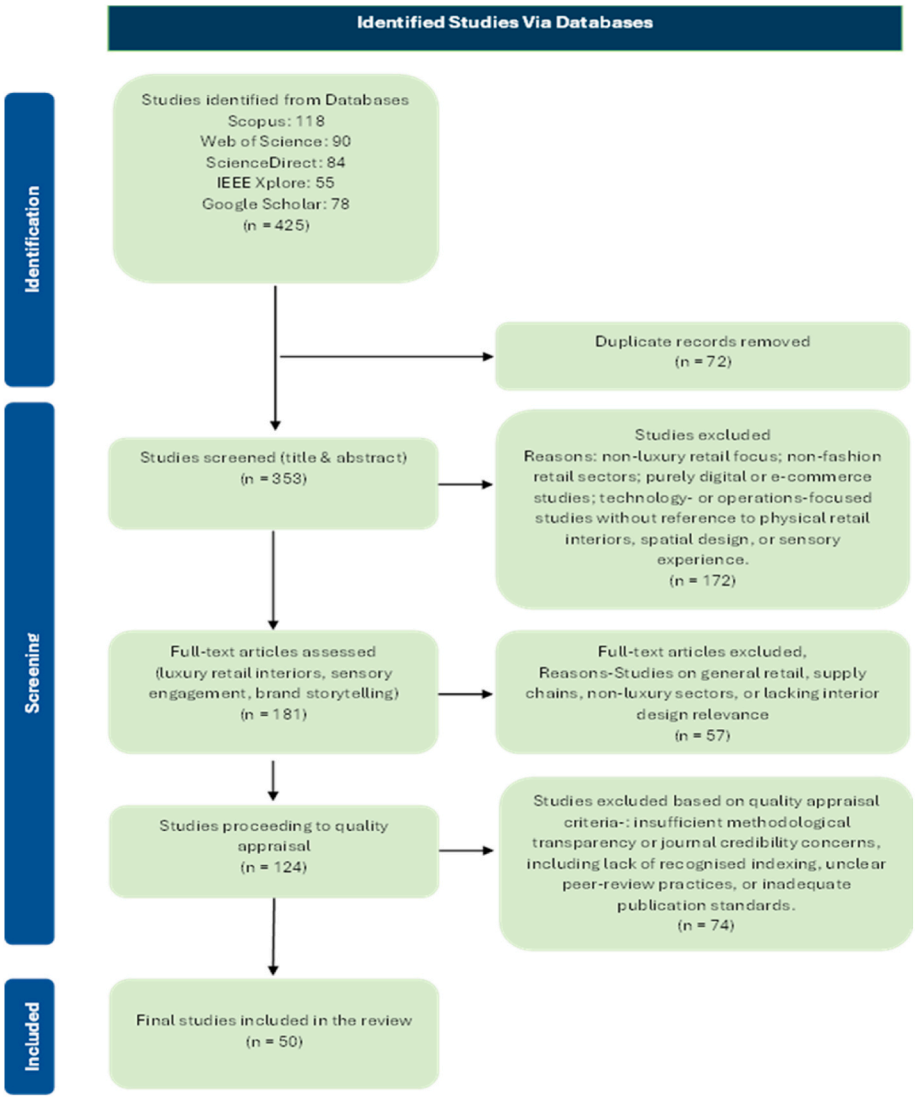

Fig. 1. PRISMA flow diagram illustrating the systematic literature review process, including identification, screening, eligibility assessment, and final inclusion of studies. (adapted from Moher et al., 2009).

Section 2.2, and only studies meeting the required methodological and conceptual standards were retained within the final sample of fifty articles.

The criteria used for assessment are summarised in Table 2, which outlines the appraisal dimensions and scoring structure applied in this review.

Table 2
Quality appraisal criteria and scoring system.

Criterion	Weight	Justification
Relevance and Study Design	0 – 2	Ensures alignment with review objectives and appropriateness of the research approach
Methodological Rigour and Validity	1 – 5	Assesses transparency, coherence, and robustness of methods and analysis
Publication Credibility and Standards	1 – 3	Considers recognised indexing, clarity of peer-review processes, and adherence to scholarly publication norms
Bias and Limitations	1 – 2	Evaluates acknowledgement of assumptions, constraints, and potential sources of bias
Reproducibility and Citation Transparency	1 – 3	Assesses traceability of sources, clarity of reporting, and potential for replication

Source: Author, adapted from CASP (2006) and Aromataris and and Munn (2017)

2.4. Methodological overview of selected studies

The methodological distribution of the fifty included studies was analysed to characterise prevailing research approaches within the literature. As shown in Fig. 2, qualitative methods were most frequently employed, reflecting the exploratory nature of research on sensory experience, spatial design, and brand storytelling in luxury retail contexts. Quantitative and mixed-methods approaches were also evident, indicating complementary empirical and integrative research efforts.

A small number of studies did not explicitly state their methodological approach; however, these were retained due to clear analytical structure and conceptual coherence, as confirmed through quality appraisal. Overall, the distribution highlights methodological diversity alongside a continued emphasis on interpretive and design-oriented inquiry.

