

## **THE ROLE OF TECHNOLOGICAL SERVICE INNOVATION IN ENHANCING CUSTOMER SATISFACTION: AN IoT AND SMART HOSPITALITY STUDY OF HOTELS IN UYO, AKWA IBOM STATE.**

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**Abstract:** In today's rapidly evolving hospitality industry, technological service innovation has become a key driver of customer satisfaction. The integration of the Internet of Things (IoT) and smart hospitality solutions has transformed hotel operations, enabling seamless connectivity, personalized guest experiences and improved service efficiency. The main objective of this study was to examine the influence of technological service innovation on customer satisfaction of hotels in Uyo, Akwa Ibom State. To achieve this objective, the main source of data was through primary source with the use of questionnaire. The researcher adopted the survey research design approach and data were collected from 369 respondents drawn from the hotel customers' base. A total number of 351 copies of the questionnaire were retrieved in useable form representing 95.1 percent of data analyzed using the Simple Regression Model (SRM). Data generated from the study were processed using descriptive and inferential statistics and hypotheses tested at 0.05 level of significance. Findings revealed that technological service innovation had significant influence on customer satisfaction of hotels in Uyo, Akwa Ibom State. Thus, the study recommended that the managers of hotel firms should integrate IoT-enabled devices that allow guests to personalize room settings-such as lighting, temperature and entertainment systems-through their smart phones or in-room tablets. This customization enhances comfort and convenience.

**Keywords:** Technological Service Innovation, Automation, Internet of Things (IoT), Customer Satisfaction.

### **Introduction**

Technological service innovation has become a pivotal factor in enhancing customer satisfaction within the hospitality industry. The integration of advanced technologies, such as the internet of things (IoT) and smart hospitality solution, has transform traditional hotel operation leading to improved guest experiences and loyalty.

The adoption of smart technologies in hotels has been shown to significantly influence guest satisfaction and loyalty. Danwati, et. al., (2024) in their study involving 332 guests in smart technology equipped hotels utilized structural equation modeling to analyze relationships between user competency, perceived ease of use, perceived usefulness, satisfaction and loyalty. The findings of this study revealed that user competency substantially affects guests' perceptions of the benefits and convenience of smart hotel technology, which in turn impact their

satisfaction and loyalty levels. This underscores the importance of understanding user perspectives and market readiness for successful technology implementation in smart hotels.

Moreover, service innovation, particularly when aligned with marketing innovation, has been found to directly enhance customer satisfaction. The interplay between these innovations and competitive advantage suggests that hotels with technological advancements can better meet evolving customer expectations, thereby improving satisfaction and fostering loyalty.

The internet of things (IoT) plays a crucial role in the evolution of smart hospitality. By connecting devices and systems, IoT enables hotels to provide personalized services, streamlined operations and enhance energy efficiency. For instance, smart room controls allow guests to customize their environment, while predictive maintenance of equipment ensures uninterrupted services. These technological advancements not only improve the guest experience but also contribute to operational efficiency and sustainability.

In Uyo, Akwa Ibom State, the hospitality sector is gradually embracing technological innovation to enhance customer satisfaction. Notable establishments such as the Ibom icon Hotel & Golf Resort, Monty Suites & Golf and Mezino place among others have been recognized for integrating smart technologies into their services. These hotels offer amenities like automated room controls, online booking systems, reflecting a commitment to leveraging technology for improved guest experiences.

The implementation of IoT and smart hospitality solutions in Uyo's hotels signifies a positive trend towards modernizing the local hospitality industry. By adopting these technologies, hotels in the region can enhance operational efficiency, offer personalized services and ultimately increase customer satisfaction and loyalty. Existing research has demonstrated a positive relationship between service innovation and customer satisfaction in the hospitality sector. Despite these findings, there is lack of specific studies focusing on the impact of IoT and smart hospitality technologies in the context of Uyo's hotel industry.

