



Influence of Smart Hospitality Technologies (SHTs) on Operational Efficiency of Five-Star-Rated Hotels in Zanzibar, Tanzania

¹Samwel Savunyu, ²Jacqueline Korir & ³Sawe Belsoy

^{1,2&3}School of Tourism, Hospitality and Events Management, Moi University

¹<https://orcid.org/0009-0005-5457-6560>

²<https://orcid.org/0000-0003-0691-4703>

³<https://orcid.org/0009-0003-2697-6271>

***Corresponding Author:** jkorirhospitality@gmail.com

ABSTRACT

Background: Emerging technologies are transforming hotel operations. In five-star-rated hotels, emerging technologies have become important tools for enhancing operational efficiency. Whereas numerous studies have examined emerging technologies in the hospitality industry in relation to guest experience and service innovation, limited empirical attention has been paid to how adopting these technologies influences operational efficiency in five-star-rated hotels in developing countries, particularly Zanzibar. This gap is important because Zanzibar's hotel sector operates in a competitive tourism environment, where efficient service delivery, process coordination, and effective resource utilization are essential to operational efficiency.

Objective: This study examined the influence of the adoption of emerging technologies on the operational efficiency of five-star-rated hotels in Zanzibar.

Method: This study adopted a mixed-methods convergent parallel design. Quantitative data were collected from 252 managers of five-star-rated hotels using structured questionnaires, and qualitative insights were obtained through open-ended questions. A census approach was used to include all eligible hotel managers, and stratified sampling ensured the representation of hotel departments. Quantitative data were analyzed using descriptive statistics and Multivariate Analysis of Variance (MANOVA), whereas qualitative data were analyzed using content analysis.

Results: The findings show that five-star-rated hotels in Zanzibar have adopted emerging technologies, with cloud computing recording the highest adoption score, followed by big data analytics, artificial intelligence, the Internet of Things, blockchain, and virtual and augmented reality. Respondents reported that positive operational efficiency outcomes included improved work performance and service delivery speed, reduced errors, time and cost savings, and improved communication. The MANOVA results demonstrated a statistically significant multivariate effect of the adoption of emerging technologies on operational efficiency (Wilks' Lambda = 0.668, $F(15, 673.978) = 7.070$, $p < 0.001$). The between-subjects effect on operational efficiency was also significant, $F(5, 246) = 9.749$, $p < 0.001$, $R^2 = 0.165$. Bonferroni post-hoc comparisons indicated that minimal adopters performed significantly lower than moderate and advanced adopters.

Conclusion: This study concludes that the adoption of emerging technologies significantly enhances operational efficiency in five-star-rated hotels in Zanzibar by improving service speed, reducing errors, strengthening interdepartmental coordination, supporting timely decision-making, and improving resource utilization.



Unique Contribution: Although emerging technologies have been widely studied in developed hospitality markets, empirical evidence from luxury hotels in developing tourism destinations, such as Zanzibar, remains limited. This study fills this gap by demonstrating that operational efficiency improves significantly as hotels progress from minimal to advanced technology. This study contributes to the hospitality technology literature by providing empirical evidence from Zanzibar.

Key Recommendation: This study recommends that five-star-rated hotels in Zanzibar support continuous staff training, digital competence development, and leadership support

Keywords: Emerging technologies, operational efficiency, digital transformation, MANOVA, hotel performance.

INTRODUCTION

Over the past decade, the adoption of emerging technologies such as artificial intelligence, big data analytics, Internet of Things applications, cloud computing, blockchain, and virtual and augmented reality has shifted from experimental use to a strategic requirement for improving hotel performance, service responsiveness, and guest experience (Anwar et al., 2024; Gajic et al., 2024; Kumar & Sharma, 2024; Nikopoulou et al., 2023). The growing importance of technology adoption in hotel operations has been further intensified by global disruptions such as the COVID-19 pandemic, which increased the need for digital solutions that support safety, resilience, flexibility, and continuity in service delivery, particularly in developing economies, where hospitality remains a key economic sector (Godolja et al., 2024). Empirical evidence suggests that digital adoption can significantly improve operational efficiency and guest satisfaction, with some studies reporting efficiency gains of up to 30% through digital systems in hospitality operations (Anwar et al., 2024; Khalil et al., 2023). These technologies enable hotels to improve reservations, housekeeping coordination, maintenance monitoring, inventory control, customer communication, revenue-related decisions, and overall service delivery quality.

Operational efficiency refers to a hotel's ability to use its human, financial, technological, and physical resources effectively to deliver services while minimizing costs, delays, and operational errors. Operational efficiency is a critical dimension of hotel performance, as it reflects the hotel's ability to use resources effectively, minimize delays, coordinate internal processes, and deliver consistent service outcomes.

Despite the growing body of literature on digital transformation in hospitality, the impact of emerging technologies on operational efficiency in five-star-rated hotels in developing countries remains unexplored. Existing studies have often focused on developed markets or general hospitality contexts, leaving a limited empirical understanding of how emerging technologies influence operational processes in developing destinations such as Zanzibar (Hossan et al., 2025; Krzysztof, 2023; Godolja et al., 2024). Furthermore, although digital maturity has been recognized as an important factor shaping the success of technology adoption, its role in strengthening the relationship between technology adoption and operational outcomes has not been adequately examined (Ardigó et al., 2023; López et al., 2023; López et al., 2025). Debates also remain regarding the cost-benefit balance of technology investments, with some studies indicating that digital transformation may suppress short-term performance due to



implementation costs (Tian, 2025), whereas others emphasize long-term operational and strategic gains (Lutfi et al., 2022; Sabharwal & Jain, 2025).

