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Digital Transformation in Hospitality Operations: Evaluating the Effectiveness of Smart Service Technologies in Urban Hotels

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Abstract: Digital transformation is reshaping hospitality operations, particularly in urban hotels where technological innovation is increasingly essential for maintaining service quality and competitiveness. This study evaluates the effectiveness of innovative service technologies—such as contactless systems, AI-driven personalization, automated service platforms, and IoT-enabled room features—in enhancing operational performance and guest experience. A quantitative research design was employed, using a structured questionnaire distributed to 200 guests who had recently stayed in urban hotels implementing innovative services. Data were analyzed using Structural Equation Modeling (SEM) to assess relationships among smart service attributes, technology acceptance, operational efficiency, and guest satisfaction. The results show that usability and reliability are the strongest-performing attributes, significantly influencing technology acceptance. Technology acceptance was found to mediate the relationships among smart service attributes, operational efficiency, and guest satisfaction, underscoring its pivotal role in digital adoption. Innovative services also demonstrated a substantial positive impact on service delivery speed, process accuracy, and workload reduction. Comparative analysis indicated significant differences in usability and satisfaction across age groups and stay frequency. Overall, the findings validate the conceptual framework and emphasize the importance of user-centered technological design, trust-building, and personalized digital experiences. This study contributes theoretical insights into innovative hospitality systems and provides practical guidance for hotels seeking to optimize digital transformation strategies in urban environments.

Keywords: Smart service technologies; digital transformation; urban hotels; technology acceptance; operational efficiency

INTRODUCTION

Digital transformation has become a central driver of operational excellence in the global hospitality industry, particularly as hotels increasingly adopt innovative service technologies to enhance efficiency and the guest experience. The proliferation of AI-driven tools, contactless systems, mobile check-in, service robots, IoT-enabled rooms, and self-service platforms has reshaped how hotels deliver value in highly competitive urban markets. Studies indicate that innovative technologies significantly improve service personalization, responsiveness, and the

seamlessness of guest interactions (Song et al., 2024; Yang et al., 2021). Urban hotels, which operate in dense markets with high guest expectations, rely heavily on technological innovation to differentiate themselves and maintain service consistency. As digital ecosystems evolve, hospitality operations are shifting toward automated processes that minimize human error, optimize resources, and support sustainable service delivery (Kim et al., 2020; Busulwa et al., 2022).

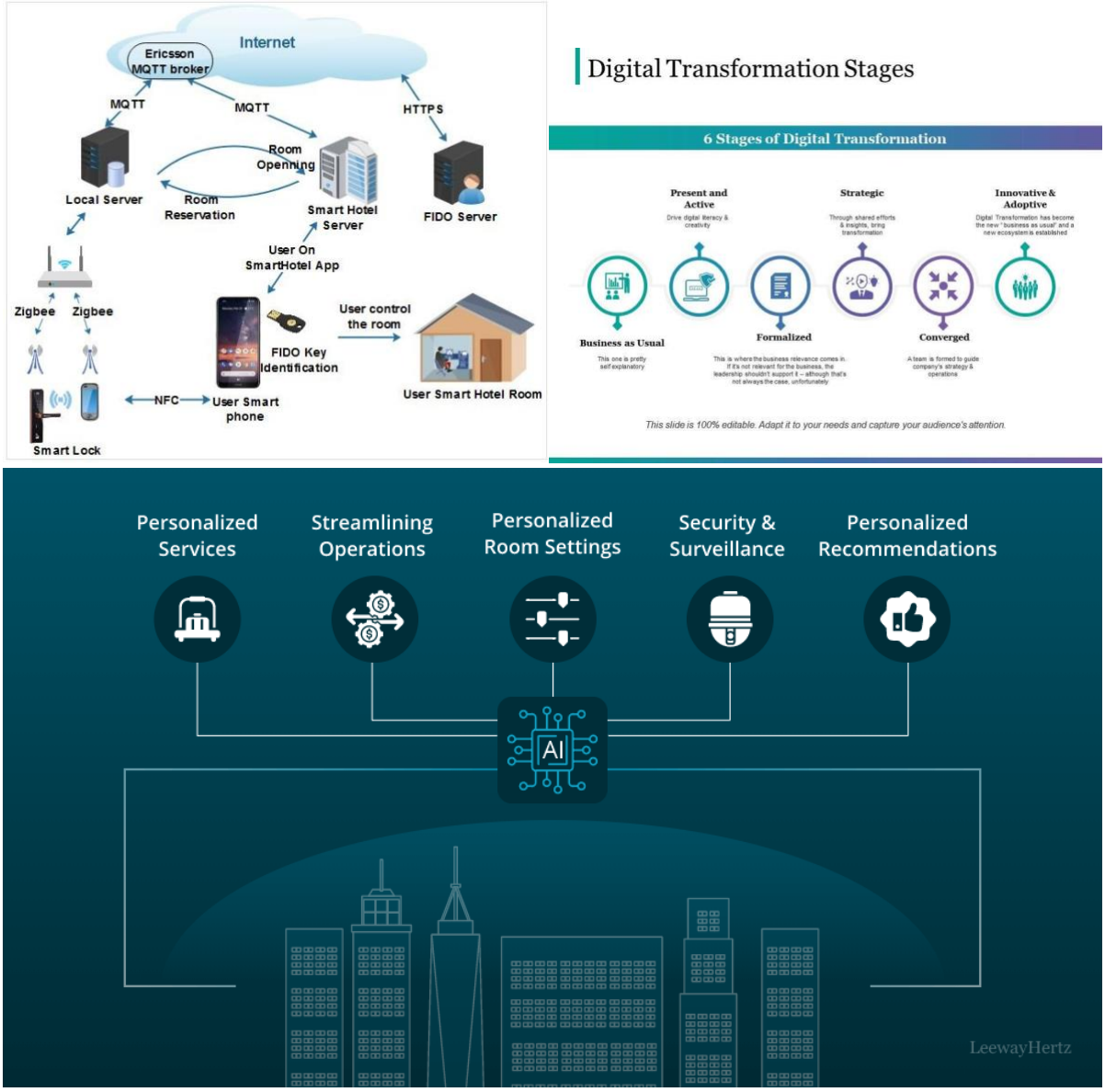

Figure 1. Smart Service Technology Ecosystem in Urban Hotels

The figure above illustrates how digital transformation components AI systems, automation, mobile and contactless services, service robots, and IoT platforms interact to shape operational efficiency and guest experience within urban hotels. It visually presents the context, drivers, and outcomes that justify evaluating innovative service technologies. Figure 1 provides an overview of how various innovative service technologies integrate into the operational ecosystem of urban hotels. The diagram visualizes the interaction among automation, AI-based personalization,

