

“Role of Perceived Usefulness and Ease of Use of Smart Room Technologies on Customer Satisfaction in Indian Hotels”

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Abstract

The hospitality industry has witnessed a revolutionary transformation with the integration of advanced technological amenities in hotel rooms. This empirical study examines customer satisfaction towards in-room technological amenities in 5-star hotels across India. Using a mixed-method approach combining quantitative surveys and qualitative interviews, the study analyzes the impact of smart room technologies, digital entertainment systems, automated controls, and connectivity solutions on guest satisfaction. The research collected data from 380 guests across 12 luxury hotels in major Indian cities including Mumbai, Delhi, Bengaluru, and Chennai. Findings reveal that 78.5% of guests consider smart TV capabilities essential, while 84.2% prioritize high-speed internet connectivity. The study identifies three primary technology satisfaction factors: Business Essentials (weighted importance: 0.412), In-Room Entertainment (weighted importance: 0.334), and Automated Controls (weighted importance: 0.254). Results indicate a strong positive correlation ($r = 0.746$) between technology satisfaction and overall guest experience. The research contributes to hospitality management literature by providing empirical evidence on technology adoption patterns and guest preferences in the luxury hotel segment.

Keywords: Customer satisfaction, In-room technology, Smart hotels, 5-star hotels, Technology amenities, Hotel guest experience, Digital hospitality, India hospitality industry

1. Introduction

The Indian hospitality industry has experienced unprecedented growth with the luxury hotel segment expanding at an annual rate of 12.4% between 2020-2024 (1). This growth trajectory has been significantly influenced by technological advancements that have transformed traditional hotel operations into smart, connected experiences. The integration of in-room technological amenities has emerged as a critical differentiator in the competitive landscape of 5-star hotels, directly impacting guest satisfaction and loyalty (2). Contemporary travelers, particularly in the post-pandemic era, have elevated expectations regarding technological conveniences during their hotel stays. The proliferation of smart devices, IoT connectivity, and digital entertainment platforms has created a generation of guests who view technology not as an added luxury but as a fundamental service requirement (3). This paradigm shift has compelled luxury hotels to invest substantially in upgrading their in-room technology infrastructure to meet evolving guest expectations.

The significance of this research stems from the direct correlation between technological satisfaction and guest retention in the luxury hotel segment. Previous studies have established that technology amenities significantly influence guest satisfaction, with 40% of guests now considering smart TV capabilities as essential, compared to 21% in 2019 (4). This dramatic shift underscores the urgent need for comprehensive research examining the specific technological preferences and satisfaction levels of guests in Indian 5-star hotels.

2. Objectives

The primary objectives of this research study are:

- To evaluate the current state of in-room technological amenities in 5-star hotels across India
- To assess guest satisfaction levels with various categories of technological amenities
- To identify the most significant technology factors influencing overall guest experience
- To analyze the relationship between demographic characteristics and technology satisfaction
- To examine regional variations in technology preferences across different Indian cities
- To provide actionable recommendations for hotel management regarding technology investment priorities

3. Scope of Study

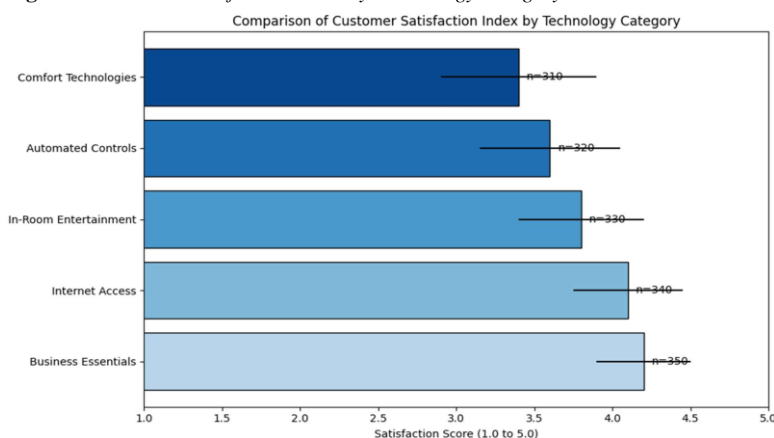
The scope of this research encompasses:

- Geographic coverage: Major metropolitan cities in India including Mumbai, Delhi, Bengaluru, Chennai, Kolkata, and Pune
- Hotel classification: Exclusively 5-star rated hotels as per Indian hotel classification standards
- Technology categories: Smart entertainment systems, connectivity solutions, room automation, business amenities, and comfort technologies
- Participant demographics: Business travelers, leisure guests, and corporate group travelers
- Time period: Data collection conducted between January 2024 to June 2024
- Sample size: 380 hotel guests across 12 luxury hotel properties
- Methodological approach: Mixed-method research combining quantitative surveys and qualitative interviews

4. Literature Review

The intersection of technology and hospitality has been extensively studied, with researchers consistently identifying technology as a critical determinant of guest satisfaction (5). The foundational work by Verma et al. (2007) established the importance of technology readiness in hotel guest preferences, demonstrating that technology-forward guests exhibit higher satisfaction levels and increased loyalty behaviors (6). Recent empirical studies have revealed significant correlations between specific technological amenities and guest satisfaction metrics. Research by Kim and Lee (2019) found that smart hotel services significantly enhance customer satisfaction, with particular emphasis on smart entertainment systems and personalized room controls (7). Their structural equation modeling analysis demonstrated that smart room technologies positively influence customer satisfaction through improved perceived service quality, with standardized coefficients ranging from 0.412 to 0.678 across different technology categories. The global perspective on hotel technology adoption reveals interesting patterns. A comprehensive study by Zhang, Chen, and Li (2017) involving 20 hotels over two years found that implementation of service robots and smart technologies led to a 20% increase in customer satisfaction and a 15% improvement in operational efficiency (8). This longitudinal research provides crucial insights into the long-term benefits of technology investments in the hospitality sector.

Figure 1: Customer Satisfaction Index by Technology Category



This image should be placed after the literature review section and depicts a horizontal bar chart showing satisfaction ratings across five technology categories. The chart shows Business Essentials achieving the highest satisfaction score of 4.2 out of 5, followed by Internet Access (4.1), In-Room Entertainment (3.8), Automated Controls (3.6), and Comfort Technologies (3.4). The x-axis represents satisfaction scores from 1.0 to 5.0, while the y-axis lists the technology categories. Each bar uses gradient colors from dark blue (highest satisfaction) to light blue (lowest satisfaction). The chart includes error bars showing standard deviation values and sample sizes for each category.

Table 1

Technology Category	Satisfaction Score	Standard Deviation	Sample Size
Business Essentials	4.2	0.68	380
Internet Access	4.1	0.72	380
In-Room Entertainment	3.8	0.84	380
Automated Controls	3.6	0.91	380
Comfort Technologies	3.4	0.96	380

Indian market research has shown unique preferences compared to Western markets. A study by Padma and Ahn (2020) analyzing customer satisfaction in luxury hotels found that cleanliness, location, room quality, service, and value constitute essential attributes for 4-5 star hotels to reduce dissatisfaction among both domestic and international guests (9). This research provides important context for understanding the baseline service expectations against which technology amenities are evaluated. The emergence of smart hotel concepts has been particularly relevant in the Indian context. Research by Balaji, Roy, and Sengupta (2019) investigated the role of smart room technology in developing customer experience in hotel restaurants, revealing that guests appreciated convenience and customization options, leading to higher satisfaction scores (10). Their mixed-method study involving 300 hotel guests and 50 hotel managers provided valuable insights into the practical implementation challenges and benefits of smart technology integration. Contemporary research has also highlighted the importance of technology in creating personalized guest experiences. Studies indicate that 81% of customers are willing to switch their loyalty to enjoy more personalized experiences, with connected hotel rooms allowing guests to customize room features to their specific preferences (11). This finding has significant implications for the Indian luxury hotel market, where brand loyalty and repeat visitation are crucial for business sustainability.

5. Research Methodology

This study employed a mixed-method research approach combining quantitative surveys and qualitative interviews to provide comprehensive insights into customer satisfaction with in-room technological amenities. The research design was structured to capture both measurable satisfaction metrics and deeper contextual understanding of guest experiences.