This study addresses this gap by examining the influence of the adoption of emerging technologies on operational efficiency in five-star-rated hotels in Zanzibar. Guided by the diffusion of innovations theory, technology adoption is viewed as an innovation process in which the technology's operational value depends on the extent to which hotels move from minimal use to more embedded and advanced applications (Rogers, 2003). By examining this relationship in the context of five-star-rated hotels in Zanzibar, this study contributes to the academic understanding and practical decision-making regarding how emerging technologies can be adopted to improve operational efficiency, strengthen competitiveness, and support digital transformation in the hotel sector in a developing economy.

OBJECTIVE

Objective: To determine the influence of the adoption of emerging technologies on the operational efficiency of five-star-rated hotels in Zanzibar.

HYPOTHESIS

H0: The adoption of emerging technologies has no statistically significant influence on the operational efficiency of five-star-rated hotels in Zanzibar.

EMPIRICAL LITERATURE REVIEW

Emerging Technologies and Operational Efficiency in Hotels

Operational efficiency remains a central performance concern in the hotel sector because it reflects the extent to which hotels can execute internal processes accurately, rapidly, and consistently, and use resources optimally. Moullin (2007) conceptualizes performance measurement as the assessment of both the efficiency and effectiveness of organizational actions. In contrast, Pnevmatikoudi and Stavrinoudis (2016) emphasize that hotel performance indicators include productivity, utilization, service quality, customer satisfaction, and continuous improvement. These dimensions are particularly important for five-star-rated hotels because service delivery depends on timely operations, reliable information flow, effective interdepartmental coordination, Resource optimization, and consistent quality.

Empirical evidence increasingly suggests that emerging technologies enhance operational efficiency by enabling automation, real-time decision-making, service coordination, cost control, and process standardization. Across the literature, the strongest gains are reported when technologies are embedded in everyday workflows rather than being treated as isolated digital tools. Digital adoption is associated with measurable efficiency improvements, including stronger operational performance and streamlined service processes in hotel settings (Anwar et al., 2024; Vo et al., 2024; Godolja et al., 2025).



Within this broader pattern, cloud computing has consistently been presented as a foundational enabler of scalable, integrated, and real-time hotel management systems. Rather than emphasizing individual studies in isolation, the literature converges on the view that cloud-based systems improve operational efficiency through enhanced data integration, interdepartmental coordination, guest service management, and responsiveness (Anwar et al., 2024; Vo et al., 2024; Hsu, 2023).

This pattern is reinforced by several studies showing that cloud-based platforms enhance guest service coordination, scalable data processing, operational agility, and data-driven decision-making when supported by adequate infrastructure and staff capabilities (Challa et al., 2022; Youssofi et al., 2023; Challa, 2025; Goel, 2025; Youssofi et al., 2025).

Collectively, these studies suggest that the operational value of cloud computing lies less in the technology itself and more in its ability to integrate hotel information systems, enable timely communication, and strengthen management visibility across the departments. However, the literature cautions that these benefits are conditional on organizational readiness, meaning that infrastructure limitations and insufficient staff training can weaken the contribution of cloud-based systems to hotel efficiency.

Artificial intelligence and related smart technologies are widely associated with operational efficiency because they automate repetitive tasks, reduce manual workload, improve service consistency, and support predictive decision-making. Rather than serving only as guest-facing innovations, these technologies are increasingly understood as operational tools that improve reservations, housekeeping, maintenance, communication, and service delivery. The literature generally agrees that AI-enabled systems contribute to process optimization and service standardization, whereas AI-IoT integration further strengthens efficiency and sustainability in hotel management (Alhammedi, 2025; Singh et al., 2024; Aljawarneh et al., 2025; Godolja et al., 2024; Gajic et al., 2024). Similarly, Anwar et al. (2024) show that when Artificial Intelligence (AI) is combined with cloud platforms, analytics, and contactless systems, hotels can improve service speed, reduce workloads, and support more responsive operations, thereby enhancing the guest experience.

Big data analytics contributes to operational efficiency by improving evidence-based decision-making, demand forecasting, performance monitoring, and responsiveness to challenges in the hotel industry. The literature consistently indicates that analytics strengthens firm and hotel performance by enhancing organizational agility, adaptive decision-making, customer retention, and reputation, particularly when supported by governance structures and organizational readiness (Lutfi et al., 2022; Khalil et al., 2023; Wawulagala, 2022; Sequeira et al., 2023; Picoto & Pinto, 2023). In operational terms, this means that analytics can help hotel managers interpret guest feedback, occupancy patterns, revenue trends, and service bottlenecks more effectively, thereby improving efficiency through quicker, better-informed managerial responses.



