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Evaluating the Impact of High-Tech Features on Customer Satisfaction: Insights from Global Online Reviews

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Abstract

This study examines how travelers perceive high-tech hotel features by analyzing online reviews. A mixed-method approach was employed, combining qualitative analysis using KH Coder for frequency and co-occurrence analysis with quantitative analysis using SPSS. The analysis identified four key dimensions of high-tech hotel features including experiences, tangibles, entertainment and facilities, which were further tested through regression analysis to evaluate their effects on satisfaction. Results revealed that experiences (β = -0.152, t = -12.258), tangibles (β = -0.183, t = -14.738), and facilities (β = -0.146, t = -11.759) negatively affected satisfaction, while entertainment (β = 0.015, t = 1.203) had a weak positive influence. Theoretically, this study challenges the common assumption in service quality theories that technological innovation automatically enhances satisfaction. It highlights the need to integrate emotional and experiential dimensions beyond functional and tangible aspects into hotel industry practices, aligning with the experience economy perspective. Practically, it emphasizes that technology should enhance, not replace basic services and human interaction, encouraging hotel managers to balance innovation with comfort, usability, and emotional engagement to strengthen overall customer satisfaction.

Keywords: hotels; high-tech hotel features; online reviews; customer satisfaction; human-technology interaction

1. Introduction

Technology is transforming the global hotel industry, changing how services are delivered and experienced. As the largest segment of the travel and tourism market, hotels are leading the way in this transformation. The industry is projected to reach a value of USD 443 billion by 2025, with the number of customers expected to rise to 1.814 billion by 2029 (Statista, 2024). This growth demonstrates increasing demand for innovative, efficient, and personalized services.

To stay competitive, hotels are adopting advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and service robots. These innovations are replacing traditional service models with technologically driven approaches, fundamentally changing how hotels engage with customers (Kaushik et al., 2015; Tussyadiah, 2020). COVID-19 pandemic has further contributed to this trend, encouraging travelers to prioritize safety, automation, and contactless experiences (Chen et al., 2021). Technology now plays a key role in offering convenience, personalization, and security.

According to Tripadvisor (2023), 94% of travelers believe technology enhances their travel experience, and 62% value innovations that save time. However, 54% of travelers feel that that technologies still don't fully meet their needs and expectation, even though 57% believe advanced innovations can significantly improve satisfaction and profitability (Tsukanova, 2024). In response, many hotels now integrate high-tech features such as smart rooms, service robots, and AI systems (Chen et al., 2021). For example, Henn-na Hotel in Japan uses robots for check-in and luggage services, while CityHub in the Netherlands provides fully automated room access.

Despite the rapid adoption of high-tech features, concerns remain about whether these innovations properly improve customer satisfaction or reduce the sense of personal connection that many customers still appreciate. Previous study suggests that while smart controls, room automation, and mobile apps can improve experiences, balancing innovation with human-centered service remains a challenge (Brochado et al., 2016).

Therefore, this study investigates how high-tech features in hotel influence customer satisfaction by analyzing 12,884 online reviews. Using Exploratory Factor Analysis (EFA) and regression analysis, it identifies the key technological features that matter most to customer and how they feel about them. The findings offer insights for hotel managers and technology developers to improve services quality while maintaining the core values of hotel industry. Additionally, this study provides practical recommendation for integrating high-tech solutions to address changing demand of modern customer.

2. Literature Review

2.1. High-tech features in the hotel industry

The adoption of technology in hotels started in the early 1970s, expending from basic operations to advanced innovation aimed at improving customer experiences (Sammons, 2000). In today, integrating high-tech features is no longer optional but essential. Travelers are no longer looking for accommodation but are expected to unique experiences enhanced by comfort with advanced technology. As highlighted by Kim et al. (2008), technological innovation enables hotel to differentiate their offerings, improve operational efficiency, enhance financial performance, and expand the range of customer services.

Hotels are now increasingly integrating a wide range of advanced technologies, including robotics, artificial intelligent (AI), mobile applications, facial recognition system and automation tools (Chen et al., 2021; Tussyadiah, 2020; Zeng et al., 2020). These innovation support real-time personalization and interactive experience (Kim & Han, 2020). Chen et al. (2021) further explains that high-tech in hotels are not merely about machines, they represent a new way of reintroducing of hotel, where artifical intelligence (AI) and Internet of Things (IoT) personalize service dynamically, making the customer'stay more enjoyable.