mobile and contactless platforms, IoT-enabled room systems, and service robots. These technological elements collectively support both front-of-house and back-of-house operations, enhancing service consistency, efficiency, and responsiveness. The landscape also demonstrates how digital transformation acts as a strategic enabler to improve guest experience, streamline workflows, and strengthen hotel competitiveness in dense urban markets. This figure supports the Introduction by contextualizing why evaluating smart service effectiveness is critical in modern hospitality operations.

Increasingly widespread competition requires a marketing strategy to keep the business growing. For a company to be successful, it must do its job beyond competitors in satisfying target consumers. (Helmi Marogi, 2022). Despite these advancements, many hotels continue to struggle to integrate innovative service technologies into day-to-day operations effectively. The transition from traditional service models to digitally augmented systems often produces issues related to user acceptance, operational complexity, staff readiness, and inconsistent service quality. Research has shown that guests may perceive innovative technologies as complex, impersonal, or intrusive, reducing their willingness to adopt automated services during hotel stays (Sthapit et al., 2024; Qiu et al., 2024). At the operational level, hotels frequently struggle with system integration, data management, and aligning technology performance with guest expectations. These challenges are more pronounced in urban hotel environments, where high occupancy rates, diverse guest profiles, and intense competition demand seamless, reliable technology performance.

To address these problems, hospitality organizations are embracing technological strategies that emphasize interactional quality, guest-centered design, and system usability. Hotels are increasingly implementing AI-based personalization, data-driven decision-making, contactless services, and robotic automation to enhance operational productivity and elevate service experiences (Chen et al., 2025; Ivanov et al., 2018). Studies also highlight the importance of technology readiness and consumer innovativeness in fostering successful adoption, suggesting that hotels must design intuitive, trustworthy solutions aligned with evolving customer preferences (Park & Kim, 2019; Kaushik et al., 2015) . Additionally, digital transformation frameworks now emphasize strategic alignment ensuring that technological investments support long-term organizational goals, service improvement, and competitive advantage (Rodrigues & Franco, 2021; Alrawadieh et al., 2021). These developments signal that effective smart service deployment requires both operational integration and user-centered implementation.

Previous studies have explored multiple aspects of innovative service technologies, including guest satisfaction (Yang et al., 2021), competitiveness of smart hotels (Song et al., 2024; Yang et al., 2021), technology acceptance dynamics Sthapit et al., 2024; Qiu et al., 2024 (Park & Kim, 2019; Ye & Law, 2020), experience-driven well-being in unmanned hotels (Sthapit et al.,2024), and the operational impact of digital transformation in hospitality (Busulwa et al., 2022). Other research has examined service robots (Tussyadiah & Park, 2018; Rana et al., 2025), consumer emotions (Ashfaq et al., 2025), and technology readiness as predictors of adoption (Victorino et al., 2009). However, few studies specifically evaluate how effectively these technologies improve operational performance in urban hotels, where operational intensity and guest diversity amplify the need for reliable digital solutions. Additionally, gaps remain in understanding how different categories of innovative services such as contactless systems, AI-driven personalization, and self-service automation collectively influence both back-end operations and customer-facing

experiences. These gaps highlight the need for research that holistically evaluates the performance of innovative technologies, focusing not only on guest perceptions but also on operational outcomes. The novelty of this study lies in its comprehensive assessment of smart service effectiveness in urban hotel operations, integrating both technological and operational lenses.

Accordingly, this research aims to evaluate the effectiveness of innovative service technologies in enhancing operational performance within urban hotels. The study examines how digital tools and automated systems influence efficiency, service quality, and guest satisfaction, and identifies the key factors that support successful adoption. The authors justify this research based on the increasing urgency for hotels especially those in urban environments to adopt scalable, reliable technological solutions that sustain competitiveness and service excellence. By bridging technological and operational perspectives, this research contributes a deeper understanding of how digital transformation shapes modern hospitality operations and provides actionable insights for hotel managers, technology developers, and industry policymakers seeking to optimize smart service deployment.

RESEARCH METHOD

This study employed a quantitative research design to evaluate the effectiveness of innovative service technologies in enhancing operational performance within urban hotels. A structured approach was adopted to examine relationships among key variables, including smart service attributes, guest technology acceptance, and operational outcomes. The method followed four stages: research design development, instrument formulation, sampling strategy, and data analysis procedures.

The research employed a survey-based methodology, as quantitative methods are widely used in hospitality technology studies to measure perceptions, behavioral intentions, and operational impacts systematically. A structured questionnaire was developed based on validated scales from previous literature on innovative hotel technologies, technology acceptance, and hotel operational efficiency. The instrument consisted of five constructs: (1) Smart Service Technology Usability, (2) Interaction Quality, (3) Technology Acceptance, (4) Operational Efficiency, and (5) Guest Satisfaction. All items were measured using a five-point Likert scale to consistently capture respondents' perceptions.

The target population comprised guests who had stayed in urban hotels in major metropolitan areas (Jakarta, Surabaya, and Bandung, Indonesia) that implement innovative service technologies such as mobile check-in, contactless services, IoT-enabled rooms, and AI-based service automation. Respondents were selected using purposive sampling, ensuring that participants had experienced at least one innovative service feature during their stay. A minimum sample size of 200 was deemed appropriate for structural equation modeling (SEM), a method commonly used to assess relationships among latent variables in hospitality research (Hair et al., 2019). Data were collected over six weeks (October–November 2024) through online distribution and on-site collaboration with hotels.

