

Enhancing Pilgrim Services During Hajj: A Service Quality Framework Approach

Othman Talal Kurdi

Master of Science in Engineering Management and Technology
Islamic University of Madinah
Madinah, Saudi Arabia
451001216@stu.iu.edu.sa

Rahmat Nurcahyo

Department of Industrial Engineering
Islamic University of Madinah
Madinah, Saudi Arabia
400758@iu.edu.sa

Abstract

The Hajj pilgrimage, the fifth pillar of Islam, poses a significant challenge for service delivery due to the massive influx of pilgrims and the complexity of logistics management. The research employs the Pilgrimage Satisfaction Model, primarily based on the SERVQUAL model, and proposes 12 key service dimensions to assess the quality of Hajj services. It focuses on determining key aspects to propose sustainable service innovations aligned with Saudi Vision 2030. First, the questionnaire was developed by experts, service providers, and evaluators of Hajj and Umrah services, and most agreed that the Comfort and Convenience dimension should be developed further. Then, the results showed that the sample comprised 130 individuals from various nationalities. Distributed by gender, 84 males and 46 females, and then divided into four age groups to analyze differences in opinions based on age. After that, the reliability results using Cronbach's alpha showed the highest value of 0.899 for (SN) Expectations. The highest value for (SN) was 0.901 for Perceptions. Then, using the Kaiser-Meyer-Olkin test, Expectations and Perceptions value > 0.5. The p-value < 0.05, indicating validity. After that, the PCA showed that the highest values were 0.951 for CR2 in Expectations and 0.949 for EP2 in Perceptions. Then, the Gap analysis showed that (GS4, ES3, ES1) have values (-0.192 to -0.015) that must be addressed.

Keywords

Service Quality, SERVQUAL model, Hajj pilgrimage, pilgrimage satisfaction, Pilgrimage Satisfaction Model.

1. Introduction

Hajj management is complex due to the interplay of multiple sectors, requiring precise planning and coordination of millions of pilgrims by land, air, and sea. Despite Saudi Arabia's significant investments to enhance services and infrastructure, challenges in Hajj service quality remain. This paper aims to improve Hajj services by integrating the SERVQUAL model to enhance pilgrim satisfaction.

1.1 Objectives

This study aims to evaluate service quality using the SERVQUAL model for service quality in Hajj, and propose a scalable, sustainable service innovation aligned with Vision 2030.

2. Literature Review

In literature reviews, we provide summaries. Vision 2030 in Religious Tourism and Service Quality in Hajj and Enhancing Service Quality in the Hajj Season, Challenges in the Hajj Season.

2.1 Vision 2030 in Religious Tourism

The transformation of the religious, archaeological, and other tourism sectors, as well as the history and development of tourism in the Kingdom of Saudi Arabia, In line with the goals set by Saudi Vision 2030, digital transformation is considered the cornerstone for driving progress in economic diversification, sustainable growth, and social development (Al-Qurtuby 2024; Al-Ayed and Al-Tit 2021).

2.2 Service Quality in Hajj

Research on Hajj service quality remains limited, whereas the literature focuses more on Umrah. The main themes revolve around pilgrim safety, satisfaction, and service management:

1. Jabnoun (2003) Develop the HAJQUAL instrument primarily based on the traditional SERVQUAL model By HAJQUAL Model
2. Eid (2012) Treat service quality and pilgrims' satisfaction levels like customer satisfaction By SERVQUAL Model.
3. Darfoon (2013) Enhance the experiences of pilgrims seeking this religious and spiritual experience By SERVPERF Model.
4. Hassan et al. (2022) Examine the Impact of pilgrims' service satisfaction on their religious spiritual experience By (SEM).

2.3 Enhancing Service Quality in the Hajj Season

Solutions for Hajj and Umrah challenges are categorized and compiled into 10 categories, developed over the past 33 years using technology and AI's capabilities in crowd management, health monitoring, and infrastructure improvement. (Showell 2022; Sakr 2024).