2.5. Thematic analysis

A thematic analysis was conducted following the six-stage approach proposed by Braun and Clarke in 2006. All fifty studies were read in full

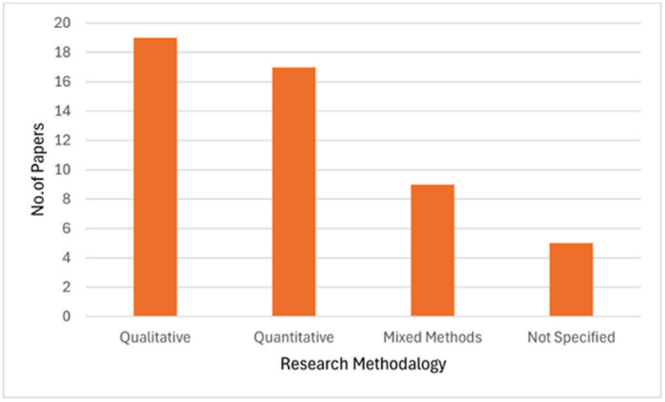

Fig. 2. Proportional distribution of methodological approaches used in the reviewed studies, indicating the relative prevalence of qualitative, quantitative, mixed-methods, and conceptual research designs.
Source: Author

and annotated to capture early impressions and initial conceptual signals. Open coding was undertaken using a structured spreadsheet, generating 702 initial codes derived directly from repeated ideas related to sensory atmosphere, spatial configuration, digital interaction, cultural expression, and narrative meaning.

These codes were iteratively reviewed and clustered through an affinity-mapping process, leading to the development of a smaller set of candidate themes that were subsequently refined and organised into the conceptual structure presented later in the paper. Manual coding enabled close engagement with the data and supported an interpretive, human-centred understanding of sensorial and spatial phenomena in luxury retail environments.

3. Descriptive analysis

The fifty studies included in this review present a diverse and interdisciplinary landscape of scholarship that links digital transformation with the experiential qualities of luxury fashion retail interiors. This descriptive analysis outlines the main characteristics of these studies, including their publication patterns, methodological choices, geographical origins and technological focus. Together, these observations provide the contextual foundation for the thematic synthesis that follows.

3.1. Overview of the selected studies

The studies span a wide range of academic journals across fields such as retail research, design studies, information systems, digital marketing, psychology and emerging technology. This diversity reflects the multidimensional nature of luxury retail environments, where sensory design, cultural meaning and digital systems converge. The overall characteristics of the reviewed publications, including study type, key focus and regional orientation, are summarised in Table 3, which offers a consolidated view of the evidence base used in this review.

3.2. Publication trends over time

A steady increase in relevant scholarship is visible from 2014 onward, with a notable rise in publications after 2019. This acceleration coincides with the maturation of key technologies such as augmented and virtual reality, interactive retail systems and artificial intelligence enabled personalisation. The highest number of publications appears in 2022, suggesting growing academic interest in the evolution of immersive and digitally supported luxury retail spaces. These temporal trends are illustrated in Fig. 3, which charts annual publication counts

Table 3
Descriptive summary of selected studies.

Dimension	Key Observations
Publication Years	Rapid growth after 2020 with peaks in 2022 and 2023
Journal Outlets	Predominantly high impact journals such as Journal of Retailing, Sustainability, and Journal of Retailing and Consumer Services
Geographic Authorship	Majority from the USA, UK, and Europe; limited South Asian contribution
Research Methodologies	Qualitative-19,Quantitative-17,Mixed Methods-9,Not Specified-5 Total 50
Technologies Studied	IoT and AR/VR most frequent, followed by AI and big data applications
Common Themes	Customer experience, sensory engagement, brand storytelling, and digital transformation

Source: Author

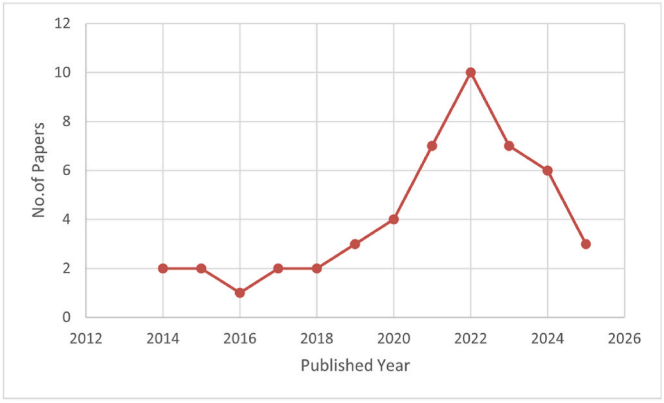

Fig. 3. Annual distribution of publications included in the systematic review, showing the growth of research on digital technologies and luxury retail environments over time.
Source: Author

across the study period.

3.3. Journal distribution and disciplinary spread

The reviewed studies are distributed across a broad set of journals rather than concentrated within a single disciplinary outlet. The fifty studies show the highest representation in Journal of Retailing and Consumer Services (n = 8), Sustainability (n = 7), Computers in Human Behaviour (n = 6), and the International Journal of Retail & Distribution Management (n = 5), while the remaining studies are distributed across twenty additional journals. The most frequently represented journals are listed in Table 4, highlighting the interdisciplinary reach of this topic.

3.4. Geographic origins of research

The geographical distribution of the reviewed studies reveals a clear imbalance across global regions. Thirty-six of the fifty studies originate

Table 4
Top journal outlets represented in the review.

Journal Title	No. of Articles
Journal of Retailing and Consumer Services	8
Sustainability	7
Computers in Human Behaviour	6
International Journal of Retail & Distribution Management	5
Fashion and Textiles	4
Others (20 journals combined)	20

Source: Author

from the United States, the United Kingdom, and Western Europe, with a further seven studies from East Asian contexts. In contrast, fewer than seven studies collectively originate from South Asia, Africa, and Latin America, highlighting a significant underrepresentation of developing and culturally diverse markets. The full geographic distribution is illustrated in Fig. 4.

3.5. Types of technologies explored

The reviewed studies examine a wide spectrum of technologies, with augmented and virtual reality discussed most frequently (n = 16). This is followed by artificial intelligence-driven applications (n = 12), omnichannel retail strategies (n = 11), immersive experience systems (n = 10), and Internet of Things-based environments (n = 9). These technologies are commonly deployed to enhance sensory engagement, spatial interaction, and brand storytelling, as illustrated in Fig. 5.