The Internet of Things (IoT) also improves operational efficiency through real-time monitoring, automation, and intelligent resource management of the hotels. In the literature, IoT applications are associated with occupancy tracking, guest movement monitoring, energy management, security enhancement, service personalization, and faster operational decision-making. Several studies have shown that IoT sensors and integrated smart hotel systems generate timely service and occupancy data that support efficiency and customer satisfaction, especially when combined with AI-enabled automation (Raman, 2023; Jiang, 2022; Sudhakar et al., 2024; Yadav & Raju, 2024). However, this evidence is also qualified by persistent concerns about implementation costs, privacy, and readiness, indicating that efficiency gains remain contingent rather than automatic.

Blockchain technology has been discussed less frequently than cloud computing, AI, and analytics have. However, the literature suggests that it can improve operational efficiency through secure transactions, transparent recordkeeping, booking verification, smart contracts, inventory management, payment systems, and supply chain traceability. Existing studies collectively indicate that blockchain can reduce booking costs, improve trust, and strengthen accountability and traceability in supply chain operations, all of which are relevant to efficient hotel management (Dong et al., 2020; Paktiti & Economides, 2023; Sankar & David, 2024; Inayatulloh, 2023; Kadam et al., 2024; Maashari, 2025; Sawon et al., 2025). However, the literature remains cautious, noting that adoption in many developing hospitality contexts is still constrained by high implementation costs, limited awareness, weak infrastructure, and shortages of digital skills (Chourasia and Zeqiri, 2020; González-Mendes et al., 2024; Hossan et al., 2025; Chourasia, 2025).

Although virtual and augmented reality are more often associated with marketing and guest experience, the empirical literature also highlights their operational relevance, particularly in staff training, service simulation, and workforce preparedness. Across the reviewed studies, immersive technologies have been shown to improve communication competence, critical thinking, problem-solving ability, technical skills, motivation, and knowledge retention through simulated and gamified learning environments (Çeltek & Akmermer, 2022; Ismail et al., 2024; Ismail et al., 2024; Rohlíková et al., 2025; Daida, 2025).

This suggests that their contribution to operational efficiency is indirect yet meaningful, as better-prepared employees are more likely to deliver standardized and consistent service. Nevertheless, high costs and technical limitations continue to hinder the widespread adoption of these technologies, particularly in resource-constrained hotels.

Collectively, empirical studies show that emerging technologies improve hotel operational efficiency. A key pattern across the studies is that efficiency gains depend not only on the specific technology adopted but also on the extent of system integration, staff capability, infrastructure readiness, leadership commitment, and the organization's digital maturity. However, despite extensive evidence linking emerging technologies to operational efficiency, existing studies have largely focused on individual technologies in the hospitality sector.



Consequently, Little empirical evidence exists on the influence of the adoption of emerging technologies on operational efficiency in five-star-rated hotels in Zanzibar, where technological infrastructure and digital maturity differ substantially from those in developed economies.

THEORETICAL REVIEW

Diffusion of Innovations Theory

The Diffusion of Innovations Theory was originally developed by Everett M. Rogers in 1962 and subsequently refined in later editions of his work published in 1983, 1995, and 2003. This theory explains how new ideas, practices, and technologies spread within social systems over time. Rogers emphasized that the adoption of innovation is shaped by key factors, including the nature of the innovation, communication channels, time, and the social system in which it is adopted. According to Rogers (2003), the theory comprises four major components: innovation, communication systems, time, and social systems. Rogers describes adoption as a staged process involving awareness, interest, evaluation, trial, and adoption of a new idea.

Nevertheless, Rogers (2003) identified five attributes that influence the rate of innovation adoption: relative advantage, compatibility, complexity, trialability, and observability. Innovations perceived to offer greater advantages, compatibility with existing systems, ease of use, opportunities for experimentation, and visible benefits are more likely to be adopted. In this study, these attributes directly explain why hotels adopt emerging technologies. Currently, the theory is connected mainly to technology adoption but not sufficiently to operational efficiency issues. Within five-star-rated hotels, technologies that demonstrate clear operational benefits are more likely to be adopted because managers perceive them as offering a relative advantage over traditional systems. Consequently, adopting these innovations can improve the industry's operational efficiency.

METHODOLOGY

Research Design

This study used a mixed-methods convergent parallel design, which is appropriate when quantitative and qualitative data are collected during the same research phase, analyzed separately, and integrated during interpretation (Creswell & Creswell, 2017; Demir & Pismek, 2018).

Study Population, Sampling, and Sample Size

The target population comprised all managers working in five-star-rated hotels in Zanzibar. According to the Zanzibar Commission for Tourism (2025), there are 56 registered five-star-rated hotels with 392 managers across hotel departments. This study used census and stratified sampling techniques. For hotel managers, stratification was applied at the departmental level to ensure the representation of seven key departments: Front Office, Housekeeping, Food and Beverage, Human Resources, Finance, ICT, and Security. A census approach was then used, including all departmental managers from the selected five-star-rated hotels, targeting 392



managers across 56 hotels in the sample. However, the response rate was only 252 Hotel managers.

Data Collection

A structured questionnaire was used to collect data, comprising closed-ended items (Likert-scale questions) and open-ended questions to capture additional views from the respondents. The questionnaire covered emerging technologies adopted by five-star-rated hotels and their operational efficiency. To enhance response rates and reduce non-response bias, the questionnaire was administered through face-to-face contact and self-completion using the drop-off-and-pick-up approach.