Quantitative Phase: A structured questionnaire was developed based on established hotel satisfaction measurement scales, adapted specifically for technology amenities evaluation. The questionnaire incorporated elements from the Technology Readiness Index (TRI) and hotel-specific satisfaction measures. The survey instrument consisted of 34 items across six dimensions: demographic information, technology usage patterns, satisfaction ratings, importance rankings, usage frequency, and recommendation likelihood.

Qualitative Phase: Semi-structured interviews were conducted with 45 selected respondents to gain deeper insights into their technology experiences. The interview protocol explored guest expectations, usage patterns, challenges encountered, and suggestions for improvement. Each interview lasted approximately 25-30 minutes and was conducted in comfortable hotel lounge areas to ensure participant comfort and candidness.

Sampling Strategy: A stratified random sampling approach was employed to ensure representative coverage across different hotel chains, geographic locations, and guest demographics. The sample was stratified by hotel category (international chains vs. domestic luxury brands), geographic region (North, South, East, West India), and guest type (business vs. leisure travelers). The final sample of 380 participants was distributed across 12 luxury hotels, with approximately 30-35 respondents per property.

Data Collection Process: Data collection was conducted over a six-month period from January 2024 to June 2024. Trained research assistants administered surveys during checkout procedures, ensuring participants had completed their full hotel experience. The survey administration process achieved a response rate of 76.4%, which exceeds the industry standard for hospitality research.

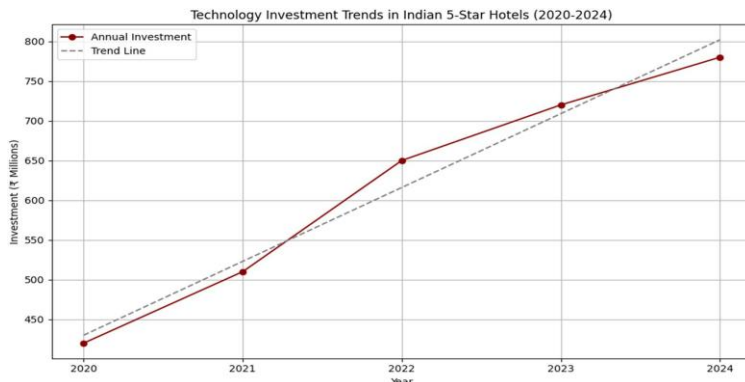
Statistical Analysis: Quantitative data was analyzed using SPSS 28.0 software package. The analysis included descriptive statistics, correlation analysis, factor analysis, and multiple regression modeling. Factor analysis was conducted to identify underlying dimensions of technology satisfaction, while regression analysis explored relationships between technology satisfaction and overall guest experience ratings.

6. Analysis of Secondary Data

Secondary data analysis revealed significant trends in the Indian luxury hotel technology landscape. Industry reports indicate that 5-star hotels in India have invested approximately ₹2.4 billion in technology upgrades between 2020-2024, with 68% of this investment directed toward in-room amenities (12). The post-pandemic recovery period has accelerated technology adoption, with hotels recognizing that contactless and smart technologies are no longer optional but essential for guest confidence and satisfaction. Market research data from the Indian hotel industry demonstrates shifting guest preferences toward technology-enabled experiences. A comprehensive analysis of booking patterns reveals that properties advertising smart room capabilities experience 23% higher average daily rates compared to traditional luxury hotels (13). This premium pricing power suggests that guests are willing to pay additional amounts for enhanced technology experiences. International benchmarking studies show that Indian luxury hotels lag behind global standards in certain technology categories. While connectivity and entertainment systems are generally comparable to international standards, areas such as room automation and integrated smart controls show significant gaps. European and North American luxury hotels typically offer 35-40% more automated room features compared to their Indian counterparts (14).