2.4 Challenges in the Hajj Season

Medical facilities, vaccinations, and potential illnesses among pilgrims and analyzing the massive crowds during Hajj and improving emergency response capabilities (Al-Tawfiq and Memish, 2019; Alqurashi et al., 2024; Alqarihi et al., 2024; Alruwais et al., 2024).

3. Methods

The proposed methodology is a mixed-methods approach consisting of two parts: the first is qualitative, involving the detailed development of the Hajj dimensions model and its verification with stakeholders, and the second is quantitative, involving the administration of a questionnaire to pilgrims to obtain a comprehensive analysis of improving the quality of services in Hajj.

Step 1: Data Collection and Cleaning. Collecting qualitative data through literature reviews to create a Conceptual Framework and verifying that it describes the questionnaire as shown in Figure 1, using the Delphi Approach through the intervention of Hajj service providers, experts in the field of Hajj and Umrah, and Hajj service quality evaluators.

They should complete the questionnaire and obtain more realistic data, which will be included in the upcoming analyses.

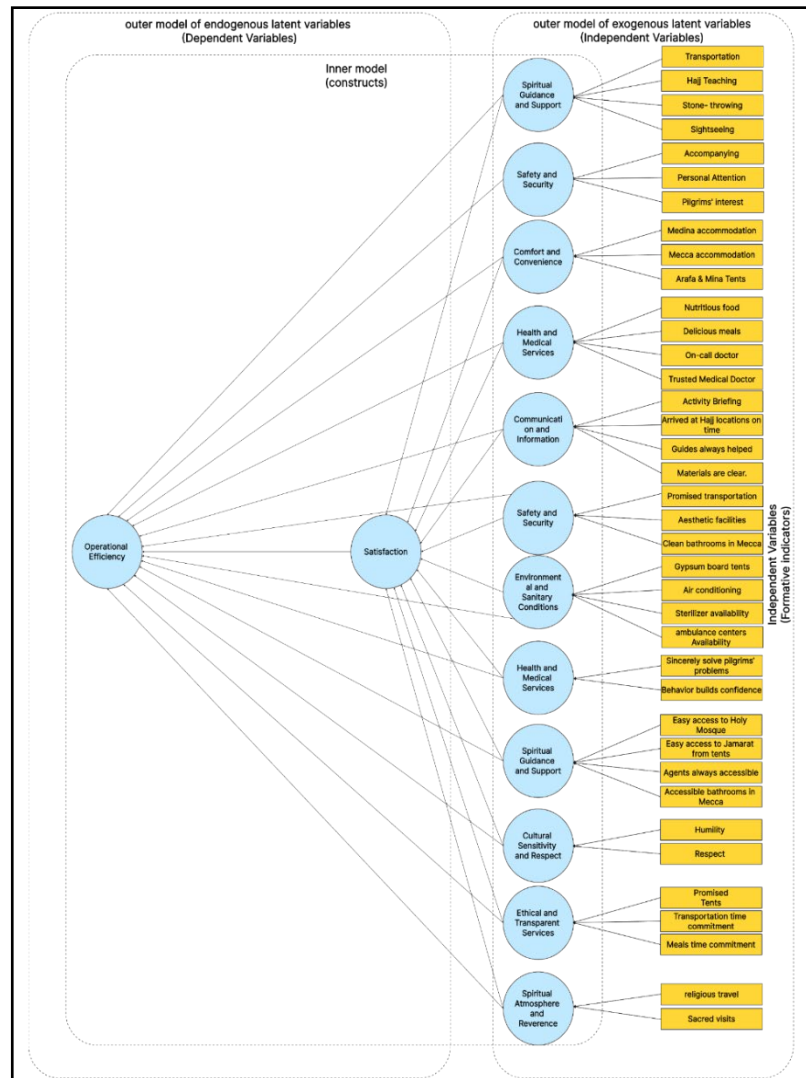


Figure 1. The Pilgrimage Satisfaction for Hajj Service Quality.