Specific features such as virtual reality (VR) for virtual tours, biometric authentication, service robots, and mobile applications are becoming increasingly common (Sharma & Singh, 2024). These tools not only streamline operations and enhance sustainability but

also deepen customer interaction. Chen et al. (2021) highlight voice and facial recognition and robotic assistants as pivotal elements of high-tech hotel service, while Qiu et al. (2020) identify AI-driven room settings and robotic service delivery as key to improving customer experience. Furthermore, voice assistants (VAs), which lie at the intersection of AI and IoT, are enabling intuitive service interaction, lowering operational costs, and enhancing service responsiveness (Buhalis & Moldavska, 2022).

These high-tech features target travelers who prioritize convenience, personalization, and unique features. As Hertog et al. (2011) stated, hotel with high-tech features combine visual, operational, and service innovations that extend beyond more functionality to transform traditional hotel. Çakar & Aykol (2019) further argue that these innovations changing customer expectations by delivering diverse and multidimensional experiences. Hence, by integrating advanced technologies with modern design and personalized service, hotels designed to deliver a sense of luxury and innovation.

Technologies such as AI and machine learning are central to this transformation, enabling faster and more efficient service (Parvez, 2021). Brochado et al. (2016) observe a rising preferences for a new and tech-enhanced hotel experiences among travelers. The demand for automation and contactless interaction, especially since the pandemic, has accelerated the use of robotics and smart service system (Zeng et al., 2020).

Real-world implementations demonstrate this high-tech trend. Japan's Henn na hotel uses facial recognition and robotic receptionists, YOTEL New York features robotic luggage storage and smart room controls, and hotel Zetta in San Francisco offers virtual reality and in-room gaming (Hollander, 2024). These real-life examples show how technology can balance functionality efficiency with unique customer experiences. As a result, high-tech features are now widely recognized as a key driver of innovation and competitiveness in the global hotel industry, transforming service delivery and rising customer expectations (Hertog et al., 2011).

2.2. Customer satisfaction and high-tech experiences

Customer satisfaction is a key outcome of implementing high-tech features in hotels. While these features are aims to enhance customer experience, their effectiveness depends on how customers perceive and interact with them. Chen et al. (2021) found that the emotional engagement and well-integrated technology significantly affect satisfaction. Similarly, Wu & Cheng (2018) emphasized that customer value technology when it is reliable, easy to use, and improve comfort.

While traditional factors such as service quality and staff interaction remain important (Kim et al., 2019), the role of technology in driving satisfaction has become increasingly importance. Understanding what customer truly value is essential for improving satisfaction, especially in hotels. Cobanoglu et al. (2011) highlighted the need of aligning technological investment with customer expectations, as not all high-tech features have the same impact on satisfaction. Brochado et al. (2016) identified two major benefits by adopting advanced technology in luxury hotel. First, it helps hotels stand out, enhance customer experience, attract new customers, and improve profitability. Second, it provides actionable insights derived from both customer and managerial feedback for selecting technologies that match with customer priorities. These strategies reinforce the importance of designing innovation that directly meet the customer need.

Sharma & Singh (2024) further explain that technologies such as AI and automation can improve satisfaction only when effectively implemented and aligned with customer need. For example, IoT-enabled smart rooms can personalized stay experiences, but their values depend on user-friendliness and smooth integration. Ethical concerns, including data privacy and inclusive design also influence customer comfort and acceptance. Çakar & Aykol (2019) illustrates this balance through the case of Eccleston Square Hotel, where advanced technologies combined with personal service resulted in high satisfaction and positive eWOM. Cao et al. (2019) further highlight that emotional connection with technology is a strong predictor of satisfaction. Similarly, Zhou et al. (2020) found that perceived innovation and safety tend to lead the higher satisfaction.

However, the adoption of high-tech features is not without risks. As Chen et al. (2021) observed, service robots may misinterpret customer request and then causing

dissatisfaction. To avoid this, hotels must prioritize proper implementation and user-friendly design to ensure that high-tech feature improve rather than disrupt the overall customer experience.

3. Methodology

This study adopted both quantitative and qualitative research methodologies. Qualitative data was collected and transformed into quantitative to identify the important features and the main attributes that customers most frequently mention. Keywords are then evaluated using co-occurrence analysis to determine their clustering relationship. Following that, an Exploratory Factor Analysis (EFA) is performed to identify the key factors among the attributes. Finally, linear regression analysis is used to identify the most significant elements that influence customer satisfaction in high-tech hotels.