Data Analysis

Quantitative data were analyzed using descriptive statistics, including means and standard deviations, to summarize responses regarding the adoption of emerging technologies and operational efficiency. Moreover, MANOVA was used to assess whether the adoption of emerging technologies significantly influenced the operational efficiency. MANOVA was used because the study examined group differences across multiple dependent variables, and this technique is appropriate for testing multivariate mean differences across groups (Hair et al., 2010). Nevertheless, data from open-ended responses were analyzed using content analysis.

Reliability and Validity of the Instruments

Internal consistency reliability was tested using Cronbach's alpha, with 0.70 as the acceptable threshold. The overall Internal consistency of the operational efficiency instrument ($\alpha = 0.861$) across all operational efficiency indicators confirms strong reliability for further analyses. Nevertheless, content validity was established through an expert review to confirm clarity, relevance, and alignment with the study objective.

RESULTS

Adoption of Emerging Technologies and Operational Efficiency

Descriptive Statistics of Study Variables

The descriptive findings showed that the five-star-rated hotels in Zanzibar had adopted several emerging technologies. Cloud computing technologies recorded the highest adoption score (mean = 4.14), followed by big data analytics (mean = 3.89), artificial intelligence (mean = 3.31), the Internet of Things (IoT) (mean = 3.28), blockchain technologies (mean = 2.88), and virtual and augmented reality (mean = 2.53). The operational efficiency indicators are positive. Respondents reported better work performance (mean = 4.78), faster service delivery (mean = 4.72), reduced errors (mean = 4.69), time savings (mean = 4.67), cost savings (mean = 4.66), improved service delivery (mean = 4.60), and enhanced task automation (mean = 4.55) when using AI.



Table 1: Responses on Operational Efficiency of Five-Star Rated Hotels (n=252)

Dimension of measurement of OE	Mean score	Standard Deviations	Explanation
Fast delivery of service (OE1)	4.72	0.449	Agreed
Reduced errors (OE2)	4.69	0.462	Agreed
Saved time and money (OE3)	4.69	0.462	Agreed
Performed better work (OE4)	4.78	0.417	Agreed
Enabled to perform routine tasks (OE5)	4.47	0.800	Agreed
Track and fix issues (OE6)	4.31	0.097	Agreed
Fasten speed (OE7)	4.61	0.543	Agreed
Increased housekeeping efficiency (OE8)	4.36	0.789	Agreed
Improved communication (OE9)	4.67	0.578	Agreed
Automated routine operations (OE10)	4.50	0.602	Agreed
Managed energy and reduced wastes (OE11)	4.39	0.79	Agreed

Qualitative Analysis

The quantitative results above indicate high operational efficiency following the adoption of emerging technologies, with all operational performance dimensions exceeding their respective threshold values. These quantitative findings are supported by qualitative responses from the open-ended questionnaire, which provide strong evidence of the transformative role of emerging technologies in improving operational processes in five-star-rated hotels in Zanzibar. The respondents reported that adopting emerging technologies led to substantial improvements in service delivery, task automation, interdepartmental coordination, and overall operational efficiency.

Respondents emphasized that adopting emerging technologies significantly enhances service delivery by enabling staff to perform their duties efficiently, professionally, and confidently. Digital systems are perceived as enabling faster and more accurate service delivery, thereby improving the quality and consistency of guest experiences. The automation of routine processes, such as bookings, check-ins, and service requests, has been reported to reduce manual workload and minimize operational errors, allowing employees to focus on higher-value, guest-oriented activities.

In addition, respondents highlighted that emerging technologies improved work efficiency by saving time and simplifying the identification and resolution of problems. Automated monitoring systems and centralized digital platforms have been reported to facilitate the identification of operational issues and prompt responses, thereby enhancing responsiveness and reducing service delays. These efficiencies contribute to smoother daily operations and improved productivity. Interdepartmental coordination and communication among hotels in the region have improved considerably following the adoption of these technologies. Respondents noted that integrated systems facilitate real-time information sharing across departments, enabling quicker decision-making, improved coordination, and more effective problem-solving. This enhanced connectivity



was perceived as supporting seamless operations, particularly in environments where multiple departments must collaborate to deliver timely services.

Furthermore, respondents reported that centralized digital systems strengthened financial and operational controls by enabling more effective expense tracking and better alignment with budget allocation. These systems are perceived to enhance transparency and accountability, thereby supporting better planning and resource management in the industry. The integration of manual tasks into centralized digital platforms has been highlighted as a key factor in ensuring operational consistency and reliability.

Qualitative findings indicate that the adoption of emerging technologies has fundamentally improved hotel operations by streamlining workflows, enhancing service quality, improving interdepartmental coordination, and supporting efficient resource management. These findings align with quantitative evidence on operational efficiency and highlight the role of digital maturity, particularly employee digital competence and leadership support, in maximizing the operational benefits of emerging technologies in five-star-rated hotels in Zanzibar.

Operational Efficiency Differences Across Emerging Technologies Adoption Groups

Figure 1 illustrates the estimated marginal means (EMMs) of operational efficiency across the coded categories of the emerging technologies. The EMMs range from approximately 4.0 to 5.0, indicating a noticeable dispersion in the adjusted operational efficiency across categories. Graphically, the first category recorded the highest mean (≈ 5.0), followed by a sharp decline to the lowest mean (≈ 4.0) in the subsequent category. Thereafter, the trend rises steadily, with several categories clustering at 4.5–4.52 before reaching a local peak at approximately 4.8. The final category (“Yes”) showed a modest decrease to approximately 4.65, although it remained above the lowest. The findings show the variations in the adjusted mean operational efficiency across the technology adoption categories. Hotels with higher levels of adoption of emerging technologies generally record higher operational efficiency scores than those with lower adoption. However, statistical significance was confirmed by subsequent MANOVA and Bonferroni post-hoc analyses.

