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REVEALING IMMERSIVE GUEST EXPERIENCES (IGX) IN THE HOTEL INDUSTRY USING CLUSTERING ANALYSIS

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ABSTRACT

The purpose of this study is to analyze existing research on the use of immersive technologies in the hotel industry and build academic and practical knowledge to explore current areas of immersive technology research and development that are critical for the effective digitalization of the hotel industry. Clustering analysis was applied to the publications analyzed by unsupervised machine learning method using the K-Means algorithm. To verify these concepts and answer the research questions, the clustered publications were subjected to in-depth content analysis within the framework of the research questions. The findings provide comprehensive information on the scope of Immersive Guest Experiences (Hereinafter referred to as IGX) for hotel industry and categorize the antecedents, dimensions, and consequences of IGX in hotels to better understand the reasons for the use of immersive technology in the hotel industry. The results provide guidance for practitioners in the design of IGX in hotels.

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INTRODUCTION

In the experience economy, the sequence of economic value has evolved to experience through the senses and experiences have become a strategic tool for businesses (Ketter, 2018; Pine & Gilmore, 1998). In this framework,

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consumers are viewed not just as rational decision-makers, as in the traditional view, but as both rational and emotional individuals who seek enjoyable experiences that offer sensory, affective, cognitive, behavioral, and social dimensions from an experiential marketing standpoint (Schmitt, 1999). In experiential marketing, the core of the product is emphasized, and the value of services is enhanced and transformed into tangible, physical, and interactive experiences (Williams, 2006).

In the tourism industry, experiences play a crucial role, especially due to the inherently intangible nature of tourism (Manhas & Ramjit, 2013). For hotel businesses, the shift in distribution channels and the predominantly intangible nature of their products and services heighten the significance of prior experiences. Therefore, the use of virtual reality (VR) and augmented reality (AR) technologies in the hotel industry can help alleviate uncertainty about products and services by providing potential guests with an opportunity to experience them in advance. These technologies, which offer a variety of experiences from pre-stay to post-stay, help meet the physical evidence requirement in service marketing (Kabadayı, 2020).

Extended reality (XR), encompassing VR, AR, and mixed reality (MR), is reshaping the customer journey by integrating immersive experiences (Santoso et al., 2022). Thus, physical space and virtual space are intertwined, and this is expressed by the term "phygital" (Neuburger et al., 2018). In this context, omnichannel touchpoints are integrated into customer experiences (CX) to create positive customer journeys (Hilken et al., 2018). Since the adoption of these digital and interactive technologies by customers depends on different cognitive, affective, and behavioral factors, it can be explained based on different theoretical origins such as the technology acceptance model (TAM), uses and gratifications theory (UGT) (Boudkouss & Djelassi, 2021); flow theory, the stimulus-organism-response (S-O-R) model (An et al., 2021); hedonic-motivation system adoption model (HMSAM) (Fan et al., 2022). Therefore, the adoption of a human-centered design perspective plays a crucial role in enhancing the effectiveness of business strategies and practices for the use of immersive technologies (Stankov & Gretzel, 2020).

This study analyzes existing research on the use of immersive technologies in the hotel industry. The aim is to build academic and practical knowledge to explore current immersive technology research and development areas that are critical for the effective phygitalization of the hotel industry. In this context, the relevant literature has been synthesized

to answer the specific research questions put forward regarding the use of immersive technology in the hotel industry, revealing the current trends and future agenda for this subject. Eventually, a comprehensive analysis has been presented on how the use of immersive technologies in the hotel industry affects the guest experience.

BASICS OF THE RESEARCH

Although early studies, such as Cheong (1995), expressed skepticism about the subject and even viewed it as a potential threat to tourism, academic interest in the tourism industry—particularly in hospitality businesses—has grown significantly in recent years. This interest focuses on technologies and applications that immerse potential travelers and guests in digital environments (Filimonau et al., 2024; Flavián et al., 2021; Hanaa & Abdul, 2024; Orús et al., 2021; Wei, 2019). Despite this, the adoption of these technologies by consumers in tourism remains relatively recent, and the corresponding body of research is still emerging (Yung & Khoo-Lattimore, 2019). Innovative technologies have found applications across various aspects of tourism, including planning, management, marketing, entertainment, education, accessibility, and cultural heritage preservation (Ali, 2022; Dogan & Kan, 2020; Guttentag, 2010). The integration of advanced human-computer interactions is enabling intelligent environments in tourism, which attract digitally savvy consumers, deliver tailored experiences (Go & Kang, 2023; Loureiro, 2020), and foster value co-creation (Buhalis et al., 2019). The use of immersive technologies has been shown to enhance the tourism sector's profitability, competitiveness, and sustainability (Cranmer et al., 2020) by optimizing corporate performance, improving organizational communication, and strengthening customer relationships (Chen, 2023).

In the course of the literature review, which was conducted with the objective of identifying research gaps in the subject area and of establishing the original value of the present study, it was observed that the reviews of VR and AR technologies in the context of general tourism (e.g. Loureiro et al., 2020; Yung & Khoo-Lattimore, 2019) merit particular attention. Furthermore, studies such as those conducted by Buhalis et al. (2023) and Wei (2019) address the combined use of VR and AR technologies within a broader framework, namely that of tourism and hospitality. Conversely, there are studies that concentrate on the specific applications of VR in tourism (e.g., Pestek & Sarvan, 2021; Sousa et al., 2024), AR in tourism (e.g., Hanaa & Abdul, 2024; Jingen Liang & Elliot, 2021), MR in tourism (e.g., Bec

et al., 2021), XR in tourism (e.g., Santoso et al., 2022), and the metaverse in tourism (e.g., Go & Kang, 2023).

Nevertheless, Lodhi et al. (2024) pointed out that no comprehensive study has yet examined the state of research on VR and AR technologies in the hospitality sector. Their bibliometric analysis provided insights into the growth of publications over time, identifying the most productive countries, journals, authors, and institutions, as well as highlighting key topics through a keyword co-occurrence network. Han and Tom Dieck (2019) underscored the need for more user-centered VR research within the hospitality and tourism industry. Similarly, Çolakoğlu et al. (2024) noted a lack of studies exploring VR experiences specifically in the hospitality sector. Shin and Jeong (2021) suggested that future research should investigate the adoption of AR in hospitality, and comparing these findings to studies conducted in the broader tourism industry. Ali (2022) observed that, despite the increasing importance of interactive and co-creative approaches, studies on AR's potential to enhance visitor experiences in hospitality and tourism remain scarce. Additionally, Chen (2023) highlighted a research gap regarding the impact of metaverse hotels on visitors.

In addition to the aforementioned considerations, there is a paucity of research in the specific context of the hotel industry that illuminates the general view of studies on immersive technologies. These technologies, which can be characterized as an umbrella structure of VR, AR, MR and XR technologies, have the potential to impact the guest experience as a whole. Consequently, the present study seeks to address this research gap. The research objectives (ROs) that have been developed in this context are presented below.

RO1: Identifying the motives for using immersive technologies in the hotel industry,

RO2: Identifying the immersive technologies commonly used in the hotel industry,

RO3: Revealing the theoretical and conceptual origins of the use of immersive technologies in the hotel industry, and

RO4: Revealing how the use of immersive technologies in the hotel industry affects the guest experience.

In order to perform these specific ROs, publications selected from Web of Science (WoS) directory in line with the PRISMA checklist were first

analyzed and clustered by unsupervised machine learning using the K-Means algorithm. The algorithm facilitated identifying document clusters with similar thematic content. Subsequently, a comprehensive and in-depth examination of these clusters was conducted to reach the specified ROs through content analysis. Consequently, both quantitative and qualitative insights were integrated into this study. In this context, the current study differs from previous reviews in the relevant literature in terms of its specific context, ROs and methodology. The results of the study contribute to the general view of studies on immersive technologies in the hotel industry and their effects on guest experience as a whole. In this respect, the study provides insights that inform future research directions and practical implications regarding the use of immersive technologies in the hotel industry and their effects on guest experience.