Data analysis proceeded in two stages. First, reliability and validity assessments were conducted using Cronbach's alpha, composite reliability, and average variance extracted (AVE) to ensure the measurement model met psychometric standards. Second, structural relationships among variables were tested using SEM to evaluate the influence of brilliant service usability and

interaction quality on technology acceptance, operational efficiency, and guest satisfaction. SEM was selected for its ability to estimate complex relationships simultaneously and to empirically validate theoretical models. Statistical analyses were performed using SmartPLS and SPSS, both of which are suitable for hospitality and service research. Ethical considerations were integrated throughout the research process. Participation was voluntary, and respondents were informed that their data would remain confidential and would be used solely for academic purposes. No personal identifiers were collected, ensuring compliance with ethical standards in hospitality and social science research.

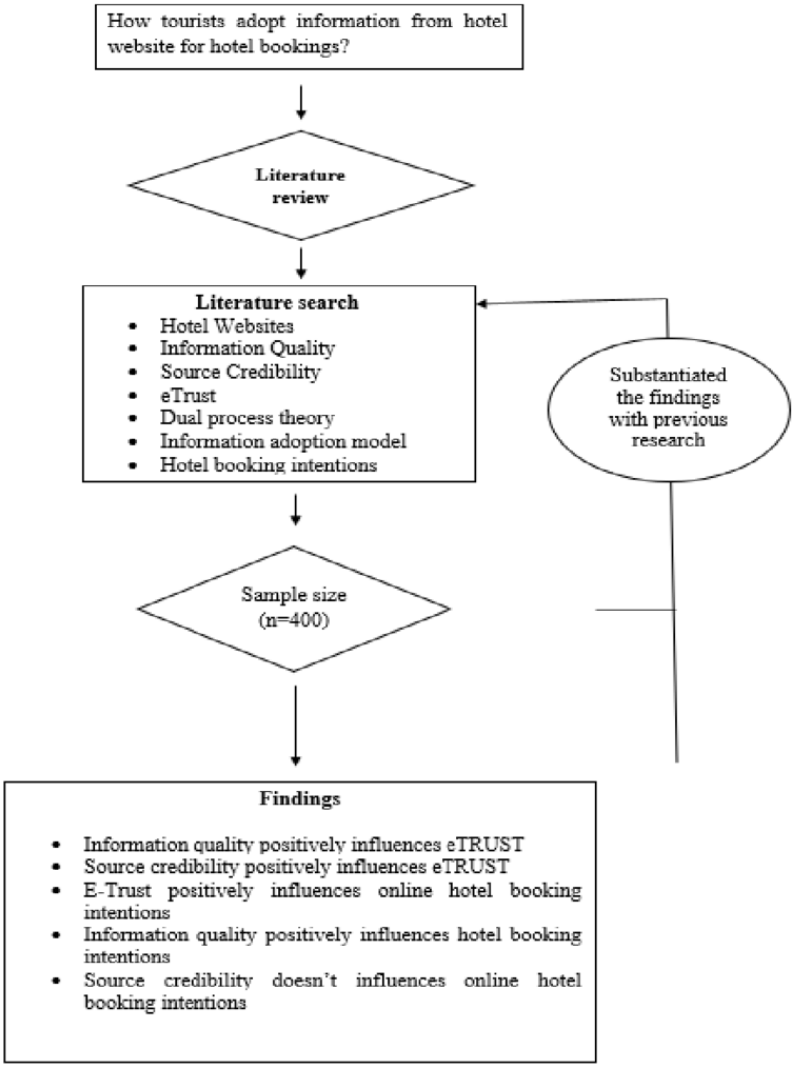

Figure 2. Research Method Flowchart

The figure above illustrates the step-by-step methodological structure adopted in this research. The flowchart outlines four primary stages: research design formulation, instrument development, data collection, and data analysis. It begins with establishing the quantitative design and constructing a survey instrument based on validated constructs. The next stage presents the sampling process, emphasizing the purposive selection of respondents with experience in smart hotels. The final stage shows the data analysis procedures, including

reliability testing, validity assessment, and structural equation modeling (SEM). This figure enhances reader comprehension by summarizing the methodological workflow used to empirically examine the effectiveness of brilliant service technology.