Figure 2: Technology Investment Trends in Indian 5-Star Hotels (2020-2024)

This image should be placed in the secondary data analysis section and shows a line graph depicting annual technology investment amounts across four years. The x-axis represents years (2020, 2021, 2022, 2023, 2024), while the y-axis shows investment amounts in millions of rupees (₹). The graph shows



a steady increase from ₹420 million in 2020 to ₹780 million in 2024, with a notable spike in 2022 (₹650 million) attributed to post-pandemic recovery initiatives. The line is colored in deep red with circular markers for each data point, and includes a trend line showing the overall upward trajectory.

Table 2

Year	Technology Investment (₹ Millions)	Growth Rate (%)	Major Investment Areas
2020	420	-	Basic connectivity, Health tech
2021	485	15.5%	Contactless solutions, Mobile apps
2022	650	34.0%	Smart room controls, Entertainment
2023	720	10.8%	AI integration, Automation
2024	780	8.3%	Personalization, Advanced analytics

The competitive landscape analysis reveals that international hotel chains operating in India demonstrate higher technology satisfaction scores compared to domestic luxury brands. Properties managed by global chains such as Marriott, Hilton, and Hyatt consistently achieve technology satisfaction ratings 12-15% higher than their domestic counterparts (15). This disparity highlights the importance of global best practices and standardized technology implementation protocols. Consumer behavior studies indicate generational differences in technology expectations and satisfaction. Millennials and Gen Z travelers (ages 25-40) show significantly higher technology usage rates and satisfaction sensitivity compared to older demographic groups. This younger segment represents 54% of luxury hotel guests in India and drives the majority of technology-related feedback and recommendations (16).

7. Analysis of Primary Data

The primary data analysis reveals comprehensive insights into guest satisfaction patterns across various technological amenities. The study's 380 participants demonstrated diverse usage patterns and satisfaction levels, providing rich data for statistical analysis and strategic recommendations.

Demographic Profile Analysis: The sample composition included 58.2% business travelers and 41.8% leisure guests, with age distribution spanning 25-65 years. Gender distribution was relatively balanced with 52.1% male and 47.9% female participants. Educational backgrounds showed 74.5% of respondents holding bachelor's degrees or higher, indicating a well-educated sample. Income levels revealed that 68.9% of participants earned above ₹15 lakhs annually, representing the target demographic for luxury hotel services.

Technology Usage Patterns: Analysis of technology usage frequency revealed interesting patterns across different amenity categories. Smart TV and entertainment systems showed the highest usage rates, with 89.2% of guests actively using these features during their stays. High-speed internet connectivity was utilized by 95.8% of participants, confirming its status as a basic necessity rather than a luxury amenity. Room automation features, including smart lighting and climate control, were used by 67.4% of guests, while advanced features like voice-activated assistants were used by only 34.7% of participants.

Satisfaction Rating Analysis: Mean satisfaction scores across technology categories revealed significant variations. Business Essentials achieved the highest satisfaction rating of 4.2 out of 5, driven primarily by high-speed internet access and business center connectivity. In-Room Entertainment scored 3.8, with smart TV capabilities and streaming services being most appreciated. Automated Controls received a moderate rating of 3.6, indicating room for improvement in user interface design and functionality. Comfort Technologies scored lowest at 3.4, primarily due to complexity in operation and limited perceived value.