An examination of the current literature on the use of immersive technologies in the hotel industry highlights several prominent themes but also exposes notable gaps that require further exploration. First, the influence of immersive technologies on fostering long-term customer loyalty (Husain et al., 2023) and encouraging repeat business (Ozdemir et al., 2023) remains underexplored. Investigating this relationship is vital for developing strategies to enhance customer retention, a cornerstone of business sustainability (Cranmer et al., 2020; Flavián et al., 2021). Second, there is a scarcity of studies addressing the cost-benefit analysis of adopting these technologies from a managerial standpoint (Pillai et al., 2021). Such insights could guide hotel managers in making strategic investment decisions. Third, the role of immersive technologies in improving accessibility for guests with disabilities (Das, 2023) has not been sufficiently addressed. Addressing this issue is socially significant and could help the hospitality sector tap into new market segments. Fourth, further research is needed on the application of immersive technologies to enhance business competencies and management skills in the hospitality industry (Konovalova & Demenev, 2020). This research should shift focus from marketing to human resource management. Lastly, adopting research methodologies based on real-world hotel practices rather than controlled laboratory settings (McLean & Barhorst, 2022) could yield more practical and applicable insights.

Addressing these research gaps is crucial for several reasons. Academically, it enhances our understanding of the diverse effects of immersive technologies within the hospitality industry. Practically, it provides hotel managers and stakeholders with insights to create more effective and holistic strategies, improving the overall guest experience and

maintaining a competitive edge in an increasingly digital world. By exploring these unresolved issues, future research can make valuable contributions to both the theoretical framework and real-world applications of immersive technologies in the hospitality sector.

IMMERSIVE TECHNOLOGY APPLICATIONS IN THE HOTEL INDUSTRY

Immersive technologies are based on the reality-virtuality continuum, encompassing concepts like AR and augmented virtuality (AV), which are collectively referred to as mixed reality (MR). Additionally, VR represents a fully virtual environment (Pratisto et al., 2022). Immersive technologies offer consumers interactivity, visual behavior, and immersive experiences (Raptis et al., 2018). With these opportunities offered by these technologies, potential visitors in the tourism sector can have an idea about destinations in advance and shape their decision-making processes through immersive experiences (Cheong, 1995).

Considering the examples of sectoral practices on the subject, the Marriott Hotel Group creates promotional opportunities for potential customers through a virtual travel content platform. Thus, it offers support to its customers to reduce uncertainty and facilitate booking decisions (news.marriott.com). As a sponsor of the 2012 London Olympic and Paralympic Games, Holiday Inn opened the world's first augmented reality hotel in the London Kensington Forum (Zou, 2022).

In the existing literature, while there are relatively more studies focusing on tourism destinations and tourist attractions, there is a limited number of immersive technology usage studies in hotels (Pratisto et al., 2022). Looking at the scope of these relatively few immersive technology applications in the hotel industry studies; for example, Israel et al. (2019b) investigated whether presenting hotels in virtual reality affects potential customers' booking intentions. Similarly, Lim et al. (2024) examined using AR and VR for hotel bookings and found that perception of using these technologies easily, innovativeness, and usefulness enhance tourists' satisfaction. Bharwani and Mathews (2021) and Gonçalves et al. (2024) questioned the challenges of technology adoption such as immersive artificial intelligence, AR, VR, wearable technology, and robotics in luxury hotels. Vilar et al. (2014; 2015) studied wayfinding and route-choice through virtual hotel and environmental variables. Patiar et al. (2021) examined the development of hospitality management students' knowledge and skills through a virtual field trip platform.

IMMERSIVE EXPERIENCES IN THE HOTEL INDUSTRY

Presence, which expresses a state of consciousness, refers to the feeling of being psychologically present in the virtual environment in terms of immersive experience. Immersion, another core element of this experience, describes capacity of technology to offer individuals a comprehensive, all-encompassing, and realistic illusion of reality (Slater & Wilbur, 1997). Vividness, another key feature of immersive experience, reflects technology's capacity to create a sensory-rich, mediated environment (Steuer, 2006). Interactivity refers to the technology's ability to facilitate seamless interaction and engagement with content (Lee et al., 2021).

The immersive guest experience in tourism context refers to the cognitive, emotional, or behavioral reactions elicited by touchpoints involving immersive technologies throughout the guest journey, shaping the overall tourism experience (Flavián et al., 2019). Narrowing this concept from the broader tourism industry to the specific context of hotel consumer experiences, Walls et al. (2011) identified key elements of the luxury hotel guest experience. These include the physical environment (ambiance, multisensory elements, space/functionality, and symbolic features), human interactions (employee factors such as attitude, professionalism, proactive service, and appearance; and fellow guest factors like demeanor, behavior, appearance, and social engagement), trip-related aspects (trip purpose, hotel type, travel companions, and the experience continuum), and personal characteristics (sensitivity, personality, travel history, and expectations). The hotel consumer experience constructs put forward by Walls (2013) consist of physical environment dimensions and human environment dimensions. The physical environment dimensions of this construct reflect the physical environment experience of the hotel, which includes design, property upkeep, and physiological/ambiance factors. The human environment dimensions reflect the human interaction experience, which includes attentiveness/caring, professionalism, guest-to-guest interactions, and reliability.

The current research focuses on the use of immersive technologies in the hotel industry. In the literature review conducted in this context, beyond the general tourism practice and experience, no research on the reflections of immersive technology use on CX specific to the context of the hotel industry was found. Therefore, in the current research, the phenomena related to immersive guest experience (IGX) scope for the hotel industry have been tried to be revealed in full detail.

METHOD

The WoS database served as the primary data source for this research. WoS provides extensive options for inclusion and exclusion, along with a wide array of query criteria. As one of the leading databases, it offers broad interdisciplinary coverage, encompassing journals from various fields, particularly social sciences and business studies (Birkle et al., 2020; Huang et al., 2019; Wang et al., 2018). Furthermore, in comparison to Scopus, which is regarded as a comprehensive database, WoS is distinguished by its higher quality standards (Forliano et al., 2021) and the inclusion of content from esteemed academic sources (Lodhi et al., 2024). In this context, within the scope of the research, the WoS database was searched with the query: *"TS=(hotel) AND (TS=(augmented reality) OR TS=(virtual reality) OR TS=(mixed reality) OR TS=(extended reality))"*. After the application of the mentioned query sentence, 114 records published between 1995 and 2023 were reached. While 67 of these 114 records are "articles", the others are proceeding and review-type studies. Of the 67 articles, 1 is early access and 5 are book chapters, so they were not included in the study.