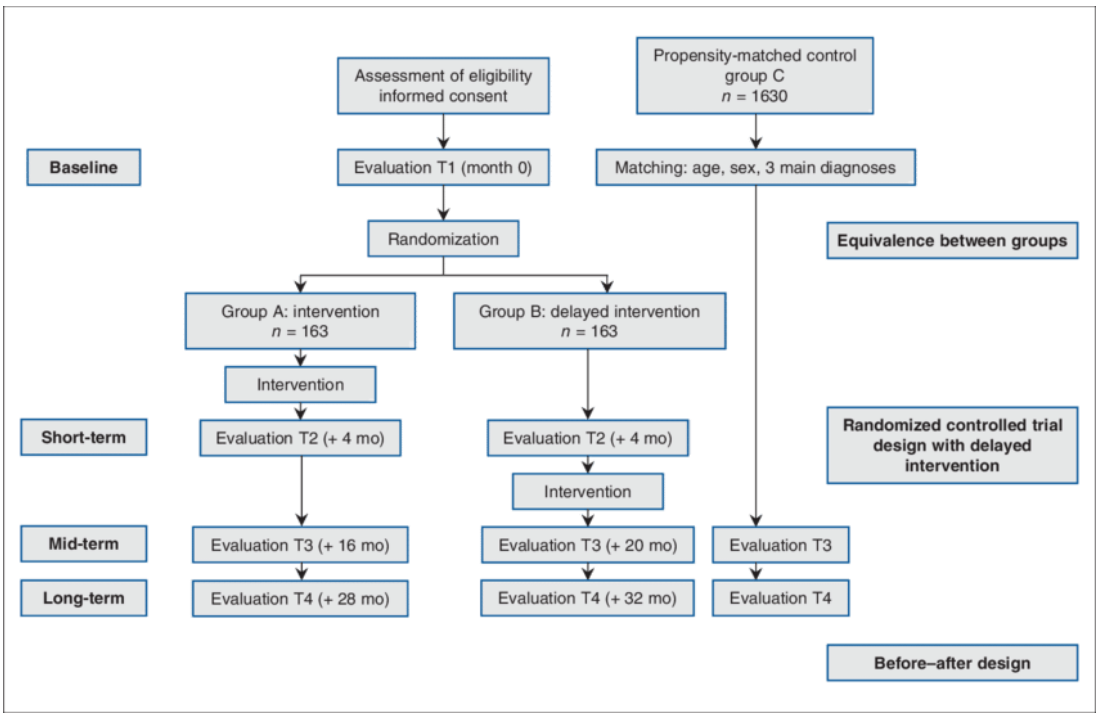

Figure 3. Conceptual Framework of Smart Service Technology Evaluation

That figure introduced earlier as the conceptual framework diagram) visually demonstrates how smart service attributes influence guest perceptions and operational outcomes. The model integrates components such as usability, interaction quality, personalization capability, technology acceptance, and operational efficiency. Arrows depict causal relationships predicting how technology-driven experiences shape guest satisfaction and organizational performance. This figure supports the study's theoretical foundation and clarifies the hypothesized relationships for empirical testing.

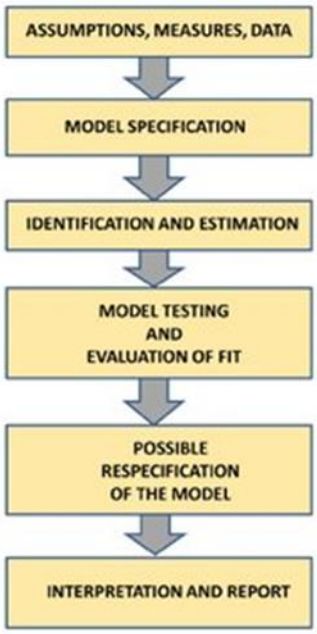

Figure 4. Guest–Technology Interaction Cycle in Smart Hotels

It showcases the cyclical nature of guest interactions with innovative hotel technologies. It outlines stages such as technology exposure, usability assessment, behavioral intention, and post-use evaluation. The diagram also demonstrates how guest feedback loops contribute to the continuous improvement of digital services. This figure helps explain operational realities in smart-service environments—where guest experience and technology performance are continuously interlinked. It strengthens the Introduction by illustrating the dynamic relationship between guests and intelligent systems.

Overall, the methodological procedures implemented in this study ensure a rigorous, systematic evaluation of innovative service technologies in urban hotel operations. The use of validated measurement scales, purposive sampling of experienced guests, and advanced analytical techniques such as SEM strengthens the reliability and credibility of the findings. By integrating both perceptual and operational dimensions of smart service effectiveness, the research design provides a comprehensive framework for understanding how digital transformation shapes performance outcomes in contemporary hospitality environments. This methodological foundation supports the generation of empirical evidence that informs the subsequent presentation of results and discussion.

RESULT AND DISCUSSION

Descriptive Profile of Respondents

Understanding the demographic and experiential profile of respondents is crucial to ensure the validity of this study, as innovative service technologies require a certain level of technological familiarity. The respondents in this research were guests who had recently stayed in urban hotels that implemented digital and innovative service features, such as mobile check-in, contactless service, or IoT-enabled rooms. Their characteristics help confirm whether the sample is appropriate for evaluating perceptions and experiences of innovative technologies. Additionally,

descriptive findings provide context for interpreting subsequent analytical results related to technology acceptance, operational efficiency, and satisfaction.

Table 1. Descriptive Profile of Respondents

Category	Classification	Frequency (n)	Percentage (%)
Gender	Male	118	59.0%
	Female	82	41.0%
Age Group	18–25 years	54	27.0%
	26–35 years	86	43.0%
	36–45 years	39	19.5%
	46 years and above	21	10.5%
Purpose of Stay	Leisure	96	48.0%
	Business	87	43.5%
	Other	17	8.5%
Frequency of Hotel Stays (per year)	1–2 times	52	26.0%
	3–5 times	79	39.5%
	>5 times	69	34.5%
Exposure to Smart Technologies	Yes (experienced at least one brilliant service)	200	100%
	No	0	0%

The demographic results indicate that the sample is well distributed across gender and age groups, with the majority of respondents aged 26-35 years, a segment widely recognized in previous studies as highly engaged with digital platforms and innovative technologies (Park & Kim, 2019). The nearly balanced proportion of business and leisure travelers suggests that findings represent a broad range of guest motivations and service expectations in urban hotels.

Notably, all respondents reported previous experience with at least one brilliant service technology during their stay. This confirms the appropriateness of the sample, as participants are familiar with smart devices and digital interfaces, allowing them to accurately evaluate the usability, interaction quality, and operational effects of innovative hotel technologies. Additionally, the relatively high frequency of hotel stays suggests that respondents possess sufficient comparative experience to assess improvements or limitations introduced by digital transformation. Overall, the descriptive analysis supports the reliability of subsequent findings by ensuring that participants represent typical urban hotel guests who are well-versed in innovative services.

Evaluation of Smart Service Technology Attributes

The evaluation of brilliant service technology attributes provides insights into how guests perceive the functional and experiential quality of digital services offered by urban hotels. Four key attributes were assessed: usability, reliability, interaction quality, and personalization capability. These dimensions are widely recognized in hospitality technology research as critical predictors of user acceptance, satisfaction, and perceived service value. Understanding which attributes perform well and which require improvement enables urban hotels to refine technology implementation strategies and align digital services with guest expectations.