3.1. Data collection

This research analyzes 12,884 online reviews collected from Google Reviews using Outscraper. The period of review collection covered seven years of available data, from 2017 to 2024. To ensure data quality and consistency, the following selection rule was applied: (1) reviews must be publicly accessible on Google Reviews, (2) reviews must contain written text (not ratings only), and (3) reviews must be made in English language to ensure text-mining accuracy. Duplicate reviews and reviews with fewer than three words were all removed. The hotels selected were obtained from HotelTechReport, which has a list of hotels that have high-tech and innovative features (Hollander, 2024). Of the original nine hotels, Atari Hotel, Las Vegas, was removed due to limited review availability, leaving a final dataset of 12,884 valid reviews for eight hotels.

The hotel selected in this study feature advanced elements such as robotic services, app-controlled functionalities, and virtual reality experiences. Although high-tech hotel lacks universally defined academic standard, this study uses the term to described features that extensively incorporate advanced technologies into both operation and customer experiences. Table 1 summarizes the hotels selected, including names, locations, reviews, ratings, and star categories.

Table 1. Hotel review data set.

Hotel Name	Locations	Star	Ratings	No. of reviews
Henn Na Hotel	Tokyo, Japan	3	4	636
YOTEL	New York, USA	3	3.9	1,413
Blow Up Hall 5050	Kosciuszki, Poland	5	4.4	199
Hotel Zetta	San Francisco, USA	4	4.3	612
Kameha Grand	Zurich, Switzerland	4	4.3	2,013
Virgin Hotels	Las Vegas, USA,	4	4.2	4,802
25hours Hotels	Vienna, Austria	4	4.5	2,247
Cityhub	Netherlands	5	4.8	962
			Total	12,884

3.2. Data analysis

To better understand how visitors perceive high-tech features in hotels, the analysis starts with a frequency analysis to identify the most frequently mentioned words, providing insights the features that customer prioritizes. A co-occurrence analysis was then conducted to explore the relationship between these keywords. An exploratory factor analysis (EFA) was applied to group related expression into key factors of customer perception. Finally, regression analysis was conducted to determine which extracted factors had the greatest influence on customer satisfaction.

4. Results

4.1. Frequency analysis of reviews

Table 2 presents the most frequently mentioned keywords from customer reviews, with “room” (9,012 mentions), “hotel” (7,923 mentions), and “clean” (2,237 mentions) ranking highest. These results highlight that while customer notice high-tech innovation, fundamental aspects like cleanliness and basic amenities remain critical to satisfaction. This emphasizes the importance of using technology to enhance, not replace core hotel service.

Words such as “modern” (608 mentions) and “machine” (376 mentions) reflect growing awareness of advanced technologies. However, these are mentioned less frequently than traditional elements like “staff” (2,822 mentions) and “service” (2,176 mentions),

suggesting that while innovation is appreciated, it remains a complement, not a replacement to core hotel services.

The reviews from customer emphasizes the need to balance technology with human-centered service. Frequently mentioned words like “friendly” and “helpful” with “modern” and “machine”, indicating that customer value both efficiency and personal interaction. This finding aligns with previous study which emphasize the necessity of integrating technological advancements with compromising the human touch in hospitality (Wang et al., 2022). As high-tech features in hotels continue to grow, these insights suggest how innovation and hotel industry can work together to meet the customer expectation.

Table 2. Top 100 frequency keywords.

Rank.	Word.	Freq.	Rank.	Word.	Freq.
1	room	9012	51	cool	564
2	hotel	7923	52	super	562
3	nice	3272	53	door	558
4	good	3136	54	first	544
5	great	2937	55	free	540
6	staff	2822	56	bit	536
7	clean	2237	57	guest	534
8	service	2176	58	front	527
9	place	2040	59	reception	512
10	time	1720	60	next	497
11	location	1632	61	resort	490
12	friendly	1561	62	more	482
13	bar	1437	63	new	477
14	night	1342	64	star	474
15	restaurant	1323	65	way	467
16	bed	1322	66	many	461
17	stay	1308	67	space	459
18	day	1207	68	bad	456
19	pool	1201	69	hour	455
20	breakfast	1199	70	fun	447
21	view	1184	71	coffee	431
22	experience	1154	72	customer	430
23	small	1083	73	few	427
24	area	1040	74	negative	418
25	strip	997	75	spacious	415
26	comfortable	982	76	design	414
27	food	972	77	airport	411
28	everything	961	78	option	411