Addressing this research gap is crucial for local hoteliers to understand how technological service innovations can be leveraged to enhance customer satisfaction. Such insights would enable hotels in Uyo to adopt appropriate technologies, improving service quality and remain competitive in the rapidly evolving hospitality landscape. Therefore, this study aims to investigate the role of technological service innovation, particularly IoT and smart hospitality applications in enhancing customer satisfaction within hotels in Uyo, Akwa Ibom State. By doing so, it seeks to provide empirical evidence that can guide strategic decisions on technology adoption and service improvement in the local hospitality industry.

### **Objectives of the Study**

The main objective of this study was to examine the influence of technological service innovation on customer satisfaction of hotels in Uyo, Akwa Ibom State. The specific objectives therefore include to:

- Examine the influence of automation on customer satisfaction of hotels in Uyo, Akwa Ibom State.
- Ascertain how connectivity (IoT) influences customer satisfaction of hotels in Uyo, Akwa Ibom State.

### **Research Questions**

This study attempts to provide answers to the following research questions:

- What is the influence of automation on customer satisfaction of hotels in Uyo, Akwa Ibom State.
- To what extent does connectivity (IoT) influence customer satisfaction of hotels in Uyo, Akwa Ibom State.

### **Research Hypotheses**

The following hypotheses were postulated to guide the study

H<sub>01</sub>: Automation does not significantly influence customer satisfaction of hotels in Uyo, Akwa Ibom State.

Ho<sub>2</sub>: Connectivity (IoT) does not significantly influence customer satisfaction of hotels in Uyo, Akwa Ibom State.

## **Review of Related Literature**

### **THE CONCEPT OF TECHNOLOGICAL SERVICE INNOVATION**

Technological service innovation refers to the use of new or improved technologies to enhance or create services, making them more official, convenient or valuable for customers. In the hotel industry, this could involve adopting advance systems like mobile check-ins, smart room controls, AI-powered customer service, or automated booking systems to improve guest experiences and streamline operations.

Technological service innovation in the hotel industry has become a focal point for enhancing guest experiences and operational efficiency. Recent studies have explored various dimensions of this concept, providing insight into current practices and future directions. A comprehensive review by Park, et al., (2023) analyzed 82 articles on technology-driven service innovation in hospitality and tourism. The study highlighted the pivotal role of advance technologies in reshaping service delivery and identified gaps in current research, suggesting avenues for future exploration.

Research by D'Souza and D'Souza (2023) examine how innovative technologies adopted by hotels influence customer experiences. Utilizing a framework encompassing product innovations, process innovations, enhance market knowledge and management innovations, the study findings revealed that process innovations, such as automated check-ins and smart rooms controls significantly enhance guest satisfaction. The findings underscore the necessity for hoteliers to stay abreast of technological advancements to meet evolving guest expectations.

Kim and Han (2022) in their study investigated consumer behaviors concerning smart hotels powered by advance technologies. Their research developed a model incorporating technology readiness, perceived ease of use, perceived usefulness, attitude, subjective norm and perceived behavioural control. The result of this study indicated that these factors collectively influence consumers' intention to choose smart hotels, emphasizing the importance of understanding consumer perceptions in the adoption of technological innovations.

Technological service innovation in hotels encompasses a broad spectrum of strategies aimed at improving guest satisfaction and operational efficiency. While technology plays a vital role, the integration of human elements and strategic management practices remains essential for successful innovation.

### **AUTOMATION AND CUSTOMER SATISFACTION**

Automation in hotel services refers to the use of technology and automated system to enhance efficiency, improve guest experiences and streamline operations in the hospitality industry. This includes, self-service kiosks for check-in and check-out, AI-powered chatbots for customer inquiries, smart room controls ( e.g., automated lighting , temperature and entertainment systems), automated housekeeping scheduling , robotics room service and concierge assistance and integrated property management systems for seamless booking and operations (Canary Technologies, 2024).

Automation in hotels helps reduce human errors, enhance personalization and optimize staff productivity, ultimately improving guest satisfaction and operational efficiency. Automation in the hospitality industry has gained momentum with hotels adopting various smart technologies to enhance customer satisfaction. The integration of automation aims to improve efficiency, reduce operational cost and enhance the guest experience. Automation enables hotels to provide personalize services, such as tailored recommendations and smart rooms controls. AI and machine learning helps analyzed guest preferences, leading to customized room settings, dining options and activity suggestions. Oracle (2025) posits that automation enhances personalization before, during and after a guest's stay, significantly improving satisfaction levels.