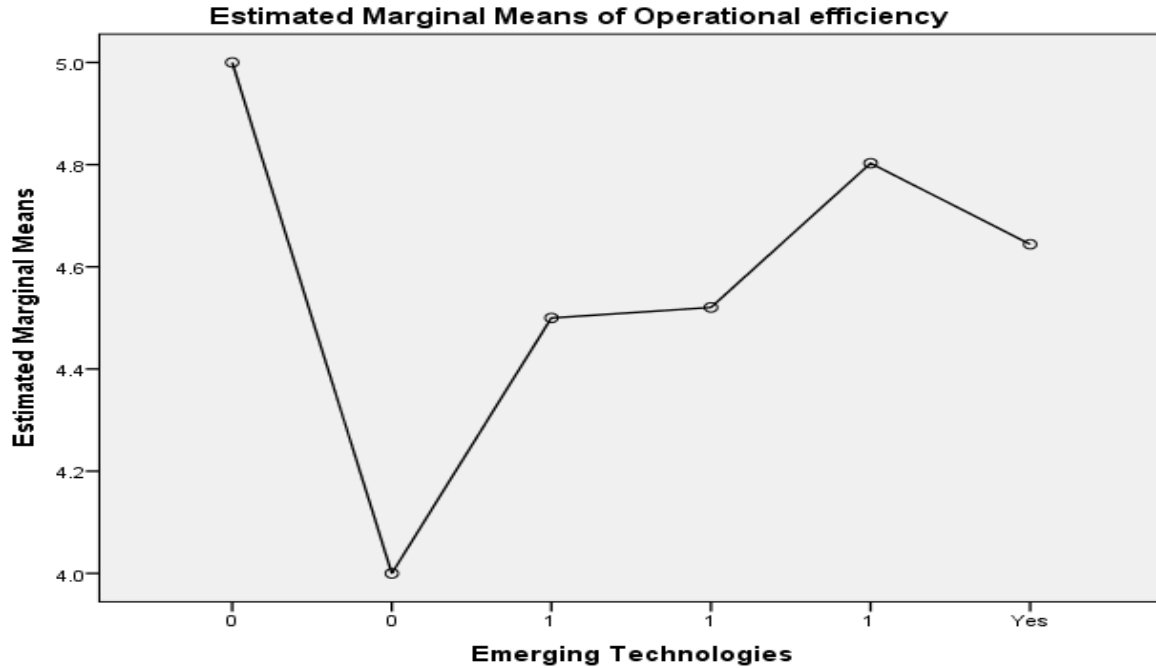


Figure 1: Estimated Marginal Means of Operational Efficiency by Emerging Technologies Adoption Level

MANOVA Tests of Between-Subjects Effects

MANOVA confirmed that the adoption of emerging technology had a statistically significant multivariate influence on performance outcomes (Wilks’ Lambda = 0.668, $F(15, 673.978) = 7.070$, $p < 0.001$). For operational efficiency, the between-subjects effect was significant, $F(5, 246) = 9.749$, $p < 0.001$, $R^2 = 0.165$, and the adjusted $R^2 = 0.148$. The Bonferroni post hoc results showed that minimal adopters performed significantly worse than moderate adopters (mean difference = -0.50, $p = 0.012$) and advanced adopters (mean difference = -0.64, $p < 0.001$). Therefore, H_{01} was rejected.

Key MANOVA Results for Operational Efficiency

Indicator	Result
Multivariate effect	Wilks’ Lambda = 0.668; $F(15, 673.978) = 7.070$; $p < 0.001$
Between-subjects effect	$F(5, 246) = 9.749$; $p < 0.001$
Explanatory power	$R^2 = 0.165$; adjusted $R^2 = 0.148$
Post-hoc comparison	Minimal adoption worse than moderate adoption: mean difference = -0.50; $p = 0.012$
Post-hoc comparison	Minimal adoption worse than advanced adoption: mean difference = -0.64; $p < 0.001$
Hypothesis decision	H_0 rejected

Hypothesis 1: Emerging Technologies Adoption Influences Operational Efficiency



(H_{01}) *The adoption of emerging technologies does not significantly influence operational efficiency in five-star luxury hotels in Zanzibar.* Multivariate analysis using Wilks' Lambda revealed a significant effect of these technologies on operational efficiency ($\Lambda = 0.668$, $F(15, 673.978) = 7.070$, $p < 0.001$). The between-subjects effects on operational efficiency were significant ($F(5, 246) = 9.749$, $p < 0.001$, $R^2 = 0.165$). Post hoc comparisons indicated that hotels with minimal technology adoption performed significantly worse than those with moderate (mean difference = -0.50 , $p = 0.012$) or advanced (mean difference = -0.64 , $p < 0.001$) technology adoption. The study concludes that H_{01} is rejected, and H_{11} is accepted. The adoption of emerging technologies has significantly enhanced the operational efficiency of five-star-rated hotels in Zanzibar. Hotels with moderate and advanced technology adoption exhibited significantly higher operational efficiency than those with minimal adoption.