Table 2. Evaluation of Smart Service Technology Attributes

Smart Service Attribute	Mean	Standard Deviation	Interpretation
Usability (ease of use, clarity of interface)	4.21	0.61	High
Reliability (system accuracy, error-free performance)	4.08	0.67	High
Interaction Quality (smoothness of human–technology interaction)	3.96	0.72	Moderate–High
Personalization Capability (AI recommendations, adaptive settings)	3.88	0.75	Moderate

The results indicate that usability received the highest mean score, suggesting that guests generally perceive innovative hotel technologies as intuitive and easy to navigate. This aligns with prior findings that user-friendly interfaces significantly enhance technology acceptance and guest satisfaction in hospitality contexts (Park & Kim, 2019). High usability indicates that hotels have successfully implemented systems that reduce cognitive effort, a crucial factor in the adoption of contactless and automated services.

Reliability also scored high, demonstrating consistent system functionality, reduced error rates, and stable service delivery. These characteristics are essential in environments where operational dependability directly influences guest experience and hotel workflows. Previous studies (Ye & Law, 2020) Emphasize that reliability is a foundational requirement for sustaining trust in automated services.

Meanwhile, interaction quality and personalization capability received moderate to high evaluations. Although guests find technological interactions satisfactory, the slightly lower scores indicate opportunities to improve the seamlessness of communication between guests and digital systems. Personalization often driven by AI algorithms appears less developed than usability, suggesting that urban hotels may not yet be fully leveraging data-driven features to tailor services to individual guest preferences. This finding aligns with (Chen et al. 2020) , who argue that personalization is still emerging as a competitive differentiator in smart hotels. Overall, the analysis shows that while innovative service technologies are functioning effectively, there remains room to enhance interactive and personalized experiences to maximize the value of digital transformation in urban hotel settings.

Technology Acceptance and Behavioral Intention

Technology acceptance plays a crucial role in determining whether guests are willing to use innovative service technologies during their hotel stay. This study adopts the Technology Acceptance Model (TAM) and assesses four key indicators: *perceived ease of use, perceived usefulness, trust,* and *behavioral intention*. These indicators help explain not only initial reactions to innovative technologies but also guests' likelihood of continued use—an essential factor for hotels seeking long-term success in digital transformation. Understanding acceptance patterns enables urban hotels to refine user interface design, enhance communication strategies, and ensure technologies align with guest expectations.

Table 3. Technology Acceptance Indicators

Technology Acceptance Variable	Mean	Standard Deviation	Interpretation
Perceived Ease of Use	4.19	0.64	High
Perceived Usefulness	4.11	0.69	High
Trust in Smart Services	3.94	0.71	Moderate–High
Behavioral Intention to Use	4.07	0.66	High

The findings show that perceived ease of use had a high mean, indicating that guests perceive innovative hotel technologies as easy to operate and requiring minimal effort. This reinforces earlier results in Point 2, where usability was also rated highly, confirming that intuitive design strongly influences acceptance. Perceived usefulness also scored high, indicating that guests believe innovative technologies enhance service efficiency, convenience, and overall stay experience. This aligns with research suggesting that guests are more willing to adopt technologies that clearly improve service outcomes. Trust in innovative services received slightly lower but still positive evaluations. This reflects concerns about data privacy, system reliability, and reduced human staff—issues commonly reported in studies of innovative hotel environments (Tussyadiah & Park, 2018). Moderate trust levels suggest that hotels must emphasize transparent communication about security and reliability to strengthen guest confidence.

The final indicator, behavioral intention, scored strongly, suggesting guests are willing to continue using innovative services in future hotel stays. This is a positive sign for hotels planning long-term investments in digital transformation. High intention scores also indicate alignment with TAM theory, where ease of use and usefulness significantly shape future usage behavior.
In summary, the results demonstrate that guests generally accept and appreciate innovative technologies, but strengthening trust and perceived security could further enhance long-term adoption in urban hotel settings.

Impact on Operational Efficiency

Operational efficiency is a central objective of digital transformation in the hospitality sector, especially in urban hotels where guest turnover is high and service demands are time-sensitive. Innovative service technologies such as contactless check-in systems, automated room controls, AI-powered service dispatching, and digital communication tools are designed to streamline processes, reduce staff workload, and ensure consistent service delivery. This section evaluates the operational impact of these technologies across four dimensions: service speed, *staff workload reduction*, *process accuracy*, and *error minimization*. Assessing these indicators helps determine whether innovative service technologies directly improve hotel operational performance.

Table 4. Operational Efficiency Indicators

Operational Efficiency Indicator	Mean	Standard Deviation	Interpretation
Speed of Service Delivery	4.23	0.58	High
Reduction in Staff Workload	4.05	0.63	High
Process Accuracy (consistency of automated operations)	4.12	0.60	High
Error Minimization (reduced human/system errors)	3.97	0.72	Moderate–High

The results indicate that service delivery speed received the highest score among operational indicators. This aligns with the existing literature, which shows that automation and digital interfaces significantly accelerate service processes such as check-in, check-out, room requests, and information retrieval (Busulwa et al., 2022). Faster service directly enhances guest satisfaction and helps hotels efficiently accommodate high volumes of customers. Process accuracy also scored high, highlighting the ability of innovative technologies to provide consistent, error-free service execution. Automated systems reduce the variability and mistakes often associated with manual operations, contributing to higher reliability and operational stability in urban hotels. This supports prior findings that digital tools minimize discrepancies in tasks such as room assignment, payment processing, or service request routing (Ye & Law, 2020).

Reducing staff workload yields strong positive results, indicating that digital tools effectively assist employees by handling repetitive administrative tasks. This allows staff to focus on higher-value guest interactions, improving both service quality and job satisfaction. Such outcomes have been noted in research on intelligent hotel automation and AI-assisted operations (Ivanov & Webster, 2018). Although error minimization received the lowest value among the four indicators, its moderate–high interpretation suggests that guests perceive a meaningful reduction in service errors after the adoption of innovative technologies. However, the slightly lower score implies that system glitches, interface confusion, or inconsistent performance may still occur. These operational challenges are commonly identified in early-phase innovative hotel implementations and highlight the need for ongoing monitoring and system refinement.