## CONNECTIVITY (IoT) AND CUSTOMER SATISFACTION

Connectivity refers to the integration of smart devices and systems within the hotel environment. This includes interconnected sensors, appliances and management platforms that enhance operational efficiency and guest experience. Ying, et al., (2024) in their study on the impact of technology innovation on customer satisfaction, employee and leadership commitment in CSR practice revealed that technology innovation had the most significant factor that mediated customer satisfaction, employee and leadership commitment with CSR practice.

Chaudhary, et al., (2025) examined the service innovation in telecommunication: the path to customer loyalty through enhanced customer satisfaction, their study findings confirmed that service innovation directly influenced customer satisfaction and significantly enhanced customer loyalty in the Nepalese telecom sector. Thus, their study also found a negligible indirect impact of service innovation on customer loyalty when customer satisfaction was considered a mediator, revealing that customer satisfaction did not fully influence this relationship in the Nepalese telecom sector, suggested that other variables, such as price sensitivity, switching costs and consistency in service quality may also had affected the relationship between service innovation, customer satisfaction and loyalty.

Ahmed, et al., (2022) examined the impact of implementing the internet of things (IoT) on customer satisfaction: evidence from Egypt found that IoT applications positively influence customer satisfaction; key factors such as application usability, security and cost were identified as significant contributors to this positive impact. The research indicated that IoT implementation leads to reduce operational costs, enhance service quality, increase staff efficiency and overall improved customer experiences.

These studies indicate that IoT connectivity positively influences customer satisfaction in hotels by enhancing service quality, operational efficiency and personalized guest experiences. However, successful implementation requires addressing challenges related to security, cost and infrastructure to fully harness the potential of IoT in the hospitality sector.

## CONCEPT OF CUSTOMER SATISFACTION

Customer satisfaction is a pivotal factor in the hotel industry, influencing customer loyalty, repeat business and overall profitability. Customer satisfaction in the hotel service industry refers to the degree to which guests' expectations are met or exceeded during their stay, encompassing aspects such as service quality, room comfort and amenities. High customer satisfaction leads to repeat business and positive word-of-mouth (Kwortnik and Thompson, 2022; Zubair, et al., 2023). It is increasingly influence by personalized experiences and effective communication (Lee, et al., 2021).

Service quality remains a cornerstone of customer satisfaction in hospitality industry. Etuk, Awah and Akpan (2024) in their study identified four dimensions-empathy, responsiveness, assurance and tangibles-as having a significant influence on customer satisfaction. The digital era has amplified the influence of online customer reviews on hotel reputations. Empirical research demonstrates that positive online reviews significantly boost customer satisfaction and can lead to higher occupancy rates. Conversely, negative reviews can deter potential guests, underscoring the importance of maintaining high service standards and engaging in active online reputation management (Etuk, Akpan and Awah, 2025).

A comprehensive analysis of online reviews has shed light on the critical attributes influencing customer satisfaction. Factors such as room cleanliness, staff professionalism and the quality of amenities have been identified as significant contributors to positive customer experiences. Hotel that excels in these areas tend to receive higher satisfaction ratings and foster customer loyalty.

## Theoretical Framework

In this section the theory considered relevant for this study was;

### 2.2.1 Service Quality (SERVQUAL) Model propounded by Parasuraman, A., Zeithaml, V. and Berry, L. (1988)

Parasuraman et al., (1988) developed the service quality model. This model was entitled SERVQUAL. Based on this model they identified five determinants of service quality in their order of importance and they include: Reliability, Responsiveness, Assurance, Empathy and Tangibles.