3.6. Keyword Co occurrence and conceptual clustering

A keyword co-occurrence analysis was conducted to identify conceptual patterns within the literature. Three main clusters emerged. The first cluster centres on branding, identity and emotional experience. The second cluster focuses on interior atmosphere and multisensory design. The third addresses technology integration, digital transformation and immersive interaction. These clusters together reflect the intertwined nature of cultural, experiential and technological concerns in modern luxury retail environments.

The co-occurrence network and cluster maps were generated using VOSviewer, based on author keywords and recurring terms extracted from the titles and abstracts of the fifty included studies. A minimum occurrence threshold was applied to reduce noise, and clusters were formed automatically using the software's association strength normalisation method. The complete network is shown in Fig. 6, with a detailed view of the central cluster presented in Fig. 7.

4. Thematic analysis and framework

To enhance transparency, the thematic structure in Section 5 was developed through an explicit progression from open codes to subthemes and higher-order themes. Fig. 8 visualises this hierarchy, providing traceability from detailed analytical "leaves" to overarching thematic domains. The thematic analysis produced a rich set of insights that help explain how emerging technologies shape the sensory, spatial and narrative qualities of luxury fashion retail interiors. Through close reading, manual coding and iterative refinement, patterns emerged that reflect how digital transformation is redefining the experiential and cultural foundations of luxury retail. These patterns were gradually consolidated into a coherent thematic structure that captures the multidimensional character of phygital luxury environments.

A wide range of descriptive codes was generated during the early stages of analysis, representing ideas related to sensory atmospheres, spatial composition, emotional engagement, identity formation,

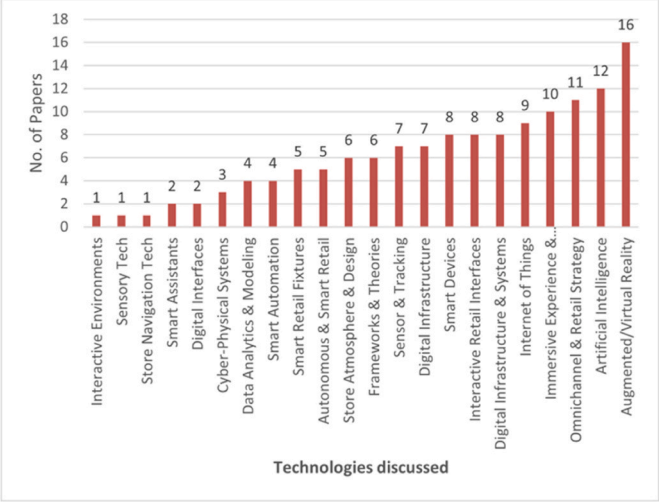

Fig. 5. Types of digital technologies examined in the reviewed literature, including Industry 4.0 technologies such as artificial intelligence, augmented reality, virtual reality, and Internet-of-Things systems.
Source: Author

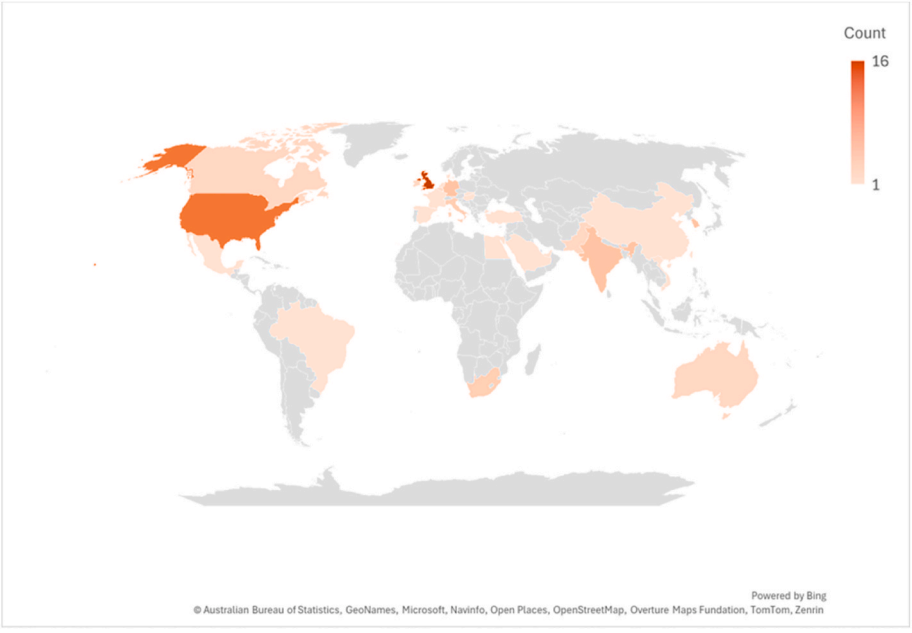

Fig. 4. Geographic distribution of the reviewed studies, illustrating the countries and regions where research on luxury retail technologies and customer experience has been conducted.
Source: Author

