

The Contribution of Innovative Technology on Sustainable Services in Kigali Marriott Hotel

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Abstract: The purpose of the study was to assess the contribution of innovative technology on the sustainable service at Marriott hotel. Marriott Kigali faces challenges in the consistent and effective implementation of innovative technology, limiting its ability to deliver high-quality, personalized guest services. Despite adopting technologies like mobile applications, automated check-in systems, and guest preference data tools, Marriott Kigali has encountered issues such as inadequate staff training, inconsistency in technological usage, and underutilization of available tools. The study was guided by the following specific objectives: To identify innovative technologies implemented by Kigali Marriott hotel; to determine the contribution of innovative technology on the sustainable service at Kigali Marriott hotel; to assess the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel and to establish the measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel. The findings of this research contribute to the existing body of knowledge in hospitality management and offer practical recommendations for improving service sustainability in the evolving landscape of luxury accommodations. Furthermore, the researcher will get more benefits including the improvement of the research experience, and awareness of the innovation and technology adoption for sustainable service. In literature review various researchers confirmed that influence of innovative technology on the sustainable service at Marriott hotel. This study adopted descriptive research design to get results related to the study, the target population is 242 while sample size was 151. Research applied purposive sampling. The source of data was primary and secondary methods. Questionnaires was used to collect primary data and documentary review applied for collecting secondary data. The data was analyzed using descriptive statistical analysis with use of frequency, percentage, mean and standard deviation, and inferential statistics by the use of Pearson correlation (r) and multiple linear regression analysis. The presentation of findings was done using tables. The research found that for innovative technologies implemented by Kigali Marriott hotel, 37.8% of respondents strongly agreed and 60% agreed that Kigali Marriott hotel innovates room facilities and amenities to maintain sustainable service. Furthermore, contribution of innovative technology on the sustainable service at Kigali Marriott hotel, 36% strongly agreed and 48.9% agreed that innovative technology maintains customer satisfaction. For the challenges facing Marriott in implementation innovative technology and sustainability of services in Kigali Marriott hotel, the findings revealed that high cost of technological upgrades at 23.6% strongly agreed and 31.1% agreed the statement. Finally, the measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel., 46.6% strongly agreed and 49.6% agreed that provision of comprehensive staff training. The study concluded that innovative technology contributes significantly to the sustainable service in hotel sector. In recommendation, hotel should allocate sufficient budgets for technological upgrades to enhance service efficiency and sustainability.

Keywords: Innovative Technology, Sustainable Services, Kigali Marriott Hotel.

I. INTRODUCTION

In world context, Innovation in tourism is a multifaceted phenomenon, particularly in terms of information and communication technology and the internet. The field of tourism was constantly expanding and diversifying and it has become one the most sustainable growing sectors of the global economy (Sigala, 2021). According to United Nation World Tourism Organization (UNWTO) international tourism represent 14% of world GDP. The number of international tourist arrivals has reached 2.8 million for 2023. Many factors contribute for these results, one of them being the development and

implementation of new technologies. They can be found in almost every aspect of tourism, including hospitality services (Buhalis, Sinarta, 2020). Their role for the development of the hotel operators was indisputable. On the one hand the use of technologies, increases the tourist's satisfaction, by providing faster and more personalized service, on the other technologies provide customer data much needed by the owners and contributes to gain more profits and recognition for the operators in hospitality industry.

Service innovation has been constantly studied to serve customers better. However, as one of the oldest industries, it was hard to innovate in hotel industry with traditional methods. Fortunately, an emerging discipline called Service Science, and information technology an outstanding representative of modern civilization, give us a good chance to innovate services in a new way (Pencarelli, 2020). A recent report by Oracle Hospitality surveyed almost 3,000 US and European travelers in order to better understand the importance of technology for a hotel guest experience (Carter, 2017). Results show that 64% of U.S. hotel guests think that it was "very or extremely important" for hotels to continue investing in technology to enhance the guest experience".

Innovation will enable hotel operators to stand out from the competition, fulfill every guest's expectation and attract new custom. A positive experience will not only impact a guest's stay but it also influences their behavior and online reviews after their trip. Managers should try to make known any improvement in the areas of sales, guest satisfaction, service quality, and productivity as a result of implementing new technology (Gössling, and Michael, 2021).

According to Ali and Ryu (2022). Hotel technology was developed in leaps and bounds across the globe, with the African continent in particular gaining traction as a major force in the hospitality industry. The region's potential continues to grow as several countries experience a boom in tourism, development and investment. In Africa context, Africa needs to prioritize and embrace technological trends," says Eben Marais, Managing Director at Anker data. He adds that hotels need to identify the appropriate innovation and adaptation tools that meet their guests' ever-changing expectations and thus increase revenue.

Guests are demanding more digital technology solutions from hotels but in order to keep the guest experience personalized, hotels need also to be proactive by understanding their needs and then providing the services automatically. Improving current offerings and providing unique guest experiences (Aluri & Palakurthi, 2020). On the other hand, contemporary authors such as Li, Bonn and Ye (2022) identified innovation benefitting hotel operational efficiency and productivity.

Whilst Randle and Dolnicar (2021) argued that such efficiencies leverage hotel capabilities on staff innovativeness and management's ability in problem solving when complaints. Thus, innovation strategy brings adaptation to guest needs and expectations whilst keeping pace with technological requirements. In East Africa Regional context, A quantitative and qualitative study on service firms by Rogerson and Rogerson. (2021) showed that top innovators invest their profits in personal skills training and have a culture of innovation. The researcher concluded that an innovation culture predicts firms' performance, thus innovative firms should have a well-articulated and clear vision, and encourage customers and staff to be participants in innovation.