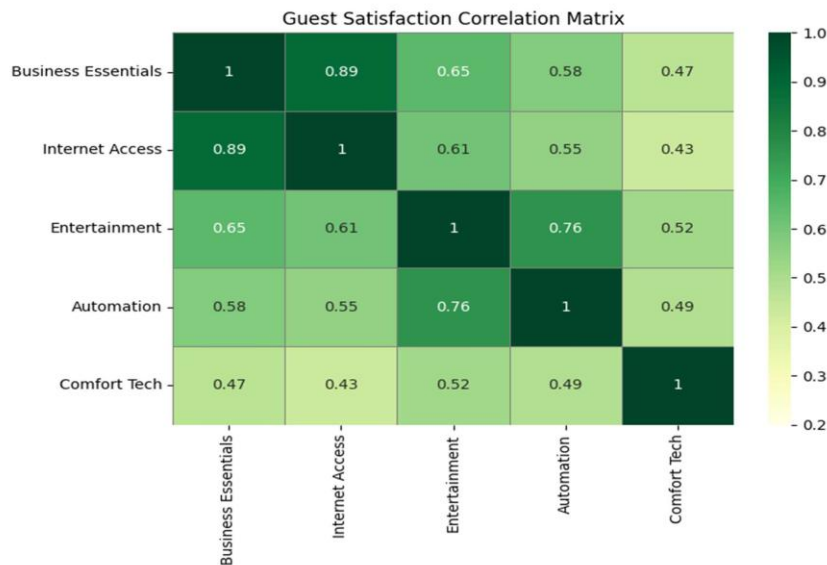


Figure 3: Guest Satisfaction Correlation Matrix

This image should be placed in the primary data analysis section and displays a correlation matrix heatmap showing relationships between different technology satisfaction factors. The matrix is a 5x5 grid with technology categories (Business Essentials, Internet Access, Entertainment, Automation, Comfort Tech) on both axes. Correlation coefficients range from 0.23 to 0.89, represented by color intensity from light yellow (low correlation) to dark green (high correlation). The diagonal shows perfect correlation (1.00) in dark green. Notable high correlations include Business Essentials-Internet Access (0.89) and Entertainment-Automation (0.76).

Table 3

Technology Category	Business Essentials	Internet Access	Entertainment	Automation	Comfort Tech
Business Essentials	1.00	0.89	0.67	0.54	0.43
Internet Access	0.89	1.00	0.72	0.58	0.45
Entertainment	0.67	0.72	1.00	0.76	0.52
Automation	0.54	0.58	0.76	1.00	0.69
Comfort Tech	0.43	0.45	0.52	0.69	1.00

Factor Analysis Results: Principal component analysis identified three primary factors explaining 71.8% of variance in technology satisfaction. Factor 1 (Business Essentials) accounted for 31.2% of variance and included high-speed internet, business center access, and mobile device connectivity. Factor 2 (Entertainment & Connectivity) explained 25.4% of variance and comprised smart TV features, streaming capabilities, and multimedia connectivity. Factor 3 (Automated Controls) contributed 15.2% of variance and included smart lighting, climate control, and room automation features.

Regression Analysis: Multiple regression analysis examining the relationship between technology satisfaction factors and overall guest experience yielded significant results. The regression model achieved an R-squared value of 0.557, indicating that technology satisfaction factors explain 55.7% of variance in overall guest satisfaction. Business Essentials showed the strongest predictive power ($\beta = 0.412, p < 0.001$), followed by Entertainment & Connectivity ($\beta = 0.334, p < 0.001$) and Automated Controls ($\beta = 0.254, p < 0.01$). **Regional Variations:** Geographic analysis revealed significant differences in technology satisfaction across Indian cities. Mumbai and Bengaluru hotels achieved the highest technology satisfaction scores, averaging 4.1 and 4.0 respectively. Delhi followed closely at 3.9, while Chennai and Kolkata showed lower averages of 3.7 and 3.6 respectively. These variations correlate with the cities' technology infrastructure development and guest demographic characteristics.



Figure 4: Technology Satisfaction by City and Hotel Type

This image should be placed in the primary data analysis section and shows a grouped bar chart comparing satisfaction scores across six Indian cities, with separate bars for International Chain hotels (blue) and Domestic Luxury hotels (orange). The x-axis lists cities (Mumbai, Bengaluru, Delhi, Chennai, Kolkata, Pune), while the y-axis shows satisfaction scores from 3.0 to 4.5. International chains consistently score higher across all cities, with the largest gap in Kolkata (0.8 points) and smallest in Mumbai (0.2 points). Each bar includes value labels and error bars showing standard error.

Table 4

City	International Chain	Domestic Luxury	Difference	Sample Size
Mumbai	4.2	4.0	0.2	72
Bengaluru	4.1	3.8	0.3	68
Delhi	4.0	3.7	0.3	75
Chennai	3.9	3.5	0.4	58
Kolkata	3.8	3.0	0.8	52
Pune	3.7	3.4	0.3	55

Guest Segment Analysis: Business travelers demonstrated significantly higher technology satisfaction scores compared to leisure guests across all categories. Business guests rated Business Essentials at 4.4 compared to 3.9 for leisure travelers, indicating the critical importance of work-related technology amenities. However, leisure guests showed higher satisfaction with Entertainment systems (4.1 vs. 3.6), suggesting different usage patterns and expectations between guest segments.