Step 2: Demographic Profiling of Respondents: The questionnaire was translated into several languages, including Arabic, Amharic, Bengali, English, Persian, Indonesian, Russian, and Turkish. This linguistic diversity ensured that participants could fully understand the content, contributing to the collection of reliable and comprehensive data that reflects a wide range of perspectives.

Step 3: Pilgrimage Satisfaction Questionnaire Analyses: Abbreviations were recorded for each item to facilitate its identification in the subsequent analyses, including a reliability test to measure internal consistency and validity tests to assess Questionnaire validity.

Step 4: Descriptive Statistics: The first part of the Hajj service quality analysis involves calculating the arithmetic mean for each dimension and item.

3.1 Demographic Profiling of Respondents

The methodology comprises 4 analytical steps. The first analysis is the Nationality Representation of Study Participants, the second is the Gender Distribution of the Study Participants. The third is the Age Group Distribution of Participants, and the fourth is the Distribution of Participants by Educational Level.

3.2 Pilgrimage Satisfaction Questionnaire Analyses

The methodology consists of 2 analysis steps. The first analysis is the Pilgrimage Satisfaction Model as shown in Table 1.

The second is the Reliability and Validity Assessment. Reliability testing was measured using Cronbach's Alpha, where a value greater than 0.70 indicates acceptable reliability (Nunnally, 1978). Validity testing was conducted using factor analysis for each questionnaire item. An item was considered valid if the KMO value was greater than 0.50 and Bartlett's test was significant ($p < 0.05$) According to (Park, 2021). Principal Component Analysis (PCA) was employed to extract factors, and an item was deemed valid if its factor loading value exceeded 0.40 (Maskey et al. 2018). The Rotated Factor Matrix was used to interpret the scale's underlying Constructs through rotations, ensuring that the instrument consistently and accurately measured the variable (Cook and Thompson 1998). The following steps define the Reliability and Validity Assessment process:

Step 1: Reliability Testing Measured using Cronbach's Alpha. A value > 0.70 indicates acceptable reliability.

Step 2: Validity Testing Measured using the Kaiser-Meyer-Olkin (KMO) value and Bartlett's test of sphericity. A KMO value > 0.50 indicates sampling adequacy, and Bartlett's test must be statistically significant ($p < 0.05$).

Step 3: Validity Testing Measured using Principal Component Analysis (PCA) to confirm construct validity. Items with factor loadings < 0.40 were removed to ensure an accurate representation of each construct.

Table 1. Applied model, which was named Pilgrimage Satisfaction Model

Pilgrimage Satisfaction Model	
ID	Iteam
GS1	Transport companies provide diverse means of transportation from Al-Masjid Al-Haram to the hotel, from the airport to the hotel, and between the sacred sites of Mina, Muzdalifah, and Arafat, with guidance.
GS2	Religious guides teach pilgrims how to perform the rituals correctly.
GS3	Instructions and guidance are available for stoning the Jamarat and for directing to accommodation locations.
GS4	Tourist trips are organized to the most important destinations in Makkah and Madinah.
SS1	Staff are available during appropriate working hours.
SS2	Staff provide individual attention.
SS3	Staff prioritize the personal interests of pilgrims.
CC1	Accommodation is close to the Sacred Mosque or the Prophet's Mosque.
CC2	Rooms and facilities in the accommodation are clean.
CC3	Additional services such as internet and breakfast are available.
CC4	Accommodation in Madinah is provided according to the service provider's promise.
CC5	Accommodation in Makkah is provided according to the service provider's promise.
CC6	Tents in Mina and Arafat are provided according to the service provider's promise.
HM1	Food provided is nutritious.
HM2	Meals provided are delicious.
HM3	The accompanying doctor is always available for service.
HM4	The competence and reliability of the accompanying doctor are trustworthy.