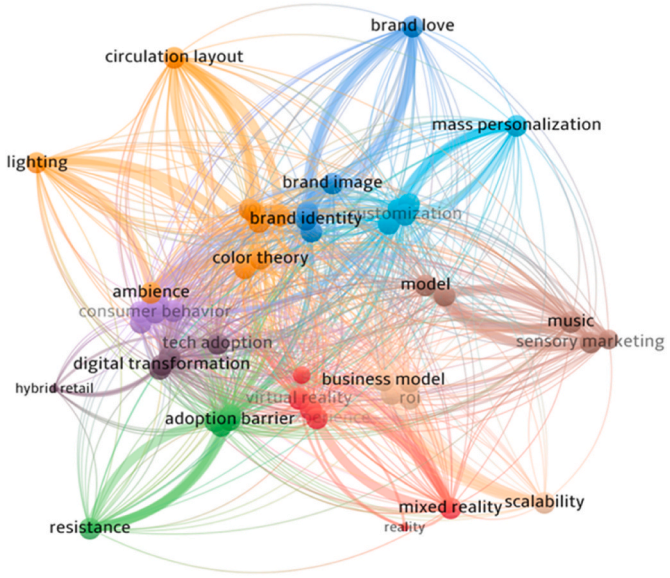

Fig. 6. Keyword co-occurrence network generated using VOSviewer, illustrating the relationships and research clusters among key concepts related to luxury retail, technology integration, and customer experience.
Source: Author

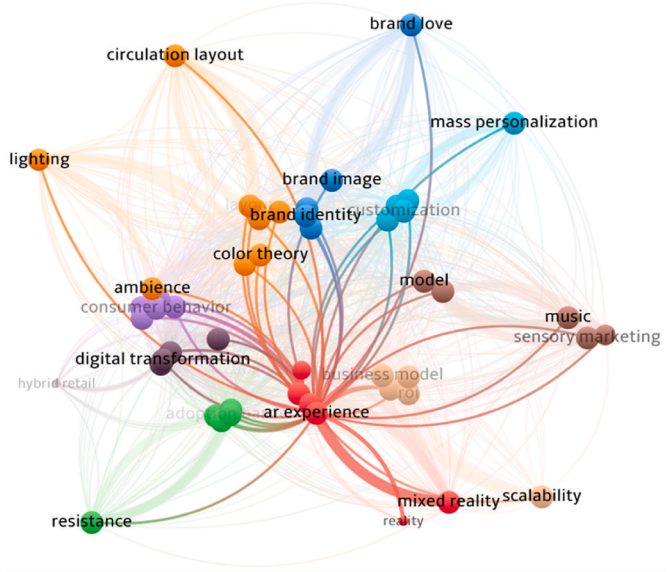

Fig. 7. Zoomed cluster map of the keyword network highlighting the major thematic clusters and their interconnections within the reviewed literature.
Source: Author

technological mediation and narrative expression. These initial codes were then grouped into clusters through an affinity mapping process, which enabled the identification of shared relationships among them.

Through this process, three major themes emerged. Each theme addresses a distinct but interconnected dimension of phygital luxury retail interiors. Together, these themes provide a holistic perspective on how sensory experience, spatial qualities and digital technologies interact to produce meaningful and emotionally resonant environments.

4.1. Theme one: branding and customer experience

The first theme focuses on the role of branding, identity and emotional experience in shaping how luxury retail environments are perceived and understood. Across the reviewed studies, luxury brands are portrayed not simply as commercial actors but as cultural storytellers who create atmospheres that evoke aspiration, exclusivity and symbolic value. Technology plays an increasingly important role in this process by enabling responsive and immersive experiences that deepen emotional connection.

Digital tools such as augmented reality mirrors, personalised recommendation systems and immersive media display help customers engage with brand narratives in more interactive ways. These technologies influence sensory experience through sound, movement, light and spatial dynamics, contributing to a sense of presence and emotional immersion. The theme therefore captures the intersection between identity formation, multisensory experience and the digital mediation of brand culture.

4.2. Theme two: retail interior environment

The second theme examines the physical and atmospheric qualities of the interior environment. The studies consistently emphasise the importance of materiality, lighting, spatial layout, colour, sound and tactility in shaping the sensorial and emotional characteristics of luxury stores. These elements contribute to what several scholars describe as the atmospheric signature of the interior, the spatial expression through which luxury is felt, interpreted and remembered.

Interior design decisions become even more complex when digital systems are embedded within the environment. Interactive fixtures, digital textures, spatial projection and adaptive lighting systems introduce new aesthetic possibilities that blend physical and digital experience. This theme highlights the continuing importance of traditional design principles while recognising that contemporary luxury interiors are increasingly shaped by socio - technical environments that respond to human movement and perception.

4.3. Theme three: technology integration in luxury retail

The third theme relates to the growing presence of technology in luxury retail and the broader cultural and experiential effects that follow. The literature reveals a shift from technology as a background operational tool to technology as a central experiential element. Augmented and virtual reality installations, artificial intelligence systems, smart displays and sensor enabled environments reshape how individuals move through space, interpret atmosphere and connect with brand stories.

This theme also captures the challenges associated with implementation, including issues related to technological readiness, staff proficiency, infrastructural limitations and the balance between innovation and heritage in luxury settings. The studies reveal an ongoing negotiation between efficiency and cultural expression, as designers and retailers work to integrate advanced systems while preserving the emotional richness that characterises luxury.

4.4. Integration of themes into a conceptual framework

The three major themes are deeply interconnected. Branding and customer experience cannot be separated from the sensory and atmospheric conditions of the interior environment. Similarly, technology integration influences both the expressive qualities of design and the emotional narratives that shape luxury perception. The thematic structure therefore reflects a network of relationships rather than separate interpretive categories.

These relationships are illustrated in Fig. 9, which presents the thematic framework developed from the analysis. The framework shows how the three themes intersect to inform a broader understanding of phygital luxury interiors. It also provides the conceptual foundation for the Multi-Layered Integration Framework presented in the next section.

