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Influence of Information Communication Technology Infrastructure on Operational Efficiency of Upscale Hotels in Nyeri County, Kenya

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Abstract

In the modern competitive landscape, companies must leverage key resources to enhance business performance, with the hospitality industry increasingly integrating information communication technology (ICT) to maintain competitiveness and operational efficiency. Recognizing the evident benefits of ICT investments, this study explores the influence of ICT adoption on the operational efficiency of upscale hotels in Nyeri County, Kenya. Utilizing a survey strategy, data were collected through a self-administered questionnaire distributed to three-, four- and five- star hotels in Nyeri County, with a response rate of 88.10% (37 out of 50 questionnaires returned). The study revealed a moderate positive relationship between ICT hardware infrastructure and operational efficiency ($r = 0.412$, $p < 0.05$), a significant positive relationship between ICT software infrastructure and operational efficiency ($r = 0.498$, $p < 0.01$), and a strong positive relationship between ICT network infrastructure and operational efficiency ($r = 0.457$, $p < 0.01$). These findings underscore the significant influence of ICT on the operational efficacy of upscale hotels in Nyeri County. The study recommends that upscale hotels in Nyeri County prioritize strategic investments in their ICT infrastructure, focusing on upgrading hardware, software, and network systems to enhance their operational efficiency and competitive edge..

Keywords: *Upscale hotels, Nyeri county, Information Communication Technology, Operational Efficacy*

1. Introduction

In the modern competitive landscape, companies must identify and leverage key resources to enhance their business performance. For the hospitality industry, the integration of information communication technology (ICT) has become a critical element for maintaining competitiveness and operational efficiency. According to Yohanna (2022), the amalgamation of information with technological advancements has been pivotal for the hotel industry in the 21st century, serving as a cornerstone for effective operations.

The strategic implementation of ICT in the hospitality sector has been recognized as essential for achieving various business objectives, including the description, promotion, distribution, organization, and delivery of services. Ezzaouia and Bulchand-Gidumal

(2023) highlight a positive and significant relationship between ICT utilization and the development of competitive advantages within the industry. This relationship underscores the necessity for hotels to adopt ICT systems to stay competitive.

The impact of ICT on the infrastructure of the hospitality industry extends to significant strategic implications for industry leaders. Hua (2020) notes that the increasing reliance on ICT systems is expected to continue transforming hotel operations substantially. Both academic researchers and industry practitioners have noted the substantial impacts ICT has already had, as well as its potential for further enhancing the hospitality and tourism industry. Garbin Praničević and Mandić (2020) emphasize that ICT implementation has led to decreased costs, greater productivity, and increased revenues in the lodging sector, thus improving overall customer service and business operations.

The adoption of ICT in business processes has proven to be beneficial, leading to lower costs and higher financial performance for hotels that utilize these tools effectively (Ezzaouia & Bulchand-Gidumal, 2023). Additionally, Yohanna (2022) points out that ICT enhances workplace communication, improves service quality, and aids managers in making informed decisions based on timely and accurate information.

Given the evident benefits, it is crucial for hoteliers to recognize the advantages of investing in ICT tools. However, there is a need for further research, particularly in varied contexts, as the factors and circumstances influencing ICT adoption can differ significantly between developed and developing countries (Akdu, 2020). This study aims to explore the influence of ICT adoption on the operational efficiency of upscale hotels in Nyeri County, Kenya, with a specific focus on upscale hotels.

1.1 Background to the Study

The hotel industry is a critical sub-sector within Kenya's tourism sector, envisioned to contribute significantly to the country's projected 10 percent annual economic growth as outlined in Kenya Vision 2030. Over the past decade, this industry has consistently contributed around 1 percent to the real Gross Domestic Product (GDP). In 2022, it directly employed 450,000 individuals and, along with the trade sector, indirectly supported the livelihoods of 11 million people. On a more localized level, the hotel industry accounted for over 10 percent of the Gross County Product (GCP) in counties such as Kwale, Mombasa, and Nairobi in 2017. This highlights its importance to both national and county-level economies, making it a pivotal sector for government focus and investment.