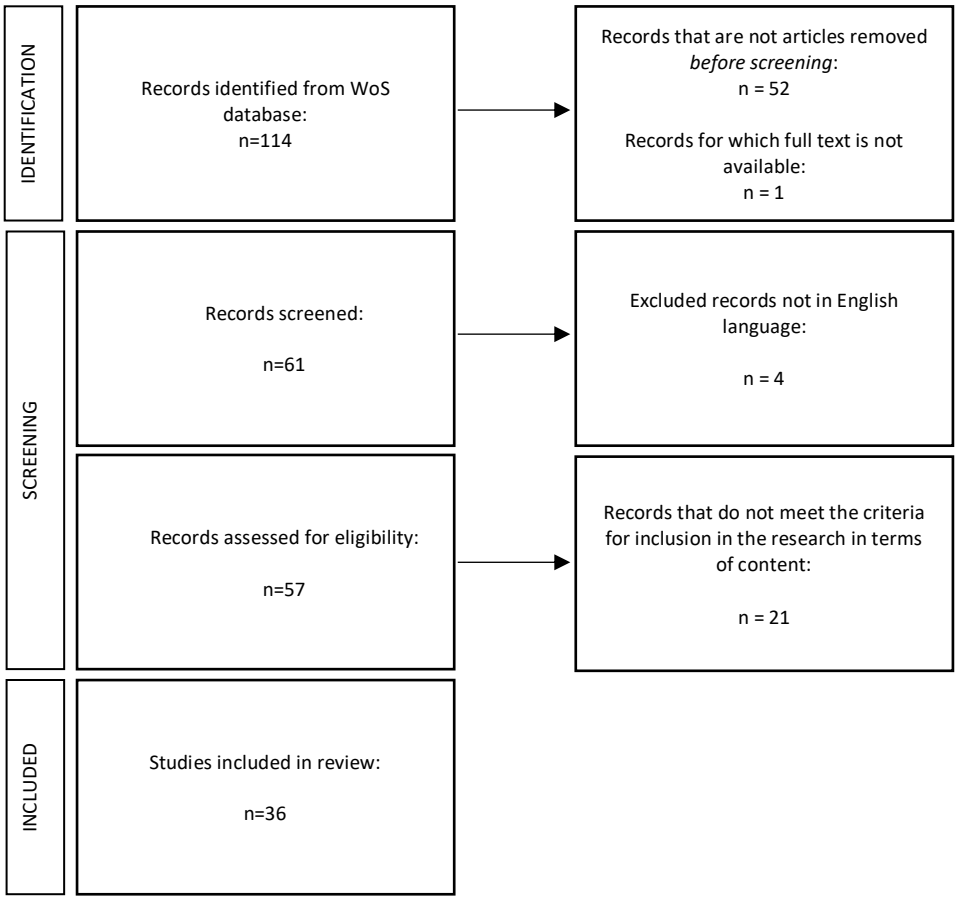

Figure 1. *The PRISMA Flowchart*

57 publications were analyzed individually and meticulously to identify publications focusing on customer experience with immersive technologies in the context of hotels and accommodation. Seventeen studies on topics such as sightseeing, hotel construction, technology-independent marketing, etc. were eliminated and 36 publications were used for this study.

The selection and analysis of data sources and records were carried out following the PRISMA checklist, originally published in 2009 and updated in 2020. This approach ensured transparency, thoroughness, and enhanced the study's overall value, as outlined by Moher (2018). A flowchart was created using the PRISMA checklist's "eligibility criteria" and "information sources" sections under the "Methods" heading. Additional details were provided under headings such as "search strategy," "selection process," "data collection process," "data items," and "synthesis methods." Figure 1 presents the PRISMA flowchart.

Before proceeding to the subsequent sections, it would be appropriate to provide a summary of the methodology employed in the study and to identify all the stages discussed in the methodology section by means of a figure, with the aim of facilitating the follow-up of the procedures in the remainder of the study. Figure 2 provides a summary of all the processes discussed in the method section.

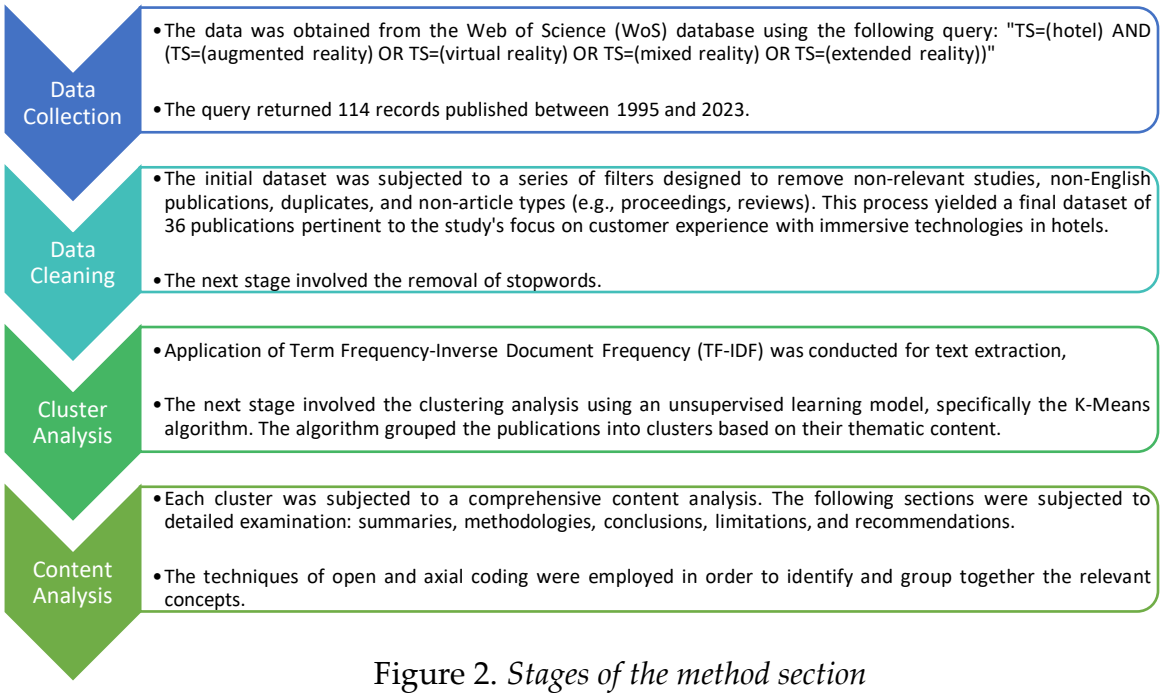

Figure 2. *Stages of the method section*

Cluster Analysis

In this study, clustering analysis was performed with an unsupervised learning model, one of the machine learning methods, using Python programming language. Unsupervised learning has a very important function in classifying written or online documents into clusters in the absence of labels provided by the supervised learning model (Greene et al., 2008). Cluster analysis is an unsupervised learning technique that plays a key role in data analysis, used to identify relationships between patterns by grouping them into similar clusters. Unlike supervised learning, which involves classifying patterns and labeling them, unsupervised learning focuses on uncovering the cluster structure of the entire dataset. A crucial factor in unsupervised learning is interconnectedness, which measures the density of connections within a single cluster. High interconnectedness suggests an effective clustering arrangement, as the instances within the same cluster are strongly interdependent (Kotsiantis & Pintelas, 2004).

K-Means Algorithm

The study encompassed not only the specific fields, such as title, abstract, and keywords, but also the full texts of the publications comprising the dataset. So full texts of the records were included in the source text mining. Various algorithms have been proposed to perform clustering analysis (Sisodia et al., 2012), and in this study, the K-Means algorithm developed by J. B. MacQueen, which is frequently used for document analysis, was preferred. The K-Means algorithm is a preferred method in text mining and clustering analyses due to its capacity to provide rapid and effective results, particularly for large data sets (Kanungo et al., 2002). In comparison to alternative methods, K-Means is distinguished by its suitability for working with high-dimensional data and its intuitive comprehensibility (Lloyd, 1982). It does not require the same level of processing power as other algorithms and minimizes the distance between clusters by providing iterative improvement with different initial conditions, thus facilitating the interpretation of data distributions (Wu et al., 2008). In particular, when analyzing data sets comprising inhomogeneous groups, such as document clusters, K-Means can facilitate the production of more appropriate results for the research questions by grouping the data in vector space (Li & Wu, 2012). Consequently, it is distinguished from other methods by offering both speed and accuracy advantages in the analysis of large data sets within the scope of the study. While applying the K-Means algorithm, in order for it to fulfill its function for the research questions, the words in the

documents that are not thought to contribute to the research should be excluded from the analysis.