29	bathroom	948	79	perfect	409
30	price	875	80	atmosphere	406
31	beautiful	872	81	check	397
32	other	869	82	towel	397
33	excellent	839	83	better	396
34	people	820	84	nothing	394
35	desk	812	85	top	393
36	floor	810	86	awesome	377
37	amazing	803	87	machine	376
38	casino	792	88	toilet	374
39	Iot	734	89	only	370
40	thing	731	90	card	364
41	drink	686	91	issue	358
42	best	679	92	center	356
43	helpful	660	93	amenity	355
44	minute	654	94	large	355
45	little	647	95	different	350
46	city	642	96	expensive	348
47	fee	619	97	tv	347
48	modern	608	98	rooftop	345
49	parking	588	99	trip	344
50	water	569	100	money	343

Following the word frequency results, co-occurrence analysis was conducted to explore keyword relationship. Figure 1 shows the central terms such as “room”, “hotel”, “good” and “clean” indicate customers still prioritize fundamental aspects like cleanliness, and comfort. Words such as “friendly” and “nice” further emphasize the importance of human interaction. These findings suggest that high-tech features are effective when combined with traditional service values.

The term “dinosaur” refers to the robotic dinosaur receptionists at Japan’s Henn-na Hotel, which have become a unique interaction. These robots handle tasks like check-in and customer request, displaying the hotel’s innovative and unique feature. However, uniqueness alone is not enough, features must also be functional and user-friendly to ensure customer satisfaction and deliver real value beyond just being different.

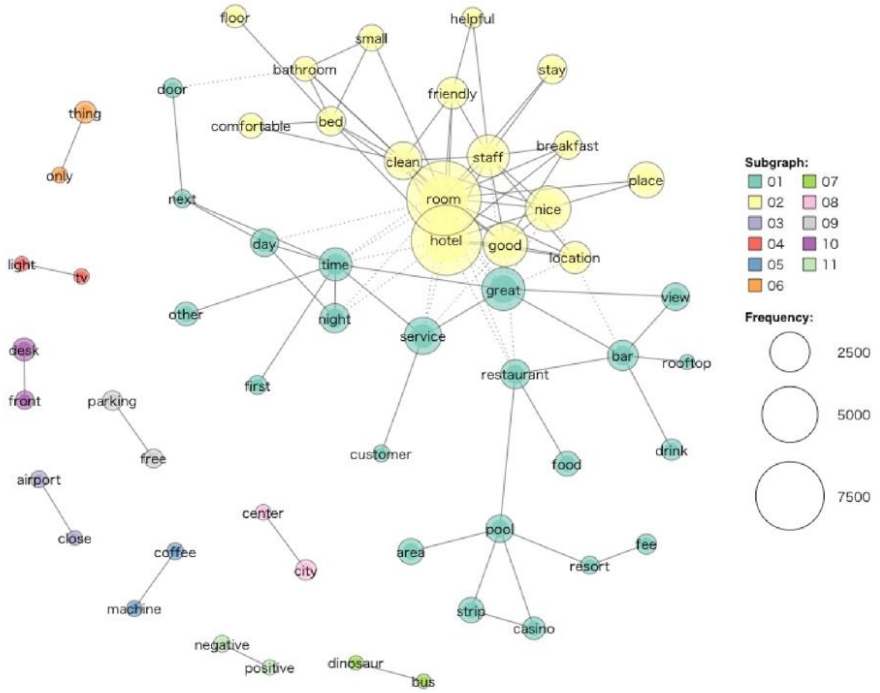

Figure 1. Co-occurrences network result.

The co-occurrence network analysis with rating (Figure 2) reveals both positive and negative perceptions of high-tech features of hotels. Positive words like “great”, “friendly”, “amazing” and “clean” often relate to central aspects such as “room”, “hotel” and “staff” indicating that customer still prioritize cleanliness, comfort, and human interaction. The terms like “beautiful” and “view” suggest that aesthetic environments, possibly enhanced by high-tech designs, also contribute to positive experiences. Overall, high-tech features are appreciated most when they integrated with traditional hospitality values.

Negative terms like “bad”, “negative” and “nothing” highlight areas where expectations were not met. Complaints often relate to costs, shown in words like “money” and “fee”, suggesting some customer feel high-tech features don’t justify the price. Mentions of “water” and “desks” indicating the functional issues, possibly from tech failures. These results emphasize that while innovation attracts attention, reliability and usability remain important to customer satisfaction.