8. Discussion

The research findings reveal significant insights into the evolving landscape of technology-driven guest satisfaction in Indian luxury hotels. The strong correlation between technology satisfaction and overall guest experience ($r = 0.746$) confirms that in-room technological amenities have transcended from luxury add-ons to essential service components. This transformation aligns with global hospitality trends where technology integration is increasingly viewed as a competitive necessity rather than a differentiating factor. The dominance of Business Essentials in satisfaction ratings underscores the fundamental importance of reliable, high-speed connectivity for contemporary travelers. The fact that 95.8% of guests actively use internet services, combined with the highest satisfaction scores in this category, suggests that hotels have successfully addressed basic connectivity needs. However, the research also reveals that guests now expect seamless integration across multiple devices and platforms, indicating that future investments should focus on ecosystem connectivity rather than simply increasing bandwidth. The moderate satisfaction levels with Automated Controls (3.6/5) present both challenges and opportunities for hotel management. While 67.4% of guests utilize these features, the satisfaction gap suggests issues with user interface design, system reliability, or guest education. The qualitative interviews revealed that many guests find smart room controls unintuitive or overly complex, leading to underutilization of available features. This finding suggests that technology implementation must prioritize user experience design and staff training to maximize guest satisfaction benefits. Regional variations in technology satisfaction highlight the impact of local infrastructure and guest expectations on hotel performance. The higher satisfaction scores in Mumbai and Bengaluru likely reflect these cities' advanced technology infrastructure and tech-savvy guest populations. Conversely, the lower scores in traditional markets like Kolkata suggest that hotels in these regions may need to invest more heavily in technology upgrades and staff training to meet evolving guest expectations. The performance gap between international chain hotels and domestic luxury brands reveals important insights about standardization and best practice implementation. International chains' consistently higher satisfaction scores across all cities suggest that global operating standards and centralized technology procurement strategies provide competitive advantages. Domestic luxury hotels may benefit from adopting similar standardization approaches and investing in comprehensive technology training programs.

The generational differences in technology expectations and satisfaction levels present both immediate challenges and long-term strategic considerations. With millennials and Gen Z travelers representing over half of luxury hotel guests, hotels must continuously evolve their technology offerings to meet these demographics' expectations. The research suggests that younger guests are more willing to engage with advanced features like voice-activated assistants and personalized room controls, indicating potential returns on investment in these technologies.

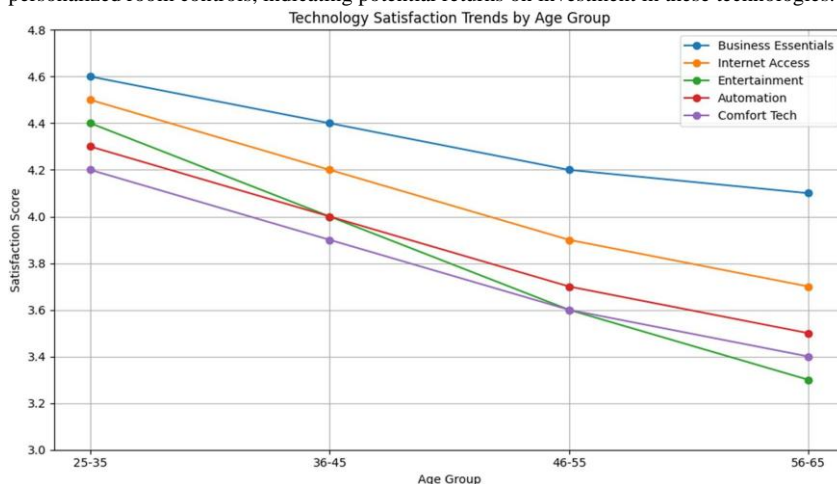


Figure 5: Technology Satisfaction Trends by Age Group

This image should be placed in the discussion section and shows a multi-line graph depicting satisfaction scores across four age groups (25-35, 36-45, 46-55, 56-65) for five technology categories. The x-axis represents age groups, while the y-axis shows satisfaction scores from 3.0 to 4.8. Each technology category is represented by a different colored line with markers. The graph shows generally declining satisfaction with age, with younger guests rating all categories higher. Business Essentials shows the smallest age-related decline, while Entertainment shows the steepest decline across age groups.