To conduct a comprehensive text mining analysis, several NLP techniques were applied to the collected data. Initially, stopword detection and removal were performed using a standard stopword list from the Natural Language Toolkit (NLTK) library. Additionally, domain-specific stopwords (e.g., "et", "al", "http", "https", "doi") were manually identified and excluded to ensure that only relevant terms were retained (Fayaza & Farhath, 2021; Sarica & Luo, 2021). Beyond stopword detection, the text data underwent morphological analysis to better understand the structure and meaning of the words. This involved lemmatization, which reduces words to their base or root form, thereby standardizing the text and improving the accuracy of keyword extraction. Both nouns and other parts of speech, such as verbs and adjectives, were considered in the analysis to capture a more holistic view of the text. The inclusion of verbs and adjectives was crucial as they provide context and additional nuances that nouns alone might miss. In this way, the findings of the study are more focused on the research objectives. To narrow down the selection of keywords, a criterion based on term frequency was employed. Words that appeared with high frequency across all documents were further analyzed using Term Frequency-Inverse Document Frequency (TF-IDF) scores. TF-IDF measures the importance of a word in a document relative to its occurrence in the entire dataset. High TF-IDF scores indicate that a word is not only frequent within a document but also unique to that document compared to others, highlighting its significance.

TF-IDF

In the field of text mining, term frequency - inverse document frequency (TF-IDF) is frequently used for text extraction (Luo et al., 2008). In this study, TF-IDF is used for text analysis while the K-Means algorithm is used for clustering. With this method, the frequency of repetition of words in the documents provides sufficient clues for text analysis. TF-IDF also provides a weighted score based not only on the frequency of occurrence of a particular word in a text but also on the frequency of occurrence of that word in all documents, thus ensuring that words related to the research question that appear infrequently in a document are not included in the analysis (Mahmood et al., 2018; Qin et al., 2021). In the context of this study, high TF-IDF scores were interpreted as indicators of key concepts and themes that are uniquely emphasized in certain publications. For example, if the term "augmented reality" has a high TF-IDF score in several

documents, it suggests that these documents specifically focus on this technology as a significant aspect of IGX in the hotel industry. This relevance is contrasted against the broader corpus, where such terms may be less emphasized, thereby marking them as critical for specific discussions. Low TF-IDF scores, on the other hand, suggest that while the term may be frequently mentioned across many documents, it is not uniquely significant to any particular document. These terms often represent more general concepts that, while common, do not provide specific insights into the unique themes of literature. The importance of a keyword with a higher TF-IDF score lies in its ability to uncover nuanced discussions and specialized topics that are pivotal for understanding the depth of research in IGX. For instance, a high TF-IDF score for "guest engagement" in certain clusters of publications highlights its role as a central theme, guiding the identification of critical research areas and gaps. By examining the distribution and significance of these scores, we can draw meaningful conclusions about the prevalent and emerging themes in literature. This method ensures that the identified keywords are not only frequent but also contextually relevant, providing a robust foundation for further content analysis and thematic exploration.

The K-Means algorithm requires the number of clusters to perform clustering (Cheng & Yu, 2022; Lei, 2022). After all the documents were expressed as vectors, the documents were tested to find the most appropriate cluster, assuming that there can be between 2 and 10 clusters for the K-Means algorithm to work experimentally. Although the number of clusters can be determined based on the researcher's experience, this mathematical determination was also made through the software, thus testing the consistency between the researcher's experience and the result of the software developed. On the graph obtained as a result of this test, the ideal number of clusters was decided with the Elbow method. The elbow method is one of the most common methods used to determine the appropriate number of clusters for the K-Means algorithm. With this method, the algorithm is run repeatedly on the data set within the range of the estimated number of clusters (as the researchers chose the range of 2-10 in this study) and the average scores for each cluster number are calculated (Et-Taleby et al., 2020; Onumanyi et al., 2022). In this study, these averages were calculated in the range of 2-10 clusters, and the sum of squared errors (SSE), which is the performance indicator of the clusters, was obtained and a graphical representation of these indicators was provided. The graph plotted for SSE against the number of clusters indicated a noticeable 'elbow'

at three clusters, suggesting this as the most appropriate number for our dataset.

While analyzing the graph, the optimal number of clusters was determined at the point where the SSE value showed a sharp decline, creating an "elbow" shape. This cluster count was then compared with the “Cross-Validation Score” and the number of clusters was controlled by 2 factors, at the same time, the consistency of the cluster membership of the documents was tested with the cross-validation score algorithm, which has a theoretically similar working logic with the Elbow method (Krieger & Green, 1999). To further ensure the robustness of our clustering approach, we cross-validated the results using additional metrics such as silhouette scores, which evaluate how well an object aligns with its assigned cluster compared to other clusters. The silhouette scores confirmed the appropriateness of our three-cluster solution by showing high cohesion within clusters and clear separation between them. By providing this additional methodological rigor, we affirm that the number of clusters was reasonably selected, and clusters accurately reflect the focused nature of the research topics they encompass.

Content Analysis

A content analysis was conducted in conjunction with a cluster analysis to ensure a comprehensive understanding of the themes and topics within the literature on IGX in the hotel industry. The initial step involved the utilization of the K-Means clustering algorithm to group the publications based on the extracted keywords and key phrases. The algorithm facilitated the identification of clusters of documents with similar thematic content, thereby providing a structured foundation for further qualitative analysis.

Subsequently, content analysis was conducted on each cluster, with the objective of elucidating the identified themes in greater depth. This qualitative method involved both open and axial coding techniques. In the open coding stage, each document within a cluster was read in detail, and initial codes were generated by identifying significant concepts, phrases, and themes. The objective of this stage was to identify as many relevant codes as possible, without limiting them to predefined categories. The open codes were then subjected to axial coding, during which relationships and patterns among them were identified. The codes were then grouped into broader categories and subcategories, thus highlighting the interrelationships and contributions of the different concepts to the overarching themes within each cluster.

The study employed a dual approach, combining content analysis with cluster analysis, to ensure the integration of both quantitative and qualitative insights. The clusters provided a structured overview of the main themes, while content analysis offered an in-depth examination of the specific topics and nuances within each cluster. This integrated approach facilitated a more nuanced and comprehensive understanding of the literature. The content analysis was not conducted in isolation from text mining; rather, it built directly upon the results of the text mining activities. This sequential and iterative process ensured that the qualitative insights derived from content analysis were firmly grounded in the quantitative patterns identified through cluster analysis. The detailed descriptions of the qualitative methods, including the coding process and the criteria for categorizing themes, are provided in the subsequent sections to offer transparency and reproducibility. After this grouping process, Cohen's Kappa analysis was applied to the coding process performed by two researchers, and the coefficient was found to be 0.76, thus the consistency of the coding process was also tested.

Based on the theoretical framework and methods outlined above, the research questions (RQs) for this study are as follows:

RQ1: What are the motives for using immersive technologies in the hotel industry?

RQ2: What are the immersive technologies commonly used in the hotel industry?

RQ3: What are the theoretical and conceptual origins of the use of immersive technologies in the hotel industry?

RQ4: How does the use of immersive technologies in the hotel industry affect the guest experience?

The research methods employed in the present paper, including scoping review techniques and clustering analysis, were crucial in defining the research questions as they provided a structured and comprehensive approach to understanding the complex landscape of immersive technologies in the hotel industry. The use of clustering analysis allowed us to identify patterns and groupings within the data, which in turn helped us to formulate specific, targeted research questions that addressed the most relevant and impactful aspects of immersive technology use. By integrating these methods, we ensured that our research questions not only reflected the current state of knowledge, but also addressed gaps and emerging

trends in the field, thereby contributing to a more nuanced and actionable understanding of immersive quest experiences in the hotel industry.

FINDINGS AND DISCUSSION

RQ1-Motives for Using Immersive Technologies

As a result of analyzing the 36 publications included in the scope of the research as described in the methodology section in detail, an answer to the research question regarding the reasons for the use of immersive technologies in the hotel industry was sought. At this point, 3 clusters were revealed in the clustering analysis performed with the K-means algorithm: *(1) Guest security, (2) Experiential Marketing, (3) HR Development*. Lodhi et al. (2024) also identified three primary thematic clusters in VR/AR research within the hospitality industry, based on a keyword co-occurrence network. The clusters were: "(i) The effects of VR on hospitality, tourism, and destinations; (ii) The role of technology in enhancing hotel satisfaction and performance; and (iii) User acceptance of AR in travel contexts". According to the authors, the first cluster focuses on how VR influences consumer services, intentions, attitudes, experiences, and destination image. The second cluster examines the impact of technology on satisfaction, behavioral intentions, and performance in the hotel sector. The third cluster explores consumer acceptance of AR technology, emphasizing user perspectives, experiences, and perceptions of AR usage.