The hotel industry in Kenya is a vital component of the nation's tourism sector, characterized by a diverse range of accommodations that cater to both domestic and international travellers (Yohanna, 2022). Governed by the Tourism Regulatory Authority (TRA), the industry adheres to a standardized star-rating system that evaluates hotels on a scale of one to five based on a comprehensive set of criteria. These criteria include infrastructure quality, customer service standards, amenities, safety, hygiene, and overall guest experience. The star-rating system ensures that hotels maintain high standards, fostering trust and reliability among guests (Gikuhi, 2020). This regulatory framework not only helps guests make informed choices but also encourages hotels to continuously improve their offerings to achieve higher ratings. The competitive nature of the industry, coupled with the regulatory oversight, drives innovation and excellence, making Kenya's hotel sector robust and dynamic.

Upscale hotels are establishments within the hospitality industry that offer luxurious accommodations, premium amenities, and high-quality services to their guests (Yohanna, 2022). In the context of this study, they include the three-, four- and five- star hotels.

1.1.1 Operational Efficiency

Operational efficacy in upscale hotels can be analyzed through various dimensions of efficiency as noted by Guyo (2014). The first dimension focuses on the relationship between the average cost of a product or service and the level of output, which is crucial for hotels striving to balance cost control with high-quality service delivery. For upscale hotels, maintaining a high level of service while managing costs involves optimizing labour, streamlining processes, and leveraging technology to enhance productivity. By effectively managing these factors, hotels can achieve a cost-effective operational model that does not compromise on the quality of guest experiences. This balance is particularly important in the hospitality industry where customer satisfaction is paramount, and operational inefficiencies can lead to increased costs and reduced competitiveness.

The second dimension of efficiency examines the connection between the average cost and the production of diverse varieties of output. In the context of upscale hotels, this translates to offering a wide range of services and amenities such as dining options, spa services, and event facilities while keeping costs manageable. Guyo (2014) suggests that operational efficiency can be achieved more easily and cost-effectively when production involves varied outputs with fewer inputs, compared to operating separate facilities for each service. This integrated approach allows upscale hotels to utilize shared resources and infrastructure, thereby reducing overhead costs and enhancing overall efficiency. By focusing on a diverse yet integrated service offering, upscale hotels can cater to a broader market segment, increase revenue streams, and maintain a competitive edge in the hospitality industry.

1.1.2 Information Communication Technology Infrastructure

The role of Information and Communication Technology (ICT) in improving the operational efficacy of upscale hotels is multifaceted, encompassing both administrative and operational technological capital. According to Ermelinda, Klodiana, and Lavdosh (2011), technology infrastructure in hotels includes protocols, hardware, software, networks, and people, which together enable efficient information management, administration, and communication. These components are integrated to streamline hotel operations, from front desk services to back-end management systems. Effective ICT infrastructure ensures that data flows seamlessly across various departments, enhancing coordination and reducing bottlenecks. This integration allows for real-time updates and decision-making, which is crucial for maintaining high service standards and operational efficiency in upscale hotels.

People, considered the rarest and most valuable component of IT infrastructure, play a crucial role in maximizing the benefits of ICT in hotels. As highlighted by Kwamboka and Sang (2019), the skills, competencies, expertise, and knowledge that the workforce brings are essential for operating and managing technological systems effectively. The human element ensures that technology is leveraged to its fullest potential, translating technical capabilities into practical improvements in service delivery and operational processes. Training and development of hotel staff in ICT competencies enable them to utilize advanced software and systems efficiently, thereby enhancing productivity and guest satisfaction. The synergy between well-trained personnel and advanced ICT systems is a key driver of operational efficiency in upscale hotels.

Management in the hospitality sector can draw valuable lessons from successful cases where technology has been leveraged to achieve operational efficiency, even during challenging economic times. Sirirak, Islam, and Khang (2010) reported a significant positive relationship between ICT infrastructure and overall hotel performance in their study. The competitive nature of the hotel industry, intensified by high guest expectations and market pressures, has led many hotels to invest in innovative technologies. These

investments are aimed at gaining a competitive edge by improving service quality, reducing costs, and enhancing operational efficiency. Successful adoption of ICT has enabled hotels to remain agile, adapt to market changes, and deliver superior guest experiences, ultimately contributing to sustained competitive advantage (Sirirak et al., 2011).