DISCUSSION OF FINDINGS

The findings indicate that the adoption of emerging technologies enhances operational efficiency in five-star-rated hotels in Zanzibar by improving the speed, coordination, accuracy, and control of operations. Although several technologies have been adopted, cloud computing has emerged as the most prominent, suggesting that hotels prioritize systems that support centralized information sharing and real-time coordination across departments. In Zanzibar's tourism-dependent economy, where five-star-rated hotels must meet international service expectations while responding to seasonal demand, diverse guest needs, and complex interdepartmental coordination, such technologies are especially valuable because they reduce operational delays, strengthen communication, and support smoother service execution across front office, housekeeping, food and beverage, finance, security, and management departments.

This interpretation is consistent with the literature that conceptualizes operational efficiency as the effective, timely, and resource-conscious execution of internal processes. Moullin (2007) views performance in terms of both efficiency and effectiveness, while Pnevmatikoudi and Stavrinoudis (2016) associate hotel performance with productivity, utilization, service quality, customer satisfaction, and continuous improvement. The present findings extend this perspective by showing that in Zanzibar's five-star-rated hotels, operational efficiency is improved not only by technology but also by the capacity of digital systems to connect highly interdependent service functions within luxury hotel operations. Qualitative evidence reinforces this point, as the respondents described the adoption of emerging technologies as practical tools for automation, coordination, and operational management. This helps explain the prominence of cloud-based systems in the study: in hotels serving an international tourism market such as Zanzibar, real-time information sharing, reservation integration, and rapid service coordination are central to maintaining service standards and protecting guest satisfaction. In this sense, the findings corroborate previous studies showing that cloud-based systems enhance coordination, information sharing, and service responsiveness in hotel operations.

Moreover, the positive role of artificial intelligence, the Internet of Things, and big data analytics can be understood through their complementary operational functions, rather than as isolated technical tools. Existing research generally shows that these technologies improve process



optimization, service standardization, sustainability, and data-driven decision-making in hotel industry operations.

In the present study, their contribution appears to stem from their combined ability to reduce manual workload, improve visibility across departments, support quicker responses to service issues, and enable better monitoring of performance and guest requirements in hotels. This is particularly important in Zanzibar, where five-star-rated hotels compete in an internationally exposed island destination and where guest expectations regarding speed, personalization, and reliability are high. Simultaneously, operational disruptions can directly affect the restaurant's reputation and repeat visits. In this context, digital technologies are not merely efficiency tools; they are strategic enablers that help hotels maintain consistent service, managerial control, and market competitiveness.

The inferential results provide stronger support for this interpretation than do the descriptive results. MANOVA confirmed a significant multivariate effect of adopting emerging technologies on operational efficiency. The between-subjects effect on operational efficiency was also significant in this study. More importantly, the findings show that efficiency gains become more visible as hotels move beyond minimal adoption and toward a stronger digital integration. This pattern is consistent with the Diffusion of Innovations Theory, which explains that the benefits of innovation become clearer as adoption progresses from experimentation to routinized and integrated use (Rogers, 1962, 1995, 2003).

The post hoc differences between minimal and more advanced adopters suggest that technology improves operational efficiency not simply because it is adopted, but because it becomes embedded in organizational routines, is supported by management, and is matched to employees' capabilities. More broadly, these findings corroborate the prior literature emphasizing that organizational readiness, top management support, and staff digital skills shape whether technology adoption translates into meaningful performance gains.

The study shows that in five-star-rated hotels in Zanzibar, emerging technologies improve operational efficiency when effectively integrated into routine service delivery and management processes, rather than being adopted minimally or in a fragmented manner.

CONCLUSION

The study concludes that the adoption of emerging technologies significantly enhances operational efficiency in five-star-rated hotels in Zanzibar. Hotels that have moved beyond minimal technology adoption demonstrate superior operational outcomes, including faster service delivery, fewer operational errors, improved communication, greater automation of routine tasks, enhanced interdepartmental coordination, and more efficient resource utilization. The findings further suggest that the operational benefits of digital transformation depend not only on technology adoption but also on the extent to which technologies are integrated into daily hotel operations and supported by organizational capabilities.



RECOMMENDATIONS

The findings of this study have implications for theory, practice, and further research.

Implications for Practice

Five-star-rated hotels should accelerate the adoption of emerging technologies directly embedded in daily hotel operations. Priority should be given to cloud computing, big data analytics, artificial intelligence, and Internet of Things applications, which have demonstrated strong associations with improvements in operational efficiencies.

Hotel managers and owners should ensure that technology adoption is not treated as a stand-alone investment but is supported by continuous staff training, employee digital competence development, system integration, and leadership support so that digital tools translate into measurable operational improvements.

Policy implications

Tourism policymakers and hospitality authorities should support hotel digital transformation through reliable digital infrastructure, innovation incentives, cybersecurity and data protection frameworks, and workforce digital-skills programs that enable hotels to adopt and use emerging technologies to improve performance.

Further Research

Future researchers may build on these findings by examining how different technologies influence other dimensions of hotel performance and extending similar studies to other hotel categories or tourism destinations to strengthen the comparative understanding of technology adoption in the hospitality industry.