The thematic framework therefore serves two main purposes. First, it

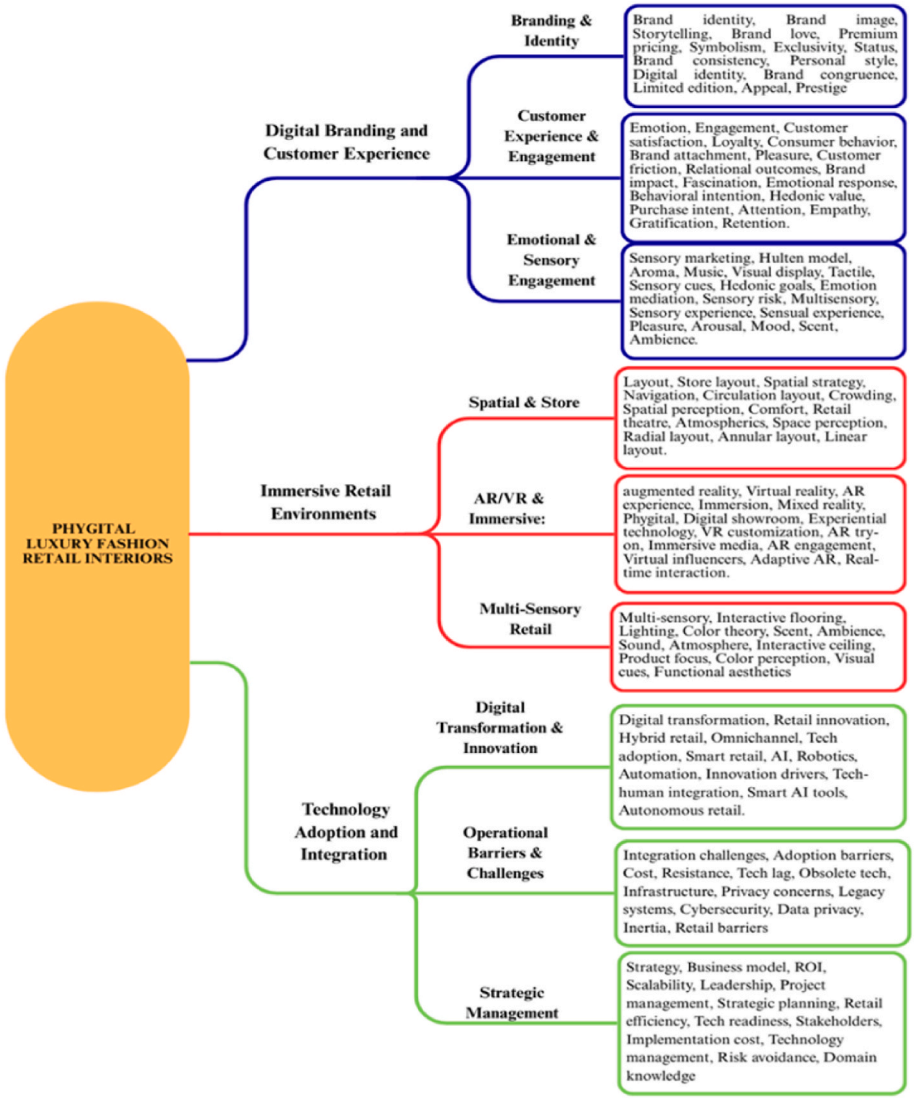

Fig. 8. Mind map illustrating the open coding structure and relationships between codes, subthemes, and overarching themes identified through thematic analysis.
Source: Author

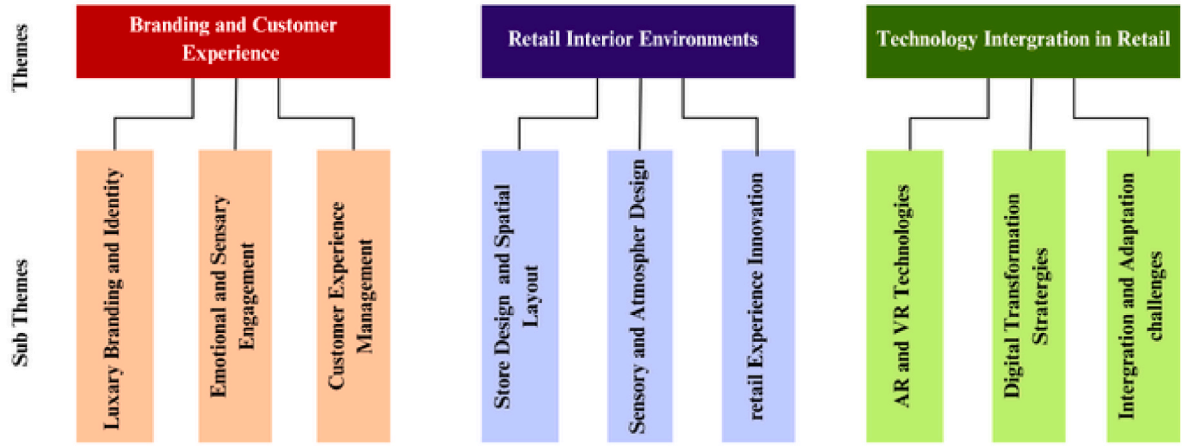

Fig. 9. Thematic framework developed from the systematic literature review showing the relationships between the core themes: branding and customer experience, retail interior environment, and technology integration.
Source: Author

demonstrates how sensory experience, spatial design and technological mediation collectively shape cultural meaning in luxury interiors.

Second, it provides a conceptual bridge between the literature review and the development of the Multi-Layered Integration Framework, which synthesises these thematic insights into a single interpretive model.

4.5. Alignment of research questions with thematic insights

To enhance analytical transparency and demonstrate how the thematic outcomes address the study's objectives, Table 5 aligns each research question with its corresponding thematic insights. This mapping clarifies the relationship between sensory engagement, phygital interaction, spatial design strategies, and the adoption challenges identified across the literature. It also connects the themes to the conceptual framework developed in the previous section.