Overall, the analysis underscores the need to balance technology with core hospitality values. Positive experiences generally focus on the integrated of high-tech features and human-cantered services, while negative ones frequently caused by poor accessibility or unmet expectations.

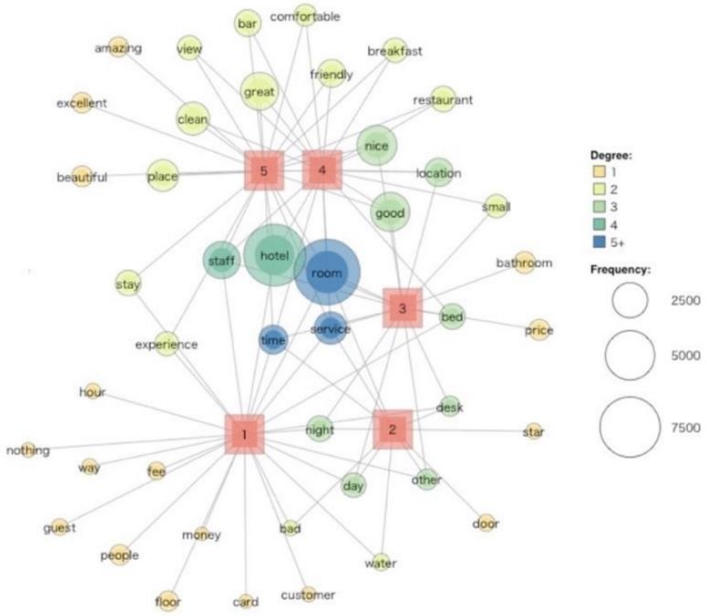

Figure 2. Co-occurrences network analysis with rating.

4.2. Exploratory factor analysis (EFA)

Exploratory Factor Analysis (EFA) was conducted to identify latent dimensions underlying customer satisfaction in hotels, based on frequent keywords extracted from 12,884 online reviews. The Kaiser-Meyer-Olkin (KMO = 0.691) and Bartlett's test of sphericity (R^2 = 20,159.108, $p < 0.001$) confirmed the suitability of the data for factor analysis. Four distinct factors emerged from the analysis: experiences, tangibles, entertainment, and hotel facilities, which represent service quality dimensions in hotels that provide high-tech features.

These factors were interpreted through the perspective of SERVQUAL theory (Zeithaml et al., 1996), with theoretical extensions to reflect the changing of customer expectations. The items such as "bed", "room", "bathroom," "comfortable" and "clean", with factor loadings ranging from 0.516 to 0.661, directly align with tangibles factor, emphasizing the importance of physical comfort in customer experiences.

The hotel facilities which included “resort”, “fee” and “pool” with factor loadings between 0.537 and 0.781, reflects customer’ evaluation of infrastructure, pricing, and recreational amenities. This dimension aligning with tangibles and reliability in SERVQUAL, given its focus on consistency and functional quality.

The entertainment factor, which included “rooftop”, “bar” and “view” had factor loadings between 0.537 and 0.777, represents a conceptual extension of the SERVQUAL theory (Kharub et al., 2021). While not traditionally included in service quality models, entertainment has become increasingly relevant in shaping leisure experiences in hotel environments. This factor highlights the changing role of entertainment spaces in hotels, responding to customers’ needs for leisure and social interaction.

The emergence of the experience factor comprising emotionally expressive terms such as “awesome”, “machine”, “cool”, “amazing”, and “amenity”, with strong factor loadings ranging from 0.545 to 0.760, highlights the importance of emotional and cognitive responses to high-tech features. This dimension is conceptually aligned with Pine and Gilmore’s Experience Economy (1998), which highlights the significance of emotionally engagement and memorable experiences in the modern service economy (Pine & Gilmore, 1998). Although not explicitly included the original SERVQUAL theory, the experience dimension reflects an evolution in how service quality is perceived, shifting from functional performance to emotional value. According to this theory, companies that design environment through fostering personal involvement and emotional value are better positioned for competitive advantage in today’s market. In the context of hotels with high-tech features, this means that automation and smart features must be carefully designed to contribute to emotional engagement, not just operational efficiency.

In addition, according to Pine and Gilmore’s Experience Economy theory, today consumers more prefer unique, memorable, and emotionally rich experiences that beyond standard typical service delivery (Pine & Gilmore, 1998). When high-tech features fail to provide the meaningful connection, they risk appearing impersonal or decreasing customer satisfaction. In this study, the experience dimension reflects an enhanced understanding of service quality in tourism, where customer perception is

shaped not only buy functional performance, but also the emotional value and personal significance the experience provides.