Dube and Nhamo (2023) who argued that the current focus of service innovation was customer needs discovery, which is operational and not strategic, later contended this. To support this, Mhlanga (2022) point out that a service provider was innovative services should focus on word of mouth, improve existing service styles, enhance existing service concept, and consider facilities layout and design. The researchers identified a need for a survey on strategic service innovation projects to analyse the precise adoption rate and confirm benefits received. According to United Nations World Tourism Organization (UNWTO, 2023), despite unpredictable shocks, tourism sector growth has surpassed global economic growth in the past six years, while Kenya National Bureau of Standard (KNBS, 2022) reported that Kenya hotel bed capacity increased by 8.7%. Bed nights occupied and length of stay however decreased by 4.3% and 9.4%, respectively. Meanwhile, a report by the World Economic Forum (2021) indicated that the Kenya Tourism and Travel Competitiveness Index (TTCI) improved from 96th in 2019 to 78th in 2022, while that of Spain improved from 4th to first position in 2022. Asamoah and Mensah, (2022) attributed this to the fact that the hotel industry in Spain embarked on a course of innovation from 2023, which led to increased prices and occupancy rates.

In Rwanda context, Technology was a key factor that influences competitive advantage. The concept of knowledge management concerns creation of structures that combine the most advanced elements of technology resources and the indispensable input of human response and decision making (Ngabo, & Uwineza, 2023). The technological change can create new possibilities for the design of a product, the way of commercialization, produce it or deliver it and the subsequent auxiliary provided services. New sectors are born when this technological change makes a new product feasible.

The nature of hospitality services, based as much on the sale of services as on the provision of service through which consumers can achieve deep-rooted needs, renders its evaluation reasonably complex. Managers in hospitality strive to improve the quality of their services and the level of customer satisfaction in the belief that this effort would create loyal visitors. Loyal visitors will return to the destination and recommend it to others (Bihibindi, & Nkurunziza, 2022). The quality of products and services has also been linked to external indicators of customer satisfaction such as complaints, warranty, litigation and market share (Niyonkuru, and Kayumba, 2023). Satisfied customers often lead to loyal customers who continuously repurchase the product or service. The main objective of this study was to assess the contribution of innovative technology on sustainable service at Marriott hotel. It was guided by the following specific objectives:

- i. To identify innovative technologies implemented by Kigali Marriott hotel
- ii. To determine the contribution of innovative technology on the sustainable service at Kigali Marriott hotel
- iii. To assess the challenges facing Marriott in implementation innovative technology and sustainability of services in Kigali Marriott hotel.
- iv. To establish the measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel.

II. THEORETICAL FRAMEWORK

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) posits that the perceived ease of use and perceived usefulness of a technology significantly influence users' acceptance and utilization of that technology. In the context of the hospitality industry, this model can help explain how hotel staff and guests perceive new technologies, such as mobile check-in systems, automated service kiosks, and customer relationship management software (Davis, 2019). By understanding these perceptions, hotel managers can tailor their training and support efforts to enhance user acceptance and engagement.

The implementation of innovative technologies can lead to improved service delivery by streamlining operations and enhancing customer experiences. For example, when hotel staff find a new reservation system easy to use and believe it will improve their efficiency, they are more likely to adopt it, ultimately leading to faster check-in processes and better customer service (O'Connor, 2018). The model emphasizes the importance of addressing both perceived ease of use and perceived usefulness to drive technology adoption effectively.

Moreover, TAM can also be used to assess customer acceptance of technological innovations in the hospitality sector. By exploring factors that influence guests' perceptions of technologies, such as mobile apps for service requests or in-room automation systems, hotels can create more user-friendly experiences (Elena, 2020). Understanding these dynamics is crucial for aligning technology investments with sustainable service practices, as greater customer acceptance can lead to more efficient resource use and enhanced satisfaction.

Diffusion of Innovations (DOI) Theory

The Diffusion of Innovations (DOI) theory, developed by Everett Rogers, provides a framework for understanding how, why, and at what rate new technologies and ideas spread within a community or organization. In the hospitality industry, DOI is particularly relevant for analyzing the adoption of innovative technologies, such as energy-efficient systems, online booking platforms, and customer feedback apps (Rogers, 2020). The theory emphasizes the role of communication channels, social systems, and individual characteristics in the diffusion process, making it a valuable tool for hotel managers looking to implement sustainable practices.

According to DOI, the rate of adoption of innovations is influenced by factors such as the perceived attributes of the technology (relative advantage, compatibility, complexity, trialability, and observability) (Mihalic, 2016). For instance, if a hotel introduces a new energy management system that significantly reduces energy costs (relative advantage), aligns with its existing operational practices (compatibility), is easy to understand (complexity), can be tested in a limited capacity (trialability), and demonstrates visible results (observability), the likelihood of widespread adoption among staff and management increases. This model helps hotels strategize their approach to introducing new technologies, ensuring that they highlight these positive attributes to facilitate acceptance.

Furthermore, DOI also emphasizes the importance of early adopters—individuals or organizations that are quick to embrace innovations—as they can influence the adoption decisions of others. In the context of sustainability, hotels can leverage these early adopters to champion innovative technologies and share their positive experiences, thereby fostering a culture of innovation within the organization (Ham, Kim, Jeong, 2015). By understanding the dynamics of diffusion, hospitality businesses can enhance their sustainability efforts through effective technology integration.

Sustainability Theory

Sustainability theory provides a holistic framework that emphasizes the interconnectedness of environmental, economic, and social dimensions of sustainability. In the hospitality industry, this theory underscores the importance of adopting innovative technologies that contribute to sustainable service delivery (Xiang, Gretzel, 2021). For example, hotels can implement energy-efficient lighting, water-saving fixtures, and waste management systems to reduce their environmental impact while enhancing their operational efficiency. The theory posits that sustainable practices are not only beneficial for the environment but also can lead to cost savings and improved customer satisfaction.

Innovative technologies play a crucial role in achieving sustainability goals within the hospitality sector. For instance, integrating renewable energy sources, such as solar panels or wind turbines, can significantly reduce a hotel's carbon footprint (Siraj, 2016). Additionally, adopting smart technology solutions, like energy management systems, can help hotels monitor and optimize their energy consumption in real-time. By focusing on sustainability, hotels can differentiate themselves in a competitive market, attract environmentally conscious guests, and comply with increasing regulatory demands related to environmental practices. Furthermore, sustainability theory encourages hotels to engage with stakeholders, including guests, employees, and the local community, to foster a culture of sustainability.

By involving these stakeholders in sustainability initiatives and leveraging innovative technologies to enhance service delivery, hotels can create a positive impact on their brand reputation and customer loyalty (Mbaiwa, 2019). This collaborative approach not only addresses immediate environmental concerns but also positions hotels as leaders in sustainable tourism, contributing to the long-term viability of the industry.