RQ1: Sensory engagement in luxury fashion retail interiors

The reviewed literature indicates that Industry 4.0 and 5.0 technologies enhance sensory engagement by enabling immersive and responsive retail environments. Technologies such as augmented reality, interactive media, and sensor-based systems intensify emotional connection by dynamically aligning sensory stimuli with brand identity. Sensory experience is therefore shaped through the integration of technology as an ambient and experiential layer rather than as isolated digital interventions.

RQ2: Brand storytelling and spatial design strategies

The findings show that emerging technologies are increasingly embedded within spatial design to support brand storytelling. Adaptive lighting, responsive displays, and digitally augmented surfaces mediate narrative meaning through spatial experience, complementing materiality and form rather than replacing them. Effective integration is consistently framed as human-centred, ensuring that technology enhances spatial coherence and narrative continuity within luxury interiors.

RQ3: Contextual challenges and emerging market considerations

The literature highlights that technology adoption in emerging markets is constrained by infrastructural readiness, cost, technical expertise, and cultural adaptation. Studies emphasise the need for context-sensitive strategies and cross-disciplinary collaboration to balance global technological trends with local realities. These challenges reveal a clear research gap, particularly in relation to developing markets such as Sri Lanka.

5. Discussion

The thematic analysis reveals that the sensory, spatial and technological dimensions of luxury fashion retail interiors are inseparable from the cultural and emotional experiences they aim to generate. When considered together, the three themes illustrate how luxury environments are shaped through a dynamic interaction between narrative identity, atmospheric design and emerging technologies. This section synthesises these insights by presenting the Multi-Layered Integration Framework, which brings the themes into a single interpretive model.

Table 5
Alignment of research questions with thematic insights.

Research Question	Key Thematic Insights	Core Themes Addressed
RQ1. How do Industry 4.0 and 5.0 technologies enhance sensory engagement in luxury fashion store interiors?	Phygital sensory immersion, digital storytelling, and emotional brand experience	Branding and Customer Experience; Retail Interior Environment
RQ2. How are these technologies integrated into brand storytelling and spatial design strategies?	Technology-enabled atmospherics, adaptive interior systems, and human-centred innovation	Retail Interior Environment; Technology Integration
RQ3. What challenges and contextual factors influence adoption in emerging markets such as Sri Lanka?	Cultural adaptation, infrastructural readiness, and cross-disciplinary collaboration	Technology Integration; Contextual Adaptation (MLIF outer layer)

Source: Author

5.1. Interpreting the findings through a socio -technical lens

The findings suggest that the evolution of luxury retail spaces cannot be understood solely through marketing, design or technology centred perspectives. Instead, they reveal a socio-technical environment in which human experience, cultural expression and technological mediation are closely intertwined. Studies within the first theme show that sensory richness and emotional resonance remain central to luxury identity, but these elements increasingly depend on digital systems that extend narrative expression into interactive and immersive forms.

Meanwhile, the second theme underscores the continuing importance of spatial and atmospheric qualities. Even as advanced systems become more common, the expressive power of materiality, light, sound and colour remains essential. These qualities support the emotional presence of luxury and allow the interior environment to function as a cultural and symbolic space. Digital systems do not replace these conditions. Instead, they deepen and sometimes transform them by enabling movement-based interaction, spatial adaptation and heightened forms of sensory immersion.

The third theme highlights a parallel development. Technological tools that were once background operational systems now contribute directly to experiential meaning. As augmented reality, artificial intelligence and interactive surfaces become embedded within store interiors, they introduce new forms of presence and new avenues for engaging memory, identity and imagination. This transformation suggests that the contemporary luxury interior is less a static environment and more a responsive atmospheric world shaped by human interaction and digital mediation.

5.2. The Multi-Layered Integration Framework

The Multi-Layered Integration Framework (MLIF) is presented here as a synthesised outcome of the thematic analysis, consolidating insights

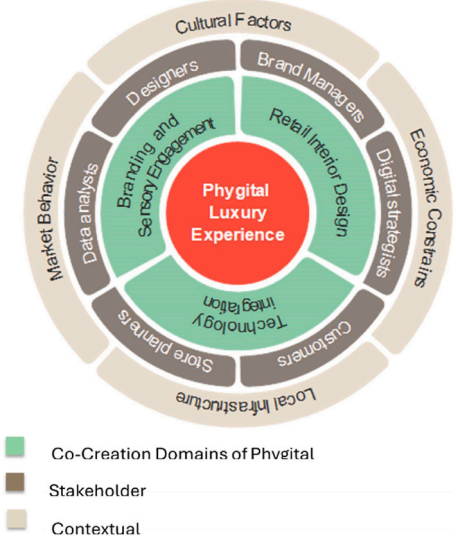

Fig. 10. Multi-Layered Integration Framework (MLIF) proposed by this study to guide the contextual integration of Industry 4.0 and emerging Industry 5.0 technologies within luxury fashion retail interiors.
Source: Author

across themes into a unified conceptual structure. Presented in Fig. 10, the framework offers a structured interpretation of how sensory atmospheres, interior design strategies, digital technologies, and brand narratives operate as interdependent layers within phygital luxury retail environments.

The MLIF synthesises the thematic findings presented in Section 4 and operationalised through the alignment of research questions and themes in Table 5. The inner layers of the framework reflect the branding and customer experience dimensions identified through the thematic analysis (Fig. 8), while the intermediate layer captures interior environment strategies that mediate sensory engagement and spatial experience. The outer layers represent technology integration and contextual adaptation, consolidating insights related to infrastructural readiness, cultural translation, and implementation challenges discussed across the reviewed studies. In this way, the MLIF functions as an integrative abstraction of the empirical patterns identified in the literature rather than as a prescriptive or speculative model.