1.2 Statement of the problem

Despite the immense potential of Information and Communication Technology (ICT) to enhance connectivity, customer engagement, and revenue generation in the tourism industry, upscale hotels in Nyeri County, Kenya, face significant challenges in fully leveraging these technologies. The ICT offer extraordinary opportunities for efficient and cost-effective direct interaction with customers, which is crucial for the tourism sector. However, the so-called ICT paradox suggests that the adoption of ICT does not always translate directly into competitive advantage, particularly in developing countries where ICT adoption rates are initially much lower compared to developed regions. This discrepancy underscores the need for a deeper understanding of how ICT can benefit upscale hotels in ways beyond immediate performance improvements. Therefore, investigating the specific role and impact of ICT adoption in the hotel sector of Nyeri County is essential to address these gaps and to develop strategies that can maximize the benefits of ICT in this context.

1.3 Research Objective

The primary objective of this study was to analyze how ICT adoption influences the operational efficiency of upscale hotels in Nyeri County.

2. Literature Review

Barney's (1991) contribution to Resource-Based View Theory (RBV) theory emphasized on firm's leverage on internal resources and capabilities to obtain sustainable competitive advantage in a competitive environment. Furthermore,

In the study of Muikamba and Nzuki (2019), the theoretical compass embedded in RBV employed to explain how public sector leverages ICTs as capabilities to enhance staff performance in Counties Governments in Kenya.

In this study, drawing from the theoretical reasoning from RBV, a firm may be able to attain operational efficiency if it is able to develop ICT infrastructure as a capability that is occasional, inimitable, valued, and irreplaceable by rivals in the competitive environment.

Technology Acceptance Model (TAM) has therefore been widely employed in literature on how technology can be adopted to simplify work processes, and to motivate individuals working in an organisation. Kiere (2015), drawn from the theoretical lens of TAM, explained how Kenya Power Company enhanced performance through adoption of electronic transaction technologies. According to Kariuki (2015), the adoption of information and communication technologies has resulted in an improvement in the functioning of Kenya's Population Service.

According to Porte's Value Chain Model, the profitability of an institution is characterised by its ultimate value exceeding the collective operational cost in the process of implementing the undertakings needed to gain competitive prowess, against the competitors. (Porter,1989). The models core purpose on value chain is separating

activities into various operational categories and relating them to strategically appropriate activities that can enable the firm to discover a basis for the company's competitive advantage, (Porter 1985).

In consideration of the Market Power and Multimarket Contact theory, an institution needs the complete value chain as opposed to isolated activities as supportive infrastructure, Porter (1985). The secondary activities like finance management and security are sustained by ICT infrastructure as a primary auxiliary activity.

It is thus important for the top management to establish measures and strategies that can position the hotel as a competitive spot to capacitate the acquirement and withholding of the market share. This is with the view that each and every hotel disseminate its market power over the few existing markets such as local tourists, institutional customers, international tourists and domestic gatherings, and the focus is on the marketing resources and capabilities that are available in these markets, (Sirirak, Islam and Khang,2010).

It implies that the focus of these hotels needs to be geared towards sharpening its infrastructure, especially those that are technological in nature. Enhanced business rivalry and bigger guest anticipations have caused hotels to be innovatively and strategically competitive. Hotel managers are of the opinion that the full adoption, efficient implementation, and consistent utilization of ICT infrastructure is vital to accomplishing desired hotel overall performance and departmental and overall operational efficiency. This is possible due to increased productivity related expectations, guest satisfaction and repeat business. (Sirirak, Islam, & Khang, 2010).

Muikamba and Nzuki (2019) evaluated ICT consideration and public sector personnel performance in Nyandarua County, Kenya. Data collected from 60 respondents working at the IT department in the County was analysed. The outcomes of the analysis disclosed that IT infrastructure such as hardware, internet, and software has significant implication on institutional performance.

Wayanga, Kamau, and Gikandi (2015) investigated the ICT infrastructure characteristics that influenced e-learning adoption in Kenyan public secondary schools. Data was obtained utilizing a questionnaire and a semi-structural interview guide in a transversal design. The result from descriptive statistics showed that many secondary schools in Kenya had low investment in ICT infrastructure. The low investment in ICT infrastructure occasioned as results of high cost of ICT resources such as ICT software, hardware and other related accessories. The study was able to identify ICT resources that might aid adoption of e-learning; however, the effect and influence of ICT infrastructure performance outcomes in organisations needs to further empirical investigation.