While SERVQUAL does not specifically define the experience dimension, it reflects similar dimension through assurance, reflecting customer trust (confidence in service delivery) and responsiveness (the hotel's ability to adjust to the demands of its customers). Recent research further supports this view, showing that emotional perception, excitement, and customer engagement now play a central role in evaluating service quality in tech-enhanced in hotel industry (Moreno Brito et al., 2024).

Overall, combining SERVQUAL with extended service dimensions and the Experience Economy theory provides a deeper comprehension of service quality in hotel industry by balancing traditional expectations with growing emotional, interactive, and technological features. The result of the factor analysis is presented in the Table 3.

Table 3. Results of exploratory factor analysis.

Factor	Word	Factor Loading	Eigenvalue	Cumulative Variance
Experiences	Awesome	0.760	2.447	15.291%
	Amenity	0.681		
	Machine	0.576		
	Cool	0.561		
	Amazing	0.545		
Tangible	Bed	0.661	1.817	26.648%
	Room	0.641		
	Bathroom	0.638		
	Comfortable	0.529		
	Clean	0.516		
Entertainment	Rooftop	0.777	1.459	35.769%
	Bar	0.758		
	View	0.537		
Facilities	Resort	0.781	1.281	43.778%
	Fee	0.681		
	Pool	0.537		

Notes. KMO: 0.691; Bartlett chi-square: 20159.108 ($p < .001$)

4.3. Regression analysis

Following the exploratory factor analysis (EFA), linear regression analysis was conducted to examine the impact of the four extracted factors as table 3 shown: experiences, tangibles, entertainment, and hotel facilities on customer satisfaction. The dependent variable used was the overall satisfaction rating from Google hotel reviews.

The results reveal that experiences (β = -0.152, t = -12.258, $p < 0.001$), tangibles (β = -0.183, t = -14.738, $p < 0.001$), and hotel facilities (β = -0.146, t = -11.759, $p < 0.001$) all had a significant negative effect on customer satisfaction. These findings suggest that when high-tech features or physical hotel elements fail to meet expectations or are poorly executed, they may contribute to customer dissatisfaction.

In contrast, entertainment (β = 0.015, t = 1.203, p = 0.229) showed a positive but statistically insignificant relationship with satisfaction. This result highlights the limited contribution of entertainment features to overall satisfaction in this context.

Table 4. Results of linear regression analysis.

Model	Unstandardized Coefficients		Standardized Coefficient	*t*	Result
	β	**Std. Error**	**Beta**		
(Constant)	4.151	0.012		334.934	
Experiences	-0.152	0.012	-0.106	-12.258***	Significant negative
Tangible	-0.183	0.012	-0.127	-14.738***	Significant negative
Entertainment	0.015	0.012	0.10	1.203	Not significant
Facilities	-0.146	0.012	-0.102	-11.759***	Significant negative

Notes: Dependent variable: Customer Satisfaction; R^2 = 0.03753; adjusted R^2 = 0.03747; F = 126.798; *Sig* = < 0.001; ***$p < 0.001$

From Table 4, the findings present several unexpected yet insightful results that require further interpretation. The regression analysis revealed that three out of four high-tech hotel features that are experiences, tangibles, and hotel facilities had a statistically significant negative impact on customer satisfaction. This outcome challenges the common assumption that introducing advanced technology automatically enhances customer experience. Instead, it indicates that poorly executed or overly complex

technological innovations may lead to customer dissatisfaction when expectations are not fulfilled.

For example, the negative coefficient for experiences indicates that high-tech features implementations can lead to dissatisfaction, particularly when they are poorly integrated into service areas or replace meaningful human interactions. This finding aligns with Pine and Gilmore's Experience Economy framework, which argues that customers prefer emotionally and personally meaningful experiences, rather than just operational efficiency (Pine & Gilmore, 1998).

Similarly, the negative impact of tangibles (room comfort, cleanliness, bathroom quality) indicates possible problems in core service delivery. This might suggest that some high-tech in hotels are ignoring basic service standards such as comfort, cleanliness, and ease. Reliability and tangibles are foundation components for satisfaction in SERVQUAL (Zeithaml et al., 1996). When digital controls, smart devices or robot service complicate simple functions such as turning lights on and off or checking in, there is perceived functional decline. This substantiates previous work citing that technology must meet minimum service needs before contributing to overall satisfaction (Cobanoglu et al., 2011).