CI1	Reports on the schedule and activities are prepared.
CI2	Timely access to the Hajj sites is provided.
CI3	Tourist guides are available at all times to provide services.
CI4	Service-related materials, such as brochures, advertisements, guidance boards, and mobile applications, are presented attractively and contain all necessary information.
RI1	Transport is available according to the service provider's promise.
RI2	The service providers' facilities are visually attractive.
RI3	Toilets in Mina, Arafat, and Muzdalifah are always clean.
ES1	Tents in Mina and Arafat are equipped with plasterboards.
ES2	Air-conditioned transport and tents are available.
ES3	Sterilisation devices are available.
ES4	First aid centres are available.
EP1	Staff are skilful and knowledgeable in problem-solving.
EP2	Staff behaviour impacts building trust.
SN1	There is easy access from Al-Masjid Al-Haram to accommodation for people with special needs.
SN2	There is easy access from the Jamarat to Mina tents for people with special needs.
SN3	Staff are available at all times during the Hajj journey for people with special needs.
SN4	There is easy access to toilets in Mina, Arafat, and Muzdalifah for people with special needs.
CR1	Service providers show humility.
CR2	Service providers show respect.
ET1	Tents in Arafat, Mina, and Muzdalifah are satisfactory.
ET2	Transport is on time as promised.
ET3	Meals are delivered at scheduled times satisfactorily.
AR1	Religious travel achieves spiritual satisfaction.
AR2	Visiting mosques and holy places heals the soul.
SF1	I am satisfied with the services and facilities offered during the Hajj journey.
OE1	I believe the Hajj services were delivered in a timely, organized, and efficient manner.

3.3 Descriptive Statistics

This compares the results for both expectations and perceptions of service, explaining the difference between them, known as the service gap, for each dimension and item in detail.

4. Results and Discussion

The results of the Delphi Approach indicate that Comfort and Convenience should be further developed. Three additional items were added to make it comprehensive. Figure 2 shows the Developed Pilgrimage Satisfaction Model for Hajj Service Quality..