Mungai (2017) investigated e-government strategic implementation and performance of the public sector in Kenya. Using interview guide and semi-structured questionnaire, data were collected from 384 respondents and analysed using content analysis and inductive statistics. The outcome showed a considerable correlation existed between e-government performance and ICT infrastructure. The evidence of significant effect found in the study can however be more generalised if empirical investigation of the effect ICT software infrastructure on performance outcomes is extended to hotel industry in Kenya context.

Odhon'g & Omolo (2015) in an effort to undertake an examination about impact of human wealth investment on organisations, made use of questionnaire to draw data from 200 participants. Data collected, was descriptively and inferentially analysed and the outcomes of the study showed a positive correlation. The study concluded that there is need to develop soft skills and adopt technology as basis for attaining performance

related outcomes. The need to adopt technology in an organisation demands better employees with requisite skills, knowledge, and abilities to leverage on benefits offered by technologies so as to obtain competitive advantage. This present study will therefore investigate people as infrastructure needed to attain performance related outcome such as operational efficiency..

2.1 Conceptual Framework

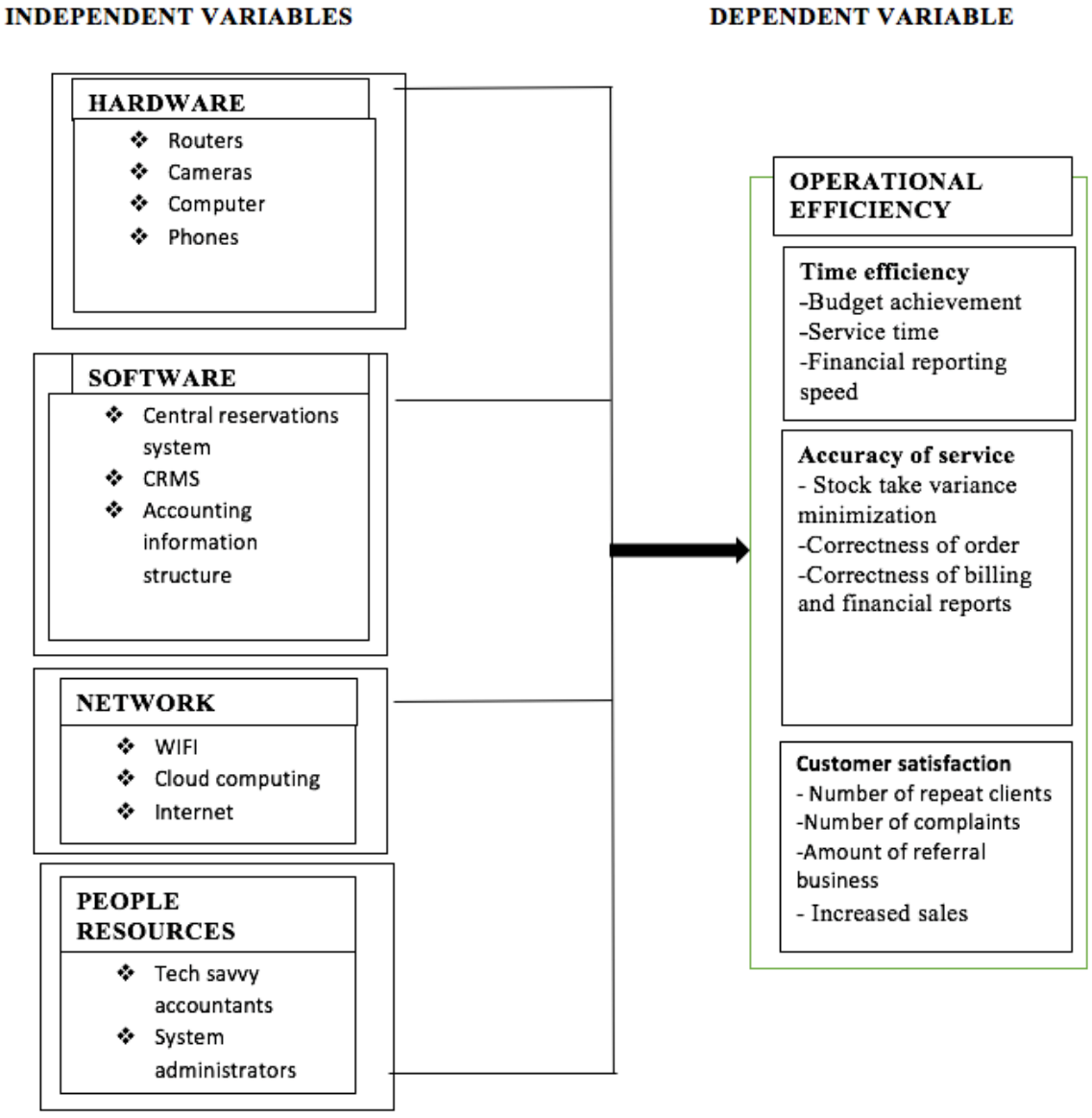

Figure 2.1 Conceptual Framework **Source:** Researcher (2023)

3. Methodology

3.1 Research Context

Kenya, an East African country with a coastline along the Indian Ocean, boasts a diverse landscape that includes savannahs, lakelands, the dramatic Great Rift Valley, and mountain highlands. It is renowned for its rich wildlife, including lions, elephants, and

rhinos. From the capital city Nairobi, visitors can embark on safaris to the Maasai Mara Reserve, famous for its annual wildebeest migrations, and to Amboseli National Park, which offers stunning views of Tanzania's 5,895-meter Mount Kilimanjaro. According to the W-Hospitality Group report (2023), Kenya ranks fifth among African nations poised to benefit significantly from investments in the hospitality sector in 2023. The hospitality industry is one of Kenya's top three revenue earners and continues to show impressive growth, earning 2.7 billion US dollars from tourism expenditures in 2023, a 32% increase from approximately 1.95 billion US dollars in 2022. Despite facing challenges, the sector has demonstrated resilience and maturity, making it a pivotal contributor to funding Kenya's development agenda.