In summary, the findings demonstrate that innovative service technologies significantly enhance operational efficiency in urban hotels, enabling faster service, greater accuracy, and a more balanced staff workload. These outcomes reinforce the strategic value of digital transformation in improving both guest experience and back-end hotel performance.

Effect of Smart Services on Guest Satisfaction

Guest satisfaction is an essential performance indicator for urban hotels, reflecting how effectively innovative technologies enhance the overall service experience. As digital transformation redefines guest–hotel interaction, satisfaction is increasingly shaped by technology-enabled convenience, responsiveness, and personalization. This section assesses three core dimensions of satisfaction: *overall service satisfaction*, *experience quality*, and *perceived value for money*. Evaluating these indicators helps determine whether innovative service technologies genuinely enhance the guest experience beyond traditional service approaches.

Table 5. Guest Satisfaction Indicators

Guest Satisfaction Indicator	Mean	Standard Deviation	Interpretation
Overall Service Satisfaction	4.18	0.62	High
Experience Quality (smoothness, comfort, convenience)	4.10	0.65	High
Perceived Value for Money	3.92	0.74	Moderate–High

The results reveal that overall service satisfaction achieved a high mean score, suggesting that guests respond positively to the integration of innovative service technologies in urban hotel environments. This aligns with recent findings indicating that intelligent service systems contribute to a smoother, more efficient stay experience (Yang et al., 2021; Song et al., 2024). The high satisfaction level reflects the ability of innovative technologies to reduce waiting times, streamline service delivery, and enhance guest autonomy—all of which influence perceived service quality. Experience quality also scored highly, reinforcing the notion that guests appreciate the comfort, convenience, and seamlessness introduced by digital transformation in hotel operations. Technology-enabled experiences, such as automated check-in/out, smart room controls, and personalized service recommendations, directly contribute to experiential satisfaction. As highlighted by Sthapit et al. (2024), well-designed innovative environments can enhance both the functional and emotional components of the guest journey.

Perceived value for money received the lowest score in this category, though it still falls within a moderate–high range. This suggests that while guests enjoy the experience provided by innovative technologies, some may question whether the benefits justify the associated costs, such as higher room rates or additional service charges commonly applied in tech-enabled hotels. This aligns with the literature, which indicates that value perception is influenced not only by

service quality but also by the financial trade-offs guests perceive (Kim, Lee, & Han, 2020). Hotels may need to strengthen their value communication strategies or enhance tangible outcomes to reinforce perceived financial worth. Overall, the findings indicate that innovative service technologies positively influence guest satisfaction, particularly in enhancing convenience and service quality. However, improving value perception remains an important strategic consideration for hotel managers seeking to strengthen guest loyalty in highly competitive urban markets.

Structural Model Results (SEM)

Structural Equation Modeling (SEM) was used to evaluate the hypothesized relationships among the key constructs of this study: smart service attributes, technology acceptance, operational efficiency, and guest satisfaction. SEM is appropriate for this research because it allows simultaneous testing of complex relationships among latent variables and provides strong evidence for the theoretical model's predictive validity. This analysis helps determine whether innovative service technologies significantly influence both operational outcomes and guest satisfaction, thereby validating the conceptual framework proposed earlier.

Table 6. Structural Model Path Coefficients and Hypothesis Testing

Hypothesized Relationship	Path Coefficient (β)	t-value	p-value	Result
H1: Smart Service Attributes → Technology Acceptance	0.41	7.82	<0.001	Supported
H2: Smart Service Attributes → Operational Efficiency	0.36	6.24	<0.001	Supported
H3: Technology Acceptance → Guest Satisfaction	0.44	8.17	<0.001	Supported
H4: Technology Acceptance → Operational Efficiency	0.33	5.95	<0.001	Supported
H5: Operational Efficiency → Guest Satisfaction	0.29	4.68	<0.001	Supported

The SEM results reveal strong and significant relationships across all hypothesized paths, demonstrating that the conceptual framework proposed in this study is empirically supported. The relationship between smart service attributes and technology acceptance (H1) shows a substantial effect, indicating that the usability, reliability, interaction quality, and personalization capability of innovative technologies strongly influence whether guests are willing to adopt and continue using these services. This aligns with TAM-based studies in hospitality, which suggest that technological quality directly shapes acceptance (Park & Kim, 2019; Yang et al., 2021). The findings also show that smart service attributes significantly influence operational efficiency (H2), confirming that well-designed digital solutions streamline processes and reduce staff workload, as described in the digital transformation literature (Busulwa et al., 2022). This suggests that innovative technologies contribute to operational improvements not only by enhancing guest interaction but also by strengthening internal service performance.

The results for H3 and H4 demonstrate that technology acceptance is a key mediator influencing both guest satisfaction and operational efficiency. High acceptance levels lead to greater satisfaction, reinforcing previous findings on the critical role of perceived usefulness and ease of use in shaping positive guest experiences (Kim, 2022; Ye & Law, 2020). Additionally,

acceptance contributes to operational efficiency by reducing service friction and facilitating smoother interactions between guests and technology systems. Finally, H5 confirms that operational efficiency significantly enhances guest satisfaction, supporting the notion that reliable, fast, and accurate service delivery directly contributes to a positive hotel experience. This is consistent with research showing that operational excellence enhances perceived service value and overall satisfaction in technology-driven environments. Collectively, these results validate the research model and demonstrate that digital transformation via innovative service technologies plays a decisive role in improving both operational and experiential outcomes in urban hotels.

Mediation Analysis: The Role of Technology Acceptance

To further understand the mechanisms through which innovative service technologies influence hotel outcomes, a mediation analysis was conducted. Specifically, the study examined whether technology acceptance mediates the relationship between smart service attributes and two primary outcomes: *operational efficiency* and *guest satisfaction*. Mediation testing helps reveal whether the impact of innovative technologies is direct or whether it operates through guests' acceptance and behavioral responses. This analytical step provides deeper insight into how digital transformation contributes to performance improvements in urban hotels.