Ethical clearance

The ethical principles of research were followed throughout this study. These included informed consent from participants, confidentiality, voluntary participation, and the respondents' right to withdraw at any time.

Acknowledgments

We also acknowledge the managers of five-star-rated hotels in Zanzibar for their willingness to participate in this study and for generously sharing their insights.

Author Contributions

All authors contributed equally to the conception and design of this study.

Conflict of Interest: The authors declare that the research was conducted without any commercial or financial relationships that could be construed as potential conflicts of interest.

Data availability statement: The datasets used to conclude this study are available upon reasonable request.



Funding

This study did not receive financial support.

Artificial Intelligence (AI) Use Disclosure

The author(s) declare that no generative Artificial Intelligence (AI) or AI-assisted technologies were used in the writing, analysis, or preparation of this manuscript.

Citation

Savunyu, S., Korir, J., & Sawe, B. (2026). Influence of Smart Hospitality Technologies (SHTs) on Operational Efficiency of Five-Star-Rated Hotels in Zanzibar, Tanzania. *International Journal of Sub-Saharan African Research*, 4(2), 73-89

REFERENCES

- Alhammedi A. (2025). Integration of Industry 4.0 technologies in the hospitality sector. *International Journal of Technology and Systems* 10 (3), 20–31. <https://doi.org/10.47604/ijts.3478>
- Anwar, F. A., Deliana, D., & Suyamto, S. (2024). Digital transformation in the hospitality industry: Improving efficiency and guest experience. *International Journal of Management Science and Information Technology*, 4(2), 428–437. <https://doi.org/10.35870/ijmsit.v4i2.3201>
- Ardigó, C. M., da Silva, A. D., & Sohn, A. P. L. (2023). Market orientation and digital maturity: a case study in a resort. *Revista Hospitalidade*, 20, 233–266. <https://doi.org/10.29147/revhosp.v20.1055>
- Çeltek, E., & Akmermer, E. (2025). Gamification in the Hospitality Industry Using AR, VR, and the Metaverse. In *Revolutionizing Hospitality Management Systems With AI, VR, and Machine Learning* (pp. 183–214). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-8769-6.ch007>
- Chourasia, B. (2025). The Future of Smart Hotels and Digital Transformation in the Hospitality Industry. In *Transforming the Service Sector with New Technology* (pp. 533–540). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-7447-4.ch032>
- Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed-methods approaches. *Sage Publications*.
- Daida, J. L. S. (2025). The role of virtual and augmented reality in employee training and development. *Journal of Informatics Education and Research*, 5(1). <https://doi.org/10.52783/jier.v5i1.2415>
- Demir, S. B., & Pismek, N. (2018). A convergent parallel mixed-methods study of controversial issues in social studies classes: A Clash of Ideologies. *Educational Sciences: Theory and Practice*, 18(1), 119–149.



- Gajic, T., Petrovic, M. D., Pesic, A. M., Conic, M., & Gligorijevic, N. (2024). Innovative approaches in hotel management: Integrating artificial intelligence (AI) and the Internet of Things (IoT) to enhance operational efficiency and sustainability. *Sustainability*, 16(17), 7279.
- Godolja, M., Sevrani, K., & Millo, D. (2025). Smart Technologies Shaping the Future of the Hotel Industry in Developing Countries: A Post-COVID Review. <https://doi.org/10.31410/itema.2024.165>
- Godolja, M., Tavanhui, T., & Sevrani, K. (2025). Strategic readiness for AI and smart technology adoption in emerging hospitality markets: A tri-lens assessment of barriers, benefits, and segments in Albania. *Tourism and Hospitality*, 6(4), 187.
- González-Mendes, S., García-Muiña, F., & González-Sánchez, R. (2024). Blockchain revolution in the tourism industry: A semi-systematic literature review. *European Journal of Tourism Research*. <https://doi.org/10.54055/ejtr.v37i.2777>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). Pearson.
- Hossan, F., Islam, M. T., & Hasan, M. K. (2025). Blockchain technology in the hospitality sector: Exploring opportunities and challenges in Bangladeshi hotels. *Journal of Asian Business Strategy*, 15(2), 31–45. <https://doi.org/10.55493/5006.v15i2.5563>
- Hsu, H. (2023). Facing the era of smartness – delivering excellent smart hospitality experiences through cloud computing. <https://doi.org/10.1080/19368623.2023.2251144>
- Inayatulloh. (2023, September). A blockchain model in the hospitality industry to increase the traceability and transparency of transactions. In *2023 International Seminar on Application for Technology of Information and Communication (iSemantic)* (pp. 58–62). IEEE. <https://doi.org/10.1109/isemantic59612.2023.10295327>
- Ismail, A., Halimatul, N., Awwad, S. A., Thinakaran, R., Quah, W. B., & Muniandy, M. (2024). Virtual Reality and Gamification in Hospitality Education at the Front Desk. *TEM Journal*, 13(3). <https://doi.org/10.18421/tem133-25>
- Kadam, S., Senta, R., Sah, R. K., Sawant, A., & Jain, S. (2024, March). Blockchain revolution: A new horizon for supply chain management in the hotel industry. In *2024 International Conference on Emerging Smart Computing and Informatics (ESCI)* (pp. 1–8). IEEE. <https://doi.org/10.1109/esci59607.2024.10497236>
- Aljawarneh, N. M., Alazzam, M. F., & Al Rawashdeh, O. M. (2025). Technology application and hotel innovating performance: the moderating role of smart hotel systems. *Mutah Journal of Humanities and Social Sciences (MJHSS)*, 40(2). <https://doi.org/10.35682/mjhss.v40i2.1111>