- i. **Reliability:** This is the ability of the hotel firms to perform the service they had promised their customers dependably and accurately.
- ii. **Responsiveness:** This refers to the willingness of the hotel firms to help their customers as well as providing prompt services.
- iii. **Assurance:** This means the knowledge and courtesy of the hotel firms employees as well as their ability to convey trust and confidence.
- iv. **Empathy:** This involves the firm's provision to care for their customers and also providing individualized attention to them.
- v. **Tangibles:** This refers to the appearance of the hotel firm's physical facilities, equipment, personnel and communication materials.

Based on these five dimensions, Parasuraman, et al., (1988) developed a 21 – item scale for measuring the service quality and they include;

- i. **Reliability**
  - a. Providing service as promised
  - b. Dependability in handling the hotel firm's customers service problems
  - c. Performing services right to the hotel firm's customers at the night time.
  - d. Maintaining error-free records
  - e. The hotel firm's ability to have employees who possess the knowledge to answer questions from their customers
- ii. **Responsiveness**
  - a. Keeping the hotel firm's customers informed on when services will be performed
  - b. Providing prompt service to the firm's customers
  - c. The hotel firm's willingness to help its customers
  - d. The hotel firm's readiness to respond to their customers' request
- iii. **Assurance**
  - a. The hotel firm's ability to have employees who can instill confidence in the customers.
  - b. Having employees who can make the hotel firm's customers feel safe in their transactions.
  - c. The hotel firm's ability to have employees who are consistently courteous.
- iv. **Empathy**
  - a. Giving the hotel firm's customers individual attention
  - b. Having employees who deal with the hotel firm's customers in a caring fashion
  - c. Having the firms' customers' best interest at heart
  - d. Having employees who understand the needs of the hotel firm's customers.
  - e. Convenient business hours

v. **Tangibles**

- a. The hotel firm's ability to have modern equipment
- b. The hotel firm's ability to have visually appealing facilities
- c. Having hotel firm's employees who have a neat and professional appearance
- d. The ability of the hotel firms to have visually appealing materials associated with the service.

This model can be viewed as a model widely used by many service organizations to measure service quality and it becomes the anchor model for this study.

**Review of Empirical Studies**

Akpan, Awah and Mfon (2024): The Moderating Role of Age and Education in the relationship between E-Service ease of use and Customer Loyalty in online shopping in Nigeria. The study aimed to examine the moderating effects of age and education on the relationship between e-service ease –of- use and customer loyalty among online shoppers in Nigeria. The method of data analysis involved descriptive and inferential statistics. The findings of the study revealed that ease-of-use alone accounts for 1.7% of the variation in customer loyalty. Hence, when age was introduced as a moderating variable, the explained variance increased significantly to 30.9%, highlighting its substantial moderating effect. They recommended that online retailers should tailor their platforms to meet the specific needs of different age groups and educational backgrounds to enhance customer satisfaction and retention.

Etuk, Akpan and Awah (2025): The influence of online reviews on brand perception and customer engagement in service marketing in Nigeria. The method of data analysis involved descriptive and inferential statistics. The findings of the study revealed that online reviews significantly influence brand perception and customer engagement. The findings indicate that positive online reviews enhance brand credibility and consumer trust, while negative reviews can deter potential customers unless effectively managed. They recommended that Nigerian service firms should adopt proactive digital reputation strategies, including real-time engagement, authenticity assurance and tailored response mechanisms, to enhance consumer confidence and brand loyalty.

Chaudhary, et al., (2025): Service innovation in telecommunication: The path to customer loyalty through enhanced customer satisfaction. The method of data analysis involved descriptive and inferential statistics. The findings of the study revealed that service innovation directly influences customer satisfaction and significantly enhances customer loyalty in the Nepalese telecom sector. They recommended that the Nepalese telecom sector should reevaluate its service innovation attempts, guiding executives to update their programs by offering new reliable innovation for strategic planning to attract local customers.

**METHODOLOGY**

**Design of the Study**

The researcher utilized a survey research approach for this study, collecting data on both the independent and the dependent variables from multiple hotels in Uyo, Akwa Ibom State. This method allowed for meaningful interaction with a large number of hotel customers in the area.

**Population of the Study**

The study's target population included all hotels customers in Akwa Ibom State, making the Population effectively limitless.