In practical terms, the MLIF can be used as a conceptual guide for designers, retailers, and researchers to evaluate and structure phygital luxury retail environments. Rather than prioritising technology in isolation, the framework encourages a layered consideration of sensory experience, spatial design, digital systems, and contextual conditions. For practitioners, the MLIF supports reflective decision-making by highlighting interdependencies between design intent, technological capability, and cultural context. For researchers, it provides a structured lens through which future empirical studies can examine technology–space–experience relationships, particularly within under-researched emerging market settings.

The outer layer represents the broader cultural identity of the brand, which shapes the symbolic and emotional expectations associated with luxury. This layer includes narrative heritage, visual language and socio-cultural meaning. The subsequent layer encompasses sensory and spatial elements such as materiality, colour, lighting, spatial layout, sound, and tactile qualities, which collectively form the atmospheric signature of the store and influence visitor perception and interpretation.

The technological layer includes artificial intelligence systems, augmented and virtual reality installations, interactive surfaces, smart lighting, sensor activated environments and other tools associated with Industry 4.0 and Industry 5.0. These technologies interact with the sensory and spatial layer by altering perception, enriching sensory engagement and enabling new modes of participation. At the centre of the framework is human experience and emotional response, where cultural identity, spatial design, and technological mediation converge to shape meaning, memory, and emotional connection within the luxury retail environment.

5.3. Contributions to cultural and experiential understanding

The MLIF contributes to the social sciences and the humanities in three main ways. First, it reframes digital transformation as a cultural and experiential process rather than a purely managerial or technical development. The model highlights how technologies reshape sensory engagement, narrative meaning and the symbolic presence of luxury.

Second, it demonstrates that interior design plays a central role in mediating the relationship between technology and human experience. Spatial and atmospheric conditions are not simply design choices but interpretive instruments through which cultural identity is expressed and felt.

Third, the framework foregrounds human experience. By positioning sensory perception and emotional resonance at the centre of the model, the MLIF supports an understanding of luxury interiors as participatory cultural spaces shaped by socio-technical interaction. This perspective moves beyond efficiency and novelty, drawing attention to ritual, symbolism and embodied experience.

5.4. Contextual challenges and future research directions

Although the literature reveals innovative possibilities for phygital luxury environments, it also points to practical challenges. Many regions, particularly in South Asia, face constraints related to infrastructure, cost, cultural translation and technological readiness. Retailers and designers in these contexts must negotiate a balance between global expectations of luxury and local cultural values.

At the same time, the literature suggests several emerging directions for the future development of luxury fashion retail interiors. Increasing emphasis is being placed on responsive and adaptive environments in which artificial intelligence and sensor-based systems dynamically adjust lighting, sound, spatial configuration, and content in response to user behaviour. Related fashion-sector frameworks also illustrate how Industry 4.0 technologies can be operationalised in support of Industry 5.0's human-centred values (e.g., "Lean 5.0"), demonstrating pathways that prioritise craftsmanship, well-being, and people-focused outcomes, albeit primarily within production and organisational contexts rather than retail interiors (Fani et al., 2024). Rather than relying on discrete technological installations, future luxury interiors are likely to integrate digital technologies as ambient and embedded layers within material, spatial, and atmospheric design. In line with Industry 5.0 perspectives, these developments foreground human–machine collaboration, well-being, craftsmanship, and emotional engagement, raising new design questions related to authenticity, privacy, inclusivity, and cultural meaning in technologically mediated retail spaces (Tirabeni et al., 2019; Pantano et al., 2022; Mourtzis et al., 2022; Bonetti et al., 2025).

Future research would benefit from place specific studies that examine how luxury is constructed, interpreted and experienced outside Western and East Asian markets. Ethnographic approaches, experiential mapping, sensory analysis and participatory design research could provide deeper insight into how individuals engage with technologically enriched environments in diverse cultural settings.

6. Conclusion

This review set out to explore how technologies associated with Industry 4.0 and Industry 5.0 are reshaping the sensory, spatial and narrative qualities of luxury fashion retail interiors. By examining fifty peer reviewed studies published between 2014 and 2025, the review provides an integrated understanding of how digital transformation influences human experience within high end retail environments. The findings show that contemporary luxury interiors are no longer defined solely by material richness or aesthetic craftsmanship. Instead, they are becoming complex socio-technical environments where cultural meaning, sensory engagement and digital mediation converge.

The thematic analysis highlighted three major dimensions of this transformation. The first involves the evolving relationship between branding and customer experience, where digital tools enable emotional immersion, narrative interaction and personalised engagement. The second concerns the continued importance of interior atmosphere and spatial quality, which remain essential to the emotional and cultural presence of luxury. The third dimension relates to the rapid expansion of technological integration, which introduces new experiential possibilities while also presenting challenges for design, practice and cultural continuity.

The Multi-Layered Integration Framework developed through this review offers a holistic interpretation of these insights. The framework positions luxury retail interiors as layered experiential systems in which cultural identity, sensory atmosphere, technological mediation and human experience are deeply interconnected. This perspective moves beyond technical descriptions of digital tools and instead emphasises how meaning, emotion and perception are shaped through their integration. By organising these elements within a layered structure, the model provides researchers and practitioners with a clearer way to understand and design phygital luxury environments.

From a practical perspective, the insights generated through this review are relevant to interior designers, luxury retail strategists, and brand practitioners navigating ongoing digital transformation. As luxury fashion brands increasingly integrate technologies such as artificial intelligence, immersive media, and connected systems into physical store environments, the review provides a consolidated reference for understanding how such technologies can be aligned with sensory experience, spatial atmosphere, and brand storytelling. Rather than treating digital tools as isolated interventions, the findings support more informed and culturally sensitive design decisions that preserve the emotional depth, experiential richness, and narrative coherence central to luxury retail interiors.