Cluster 1-Guest Security

Looking at the word cloud for Cluster 1 in Figure 3, the words evacuation, signage, information, wayfinding, and environment are notable.

Figure 3. *Wordcloud for Cluster 1*

The TF-IDF Scores obtained through text mining given in Table 1 also support this finding. Accordingly, words such as travel anxiety (1.01), evacuation (0.71), and trust (0.68) have high TF-IDF Scores.

Table 1. *Cluster 1 for the motives for using immersive technologies in the hotel industry*

Clusters	Contents	Term frequencies (TF-IDF Score)		Publications	# of articles
Cluster 1: Guest security	Reducing travel anxiety with wayfinding, evacuation and escape route tracking through immersive technologies in and around the hotel in everyday and emergency situations	Travel anxiety	1,01	Ahn & Lee (2013); Ahn et al. (2013); Arias et al. (2019); Lee & Oh (2007); Lewinson & Esnard (2015); Meng & Zhang (2014); Rokhsaritalemi et al. (2022); Snopková et al. (2022); Vilar et al. (2014); Vilar et al. (2015)	10
		Evacuation	0,71		
		Trust	0,68		
		Signage	0,61		
		Information	0,60		
		Wayfinding	0,56		
		Emergency	0,50		
		Fire	0,50		
		Environmental factors	0,44		
		Relief	0,35		

Based on the content analysis, Cluster 1 was found to have content related to reducing travel anxiety by wayfinding, evacuation and escape route tracking through immersive technologies in and around the hotel in daily and emergencies. In other words, it was revealed that the first of the triggers of immersive technology use in the hotel industry was related to security and thus Cluster 1 was named "*Guest security*". At this point, it can be stated that the findings of the research obtained from clustering, text, and content analyses are consistent.

In the existing literature, it has been emphasized that security, reliability, and privacy are essential for creating a favorable hotel environment (Bhat, 2013; Hilliard & Baloglu, 2008; Walls, 2013). It has been stated that guests may be willing to pay more for strict security measures (Feickert et al., 2006). Ahn and Lee (2013) found that narrative video clips on hotels' embedded virtual reality websites can provide guests with the escape route and surrounding neighborhood information to provide psychological relief and alleviate travel anxiety.

While it is true that Cluster 1, which focuses on guest security, appeared relatively homogeneous, this homogeneity is an inherent characteristic of the content covered by the publications within this cluster. The focus on specific topics such as wayfinding, evacuation, and travel

anxiety reflects a concentrated research interest in enhancing guest security through immersive technologies. This uniformity underscores the critical and specialized nature of security-related research in the context of immersive experiences in the hotel industry.

Cluster 2-Experiential Marketing

Figure 4 shows the word cloud for Cluster 2. In Cluster 2, words such as experience, emotion, response, value, and color stand out.

Figure 4. *Wordcloud for Cluster 2*

This conclusion is further supported by the TF-IDF Scores for Cluster 2 in Table 2. In this respect, words with high TF-IDF Scores in Cluster 2 include experience (1.61), marketing (1.29), and presence (1.28).

In terms of content analysis findings, Cluster 2 covers issues such as the interaction of immersive technologies with guests' cognitive, emotional, and behavioral attitudes; creating unique guest experiences through immersive technologies; and the impact of immersive technology use in the hotel industry on brand marketing and purchase intention. At this point, Cluster 2, which is the second of the triggers of immersive technology use in the hotel industry, is characterized as "*Experiential marketing*".

Considering the findings of other studies on experiential marketing in the hotel industry, Bailey and Ball (2006) emphasized that the information that a tourist gains after seeing, feeling, and hearing a hotel will create associations with the brand. Wu et al. (2017) pointed out that room comfort, and co-creation platforms to create engaging experiences are among the main experiential marketing factors for hotels. McLean and Barhorst (2022), in their research focusing on VR's ability to influence tourism consumers' attitudes and behavioral intentions, revealed that VR

games offer an authentic experience. They also stated that immersive VR hotel experience plays an important role in encouraging the development of detailed mental images before the visit and managing tourism consumers' expectations.

Table 2. *Cluster 2 for the motives for using immersive technologies in the hotel industry*

Clusters	Contents	Term frequencies (TF-IDF Score)		Publications	# of articles
Cluster 2: Experiential marketing	Interaction of immersive technologies with guests' cognitive, emotional and behavioral attitudes; Creating authentic guest experience through immersive technologies; Impact of immersive technology use on brand marketing and purchase intention in the hospitality industry	Experience	1,61	Alfaro et al. (2019); Alfaro et al. (2022); Ballina et al. (2019); Bogicevic et al. (2019); Bogicevic et al. (2021); Flavián et al. (2021); Golja & Paulišić (2021); Israel et al. (2019a); Israel et al. (2019b); Leung et al. (2020); Lo & Cheng (2020); Lyu et al. (2021); McLean & Barhorst (2022); Orús et al. (2021); Ruiz-Molina et al. (2018); Siamionava et al. (2018); Slevitch et al. (2022a); Slevitch et al. (2022b); Surovaya et al. (2020); Xu et al. (2022); Yoon et al. (2021); Zeng et al. (2020)	22
		Marketing	1,29		
		Presence	1,28		
		Information	1,00		
		Intention	0,85		
		Brand	0,80		
		Advertising	0,75		
		Perceptions	0,67		
		Positive emotions	0,67		
		Immersion	0,67		
		Preview	0,63		
		Environment	0,63		
		Attitude	0,62		
		Outcomes	0,61		
		Technological innovations	0,59		
		Responses	0,59		
		Cognitive load	0,57		
		Value	0,57		

Cluster 3-HR Development

For Cluster 3 in Figure 5, the words employee, negative mood, mindfulness, intervention, and turnover intention attract attention.

Figure 5. *Wordcloud for Cluster 3*

Table 3 shows that words such as soft skills (0.50), hospitality students (0.41), and training (0.40) have higher TF-IDF Scores.

Table 3. *Cluster 3 for the motives for using immersive technologies in the hotel industry*

Clusters	Contents	Term frequencies (TF-IDF Score)		Publications	# of articles
Cluster 3: HR development	Use of immersive technologies in the education, training and development of hospitality students, employees and managers	Soft skills	0,50	Chalupa & Chadt (2021); Konovalova & Demenev (2020); Leung et al. (2023); Patiar et al. (2021)	4
		Hospitality students	0,41		
		Training	0,40		
		Learning	0,39		
		Negative mood	0,37		
		Mindfulness	0,35		
		Employees	0,31		
		Development	0,28		
		Education	0,25		
		Knowledge	0,22		
		Turnover intention	0,16		
		Workplace stress management	0,12		

As a result of the content analysis, Cluster 3 was found to be related to the use of immersive technologies in the education, training, and development processes of hotel students, employees, and managers. In this context, Cluster 3, which constitutes the third triggering factor of the use of immersive technology in the hotel industry, is named "*Human resource (HR) development*".

Bharwani and Jauhari (2017) propose that hospitality intelligence—which encompasses emotional, cultural, and experiential intelligence—combined with technical expertise, may enable frontline staff to interact more positively with guests, thereby helping to make their stay more memorable. Ampountolas et al. (2019) discovered that employing hotel simulations promotes experiential learning and enhances students' decision-making abilities. Leung et al. (2023) state that the work stress of hotel staff can be reduced with VR support. In this direction, they suggest that practitioners should ensure that natural spaces are brought indoors through VR when break times are not enough to relax in outdoor environments. Thus, with VR experience, the negative mood of the hotel staff can be dispersed and the possibility of leaving the job can be reduced.