Service-Dominant Logic (S-D Logic)

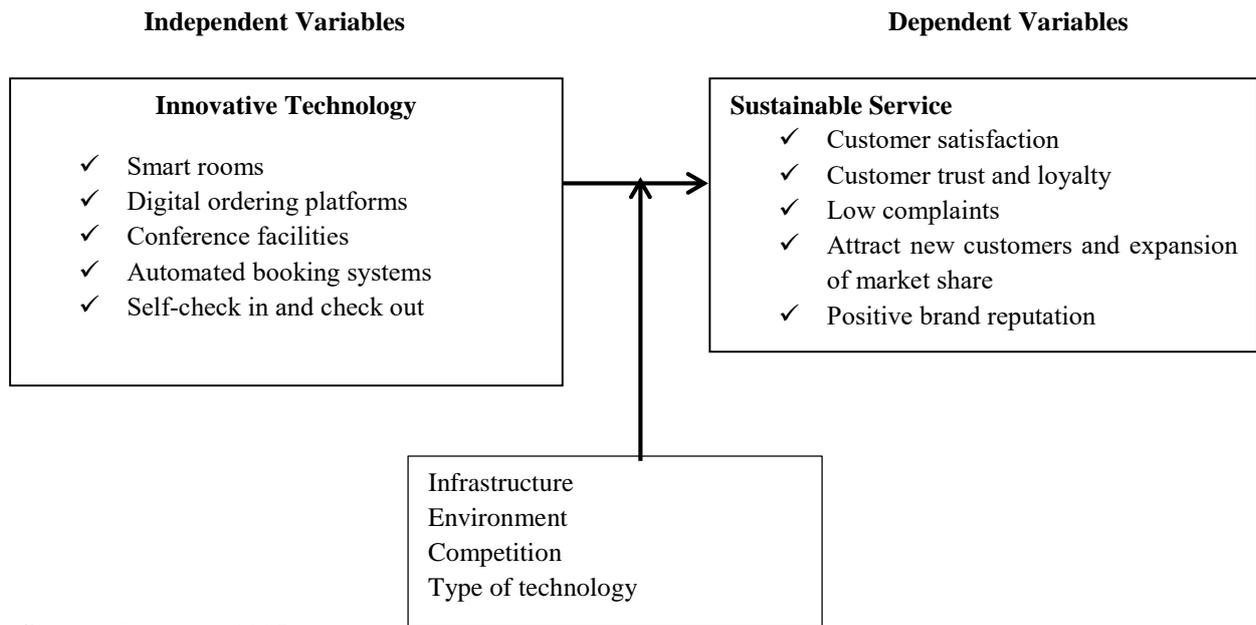
Service-Dominant Logic (S-D Logic) is a theoretical framework that emphasizes the co-creation of value through interactions between service providers and customers. In the hospitality industry, this theory suggests that innovative technologies facilitate the co-creation of value by enhancing guest experiences and enabling personalized service delivery (Elkington, 2019). For example, mobile applications that allow guests to customize their preferences, request services, and provide real-time feedback empower them to actively participate in the service process, leading to higher satisfaction and loyalty.

The integration of innovative technologies within the service delivery process enhances the ability of hotels to respond to customer needs effectively (Odularu, 2019). By leveraging data analytics and customer feedback mechanisms, hotels can tailor their offerings to meet specific guest preferences, leading to a more personalized experience. This approach aligns with S-D Logic's focus on understanding customers as active participants in the value creation process, rather than passive recipients of services.

Additionally, S-D Logic highlights the importance of relationships in service delivery. Innovative technologies can foster stronger relationships between hotels and their guests by facilitating communication and engagement. For instance, utilizing social media platforms and customer relationship management (CRM) systems allows hotels to build lasting connections with their customers, leading to enhanced loyalty and advocacy (Achieng and Kinuthia, 2016). By embracing S-D Logic, hospitality businesses can leverage innovative technologies to create sustainable service delivery models that prioritize customer engagement and satisfaction.

III. CONCEPTUAL FRAMEWORK

A conceptual framework was a synthetization of integrated components and variables which help in capturing and solving a real-world problem. It was analytical tool used for viewing the deductive resolution of an identified issue. In this research, Conceptual Framework guides researcher is shown in Figure 1:



Source: Research, 2025

Figure 1: Conceptual Framework

The conceptual framework indicates relationship between three variables (independent, dependent and intervening variables). This Conceptual framework indicates the influence of innovative technology on the sustainable service in hospitality industry under independent variable shows the innovations implemented by hotel industry such room facilities, conference facilities, reservations systems as well as check and check out process to make sustainable service. On the other hand, dependent variable provides information showing indicators of sustainable service. The conceptual framework reveals that customer satisfaction, customer trusts and loyalty, low complaints and brand reputation indicate sustainable service in hotel industry.

IV. RESEARCH METHODS

A research design was a strategy that details the steps to be taken for analyzing and gathering data on various research topics as well as reporting findings in appropriate manner (Lewis, 2015). A descriptive research approach and case study was used to meet the objectives of the study. A descriptive research design, according to Creswell and Creswell (2017), was a framework for conducting research that includes a set of instructions for gathering data for the study. According to Mugenda & Mugenda (2019), a descriptive research design responds to the who, what, and how research questions of a study by describing facts and features in connection to the study population. The descriptive research design helped the researcher to identify, analyze and interpret the researchable topic. Frequencies, percentages, mean, standard deviation and coefficient correlation analysis were good techniques to examine the influence of innovative technology on the sustainable service in Marriott Hotel. The case study helped researcher to get an in-depth analysis of the research problem.

Target Population

According to Barasa, *et al* (2015), a population was a group of people from which research was conducted and has comparable observable traits. Target population was a set of elements from whose data can be collected and classified according to criteria that were useful to the researcher (Asiamah, Mensah, & Oteng-Abayie, 2017). The target population was 242 employees of Kigali Marriott Hotel.