The review also identifies gaps in existing scholarship. Much of the literature originates from Western and East Asian contexts, with limited representation from South Asia and other emerging markets. As a result, current knowledge is shaped by cultural assumptions that may not fully reflect the diversity of global luxury practices. Future research would benefit from studies that examine how luxury is interpreted and experienced across different cultural, economic and technological settings. Such work is particularly important for regions where digital adoption is uneven and where local aesthetic traditions remain central to identity and experience.

Looking ahead, the findings suggest that luxury fashion retail interiors are likely to evolve toward increasingly adaptive and responsive environments, where artificial intelligence, sensor-based systems, and immersive media operate as ambient and integrated components of spatial design rather than discrete technological features. In line with Industry 5.0 principles, future luxury interiors may place greater emphasis on human–machine collaboration, well-being, craftsmanship, and emotional resonance, raising new design questions related to authenticity, ethics, privacy, and cultural meaning.

Overall, this review contributes to the social sciences and the humanities by repositioning digital transformation as a cultural and experiential phenomenon. It shows that technologies associated with Industry 4.0 and Industry 5.0 do more than enhance operational efficiency or create visual spectacle. They reshape the ways in which individuals perceive space, engage with narrative and construct emotional meaning within luxury retail interiors. By bringing together insights from design, technology, culture and sensory studies, this research deepens our understanding of how future luxury environments can remain both technologically innovative and emotionally grounded.

CRediT authorship contribution statement

Janitha C. Ratnayake: Writing – original draft, Visualization, Validation, Methodology, Formal analysis, Data curation, Conceptualization. **Nisha Jayasuriya:** Writing – review & editing, Supervision. **Theekshana Suraweera:** Writing – review & editing, Supervision. **Lalith De Silva:** Writing – review & editing, Supervision.

Data availability statement

No datasets were generated or analysed during the current study.

Declaration of the use of AI assisted technologies

During the preparation of this manuscript, the authors used ChatGPT (OpenAI, 2025) and EditGPT (OpenAI, 2025) to assist with language refinement, grammar correction, and structural clarity. These tools were employed solely to enhance readability and did not generate or modify any analytical content, interpretations, or conclusions. All authors reviewed and verified the accuracy and integrity of the final text and take full responsibility for the content of this publication.

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Ethical approval is not applicable to this manuscript.

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Appendix A. Search Strategy and Study Identification

The systematic literature search was conducted between January and March 2025 to identify peer-reviewed research examining the integration of Industry 4.0 and Industry 5.0 technologies within luxury fashion retail interiors, with particular attention to sensory, spatial, and experiential dimensions. To ensure comprehensive interdisciplinary coverage, searches were carried out across Scopus, Web of Science, ScienceDirect, IEEE Xplore, and Google Scholar.

Search Strategy

Search terms were developed iteratively in line with the research objectives and organised into three interrelated keyword clusters addressing.

(i) technological paradigms and digital systems,
(ii) luxury fashion retail and brand context, and
(iii) interior, sensory, and experiential dimensions of retail environments.

Boolean operators (AND, OR) were used to combine these clusters and refine the search results.

Representative Boolean Search Strings.

The following Boolean combinations illustrate the search logic applied across databases, with adaptations made where necessary to accommodate database-specific syntax.

Search String 1 (Phygital retail and industrial paradigms):

((phygital AND "fashion retail")AND ("industry 4.0″ OR "industry 5.0″ OR "fourth industrial revolution" OR "fifth industrial revolution"))AND (luxury OR "luxury retail" OR "luxury fashion" OR "luxury brand*" OR "premium retail" OR "flagship store*")

Search String 2 (Smart and digital retail technologies):

(phygital OR "smart retail" OR "smart store*" OR "digital retail" OR "retail 4.0″ OR omnichannelOR "in-store technolog*" OR AR OR VR OR XR OR "mixed reality" OR "extended reality"OR "internet of things" OR IoT OR RFID OR "artificial intelligence" OR AIOR "smart mirror*" OR "virtual try-on" OR "interactive display*" OR "digital signage")

Search String 3 (Experiential and spatial focus in luxury retail interiors):

(("industry 4.0″ OR "industry 5.0″ OR phygital OR "smart retail" OR

"smart store" OR "digital retail")AND (luxury OR "luxury retail" OR "luxury fashion" OR "flagship store")AND ("store atmosphere" OR servicescape OR "customer experience" OR "sensory experience"OR "brand storytelling" OR "brand experience" OR "in-store experience")AND (IoT OR RFID OR "computer vision" OR "digital signage"OR "interactive display" OR "smart mirror" OR "virtual try-on"))

Where supported (e.g., Scopus), filters were applied to limit results to peer-reviewed journal articles, English-language publications, and relevant disciplinary areas.

Inclusion Parameters

The search was restricted to.

- Peer-reviewed journal articles
- English-language publications
- Publication period: 2014–2025, corresponding to the emergence of Industry 4.0 and the subsequent development of Industry 5.0 discourse

Conference proceedings, book chapters, industry reports, and non-peer-reviewed sources were excluded.

Study Identification

The initial searches yielded a total of 425 records, distributed as follows.

- Scopus: 118 records
- Web of Science: 90 records
- ScienceDirect: 84 records
- IEEE Xplore: 55 records
- Google Scholar: 78 records

All records were exported for screening and duplicate removal. The subsequent screening and selection process is described in Section 2.2 and visually summarised in Fig. 1, which presents the PRISMA flow diagram corresponding to each stage of study identification, screening, eligibility assessment, and final inclusion.

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