- Krzysztof, W. (2023). Digital transformation in the hotel industry: Shaping the challenges and opportunities by the case of five-star hotels in Bulgaria. *Tourism, Hospitality & Event Management*, 205–232. https://doi.org/10.1007/978-3-031-31682-1_11
- Kumar, P. S., & Sharma, D. A. (2024). An era of digital transformation in the hospitality and tourism sector. <https://doi.org/10.53555/kuey.v30i4.4330>
- López, A. G., Galindo-Pérez-de-Azpillaga, L., & Robles, F. (2025). The flow of digital transition: The challenges of technological solutions for hotels. *Social Indicators Research*. <https://doi.org/10.1007/s11205-024-03487-5>
- Lutfi, A., Al-Khasawneh, A. L., Almaiah, M. A., Alshira'h, A. F., Alshirah, M. H., Alsyouf, A., Alrawad, M., Al-Khasawneh, A., Saad, M., & Ali, R. M. A. A. (2022). Antecedents of big data analytics adoption and its impacts on performance: A contingent effect. *Sustainability*, 14 (23), 15516–15516. <https://doi.org/10.3390/su142315516>
- Moullin, M. (2007). Performance measurement definitions: Linking performance measurement and organizational excellence. *International Journal of Health Care Quality Assurance*, 20(3), 181–183.
- Nikopoulou, M., Kourouthanassis, P., Chasapi, G., Pateli, A., & Mylonas, N. (2023). Determinants of digital transformation in the hospitality industry: Technological, organizational, and environmental drivers. *Sustainability*, 15(3), 2736. <https://doi.org/10.3390/su15032736>
- Paktiti, M., & Economides, A. A. (2023). Smart contract applications in tourism. *International Journal of Technology Management & Sustainable Development*, 22(2), 165–184. https://doi.org/10.1386/tmsd_00074_1
- Pnevmatikoudi, K., & Stavrinoudis, T. (2016). Classification of hotel performance measurement indicators presented in international scientific research. *European Journal of Tourism Research*, 12, 82-98. <https://doi.org/10.54055/ejtr.v12i.214>
- Rogers, E. M. (2003). Diffusion of innovations (5th ed.). *Free Press*.
- Rohlíková, L., Fiala, J., Han, J., Husak, J., Chadt, K., Chalupa, S., Jenčková, J., Kotek, M., Peruřková, M., Průcha, T., Stejskal, J., & Visvizi, A. (2022). Innovating in the tourism industry through virtual reality (VR) and education in the hotel business. *International Journal of Smart Education and Urban Society*, 13(1), 1–12. <https://doi.org/10.4018/ijseus.309955>
- Sabharwal, D., & Jain, V. (2025). Transforming hospitality through AI, big data, and automation: the new era of service innovation. In *addressing contemporary challenges in the b2b hospitality sector* (pp. 309–336). *IGI Global Scientific Publishing*. <https://doi.org/10.4018/979-8-3693-9760-2.ch01>.



- Sankar, J. G., & David, A. (2024). Transforming the travel landscape: Smart contracts in tourism management. In *Decentralizing the online experience with Web3 technologies* (pp. 246–266). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-1532-3.ch012>
- Sawon, M. M. H., Hossain, M. A., & Talukder, M. B. (2026). Revolutionizing hospitality through smart logistics: innovations in supply chain and inventory control in the hospitality industry. in *smart operations and enhancing guest experience in the hospitality industry* (pp. 95–124). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-2145-5.ch004>
- Singh, D. K., & Singh, S. V. (2025). Impact of emerging technologies on hotel information systems: A systematic review of adoption, challenges, and outcomes in the Indian hospitality sector. *Journal of Informatics Education and Research*, 5(3). <https://doi.org/10.52783/jier.v5i3.3476>
- Singh, S., Sharma, M., & Bangad, P. R. (2024). Technology-driven trends in hospitality: the rise of smart hotels in the digital era. *Shodhkosh: Journal of Visual and Performing Arts Yyepdumenu: Granthaalayah Publications and Printers*, 5(6).
- Tian, Y. (2025). The impact of digital technology on enterprise operational performance. *Advances in Economics, Management and Political Sciences*, 211 (1), 238–246. <https://doi.org/10.54254/2754-1169/2025.cau26587>
- Vo, D. T. T., Abu Afifa, M., Bui, D. V., Van, H. V., & Nguyen, N. (2024). Nexus among cloud-based accounting, employee job performance, employee digital skills, and operational performance: a mediating–moderating model. *Meditari Accountancy Research*, 32(6), 2321-2347.
- Wawulagala, N. S. (2022). *A ten-on the role and importance of artificial intelligence (AI) and automation in high-end year outlook hotels* (Doctoral dissertation, California Southern University).
- Youssofi, A., Jeannot, F., Jongmans, E., & Dampérat, M. (2024). Designing the digitalized guest experience: A comprehensive framework and research agenda. *Psychology & Marketing*, 41(3), 512–531.