Sample Design

An exact strategy for selecting a sample from a certain population was known as a sample design. It describes the approach, strategy, or process the researcher would use to choose the items for the sample. Sample design was a method that helps researchers determine the sample's size, or the number of objects to include in the sample. Consequently, sample design was developed before data collection.

Sample Size

Sample size was defined as data collection method of gathering information via a small number of individuals, things, or events that a researcher believes to accurately reflect a specific population. Further, sample size was a subset of the target

population that was both representative and generalizable to the entire population. The study calculated sample size using Silvan’s formula.

$n = N / 1 + N(e^2)$ where, N= Population size n= Sample size and e^2 = Margin of error (or) confidence interval where the standard margin of error was equal to 5% for 95% confidentiality

By applying above formula, the sample size becomes

$n = 242 / (1 + 242(0.05)^2) = 151$ respondents

Sampling Techniques

Sampling was the process of choosing individuals from a group to represent the total population According to Barasa *et al.* (2015), sampling was the process of representatively choosing a subset of respondents from the target population. The two most common sampling approaches are probability and non-probability. Every member of the population has an equal chance of being chosen in probability sampling, whereas non-probability sampling occurs when certain members of the target population do not (Lewis, 2015). To get the representative sample for the study population, the researcher used a purposive sampling method to select sample units. The rationale behind was that it was believed that purposive sampling provides units with relevant information about the contribution of innovative technology and it’s sustainable service in hospitality industry a case study of Kigali Marriott Hotel.

Data Collection Methods

Data collection was the systematic gathering of data using a predetermined scientific procedure (Cooper, Schindler, 2014). The choice of a substandard data collection technique has a negative impact on the data. The researcher utilized questionnaires to get primary data and documentary review to gather secondary data.

Data Collection Instruments

Kothari (2017) defined data collection instruments as the tools and procedures used to gather data. There are two approaches for gathering data: primary and secondary. Both primary and secondary data are utilized to get the required information to accomplish the study successful. The primary data was collected using questionnaires. A questionnaire, in the opinion of Cresw, Kausha, and Singh (2017), was a tool for gathering information in order to obtain the answers to a series of research questions. The study’s research questions were addressed using the structured questionnaires. In order to facilitate conducting qualitative analysis and reduce bias, the questionnaire was created using a scale approach that uses a 4-point opinion scale (Likert scale Format), where 1 indicates strongly disagree and 4 represents strongly agree (Mugenda & Mugenda, 2013). The questionnaires were distributed using the drop-and-pick technique. Since the organized questionnaire guarantees anonymity, the answers are well-considered.

V. RESEARCH FINDINGS AND DISCUSSION

1. Demographic Characteristics of Respondents

In this study, demographic characteristics of respondents were important as this helped researcher to identify types of respondents in terms of age, marital status, nationality, education.

Marital Status of Respondents

In this study, the researcher collected information related to respondent’s marital status to determine the extent of marital status in Kigali Marriott hotel. The information collected was summarized as follows:

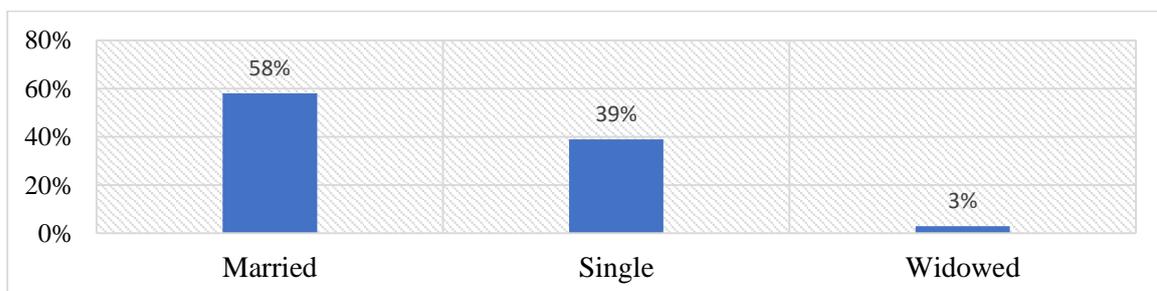


Figure 2: Marital status of Respondents

Source: Primary data (2025)

The findings indicated that 58% were married while 39% was single. On the other hand, 3% was widowed. The findings show a notable difference between married and single respondents, with 58% being married and 39% single. This indicates that married individuals form the majority, this is due to they have more stability and long-term commitment within their professional roles. In contrast, the single group (39%) represents a significant portion, possibly reflecting younger employees or those still establishing their careers.

2. Presentation of Findings

In this section, the research objectives are dissected, analyzed, understood, and discussed in light of the study's findings. Research data was analyzed using a wide variety of statistical methods, including percentages, means, standard deviation, Pearson coefficient correlation and multiple regression. The results were illustrated in accordance with the following objective to identify innovative technologies implemented by Kigali Marriott hotel, to determine the contribution of innovative technology on the sustainable service at Kigali Marriott hotel, to assess the challenges facing Marriott in implementation innovative technology and sustainability of services in Kigali Marriott hotel, to establish the measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel.

The innovative technologies implemented by Kigali Marriott hotel

This section shows the innovative technologies implemented by Kigali Marriott hotel. Responses were analyzed using a Likert scale that went from "Strongly Disagreed" to "Strongly Agreed." The mean and standard deviation were also given. The results are shown in the table below.

Table 1: The innovative technologies implemented by Kigali Marriott

Responses	SA	A	D	SD	Mean	St. Dev
Kigali Marriott hotel innovates room facilities (Smart TV, Automatic light) and amenities	37.8	60	2.2	0	3.35	.52
Digital ordering platforms and POS payment	32.9	39.1	18	14	3.48	.50
Smart Meeting Rooms & AV Technology	43.6	42.2	14.2	0	3.57	.49
Establishment of automated reservations systems boost sustainable service	39	42	12	7	3.80	.40
Facial Recognition Check in, Mobile Key & Contactless Entry	31.1	43.7	22.2	3	3.48	.54

Source: Primary data, 2025

Table 1 displays the responses received from respondents regarding the innovative technologies implemented by Kigali Marriott hotel. The purpose of the study was to determine whether Kigali Marriott hotel innovates room facilities (Smart TV, Automatic light) and amenities. After conducting an analysis, it was determined that 37.8% of respondents strongly concurred and 60% agreed with the statement. In addition, the results were validated with a robust mean of 3.35 and an uncertain standard deviation of 0.52. However, 2.2% of respondents disagreed; based on the findings, the vast majority of respondents concurred with the statement.