RQ2-Immersive Virtual Experiences

The findings related to the second research question, which examines the immersive technologies commonly used in the hotel industry, are presented

in Table 4. The content analysis results, along with the TF-IDF scores, complement each other and indicate that VR-based immersive technologies are most used in the hotel industry. In other words, the visual appeal and imaginative potential of VR (Orús et al., 2021; Slevitch et al., 2022b) are leveraged to create immersive virtual experiences.

Table 4. *Immersive technologies common in the hotel industry*

Clusters	Immersive technologies	Total publications (f)
Cluster 1: Guest security	Virtual Reality (VR)	8 *(TF-IDF Score: 1,05)*
	Augmented Reality (AR)	1
	Geographic Information System (GIS) Mapping	2
Cluster 2: Experiential marketing	VR	19 *(TF-IDF Score: 3,70)*
	AR	1
	Information and Communication Technologies (ICT)	2
Cluster 3: HR development	VR	3 *(TF-IDF Score: 0,22)*
	Simulation	2

Table 5. *Publications by research methodology*

Clusters	Research methods	Total publications (f)	Data collection methods
Cluster 1: Guest security	Quantitative	8	Experiment *(VR / AR / GIS mapping-based)* & survey
	Qualitative	1	Grounded theory approach *(interview & GIS mapping & photovoice)*
	Mixed	1	Experiment *(VR-based)* & Survey & Qualitative observation
Cluster 2: Experiential marketing	Quantitative	18	Experiment *(VR / AR / 360-degree tour / video / image-based)* & survey Survey
	Qualitative	2	Case study *(semi-structured interview & website analysis & document analysis)* Content analysis
	Mixed	2	Interview & Experiment *(immersive virtual reality (VRI) with 360-degree video)* & Survey Scale development *(interview & survey)*
Cluster 3: HR development	Quantitative	1	Field experiment *(VR-based)* & survey
	Qualitative	2	Pre-open-ended questionnaire & using the virtual field trip platform & post-open-ended questionnaire & thematic analysis Semi-structured interview
	Mixed	1	Experiment *(simulation game)* & Qualitative observation & Survey

It can be stated that the distribution of publications by research methodology seen in Table 5 also supports this finding. The 36 publications analyzed in this study were largely designed as VR-based experiments. In this direction, the embedded VR hotel websites with narrated video clips

(Ahn et al., 2013; Ahn & Lee, 2013), smartphone-based VR systems (Israel et al., 2019b), and virtual field trip platforms (Patiar et al., 2021) can be exemplified as VR-based immersive technologies used.

RQ3-Theoretical and Conceptual Origins of the Use of Immersive Technologies in the Hotel Industry

The results related to the theoretical and conceptual foundations of immersive technology use in the hotel industry, as addressed in the third research question, are presented in Table 6. Upon reviewing Table 6, it becomes evident that the application of immersive technologies in the hotel industry is largely grounded in behavioral models. Notable models in this context include those focused on technology acceptance, such as the Technology Acceptance Model (TAM) and its Extended and Unified Versions (Israel et al., 2019a), as well as models examining the behavioral effects of emotional responses to environmental stimuli, like the Stimulus-Organism-Response (S-O-R) Model (Yoon et al., 2021). An additional key finding is that half of the 36 publications analyzed did not rely on any theory.

Table 6. *Theoretical and conceptual origins of the use of immersive technologies in the hotel industry*

Clusters	Theoretical and Conceptual Origins	Total publications (f)
Cluster 1: Guest security	Mayer et al.'s Trust Model	2
	N/A	8
Cluster 2: Experiential marketing	Technology Acceptance Model (TAM) / Extended and Unified Versions of TAM	3
	The Theory of Technological Mediation	2
	Presence Theory	2
	Stimulus-Organism-Response (S-O-R) Model	2
	Cognitive Load Theory (CLT)	2
	Limited Perceptual Capacity Model of Attention	2
	Perceptual Load Theory	1
	Theory of Reasoned Action	1
	Self-determination Theory (SDT)	1
	Elaboration Likelihood Model (ELM)	1
	Transportation Imagery Model (TIM)	1
	Dual Coding Theory	1
	Color Theory	1
	Color-in-context Theory	1
	Hierarchy Model of Advertising Effects	1
	N/A	7
Cluster 3: HR development	Spillover Theory	1
	Stress Recovery Theory	1
	Mindfulness Theory	1
	N/A	3

RQ4-IGX

The findings for the fourth research question on how the use of immersive technologies in the hotel industry affects the guest experience are presented separately by cluster below.

Table 7, which includes IGX scope for the hotel industry based on Cluster 1, shows that explicit environmental and conditional knowledge about the hotel provided by immersive technologies is an important IGX antecedent within the scope of guest security. Through the realistic, immersive, personalized, and visualized experiences created, travel anxiety is alleviated and consumer behavior toward choosing the hotel is exhibited with the psychological comfort experienced. Barsky and Nash (2002) pointed to comfort, and security as examples of different guest emotions that are components of satisfaction and loyalty during a hotel stay. Walls (2013) considers reliability, a human interaction dimension of the hotel consumer experience, as a human interaction dimension of the hotel consumer experience when hotel employees make guests feel safe and secure during their stay at the hotel. Tractinsky et al. (1999) found that the level of trust in hotels affects consumers' online hotel booking intentions. Meng and Zhang (2014) pointed out that fire evacuation system design in hotels can be improved based on a virtual fire environment. Thus, in case of emergencies such as fire, the wayfinding behaviors and reactions of guests who have no prior knowledge about the hotel can be predicted in a VR-based manner.

Table 7. *IGX scope for the hotel industry based on Cluster 1*

Cluster 1	**Antecedents**	**IGX**		**Consequences**
		Immersive Components	***Affective and Cognitive Components***	
Guest security	Explicit environmental and conditional knowledge about the hotel provided by immersive technologies	• Realism • Immersion • Personalization • Visualization	• Feeling of psychological relief • Sense of trust • Perception of travel security	Preference of hotel

The IGX scope for the hotel industry based on Cluster 2 is shown in Table 8. In this framework, IGX antecedents within the experiential marketing cluster include some perceptions of technology type and technology use from TAM, individual innovativeness towards technology, and some demographic characteristics. Emotional and cognitive

experiences of the hotel are developed through immersive experiences such as presence, mental imagery, and co-creation. This leads to positive outcomes such as guest satisfaction with the hotel and its brand, willingness to make reservations, intention to revisit, and willingness to pay more. Flavián et al. (2021) emphasized the importance of integrating VR with hotels' communication strategies in providing hotel-based pre-experiences in terms of promoting psychological and behavioral engagement. Orús et al. (2021) pointed out that presence as a pre-experience drives the booking intentions of potential guests. Israel et al. (2019b) revealed that the hedonic and utilitarian value of a virtual hotel experience boosts the likelihood of customers booking travel accommodations.