**Sampling and the Sample Size determination**

Since the population size for the study was infinite, sample size for this study was determined using the Topman Formula at 5% level of tolerable error.

The formula is given as

$$n = \frac{Z^2 \cdot pq}{e^2}$$

Where n = required sample size

z = the value of z-score associated with the degree of confidence is 95% confidence level being 1.96 from the Z-score table.

p = 0.7 decimal (positive)

q = 0.3 decimal (negative)

e = acceptable tolerance level of error (stated in percentage points)

$$\begin{aligned} n &= \frac{Z^2 \cdot pq}{e^2} \\ &= \frac{1.96^2 \cdot (0.6 \times 0.4)}{0.05^2} \\ &= \frac{3.8416 \times 0.24}{0.0025} \\ &= \frac{0.921964}{0.0025} \\ &= 368.7 \\ &= 369 \end{aligned}$$

Therefore, the sample size of the study was 369.

### Sampling Procedure

The study employed a convenient sampling technique to distribute the research instrument. This method involved selecting respondents who were willing to participate and easily accessible to the researcher.

### Methods of Data Collection

The data analysis included both descriptive and inferential statistics. A simple regression analysis was conducted to assess how technological service innovation influences customer satisfaction. All hypotheses were tested at a significance level of  $P > 0.05$ .

### Sources of Data

The main source of data employed in this study was the primary data source. The primary data source was a structured questionnaire which was served on respondents. The questionnaire was made up of two sections: section "A" generated data on demography, while section "B" was made up of two sub- sections which were the independent variable (technological service innovation) and the dependent variable (customer satisfaction).

## DATA PRESENTATION AND ANALYSIS

### Data Analysis

#### Test of Hypothesis One

Automation does not significantly influence customer satisfaction of hotels in Uyo, Akwa Ibom State.

**Table 1: Model Summary of the Influence of automation on Customer Satisfaction of Hotels**

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate
1	.814 <sup>a</sup>	.875	.785	.81690

a. Predictors (constant), Automation

Source: Field Survey, 2025

### Analysis of Variance of the Influence of automation on Customer Satisfaction of Hotels

	Model	Sum of squares	Df	Mean square	F	Sig.
<b>Regression</b>	1719.835	1	1892.757	2741.315	.000 <sup>b</sup>	
<b>1 Residual</b>	483.654	350	5.781			
<b>Total</b>	2203.489	351				

a. **Dependent Variable:** Customer Satisfaction

b. **Predictors:** (Constant), Automation

**Source:** Field Survey, 2025

The regression in table 1 shows that the coefficient of the constant terms (that is, the explanatory or predictor) variable. Automation has R-value of (.814) which indicates a positive relationship between the explanatory variable and the criteria variable. The R-square, the coefficient of determination value is (.875). This means that 87.5 percent of the variation on the Customer Satisfaction can be explained from the independent variable (Automation). The table also shows the adjusted R-square for the model as (.785). But adjusted R-square is very useful in multiple regression analysis where it adjusts the R-square by the number of predictor values in the model. This adjustment allows the easy comparison of the explanatory power of the models with different numbers of independent variables. The F-ratio in the ANOVA table shows the overall regression effect in the model. The F-ratio value is 2741.315 which is significant at 0.000 and is less than 0.05 percent level of significance. Therefore we reject the null hypothesis and accept that Automation contribute towards Customer Satisfaction of Hotels in Uyo, Akwa Ibom State.