In addition, when respondents were asked whether digital ordering platforms and POS payment, 39.1% agreed and 36.9% strongly agreed with the statement. on the other hand, 18% disagreed and 14% strongly disagreed the statement. The responses had a mean of 3.48 and a standard deviation of 0.50, indicating that the respondents agreed with the statement at the level of statistical significance. When a researcher asked respondents whether Smart Meeting Rooms & AV Technology, researcher received the following responses: The respondents agreed at 43.6% strongly agreed, and 42.2% agreed. Oppositely, 14.2% were disagreed the statement. The statement's results had a mean of 3.57 and a standard deviation of 0.49. The majority of respondents (39%) strongly agreed and 42% agreed with the statement that Establishment of automated reservations systems boost sustainable service. However, 12% disagreed and 7% strongly disagree the statement. The responses yielded a robust mean of 3.80 and an uncertain standard deviation of 0.40. Respondents demonstrated that Facial Recognition Check in, Mobile Key & Contactless Entry. The majority of respondents (31.1% strongly agreed and 43.7% agreed the statement, which was supported by a strong mean of 3.48 and a standard deviation of .54. However, only 22.2% of respondents disagreed as well as 3% strongly disagree the statement.

The findings obtained by researcher were in line of Müller and Schmidt (2022) examined the influence of Adoption of Smart Room Technology in European Hotels, the study concluded that smart room technologies significantly enhance guest satisfaction and are preferred by a majority of hotel guests in Europe. The hotel industry has embraced innovative technologies to enhance guest experiences, improve efficiency, and promote sustainability. One of the most significant advancements is smart room technology, which integrates the Internet of Things (IoT) to allow guests to control room features such as lighting, temperature, and entertainment through mobile apps or voice assistants. Many hotels have adopted keyless entry systems, enabling guests to use their smartphones to unlock rooms, reducing wait times at check-in and enhancing security. Additionally, artificial intelligence (AI) chatbots are being used for customer service, providing 24/7 assistance with reservations, inquiries, and personalized recommendations, improving guest engagement and convenience.

Sustainability-driven innovations have also transformed hotel operations. Many hotels are implementing energy management systems that use sensors to optimize lighting and air conditioning, reducing energy waste and operational costs. Automated food waste tracking systems help hotels minimize waste by analyzing consumption patterns and adjusting procurement strategies accordingly. Robotics was another emerging trend, with some hotels employing robotic concierges and automated cleaning services to enhance efficiency and reduce labor costs. Furthermore, the integration of block chain technology in hotel bookings enhances transparency, security, and trust in transactions, particularly in loyalty programs and payment processing. These technological advancements are shaping the future of the hospitality industry by delivering seamless, personalized, and eco-friendly experiences for guests.

The contribution of innovative technology on the sustainable service at Kigali Marriott hotel

This section was intended to analyze the findings related to the contribution of innovative technology on the sustainable service at Kigali Marriott hotel, and this question provides researchers with the significance contribution of innovative technology on the sustainable service at Kigali Marriott hotel.

Table 2: The Contribution of Innovative Technology on The Sustainable Service at Kigali Marriott Hotel

Responses	SA	A	D	SD	Mean	Std. dev
Innovative technology enhanced customer satisfaction	36	48.9	9.8	5.3	3.15	.80
Innovative technology enhances personalized service to guests	36.4	48.9	10.2	4.5	3.17	.78
Innovative technology improved check-in and check-out process leading to the sustainable service	37.1	47.7	9.5	5.7	3.23	.81
Innovative technology improved customer trust and images reputation	34.7	42.7	16	6.9	3.48	.76
Innovative technology led to efficiency and effective service delivery thus sustainable service	33.7	40.6	21.9	3.8	3.10	.79

Source: Primary data, 2025

The contribution of innovative technology on the sustainable service at Kigali Marriott hotel was displayed in Table 2; Concerning on innovative technology enhanced customer satisfaction, 48.9% agreed and 36% strongly agreed. On the other hand, 5.3% strongly disagreed with the statement, and 9.8% disagreed. Moreover, the statement was accepted by respondents with a standard deviation of 0.80 and a mean of 3.15. Furthermore, innovative technology enhances personalized service to the guests, as evidenced by 48.9% and 36.4% strongly agreed ratings. Only a small percentage of respondents—10.2% disagreed and 4.5% strongly disagreed—refused the assertion, nevertheless. Furthermore, with a mean of 3.17 and a standard deviation of .78, the respondents concurred.

The results showed that, with 47.7% of respondents agreeing and 37.1% strongly agreed that innovative technology improved check-in and checkout process leading to the sustainable service. Nonetheless, 5.7% and 9.5%, respectively, strongly disagreed and disagreed. The respondents agreed on a mean of 3.13 and a standard deviation of 0.68, according to the data. However, when the researcher asked the respondents if the innovative technology improves customer trust and image reputation, 34.7% and 42.3%, respectively, strongly agreed and agreed. Nevertheless, 16% disagreed with the

assertion, and 6.9% strongly disagreed. Conversely, participants reached a consensus with a mean of 3.48% and a standard deviation of 0.76.

Last but not least, 46.6% of respondents agreed and 33.7% strongly agreed that innovative technology led to efficiency and effective service delivery thus sustainable service. However, respondents agreed with a mean of 3.10 and a standard deviation of .79, whereas 21.9% disagreed and 3.8% strongly disagreed.

The results corroborated by Kganyago and Masuku. (2023) examined the impact of Digital Payment Systems on Service Delivery in South African Hotels. The study concluded that digital payment systems significantly enhance service delivery by improving transaction efficiency and guest satisfaction in South African hotels.

Innovative technology has significantly contributed to the sustainability of service delivery at Kigali Marriott Hotel, particularly through energy efficiency, digital transformation, and enhanced guest experiences. Research findings indicate that the hotel has integrated environmentally sustainable designs, including advanced building services that align with Marriott Engineering Design Standards. Additionally, Kigali Marriott employs smart room technologies, digital check-ins, and automated climate control, reducing energy consumption while enhancing guest comfort and convenience.