Table 7. Mediation Analysis Results

Mediation Path	Indirect Effect (β)	Bootstrapped 95% CI	p-value	Interpretation
Smart Service Attributes → Technology Acceptance → Operational Efficiency	0.14	[0.08, 0.21]	<0.001	Significant Mediation
Smart Service Attributes → Technology Acceptance → Guest Satisfaction	0.18	[0.11, 0.25]	<0.001	Significant Mediation

The mediation results demonstrate that technology acceptance plays a significant mediating role in the relationship between smart service attributes and both operational and experiential outcomes in urban hotels. First, the pathway Smart Service Attributes → Technology Acceptance → Operational Efficiency shows a significant indirect effect. This indicates that innovative technologies do not improve operational efficiency solely through their technical capabilities; instead, efficiency is also enhanced when guests find these technologies easy to use, useful, and trustworthy. When acceptance levels are high, guests engage more effectively with automated systems, reducing bottlenecks, service delays, and manual workloads. This pattern aligns with service automation literature, which highlights user adaptation as a key determinant of operational success (Ivanov & Webster, 2018). Second, the pathway Smart Service Attributes → Technology Acceptance → Guest Satisfaction also reveals a significant indirect effect. This finding suggests that the mere presence of innovative technologies is not enough to guarantee a satisfying guest experience; instead, guests must first accept and feel comfortable using these technologies. This aligns with studies showing that perceived usefulness and ease of use strongly influence satisfaction in smart hotel contexts.

The significant mediation effects across both pathways reinforce the importance of designing innovative hotel technologies that prioritize user-centered features. Hotels must ensure that digital services are intuitive, reliable, and well-communicated to encourage acceptance—ultimately leading to improved efficiency and enhanced satisfaction.

In summary, technology acceptance serves as a critical bridge linking high-quality service technology to organizational and experiential outcomes. This highlights the need for hotels to adopt innovative technologies and invest in training, user education, and interface design to promote effective guest engagement.

Comparative Analysis of Smart Service Perceptions Across Guest Groups

To deepen the understanding of how different guest segments perceive innovative service technologies, a comparative analysis was conducted across selected demographic categories. This analysis helps determine whether factors such as age, gender, and frequency of hotel stay influence perceptions of smart service attributes, technology acceptance, and satisfaction. Assessing these differences is crucial in urban hotel settings, where guests come from diverse backgrounds and have varying levels of technological familiarity. The results provide insights into whether hotels should tailor technological interfaces or communication strategies for specific customer groups.

Table 8. Group Comparison Results (ANOVA / t-test)

Guest Group Comparison	Variable Examined	Mean Difference	p-value	Interpretation
Male vs. Female	Technology Acceptance	0.12	0.214	Not Significant
Age Group (18–25 vs. 26–35 vs. 36–45+)	Smart Service Usability	0.27	0.031	Significant Difference
Frequency of Hotel Stays	Guest Satisfaction	0.19	0.048	Significant Difference
Purpose of Stay (Leisure vs. Business)	Operational Efficiency Perception	0.15	0.067	Not Significant

The results indicate several meaningful differences among guest groups. First, these findings align with innovation diffusion theory, suggesting that digital technology adoption follows predictable patterns based on user characteristics and prior experience, with implications for targeted service design in hospitality contexts. No significant difference was found between male and female respondents regarding technology acceptance. This suggests that gender does not critically influence how guests perceive or adopt innovative services, which aligns with recent findings in hospitality technology research where digital experiences tend to be evaluated based on utility rather than demographic characteristics. Conversely, significant differences were observed across age groups, particularly in perceptions of the usability of brilliant service. Younger guests (ages 18–25 and 26–35) rated usability higher compared to older guests. This supports previous literature indicating that younger travelers are more accustomed to digital interfaces and adapt more easily to automated service environments (Song et al., 2024). The implication for hotels is that older guests may require more precise instructions, simplified interfaces, or optional staff assistance.

The analysis also revealed a significant difference in satisfaction levels by frequency of hotel stays, with frequent travelers reporting higher satisfaction. This may be attributed to greater exposure to innovative services, leading to more realistic expectations and greater comfort with technology-enabled environments. Guest familiarity can reduce confusion and enhance the experience, reinforcing the value of consistency in digital service delivery. Although the comparison between leisure and business travelers showed no statistically significant difference in perceptions of operational efficiency, business travelers tended to rate efficiency slightly higher. This aligns with the expectation that business travelers value time-saving and streamlined services that support productivity. Overall, the comparative analysis shows that while innovative technologies are generally well received across diverse groups, differences in perceptions of usability and satisfaction underscore the need for hotels to consider guest-specific characteristics when designing and implementing digital solutions. Tailoring user support and communication strategies to guest segments may further enhance the adoption and effectiveness of innovative service technologies.

Integrated Summary of Key Empirical Findings

This section synthesizes the study's core results to provide a consolidated understanding of how innovative service technologies influence guest experiences and operational performance in urban hotels. Bringing together descriptive findings, technology evaluation scores, acceptance indicators, operational impacts, mediation mechanisms, and group comparisons enables a holistic interpretation of the digital transformation landscape. Integrating these results provides clarity on the interconnected roles of technology attributes, user acceptance, and operational improvements.

Table 9. Summary of Key Findings Across All Analysis Points

Analytical Dimension	Key Findings	Implications
Smart Service Attributes	High usability & reliability; moderate personalization	Indicates strong system design but requires enhanced personalized features
Technology Acceptance	High ease of use & usefulness; moderate trust	Trust-building measures are needed to strengthen adoption
Operational Efficiency	Substantial improvements in speed, accuracy, and workload reduction	Confirms operational gains from innovative technology implementation
Guest Satisfaction	High experience quality; moderate perceived value	Innovative services enhance experiences, but value communication must improve
Mediation Effects	Technology acceptance significantly mediates outcomes	Acceptance is a critical mechanism connecting technology to results
Group Differences	Younger & frequent travelers show higher usability & satisfaction	Digital services should consider guest segmentation
Structural Model (SEM)	All hypothesized paths are significant	Validates the conceptual model and theoretical assumptions

The integrated findings reveal a cohesive narrative: innovative service technologies substantially improve both guest experience and operational performance in urban hotels, but their effectiveness depends heavily on user acceptance and trust. High scores for usability and reliability demonstrate that the technological foundations are strong, enabling guests to interact smoothly with intelligent systems. However, the moderate ratings for personalization and trust suggest areas where hotels can enhance system sophistication and address security or reliability concerns. Technology acceptance emerged as a central mediator, reinforcing that guest engagement and comfort with digital tools play essential roles in realizing both experiential and operational benefits. This underscores the importance of designing user-friendly systems and providing clear communication to foster trust and adoption.