### Hypothesis 2

Connectivity (IoT) does not significantly influence customer satisfaction of hotels in Uyo, Akwa Ibom State

**Table 2: Model Summary of the Connectivity (IoT) on Customer Satisfaction of Hotels**

	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
<b>1</b>	.831	.877	.817	.79782	

a. Predictors: (Constant), Connectivity (IoT)

### Analysis of Variance of the Influence Connectivity (IoT) on Customer Satisfaction of Hotels

	Model	Sum of squares	Df	Mean square	F	Sig.
<b>Regression</b>	1891.582	1	1773.957	2537.352	.000 <sup>b</sup>	
<b>1 Residual</b>	972.713	350	4.731			
<b>Total</b>	2864.295	351				

a. **Dependent Variable:** Customer Satisfaction

b. **Predictors:** (Constant), Connectivity (IoT)

**Source:** Field Survey, 2025

a. The regression result in table 2 revealed that the regression coefficient of R-value is (.831) which indicates that there is a strong positive relationship existing between Connectivity (IoT) and Customer Satisfaction in the selected hotels. The model summary table shows that the R-Square regression coefficient is (.877), which indicate that Connectivity (IoT) accounts for 87.7 percent of the total variation on the Customer Satisfaction of hotels in



the study area. The ANOVA table shows the F-ratio for the regression model which indicates the statistical significance of the overall regression model. The F-ratio value is 2537.352 which is statistically significance at 0.000 level, since the probability value (P-V=0.000) is less than 0.05 percent, we reject the null hypothesis and upheld the alternative. This means that there is a significant influence of Connectivity (IoT) on Customer Satisfaction of hotels.

### Discussion of Findings

The first hypothesis of this study states that automation does not significantly influence customer satisfaction of hotels in Uyo, Akwa Ibom State. The findings of the study revealed a significant influence of automation on customer satisfaction of hotels. The F-ratio in the ANOVA table 1 shows the overall regression effect in the model. The F-ratio was 2741.315 which was significant at 0.000 and was less than 0.05 percent level of significance. This is in consonance with the study of Chaudhary, et al., (2025) who found that service innovation directly influences customer satisfaction and significantly enhances customer loyalty in the Nepalese telecom sector and Oracle (2025) who found out that automation enhances personalization before, during and after a guest's stay, significantly improving satisfaction levels.

The second hypothesis of this study states that Connectivity (IoT) does not significantly influence customer satisfaction of hotels in Uyo, Akwa Ibom State. The findings of the study revealed a significant effect of connectivity (IoT) on customer satisfaction of hotels in the study area. The F-ratio in the ANOVA table 2 shows the overall regression effect in the model. The F-ratio was 2537.352 which was significant at 0.000 and was less than 0.05 percent level of significance. This is in consonance with the study of Ahmed, et al., (2022) who found that IoT applications positively influence customer satisfaction.

## SUMMARY, CONCLUSIONS AND RECOMMENDATION

### Summary

The main thrust of this study has been presented in the preceding sections. This section is concerned with the summary of major findings. The study investigated the influence of technological service innovation on customer satisfaction of hotels in Uyo, Akwa Ibom State. Two hypotheses were formulated to guide this study and all the hypotheses were tested at 0.05 level of significance through the use of simple regression analysis. The two null hypotheses were rejected and the alternative hypotheses accepted. This resulted from the fact that the regression results were all significant, the computed F-values for all the two hypotheses show statistical significance of the overall regression model, this means that there was statistically significant influence of Technological Service Innovation strategies such as (Automation and Connectivity (IoT)) on Customer Satisfaction of hotels in Uyo, Akwa Ibom State.

To achieve the objectives, a survey research design was used to reach out to the respondents of the hotels. The population of the study was infinite. The Topman sample size determination formula at 5% level of tolerable error was used to determine the sample size of 369. The convenience sampling technique was employed in the administration of the research instrument for the study.

### Conclusion

Based on the findings of this study, the following conclusions were established.

- Automation has significant influence on customer satisfaction of hotels in Uyo, Akwa Ibom State.
- Connectivity (IoT) has significant influence on customer satisfaction of hotels in Uyo, Akwa Ibom State.

### Recommendations

Based on the findings of this study, we recommend that the managers of the hotels should enhance effective use

of Technological Service Innovation strategies to:

- Adopt automated check-in and check-out processes: Introducing self-service kiosk or mobile applications for check-in and check-out can minimize wait times and enhance the overall guest experience.
- Integrate IoT-enabled devices that allow guests to personalize room settings-such as lighting, temperature and entertainment systems-through their smart phones or in-room tablets. This customization enhances comfort and convenience.

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