Moreover, the hotel's investment in digital solutions for service delivery has improved efficiency and customer satisfaction. For instance, digital concierge services, AI-powered chatbots, and mobile applications streamline guest interactions, reducing wait times and improving personalized services. Studies on the impact of smart hospitality technologies suggest that such innovations lead to increased operational efficiency and revenue growth while ensuring sustainable practices. These advancements align with global trends in the hospitality industry, where technology is leveraged to optimize resources, minimize waste, and enhance the overall guest experience.

The challenges facing Marriott in implementation innovative technology and sustainability of services in Kigali Marriott hotel

This section provides further information regarding the findings about the challenges facing Marriott in implementation innovative technology and sustainability of services in Kigali Marriott hotel. Using descriptive statistics like percentage, mean, and standard deviation, the following results demonstrated the challenges facing Marriott in implementation innovative technology and sustainability of services in Kigali Marriott hotel.

Table 3: The challenges facing Marriott in implementation innovative technology and sustainability of services in Kigali Marriott hotel

Responses	SA	A	D	SD	Mean	Std. dev
High cost of technological upgrades affected sustainable service	23.6	31.1	24.9	20.4	3.4	.55
Inadequate skilled staff and adaptation are the challenge to sustainable service	18.6	22.7	35.7	23.1	3.32	.63
The challenge of balancing personalized service with automation is barrier for sustainable service.	21.5	35.6	39.4	13.5	3.27	.73
Fear of customer privacy and security concerns affected sustainable service.	15.4	23.6	41.8	19.2	3.24	.75
Infrastructural limitations reduced sustainable service in hotel sector.	16.2	25.5	30.5	27.8	3.28	.72

Source: Primary Data (2025)

The respondents revealed that high cost of technological upgrades affected for sustainable service. According to the data, 31.1% of respondents agreed with the statement, and 23.6% strongly agreed. While the respondents agreed with the statement with a strong mean of 3.40 and standard deviation of 0.55, 24.9% disagreed and 20.4% strongly disagreed. When the researcher questioned the respondents if they thought that inadequate skilled staff and adaptation are the challenge for sustainable service, the majority of them—18.6% strongly agreed and 22.7% agreed the statement at mean of 3.32 and standard deviation of .63. However, 35.7% disagreed and 23.1% strongly disagreed the statement.

The researcher asked the participants whether the challenge of balancing personalized service with automation was barrier for sustainable service. Results showed that 21.5% agreed and 35.6% strongly agreed. On the other hand, respondents agreed with the statement with a mean of 3.27 and a standard deviation of .73, whilst 39.4% disagreed and 13.5% strongly disagreed. The researcher asked the respondents whether fear of customer privacy and security concerns discourage customers to anticipate in sustainable service, the following feedback was received. 23.6% agreed and 15.4% strongly agreed. While 41.8% strongly objected and 19.2% disagreed with the statement, it was validated with a mean of 3.24 and a standard deviation of 0.75. The survey found that Infrastructural limitations decline sustainable service in hotel sector, 16.2% strongly agreed and 25.5% agreed oppositely 30.5% disagreed and 27.8% strongly disagreed the statement. Conversely, the standard deviation was 0.72 and the mean was 3.28 among the responders.

The outcomes attained by researcher was in line of Njeri and Kasule (2023) examined the barriers affecting Technology Adoption in East African Hotels. The study concluded that hotels in East Africa encounter significant barriers to technology adoption, largely due to infrastructural limitations and management perspectives.

The implementation of innovative technology and ensuring the sustainability of services in the hotel industry, particularly at Marriott Kigali, faces several challenges. Research findings highlight that one major hurdle was the high cost of upgrading technology infrastructure, which can strain resources, especially in a highly competitive market. Additionally, staff resistance to adopting new technological tools due to a lack of proper training and fear of job displacement presents another barrier. Marriott Kigali, like many other hotels, struggles with integrating new systems into existing operations, resulting in inefficiencies or disruptions in service delivery. Furthermore, maintaining a balance between technological advancement and sustainability efforts was difficult, as eco-friendly practices often require substantial investment and careful planning. The complexity of aligning innovation with sustainable practices, such as energy-efficient systems or waste reduction technologies, further complicates the process. As the hotel industry moves toward a more digitally connected and environmentally conscious future, Marriott must overcome these obstacles by fostering a culture of innovation, providing ongoing employee training, and carefully integrating technology that aligns with sustainability goals.

The Measures That Mitigate the Challenges Facing Innovative Technology and Sustainability of Service at Kigali Marriott Hotel

This section emphasizes on the measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel. The following responses were provided.

Table 4: The measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel

Responses	SA	A	D	SD	Mean	Std. Dev
Provision of comprehensive staff training to promote sustainable service.	46.6	49.6	3.0	0.8	3.42	.59
Ensure Balanced usage of automation and personalized service which is crucial for sustainable service.	45.1	47.3	4.9	2.7	3.34	.69
Ability of Marriott hotel to implement robust cybersecurity measures to protect guest data	41.7	42.0	12.9	3.4	3.21	.79
Encouraged culture of innovation and staff to maintain sustainable service	35.2	44.3	17.0	3.5	3.11	.80
Engaged in continuous improvement in technological innovations to enhance sustainable service	42.4	50.4	4.9	2.3	3.32	.62

Source: Primary data (2025)

The table 4 reveals the measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel. The findings indicated that 49.6% agreed and 46.6% strongly agreed that provision of comprehensive staff training and development stimulate sustainable service. The mean score was 3.42, with a standard deviation of 0.59. However, 3.0% and 0.8% disagreed with the statement and disagreed strongly with it. Additionally, the survey found that Balanced use of automation personalization is crucial for sustainable service, with 45.1% strongly agreed and 47.3% agreed,

with a strong mean of 3.34 and a standard deviation of 0.69 while 2.7% strongly disagreed with the statement, while 4.9% disagreed.