The negative relationship with hotel facilities, such as pools or resort amenities, may be due to pricing concerns, operational issues, or disappointed expectations regarding advertised features. Customer may believe that these services provide insufficient added value, especially if they are not consistent with the hotel's high-tech image or are difficult to access and maintain.

Interestingly, while entertainment features (such as rooftop bars and scenic views) had a positive coefficient, the outcome was not statistically significant. This means that, while such features may improve atmosphere and entertainment, they are most likely secondary rather than primary to customer satisfaction. According to previous research Bilgihan et al. (2010), customers may only appreciate entertainment amenities after core service requirements have been reached.

Overall, these findings emphasize the significance of creating technological experiences that are functional, user-friendly, and effectively linked with traditional hotel concepts.

When innovation prioritizes novelty over reliability or removes human warmth, it can lead to dissatisfaction. Thus, rather than stressing innovation as a marketing strategy, hotels should ensure that their technological features enhance rather than replace basic service quality, comfort, and reliability.

5. Discussion

This study explored how high-tech features in hotels influence customer satisfaction, identifying four dimensions: experiences, tangibles, entertainment, and hotel facilities. In contrast to previous study, that technological advancement automatically enhance satisfaction, as suggested by Tussyadiah (2020) which highlights that robot service and automation often expected to improve customer experience. This study presents a contrasting perspective of how customer perceive high-tech features. Three out of the four dimensions (experiences, tangibles, and hotel facilities) have a negative impact on consumer satisfaction, while entertainment showed no significant effect. These results highlight a critical gap in both the theoretical understanding and practical implementation of service innovation in the hotel industry.

The negative relationship between customer experience and satisfaction suggests that while high-tech features are designed to create fun and memorable experiences, their impact becomes negative when such features difficult to use, limit human interaction or fail to deliver emotional value. According to the Experience Economy Theory (Pine & Gilmore, 1998), the experience dimension contributes to satisfaction only when the technology can enhance engagement, enjoyment, and personal involvement. When automation eliminates social contact, appears difficult to utilize, or causes usability errors, customer perceive the stay as less meaningful and emotionally disconnected. Therefore, a negative coefficient for the experience aspect shows that technological advancement alone does not ensure a better customer experience, emotional value remains essential.

Accordingly, service robot recognized as one of the high-tech features in hotels, illustrate this challenge. While intended to improve operational efficiency. their effectiveness

depends on how customer perceive these interactions. As Murphy et al. (2019) highlight, service robots should balance between technological performance and human engagement, as poor design or lack of warmth can lead to discomfort or reduced trust. This view is strengthened by the identification of emotional and experience variables such as social presence, novelty, and functional value as critical components in customer satisfaction in smart hotel services (Wang & Fu, 2024). When customer perceive robots as confusing, their overall service experience and the emotional value of their stay can be negatively affected. This study emphasizes the importance of designing technology to feel warm, approachable, and emotionally engaging, so it adds to the overall customer experience rather than replacing meaningful human interactions. Technology may enhance hotel by enhancing emotional connection and comfort, not by replacing the personal experience that many customers still enjoy.

The tangibles aspect which includes cleanliness, comfort, and room quality, also had a negative impact on satisfaction, highlighting the importance of basic aspects of service even in hotels with high-tech features. Focusing too much on advanced technology can sometimes ignore fundamental of service quality. When customers feel that innovation replaces core expectations, it can lead to dissatisfaction and reduce overall satisfaction. Similarly, the hotel facilities dimension, which includes pools, resorts, and pricing, demonstrates that even popular features may not working if considered incompatible with value, accessibility, or brand image. These findings suggest that implementing high-tech features in hotels is not just about adding new technologies, it also requires ensuring that fundamental services function well. This aligns with Moreno Brito et al. (2024), who emphasized the importance of emotional and cognitive responses in shaping customer experiences in hotel. While their study focused on ecological hotel, the emotional aspect is equally relevant in high-tech hotel settings. Our results offer an insight, when essential services like cleanliness or comfort are lacking, the perceived benefits of innovation may be decreased. This highlights that customer satisfaction depends not only on the excitement of innovation but also on the reliability of basic service delivery working in together.