The study was conducted in Nyeri County, one of Kenya's 47 counties. According to the Kenya Tourism Circuit, Nyeri County is part of the central region, along with Kirinyaga, Kiambu, Murang'a, and Nyandarua counties. The central region's primary tourist attraction is Mount Kenya, with climbing this iconic mountain being the key tourist activity. Additionally, central region offers other exquisite destinations such as Aberdare National Park, The Buxton Tunnel, Fourteen Falls, Thomson Falls, Solio Game Reserve, Subukia Shrine, and Evergreen Park (Makunyi, 2023).

3.2 Research Design and Data Collection

The research is exploratory in nature and adopts an interpretive philosophical stance (Zervas et al., 2017). This approach was selected because it aims to understand human thought and action within social and organizational contexts, providing deep insights into ICT phenomena in the hotel industry. The research design utilizes a survey strategy to explore the influence of ICT adoption on the operational efficiency of upscale hotels in Nyeri County. To collect data, a self-administered questionnaire was developed. The research instrument used a 5-point Likert scale whereby the study participants were asked to express their opinions within a scale of 1 to 5 where 1= strongly disagree and 5=strongly agree. The data was subsequently analysed using the mean, standard deviation and regression and correlation coefficients. The study targeted all 25 three-, four- and five- star hotels in Nyeri County, with a sample of 50 respondents consisting of hotel managers and heads of IT departments in these hotels.

4. Results and Discussion

4.1 Descriptive Statistics Analysis

The study administered a total of 50 questionnaires to three-, four- and five- star hotels in Nyeri County and 37 duly filled questionnaires were returned representing 88.10%, Mugenda & Mugenda (2003) notes that this is acceptable to conduct a statistical analysis. The operational efficiency measures used were, time efficiency, accuracy of service and customer satisfaction, rated with aggregate mean and Standard Deviation (SD) scores of 2.8610 and 1.3607 respectively, implying that the approximate level of agreement. The average mean was 3, an indication that the participants did not agree nor in disagree with the items on the questionnaire.

Regarding ICT hardware infrastructure, the descriptive statistics revealed an aggregate

mean score of 2.4811 with a standard deviation of 1.5653. Most participants agreed that the existing hardware infrastructure influenced efficiency in hotel operations. The standard deviation, being greater than zero, indicates a high dispersion among participants' responses.