With a highest mean of 3.21 and a low standard deviation of 0.79, the respondents highly agreed that the ability of hotels to implement robust cyber security measures to protect guest data. Furthermore, survey indicated that 42% strongly agreed and 41.7% agreed. However, 12.9% disagreed and 3.4% strongly disagreed the statement. Additionally, hotel should encourage a culture of innovation and staff to maintain sustainable service. According to the survey, 35.2% of respondents strongly agreed, and 44.3% agreed, with a mean of 3.11 and a standard deviation of 0.79. Nonetheless, the results showed low disagreement: 3.5% strongly disagreed with the assertion, while 17.0% disagreed. When the researcher finally questioned if engaging in continuous improvement in technological innovations enhance sustainable service, 50.4% of the respondents said that it did and 42.4% strongly concurred, with a 3.32% mean and a 0.67 standard deviation. However, 2.3% strongly disagreed with the assertion, and 4.9% disagreed. The results corroborated a study by Munyaneza and Karangwa (2024) assessed the influence of Technology Adoption Strategies in the Hospitality Sector of Rwanda. The study concluded that Rwandan hotels that prioritize guest feedback and strategic planning are more successful in adopting innovative technologies leading to the sustainable service.

Hotels implementing sustainable sourcing of materials and AI-driven customer service experience improved service quality and reduced operational costs. Additionally, continuous staff training on digital tools ensures better adoption and long-term success, fostering both sustainability and technological advancement.

The contribution of innovative technology on the sustainable service at Marriott hotel

The contribution of innovative technology on the sustainable service is evaluated based on multiple indicators, such as customer satisfaction, customer loyalty, low complaints as well as attracting new customers. The results are listed in the table below.

Table 5: The contribution of innovative technology on the sustainable service at Marriott hotel

Responses	SA	A	D	SD	Mean	St. Dev
The use of innovative technology at Kigali Marriott Hotel enhanced customer satisfaction by improving service quality.	22.2	57.8	11.1	8.9	2.93	.83
Advanced technology in hotel operations increased customer trust and long-term loyalty	27.8	61.2	9	2	3.60	.49
The implementation of digital innovations led to a reduction in customer complaints improved sustainable hotel services	40	49	8	3	3.57	.49
The integration of smart technology in hotel services attracts new customers and resulted in sustainable hotel services	37.8	42.2	16	4	3.57	.50
The adoption of innovative technology has strengthened the hotel's brand reputation and competitiveness.	31.5	45.2	17.3	6	3.61	.53

Source: Primary data, 2025

The reference to table 5 illustrates the contribution of innovative technology on the sustainable service at Kigali Marriott Hotel. The researcher wanted to know if the use of innovative technology at Kigali Marriott Hotel enhances customer satisfaction by improving service quality, the following results were recorded; 57.8% of respondents agreed and 22.2% strongly agreed, with a mean of 2.93 and a standard deviation of 0.81. In contrast, 11.1% and 8.9% disagreed and strongly disagreed with the statement, respectively. Furthermore, advanced technology in hotel operations increases customer trust and long-term loyalty at agreement of 27.8% of respondents firmly agreed and 61.2% agreed with a mean of 3.60 and a standard deviation of 0.42. However, 9% disagreed and 2% of respondents firmly disagreed with the statement. Additionally, the implementation of digital innovations led to a reduction in customer complaints about hotel services, the results showed that 40% of respondents chose strongly agreed and 49% chose agreed, with a mean of 3.57 and a standard deviation of 0.20, despite this, 8% of respondents disagreed and 3% strongly disagreed with the statement.

The respondents indicated that the integration of smart technology in hotel services attracts new customers and expands market share at a rate of 37.8% firmly agreed and 42.2% agreed. With the highest mean of 3.57 and the lowest standard deviation of 0.49, the results indicate respondents' strong agreement. However, 16% and 4% of respondents disapproved

and strongly disagreed with the statement, respectively. Lastly but not least, adoption of innovative technology has strengthened the hotel's brand reputation and competitiveness. At 31.5% strongly agreed and 45.2% agreed, the results were confirmed with mean of 3.61 and uncertain deviation of standard deviation of .53; However, few of respondents disagreed the statement, 17.3% and 6% disagreed and strongly disagreed the statement.

According to the research conducted by Randle and Dolnicar (2021) argued that innovation strategy brings adaptation to guest needs and expectations leading to the customer satisfaction as well as creation of customer loyalty. Innovation technology improves customer satisfaction as well as customer loyalty. The innovation technology facilitates hotel to expand the market share through promoting brand image.

Correlational Analysis between innovative technology and sustainable service at Marriott hotel

Researchers utilized correlational analysis because they were interested in investigating the link between independent factors and the variable they were studying (the dependent variable). The following dependent variables, namely innovative technology, contribution of innovative technology, challenges and measures options, were used in the study to investigate the independent variable, which is sustainable service.

Table 6: Pearson Correlation Matrix

		Innovative technology	Contribution of innovative technology	Challenges	Measures	Sustainable service
Innovative technology	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	151				
Contribution of innovative technology	Pearson Correlation	.837**	1			
	Sig. (2-tailed)	.000				
	N	151	151			
Challenges	Pearson Correlation	.482**	.464**	1		
	Sig. (2-tailed)	.000	.000			
	N	151	151	151		
Measures	Pearson Correlation	.720**	.758**	.784**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	151	151	151	151	
Sustainable Service	Pearson Correlation	.817**	.837**	.494**	.790**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	64	64	64	64	64

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Primary data, 2025

Taking into account all of the variables that were tested, the results showed that innovative technology are implemented at Kigali Marriott hotel at $r=0.817$ (81.7%). This indicated a strong correlation between innovated technologies and sustainable services) While the findings revealed that innovative technology contributed to the sustainable service at $r=.837$ (83.7%) which was a strong correlation. However, the challenges facing implementation of innovative technology on the sustainable service computed $r=.494$ (49.4%). Finally, measures that mitigate the challenges facing innovative technology and sustainability of service at $r=.79$ (79%)

The relationship between innovative technology and sustainable service at Marriott Hotel was centered on efficiency, infrastructure, skilled staff and guest satisfaction. These innovations not only improve service delivery but also build customer trust and brand loyalty, positioning Marriott as a leader in hospitality while sustaining high service standards.