Table 8. *IGX scope for the hotel industry based on Cluster 2*

Cluster 2	**Antecedents**		**IGX**		**Consequences**
	Technology-based Components	***Individual-based Components***	***Immersive Components***	***Affective and Cognitive Components***	
Experiential marketing	• Technological embodiment *(desktop computers, smartphones, and VR devices etc.)* • Type of technology *(self-service, mobile, web-based, and social media etc.)* • Type of technological device *(VR headsets, and natural devices etc.)* • Preview mode *(static images, 360-degree tours, and VR etc.)* • Commercial type *(traditional, and VR etc.)* • Attractiveness of preferred technology • Ease of imagination • Visual appeal • The value of the preferred technology in creating experience *(hedonic, utilitarian, etc.)* • Task-technology fit • Perceived usefulness • Perceived ease of use • Perceived enjoyment	• Personal innovativeness towards technology • Elaborateness • Cognitive style • Cognitive load • Gender • Age • Social and cultural background	• Presence / Telepresence • Interactivity • Vividness • Mental imagery • Affective arousal • Immersion • Curiosity • Co-creation • Authenticity	• Pleasure from the hotel room design • Enjoyment from the service atmospherics • Sense of relaxation • Having positive emotions • Perceived service quality	• Guest satisfaction • Willingness to pay more • Brand attitude • Visit intention • Booking intention • Purchase intention • Revisit intention • Brand engagement • Word-of-mouth

When Table 9, which includes IGX scope for the hotel industry based on Cluster 3, is examined, it is understood that immersive employee experiences have consequences for IGX. In this framework, individual and technological antecedents within the scope of HR development for the hotel industry affect immersive employee experiences in different dimensions

Table 9. *IGX scope for the hotel industry based on Cluster 3*

Cluster 3	**Antecedents**		**Immersive Employee Experiences**				**Consequences for IGX**	
	Technology-based Components	***Individual-based Components***	***Immersive Components***	***Affective Components***	***Cognitive Components***	***Behavioral Components***	***Cognitive Outcomes***	***Behavioral Outcomes***
HR development	• Realistic simulation of managerial situations through innovative technologies • Perceived usefulness	• Readiness to use immersive technology of employees	• Realism • Mindfulness • Emotional involvement	• Feeling of employee positive mood • Feeling of employee satisfaction • Feeling of employee motivation	• Employee perceptions of actual acquisition of coping with workplace stress management • Perceived importance of improving employee soft skills • Perceived importance of enhancing professional knowledge and developing employees' practical skills	• Decreasing willingness to employee turnover intention	• Guest-perceived high-quality service	• Maintaining guest satisfaction

and create cognitive and behavioral outcomes towards IGX. Konovalova and Demenev (2020) pointed out that realistic simulation of problematic situations in hotel management with VR-based technologies and the readiness of hotel staff to use new digital technologies such as VR are important for practical training of managerial skills. Chalupa and Chadt (2021) discovered that employing VR as a tool for simulating real-world scenarios during the training of hotel and front office managers positively influences employee motivation and job satisfaction. Guests perceive high quality in the services provided by such personnel.

A Comprehensive Model of IGX in the Hotel Industry

A Comprehensive model of IGX in the hotel industry is revealed by grouping the findings of the research, which are discussed separately and in detail based on clusters in terms of how the use of immersive technologies in the hotel industry affects the guest experience.

Table 10. *The antecedent variables of IGX in the hotel industry*

Antecedents		
Technology-based Components	• *Technical Drivers*	• Technological embodiment • Type of technology • Type of technological device • Preview mode • Commercial type
	• *Value Drivers*	• Visual appeal • Attractiveness • Ease of imagination • Creation of experience value
	• *Motivational Drivers*	• Informativeness • Task-technology fit • Perceived usefulness • Perceived ease of use • Perceived enjoyment
Individual-based Components	• *Personal Characteristics*	• Personal innovativeness • Elaborateness • Cognitive style • Cognitive load
	• *Demographic Features*	• Gender • Age • Socio-cultural background

Table 10 shows the antecedents of this comprehensive hotel IGX model. These antecedents are categorized into two main groups: technology-based, and individual-based. Technology-based components are divided into three subgroups: technical, value, and motivational drivers. Individual-based components are divided into two subgroups:

personal characteristics and demographic characteristics. Technical antecedents include factors related to technology type and infrastructure. Value antecedents include the attractiveness of the immersive technology used and its potential to create an experience. Motivational antecedents consist of factors such as ease of use and convenience, which reflect individual attitudes towards the technology such as acceptance intention.

Ali and Omar (2014) identified the physical surroundings that represent a hotel's service environment and the social dynamics involving interactions with staff and other guests as key factors shaping the customer experience. Israel et al. (2019b) noted that the VR application used in their study on the hedonic and utilitarian value of VR hotel experiences relies on static panoramic images. They suggested that incorporating visual and auditory elements, such as audio, video, and animation, could enhance the level of immersion. Lyu et al. (2021), in their study on the effectiveness of VR in hospitality advertising, combined presence model and gender effects and found that women are more affected by VR than men in a virtual environment.

Table 11. *The dimensions of IGX in the hotel industry*

IGX	
Immersive Components	• Realism • Personalization • Visualization • Presence / Telepresence • Interactivity • Vividness • Mental imagery • Affective arousal • Immersion • Curiosity • Co-creation • Authenticity
Affective Components	• Feeling of psychological relief • Sense of trust • Pleasure from the hotel room design • Enjoyment from the service atmospherics • Sense of relaxation • Having positive emotions
Cognitive Components	• Perception of travel security • Perceived service quality
Social Components	• Staff-guest interactions

Table 11 presents the dimensions of IGX in the hotel industry. In this context, four main groups are formed immersive, affective, cognitive, and

social components. Immersive components reflect experience dimensions such as realism, personalization, visualization, presence, and co-creation. Affective components include positive emotions in terms of factors such as psychological relief, room design, and service atmospherics. Cognitive components consist of perceptions of travel security, and service quality.

Social components, on the other hand, reflect the results of immersive employee experiences related to IGX, which emerged within the scope of cluster 3 of the research regarding the use of immersive technologies for HR development, and emphasize staff-guest interactions in this direction. Alnawas and Hemsley-Brown (2019) identified emotional experiences, staff-guest interactions, guest-to-guest interactions, lifestyle, learning opportunities, atmosphere, and guest security as key first-order indicators of customer experience in their model of customer experience quality within the hotel industry. Yoruk et al. (2023) discovered that emotional experiences emerged as the most significant dimension in understanding guest interactions with service robots in the hospitality sector. This was followed by functional experiences as the second most prominent dimension. Among the sub-dimensions, social interactions, a key aspect of emotional experiences, received relatively greater attention. In terms of functional experiences, convenience was found to be at the forefront. Rahimian et al. (2021) emphasized the critical role of using technology in developing, integrating touchpoints, and personalizing hotel services within the scope of customer experience management in the hotel sector. Slevitch et al. (2022a), using psycho-physiological measurement tools, found that customers comprehensively processed VR stimuli for hotel promotion by combining emotion and cognition experiences.

Table 12 presents the consequential variables of the comprehensive model of IGX in the hotel industry. In this scope, there are three main groups: affective, cognitive, and behavioral outcomes. Affective outcomes include guest satisfaction. Cognitive outcomes include quality service perceived by the guest, and willingness to pay more for immersive technologies used by the hotel throughout the guest journey. Behavioral outcomes include attitudes such as preference, reservation, revisit, and recommendation, and tendencies such as satisfaction and loyalty towards the hotel and brand. Walls (2013) found a positive relationship between the physical environment and human relations dimensions of hotel consumer experience and the perceived value dimension consisting of emotional, cognitive, and social/self-concept value. Lyu et al. (2021) revealed that VR ads positively affect customers' attitudes towards the hotel's advertisements, brand attitude, and booking intention, as VR ads create

presence through higher levels of vividness and interactivity. McLean and Barhorst (2022) found a significant effect between satisfaction with a hotel's appearance and intention to revisit when guests use a VR preview.

Table 12. *The consequential variables of IGX in the hotel industry*

Consequences	
Affective Outcomes	• Guest satisfaction
Cognitive Outcomes	• Guest-perceived high-quality service • Willingness to pay more
Behavioral Outcomes	• Brand attitude • Preference of hotel • Visit intention • Booking intention • Purchase intention • Revisit intention • Maintaining guest satisfaction • Brand engagement • Word-of-mouth

CONCLUSION

CX is a phenomenon that has been analyzed in different contexts and its scope has been tried to be revealed. As a phenomenon that attracts academic interest within the tourism sector, the wide range of field-specific studies contributes to a broader understanding of the concept and its contextual foundations. However, research on CX within the hotel industry, a key part of the tourism sector, remains relatively limited, and a comprehensive CX approach in this specific context is yet to be established. Additionally, understanding how technological advancements and digital transformation shape the conceptualization and dimensions of CX in the hotel industry represents another area for further exploration. Furthermore, it is significant that a thorough conceptual, theoretical, and methodological framework regarding the impact of immersive technologies on CX in the hotel industry has yet to emerge in the literature. In this regard, the current study addresses context-specific phenomena by presenting a comprehensive model of immersive guest experiences (IGX) in the hotel industry.