In contrast, the entertainment dimension showed a positive but statistically insignificant impact on customer satisfaction. Features such as rooftop bars and scenic views may improve a feeling, but they tend to serve as complementary enhancements rather than primary satisfaction drives. This is consistent with Bilgihan et al. (2010), who found that hotel visitors appreciate but do not prioritize technology for entertainment. This supports the idea that basic service delivery, usability, and emotional connection are more important than fancy and high-tech features. Although the entertainment dimension did not show a significant effect on satisfaction, the conceptual value of entertainment remains important. As highlighted by Hwang & Lee (2019), entertainment can contribute significantly to emotional value and personal satisfaction when it aligns with customers' expectations and emotional needs.

The results also point to the need for market segmentation based on technological readiness and generational differences. While younger visitors familiar with technology may enjoy high-tech features, older or less experienced in technology visitors might find them confusing or difficult to use. As Çakar & Aykol (2019) noted, some visitors express dissatisfaction when technology replaces personal interaction, especially when staff presence and emotional warmth are lacking.

In conclusion, high-tech features should complement, not replace the personal connection that defines hospitality. This study highlights an important finding, innovation without empathy and reliability can lead to dissatisfaction. By combining high-tech features with emotional intelligence and core service quality, hotels can deliver unique experiences that fulfil the needs of varied expectation of travelers.

5.1. Theoretical implication

This study advances theoretical understanding of service quality in hotels with high-tech features. While much of the existing literature assumes that technology adoption enhances customer experience, our findings demonstrate that advanced features can negatively affect satisfaction when they create usability challenges and fail to support essential services.

First, the negative effect of the tangible and experience dimensions extends SERVQUAL theory by demonstrating that technology-mediated tangibles can produce a technology expectation–performance gap and lead to dissatisfaction. This suggests that the SERVQUAL model needs to more explicitly account for operational complexity, customer learning effort, and interaction design as drivers of quality in technology-mediated services.

Second, the influence of emotional response confirms the Experience Economy theory (Pine & Gilmore, 1998). Our results indicate that technology contributes to satisfaction only when it enhances affective engagement and creates meaningful experiences. If technology disrupts emotional connection, overall satisfaction decreases. Thus, technological transformation in hospitality must be examined not just on functional benefits but on how it affects customers' emotional experience.

Overall, this study contributes to hospitality theory by emphasizing that the success of high-tech services depends on the balance between technological innovation, ease in use, and emotional value creation. Therefore, this study encourages future research to explore how emotions, ease of use, and traditional service standards work together in shaping customer satisfaction in high-tech hotel context.

5.2. Practical implication

From a managerial perspective, the findings emphasize that introducing advanced technology does not guarantee improved customer satisfaction. Technology should enhance not replace the core service. When basic expectations such as comfort, cleanliness and helpful staff are not fulfilled, even the most innovative features may lead disappointment rather than satisfy.

Hotel managers must prioritize usability and accessibility when implementing high-tech features. When customer unfamiliar with some digital tools and complex systems, can negatively affect their overall experience. Thus, ensuring user-friendly design and providing clear instructions or assistance are important.

Additionally, there must be consistency between marketing and actual service delivery. Promoting innovation while failing to deliver on essential comfort can undermine trust

and result in negative word-of-mouth. Customer should receive an experience that matches the expectations set by promotional materials.

Importantly, hotel staff remain important in connecting the gap between technology and human interaction. Employees should not only be well-trained in operating high-tech features but also in supporting customer who prefer traditional interactions. Offering alternative check-in options, such as digital or in-person, can benefit with different levels of technology familiarity. Finally, this study suggest the value of customer segmentation based on tech-readiness and generational preferences. Since younger tourists who are more comfortable with technology may be more open to innovation, while older or less familiar with technology may prefer conventional service options. Recognizing and accommodating these differences can lead to higher satisfaction across diverse customer groups.

5.3. Limitation and further research

This study has some limitations that need to be addressed in future research. First, it relied on secondary data drawn from online reviews. While valuable, these reviews may not fully capture the diversity of customer experiences, especially in relation to personal factors such as demographics or travel purpose. Future research could benefit from a mixed-method approach that combines review analysis with surveys or interviews to offer more detailed insights.

Second, although this study identified core service dimensions, it did not explore how different traveler groups such as business versus leisure customers or different age segments might perceive these features. Future studies could apply segmentation-based analysis to uncover variations in preferences and expectations across customer types.

Lastly, this study selected hotels based on a public technology review platform, which may not clearly differentiate between high-tech or smart hotels. As the definitions and boundaries between these categories continue to evolve, they can often overlap or remain ambiguous. Future research should aim to clarify these classifications and explore how each type of technology-based innovation uniquely influences customer perceptions and satisfaction.

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