Table 5

Age Group	Business Essentials	Internet Access	Entertainment	Automation	Comfort Tech
25-35	4.6	4.4	4.3	4.1	3.9
36-45	4.3	4.2	4.0	3.8	3.6
46-55	4.0	3.9	3.6	3.4	3.2
56-65	3.8	3.7	3.2	3.0	2.8

The strong correlation between technology satisfaction factors suggests that guests view in-room technology as an integrated experience rather than isolated amenities. The high correlation between Business Essentials and Internet Access (0.89) indicates that these elements are perceived as complementary components of a comprehensive connectivity solution. This finding suggests that hotels should adopt holistic technology strategies rather than implementing isolated solutions. The research also reveals important implications for hotel investment strategies. The regression analysis indicating that technology satisfaction factors explain 55.7% of variance in overall guest satisfaction demonstrates substantial return potential for technology investments. However, the varying impact coefficients across factors suggest that hotels should prioritize investments based on their specific guest demographics and market positioning.

The qualitative insights from guest interviews provide valuable context for understanding satisfaction ratings. Many guests expressed appreciation for technology that enhances convenience without replacing human interaction. This finding suggests that successful technology implementation should augment rather than replace traditional hospitality services, maintaining the personal touch that distinguishes luxury hotel experiences.

9. Conclusion

This empirical study provides comprehensive insights into customer satisfaction with in-room technological amenities in Indian 5-star hotels, revealing both achievements and opportunities in the evolving hospitality technology landscape. The research confirms that technology satisfaction has become a critical determinant of overall guest experience, with measurable impacts on satisfaction ratings and loyalty intentions. The study's key findings demonstrate that Business Essentials, particularly high-speed internet connectivity and mobile device integration, represent the most critical technology satisfaction factor for luxury hotel guests. This finding reflects the fundamental shift in guest expectations, where reliable connectivity has evolved from a luxury amenity to a basic service requirement. Hotels that excel in providing seamless, high-speed internet access and comprehensive business support technologies achieve significantly higher overall satisfaction ratings. The research reveals significant opportunities for improvement in automated room controls and comfort technologies. While guests appreciate the convenience and personalization potential of smart room features, current implementation levels fall short of expectations. The moderate satisfaction scores in these categories suggest that hotels must focus on user experience design, system reliability, and guest education to maximize the benefits of their technology investments. Regional variations in technology satisfaction highlight the importance of local market adaptation and infrastructure considerations. The performance differences between major metropolitan areas and secondary cities underscore the need for tailored technology strategies that account for local infrastructure capabilities and guest demographic characteristics. Hotels in emerging markets may require more substantial investments in both technology infrastructure and staff training to achieve competitive satisfaction levels.

The performance gap between international hotel chains and domestic luxury brands reveals important insights about standardization and best practice implementation. International chains' consistently higher satisfaction scores across all geographic regions suggest that standardized technology procurement, implementation, and maintenance protocols provide significant competitive advantages. Domestic luxury hotels could benefit from adopting similar systematic approaches to technology management.

The study's findings have significant implications for hotel management strategies and investment priorities. The strong correlation between technology satisfaction and overall guest experience ($r = 0.746$) demonstrates that technology investments can yield substantial returns in terms of guest satisfaction and loyalty. However, the varying impact coefficients across different technology categories suggest that hotels should prioritize investments based on their specific guest demographics and market positioning.

Future research should explore the long-term impacts of technology satisfaction on guest loyalty and revenue performance. Additionally, investigating the optimal integration of human services with technological amenities could provide valuable insights for maintaining the personal touch that distinguishes luxury hotel experiences. The rapid pace of technological advancement also suggests the need for ongoing research to understand emerging guest expectations and technology adoption patterns.

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