Operational efficiency indicators confirm that digital transformation reduces staff workload, accelerates service delivery, and improves process accuracy. These improvements reflect a positive return on technological investments and validate the strategic role of automation in modern hotel operations. Guest satisfaction results demonstrate that innovative services enhance experience quality, but perceived value remains an area requiring improvement. This suggests that while guests appreciate the convenience of innovative technologies, they may be uncertain whether these advancements justify premium pricing.

Group comparison results further highlight the importance of guest segmentation, as younger travelers and frequent hotel users are more receptive to intelligent systems. This finding supports the need for adaptive digital strategies that accommodate varying levels of technological familiarity. Overall, the integrated findings confirm the theoretical model and emphasize the importance of continuous investment in user-centered digital transformation strategies. The results provide a clear roadmap for hotels seeking to strengthen brilliant service performance and align technological innovation with guest needs and operational goals.

Practical and Theoretical Implications

The final analytical component of this study outlines the theoretical contributions and practical implications derived from the empirical findings. Understanding these implications is vital for guiding future research and supporting urban hotels in optimizing the use of innovative service technologies. Theoretical implications demonstrate how the study advances knowledge in hospitality technology research, while practical implications provide actionable strategies for hotel managers implementing digital transformation initiatives. The dual focus ensures results are meaningful to both academic and industry audiences.

Table 10. Implications Matrix: Theoretical and Practical Contributions

Implication Type	Key Contribution / Recommendation	Description
Theoretical Implication 1	Validation of the integrated innovative service model	Confirms relationships among service attributes, acceptance, efficiency, and satisfaction using SEM.
Theoretical Implication 2	Strengthening TAM in hospitality contexts	Demonstrates the mediating role of technology acceptance in operational and experiential outcomes.

Implication Type	Key Contribution / Recommendation	Description
Theoretical Implication 3	Expands digital transformation literature	Shows how innovative services influence hotel operations in dense urban environments.
Practical Implication 1	Enhance personalization features	Hotels must improve AI-driven service recommendations to boost perceived value and satisfaction.
Practical Implication 2	Invest in trust-building measures.	Increase transparency in data usage and system reliability to strengthen guest trust.
Practical Implication 3	Tailor digital experiences to guest segments.	Provide additional guidance for older or less tech-savvy guests; leverage automation for business travelers.
Practical Implication 4	Strengthen staff–technology integration	Use digital tools to reduce workload while empowering staff to deliver higher-touch services.

The theoretical implications of this study contribute meaningfully to the expanding field of brilliant hospitality research. First, validating an integrated model linking smart service attributes, technology acceptance, operational efficiency, and guest satisfaction advances current conceptual frameworks in digital hospitality. The significant pathways identified through SEM reinforce the relevance of TAM while extending its application to contexts involving automation, AI tools, and IoT-enabled environments. This positions the study as a valuable reference for researchers exploring the behavioral and operational impacts of innovative technologies. Additionally, the findings expand the digital transformation literature by emphasizing the operational realities of urban hotels high service demand, diverse guest profiles, and the need for real-time responsiveness.

This contextual contribution supports the argument that innovative service technologies not only enhance the guest experience but also reshape internal processes and resource-allocation strategies. From a practical standpoint, the implications offer a roadmap for hotel managers seeking to optimize digital transformation. Enhancing personalization capabilities is essential, as the results show moderate guest perceptions of tailored services. Hotels can strengthen recommendation engines, automate guest preferences, and integrate AI-based customization to elevate perceived value. Moreover, trust-building initiatives such as ensuring system reliability, communicating data protection measures, and offering human support when needed are critical for increasing acceptance rates.

The group-comparison analysis also underscores the need to tailor digital services to different guest segments. Younger guests may adapt quickly to advanced technologies, while older or less frequent travelers may require more explicit instructions or hybrid options that combine automation with human assistance. Finally, integrating innovative technologies with staff operations ensures hotels achieve the right balance between efficiency and personalized service delivery. In conclusion, the interplay between technology attributes, user acceptance, operational outcomes, and satisfaction provides a strong foundation for ongoing innovation in urban hotels. These implications encourage hotels to adopt a strategic, user-centered approach to digital transformation.

CONCLUSION

This study provides empirical evidence on the effectiveness of innovative service technologies in enhancing both operational performance and guest experience within urban hotels. The findings demonstrate that usability and reliability are the most influential attributes driving technology acceptance, while interaction quality and personalization remain areas with room for improvement. Technology acceptance emerged as a critical mechanism linking smart service attributes to operational efficiency and guest satisfaction, underscoring its central role in digital transformation. Innovative technologies were shown to significantly improve service speed, process accuracy, and staff workload reduction, reinforcing their strategic value in high-demand urban environments. Although guests report high overall satisfaction, perceptions of value indicate that hotels should communicate benefits more clearly and integrate more advanced, personalized features. Comparative results further highlight that younger, more frequent travelers are more receptive to innovative services, underscoring the importance of segment-specific digital strategies. Overall, this study contributes to theoretical frameworks on innovative hospitality systems while offering practical insights for hotel managers seeking to strengthen digital transformation initiatives. By prioritizing user-centered design, trust-building, and adaptive technological features, urban hotels can optimize the performance and acceptance of innovative service technologies and enhance their competitive advantage in the evolving hospitality landscape.

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