Theoretical Contributions

This research contributes to the understanding of the reasons for the use of immersive technology in the hotel industry, the types of immersive technology commonly used, the theoretical and conceptual origins of

immersive technology use, and the effects of immersive technology use on guest experience. Accordingly, it provides detailed information on the IGX scope for the hotel industry and categorizes the antecedents, dimensions, and consequences of IGX in hotels.

Research results revealed that immersive technology is used in hotels for guest security, experiential marketing, and HR development. The immersive technology commonly used in hotels is VR-based. Thus, it is noteworthy that immersive virtual experiences are created. The use of immersive technologies in the hotel industry is relatively more based on behavioral models. As a result of the examinations within the scope of IGX scope for the hotel industry, a comprehensive model of IGX in the hotel industry has been put forward. In this framework, antecedents of IGX (Technology-based components: Technical, value, and motivational drivers; and Individual-based components: Personal characteristics, and demographic features), dimensions of IGX (immersive, affective, cognitive, and social components), and consequences of IGX (affective, cognitive, and behavioral outcomes) were revealed. Additionally, the dimensions of immersive employee experiences were determined to consist of immersive, affective, cognitive, and behavioral components. At this point, the social components of IGX reflected the outcomes of immersive employee experiences related to IGX that emerged for the use of immersive technologies for HR development and emphasized staff-guest interactions in this direction.

In conclusion, the three clusters identified in this study each highlight potential research gaps. Additionally, the comprehensive model of immersive guest experiences (IGX) in the hotel industry, derived from the research findings, could serve as a foundation for future empirical studies. However, most existing studies lack a solid theoretical basis, and the use of immersive technologies in the hotel industry is mainly examined through laboratory experiments. This underscores the need for empirical research to be conducted in actual hotel settings. Despite this, the growing interest in VR technology in the hotel industry, as indicated by relevant studies, points to the need for further exploration of experiences with other immersive technologies. Such research would allow for comparisons between immersive technology experiences in the hotel sector and the broader tourism industry, helping to guide stakeholders in the field. Moreover, the relatively high number of studies in the second cluster, which focuses on marketing applications of immersive technology in hotels, will provide valuable insights for developing new perspectives by concentrating on human resource management in the third cluster.

Practical Implications

The results of the research guide practitioners in the design of IGX in hotels. As many studies examined the use of immersive technologies for marketing purposes at the pre-trip stage, the positive effects of technologies like AR and VR on the behavioral intentions of potential guests are proven. Hotels can adopt these applications as effective marketing tools in their websites to attract attention, overcome the guests' risk perception by providing visually supported information, speed up the customer decision process, and increase the number of bookings. Moreover, this study highlights potential applications of immersive technologies that can serve as valuable resources for hoteliers. These technologies can be utilized to enhance guest security perception, elevate experiential marketing efforts, and support human resource (HR) development initiatives. Based on the understanding of the background and outcomes of IGX in hotels, creating positive experiences throughout the guest journey reveals the benefits to the business and brand such as revisiting intention and brand engagement. It also allows for the evaluation of touchpoints and practices that can contribute to the improvement and development of IGX design in hotels from the customer, employee, and business perspectives. Thus, it enlightens the creation of phygital guest experiences through the placement of omnichannel touchpoints on guest journey maps to create positive IGX in hotels.

On the other hand, the findings, especially within the scope of technology-based antecedents of IGX, and immersive dimensions of IGX, draw attention to the impact of adopting a human-centered design perspective on the success of business strategies and practices for the use of immersive technology. Hotels should also be aware of the skepticism of using immersive technology as it can have negative effects, too. For example, in the specific context of luxury hotels, immersive technologies using artificial intelligence reduce customers' behavioral intentions of choosing these services and degrade their perceptions of the luxury value for these services (Gonçalves et al., 2024). Results suggest that customers do not want to benefit from artificial intelligence and immersion while getting luxury services. Considering the traditional luxury elements of hospitality such as exclusivity, craftsmanship, and a personalized service, luxury hotels should find the fine tune between high-tech and high-touch (Bharwani & Mathews, 2021). Managers are advised to consider hybrid options and be informed about their customers' priorities.

In conclusion, the utilization of immersive technologies in hotel businesses for purposes such as guest security, experiential marketing, and human resource (HR) development can contribute to the creation and sustenance of sustainable business models within the context of the hospitality sector. Furthermore, the application of immersive technologies, in particular IGX, can serve as a foundation for strategic and managerial success, as evidenced by the provision of personalized services and the development of staff competencies.

Limitations and Future Research

The 36 studies within the scope of the research were selected only through WoS database query. Considering that the phenomenon of IGX in hotels has a multidisciplinary nature based on different origins such as psychological, behavioral, technological, etc., queries can be made through different databases in future research. In the current research, by considering machine learning and content analysis together, an evaluation was not made only on titles, abstracts, and keywords, but meticulous and repeated full-text papers were reviewed. For this reason, although the inclusion of 36 articles within the scope of the current research is not considered as a limitation based on both the relative novelty of the subject and the detailed analyses performed, future research can be conducted with larger samples. Thus, the scope of IGX in hotels can be expanded and enriched. In addition, evaluations of the IGX phenomenon in other pillars of the tourism and hospitality sector such as food and beverage and transportation will also allow for comparative analyses. On the other hand, research designs focusing on negative IGX in hotels can provide different perspectives on the subject and pave the way for a comprehensive conceptualization of hotel IGX.

While text mining and clustering techniques provide a valuable high-level overview of the existing literature on IGX in the hotel industry, they also have limitations. The complex motivations behind the use of immersive technologies can be better captured through detailed qualitative analysis. Given that our dataset consisted of 36 articles, a comprehensive qualitative review could provide richer, more nuanced insights that are directly relevant to our research questions. Manual, qualitative analysis allows for in-depth exploration of themes, contexts, and underlying motivations that may be missed by automated methods. Future research should consider a mixed methods approach, integrating qualitative methods such as in-depth interviews, thematic analysis and case studies to complement the findings from text mining and clustering. This would

provide a more holistic understanding of the phenomena and provide deeper insights into the motivations and impacts of immersive technologies in the hotel industry.

The comprehensive model of IGX in the hotel industry dimensions revealed as a result of the research can be evaluated for the theoretical, and methodological development of further research. At this point, while designing new research designs and research models to produce a well-grounded study, the finding that half of the 36 publications in the current study were not based on any theoretical framework should not be overlooked. In this direction, instead of models that focus on individual acceptance of new technologies, such as TAM, which has been widely used in relatively previous research, turning to constructs such as Presence Theory, which focuses on revealing the experiences created by immersive technologies, has the potential to offer different perspectives. At this point, in the light of the IGX scope for the hotel industry, and the comprehensive model of IGX in the hotel industry findings of the current research, mediators, and moderators of IGX can be investigated. In this framework, studies can be conducted in which immersive components are specifically included in the existing customer experience in the hotel industry models.

Considering that the 36 publications analyzed in the current research were largely designed as VR-based experiments, mixed methods can be used in future research. The results of the current research revealed that the immersive technologies commonly used in the hotel industry are VR-based. In future research on the topic, this scope can be expanded to reveal the immersive effects of VR, AR, and MR technologies on guest experience. It is noteworthy that the publications analyzed within the scope of the current research focus more on the pre-stay phase of the guest journey and include sales, marketing, and advertising efforts. Accordingly, future research must be designed to provide a framework for all stages of the guest journey. In addition to marketing, conducting research that focuses on business operations, human resources strategies, technology management, and design, and collecting data from consumers, employees, and managers can provide a holistic view of IGX in hotels that goes beyond one-sided and narrow evaluations.

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