For ICT software infrastructure, the mean aggregate was approximately 2.6036, with a standard deviation of 1.5051 on a 4 summative scale. This indicates that most participants agreed on the presence and influence of software systems in hotel operations. The mean score suggests that software infrastructure is a critical component of the information communication systems adopted by hotels in Nyeri County. These findings align with Mungai (2017), who found a significant relationship between e-government performance and ICT infrastructure in the hotel sector.

Regarding ICT network infrastructure, the mean aggregate value was 2.3784, with a standard deviation of 1.5477. This mean value indicates that upscale hotels have benefited from ICT network infrastructure, contributing to relatively high levels of competitive advantage.

4.2 Inferential Statistics Analysis

To assess the impact of ICT hardware infrastructure on operational efficiency, a Pearson correlation analysis was conducted. The correlation coefficient between ICT hardware infrastructure and operational efficiency was found to be $r = 0.412$, $p < 0.05$, suggesting a moderate positive relationship. This indicates that improvements in hardware infrastructure are associated with better operational efficiency in hotel operations. The high standard deviation (1.5653) reflects a diverse range of opinions, which may be due to varying levels of hardware sophistication and utilization across different hotels.

Similarly, the impact of ICT software infrastructure on operational efficiency was analyzed using Pearson correlation. The analysis revealed a correlation coefficient of $r = 0.498$, $p < 0.01$, indicating a significant positive relationship between software infrastructure and operational efficiency. The mean aggregate score of 2.6036 and standard deviation of 1.5051 suggest that participants generally agreed on the beneficial role of software systems in enhancing hotel operations.

Finally, the relationship between ICT network infrastructure and operational efficiency was examined. The correlation coefficient was $r = 0.457$, $p < 0.01$, indicating a strong positive relationship. The mean aggregate value of 2.3784 and standard deviation of 1.5477 suggest that hotels with robust network infrastructure experience higher levels of competitive advantage and operational efficiency. These results highlight the importance of comprehensive ICT infrastructure, encompassing hardware, software, and network systems, in driving the operational success of upscale hotels in Nyeri County.

5. Conclusions and Recommendations

The findings from this study underscore the significant influence of ICT on the operational efficacy of upscale hotels in Nyeri County. The positive correlations between ICT infrastructure components (hardware, software, and network) and operational efficiency measures (time efficiency, accuracy of service, and customer satisfaction) indicate that robust ICT systems are crucial for enhancing hotel operations. Hotels that

have invested in advanced hardware, comprehensive software systems, and reliable network infrastructure tend to achieve higher operational efficiency, translating into better service delivery and customer satisfaction. These results highlight the necessity for hotel managers and stakeholders to prioritize ICT investments to maintain competitive advantage and improve overall performance.

Moreover, the study reveals the varying levels of ICT adoption and its impacts across different hotels, emphasizing the need for a tailored approach in implementing ICT solutions. While some hotels have successfully integrated ICT systems, leading to significant operational improvements, others still face challenges such as inadequate infrastructure and high implementation costs. Addressing these challenges through targeted investments, training, and development of ICT competencies among staff can further enhance the benefits of ICT adoption. Overall, the research underscores the strategic importance of ICT in driving operational efficacy and achieving sustainable growth in the hospitality industry in Nyeri County.

Upscale hotels in Nyeri County should prioritize strategic investments in their ICT infrastructure, focusing on upgrading hardware, software, and network systems. This includes adopting state-of-the-art hardware to support operational needs, implementing comprehensive software solutions for efficient management of hotel services, and ensuring robust and reliable network infrastructure to facilitate seamless communication and connectivity. Hotels should conduct regular assessments of their ICT infrastructure to identify areas for improvement and allocate resources accordingly. By doing so, they can enhance operational efficiency, reduce costs, and maintain a competitive edge in the hospitality market.

To build on the findings of this study and gain a more comprehensive understanding of the influence of ICT on operational efficacy, it is recommended that future research should involve larger sample sizes. Expanding the sample size will enhance the generalizability of the results, providing a more accurate representation of the impact of ICT adoption across a broader range of upscale hotels. Larger samples can also allow for more detailed subgroup analyses, uncovering more insights into how different types of hotels and varying levels of ICT integration affect operational efficiency. This approach will provide more robust data to inform strategic decisions and policy recommendations for the hospitality industry in Nyeri County and beyond.

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