Regression Analysis

The relationship between the independent variable (Innovative technology) and the dependent variable (sustainable service) is shown in this section. For the purpose of determining whether or not the innovative technology had a substantial influence on the sustainable service, a regression linear analysis was carried out. One independent variable can be broken down into its component pieces, which are innovative technology implemented, contribution of innovative technology, challenges and measures. In order to determine the contribution independent variable on the dependent variable, the modal summaries, the variances, and the coefficients of the variables were calculated.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.875 ^a	.765	.748	.69805

Source: Primary Data (2025)

a. Predictors: (Constant), innovative technology, contribution of innovative technology, challenges and measures.

As can be seen in Table 7, the regression analysis revealed a positive correlation ($R=0.875$) between the model's predictors innovative technology, contribution of innovative technology, challenges and measures and the overall R^2 value, which was calculated to be 76.5%. Within the context of the sustainable service the findings substantiated the hypothesis that an independent variable exerts a significant influence on the sustainable service in Kigali Marriott Hotel. The sustainable service was significantly influenced by the innovative technology.

Table 8: Analysis of Variance (ANOVA)

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	85.132	12	28.377	44.557	.000 ^b
Residual	26.112	139	.637		
Total	111.244	151			

Source: Primary Data (2025)

a. Predictors: (Constant), innovative technology, contribution of innovative technology, challenges and measures.

b. Dependent Variable: Sustainable service

Table 8 shows that the model predicts that other variables can explain 76.5% (85.132 out of 111.244) of the differences in the sustainable service in Kigali Marriott Hotel, while variables not included in the model can explain 23.5% (26.111 out of 111.244). The F value of the model is 44.557, which was a greater than zero. A P-value of 0.000 is below the set level, which means that the relationship between the independent factors and the dependent variables was statistically significant. The results of Analysis of Variance showed that the sustainable service enhances due to the implementation innovative technology.

Table 9: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.902	1.555		2.445	.000
Innovative Technology	.490	.126	.460	1.510	.000
Contribution of innovative technology	.366	.093	.438	1.787	.001
Challenges	.093	.025	-.003	1.268	.002
Measures	.313	.125	.397	2.268	.002

Source: Primary Data (2025)

Dependent Variable: Sustainable service

Researcher formulated regression line using the following equation

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

By replacing the values of β we get:

$$Y = 2.902 + .460X_1 + .438X_2 - 0.003 X_3 + .397X_4 + .69805$$

In Table 9, you can see how the regression values turned out. Standardized factors (Beta) made it possible to figure out how well an innovative technology was doing. T-statistics show that the sustainable service was influenced highly to the innovative technology in hospitality industry. However, the challenges facing implementation of innovative technology and sustainability of services in Kigali Marriott hotel declines the sustainable service at Kigali Marriott hotel at 0.003 level.

Results of Hypothesis Testing

The researcher tested whether he should accept or reject the hypothesis based on the data produced by applying the summary of the linear regression model. As consequence of this, the table demonstrates, using the findings of the hypotheses that were tested, the key effects needed to either affirm or reject hypotheses.

Table 10: Results of Hypotheses Testing

Hypothesis developed	Beta (β)	P-values	Decision on Ho	R ²
Innovative Technology	.460	.000	Rejected	
Contribution of innovative Technology	.438	.001	Rejected	.765
Challenges	-.003	.002	Rejected	
Measures	.397	.002		

Source: Primary Data, 2025

Three hypotheses relevant to research objectives were explored in the study. The first hypothesis stated that there are no innovative technologies implemented by Kigali Marriott hotel, the second hypothesis states that innovative technology has no significant on the sustainable service at Kigali Marriott hotel, the third hypothesis states that there is no challenges facing innovative technology and sustainability of service at Kigali Marriott hotel and the fourth one assessed that there are no measures that mitigate the challenges facing innovative technology and sustainability of service at Kigali Marriott hotel. All hypotheses were rejected since the p-value was less than 0.005, indicating that all variables had influence on the sustainability of service.

VI. CONCLUSION

The Innovative Technologies Implemented by Kigali Marriott Hotel

Based on the findings from this study, it is clear indication that Kigali Marriott Hotel has embraced innovative technologies to enhance sustainable service and improve guest experiences. Upgrading room facilities and amenities ensures comfort and operational efficiency, contributing to long-term sustainability. The introduction of digital ordering platforms streamlines service delivery, making operations more efficient and responsive. Additionally, modern and digitalized conference facilities provide an enhanced business environment, attracting more clients. Automated reservation systems simplify booking processes, reducing delays and improving convenience.

The Contribution of Innovative Technology on the Sustainable Service at Kigali Marriott Hotel

Furthermore, the study concluded that innovative technology plays a crucial role in ensuring sustainable service at Kigali Marriott Hotel by enhancing efficiency and customer experience. It helps maintain high customer satisfaction by improving service quality and responsiveness. Personalized guest experiences are enhanced through advanced technology, strengthening customer loyalty and brand reputation. Streamlining the check-in and check-out process ensures convenience. Additionally, technological advancements foster trust among customers and stakeholders by ensuring reliability and seamless communication.

The Challenges Facing Marriott in Implementation Innovative Technology and Sustainability of Services in Kigali Marriott Hotel

The study concluded that Kigali Marriott Hotel encounters various obstacles in implementing innovative technology to sustain its services. The high cost of upgrading technology remains a significant barrier, limiting the adoption of advanced solutions. Additionally, insufficient staff training and difficulty in adapting to new systems hinder efficient service delivery. Striking a balance between automation and personalized guest experiences presents a challenge. Privacy and security concerns also discourage customers from fully embracing digital services.

The Measures that Mitigate the Challenges Facing Innovative Technology and Sustainability of Service at Kigali Marriott Hotel

Furthermore, the study concluded that providing comprehensive staff training enhances employees' ability to adapt to new technologies, improving service efficiency. A balanced approach to automation and personalization ensures that technology enhances guest experiences without compromising human interaction. Additionally, ongoing investment in technological advancements enhances efficiency, ensuring long-term sustainability and competitiveness in the hospitality industry of organization. As the overall conclusion, all variables considered by researcher innovative technology contribute significantly to the sustainable service in hotel sector.

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