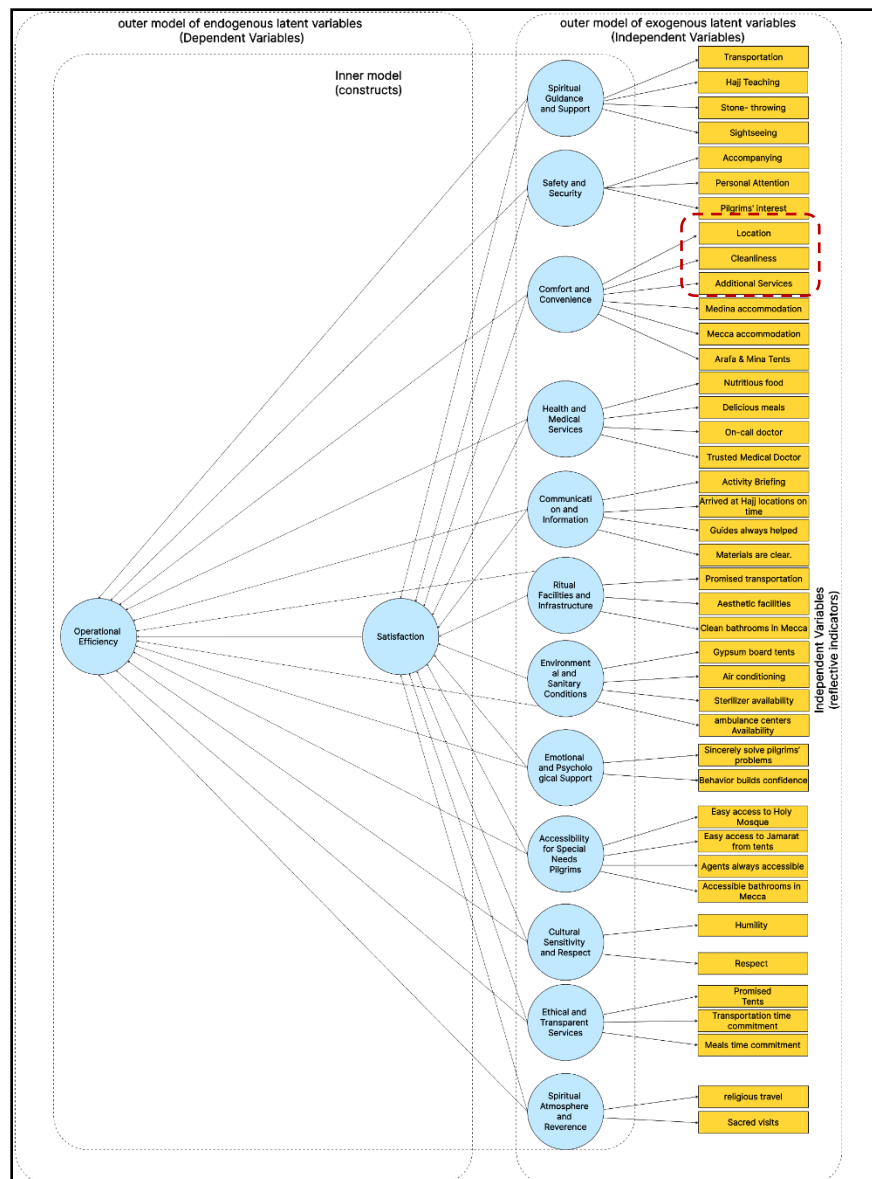


Figure 2. Developed Pilgrimage Satisfaction Model for Hajj Service Quality.

The initial sample included 363 participants. After cleaning, the number of participants who had previously performed Hajj was reduced to 130, representing 36% of the total sample, as illustrated in Figure 3. participants belong to various nationalities, with the largest group consisting of 69 participants from the Kingdom of Saudi Arabia, followed by Indonesia with 13 participants, Egypt with 7, India with 6, Pakistan with 4, United States with 4, Malaysia with 3, Bangladesh with 2, Nigeria with 2, Tunisia with 2, United Kingdom with 2, Sudan with 2. The smallest groups, each with one participant, were from the Philippines, Kazakhstan, Somalia, Türkiye, Russia, Ethiopia, Cameroon, Kuwait, Algeria, Kenya, Libya, and Morocco, Figure 4 and Table 2. Participants were distributed by gender: 84 males (66%) and 46 females (34%), as shown in Figure 5. Participants in the study were divided into four age groups to analyze age-related differences in opinions. The first group includes 25 participants aged 18 to 30 years. The second-largest group included those aged 31-50 years, with 68 participants. The third group consisted of participants aged 51-70 years, totaling 32 participants. The fourth group included only 2 participants aged 71 or older. This distribution is illustrated in Figure 6. Participants were distributed by educational level. The largest group consisted of those holding a bachelor's degree, with 72 participants. This was followed by high school graduates (21 participants), master's degree holders (22 participants), and PhD holders (9 participants). Additionally, 6 participants indicated an educational level categorized as "Other." This distribution is illustrated in Figure 7.

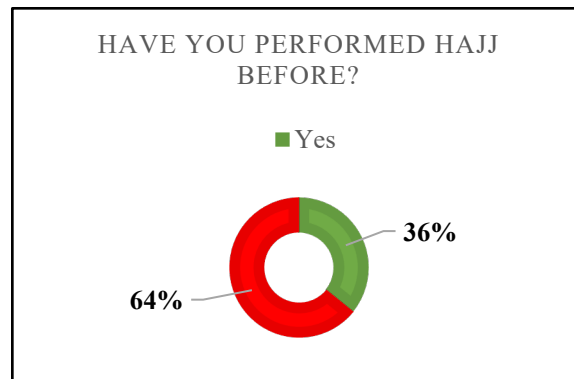


Figure 3. Participants' Response to the Question "Have You Performed Hajj Before?"

Table 2. Distribution of Participants by Nationality

Nationality			
☐	Saudi Arabia	69	
☐	Indonesia	13	
☐	Egypt	7	
☐	India	6	
☐	Pakistan	4	
☐	United States	4	
☐	Malaysia	3	
☐	Singapore	2	
☐	Bangladesh	2	
☐	Nigeria	2	
☐	Tunisia	2	
☐	United Kingdom	2	
☐	Sudan	2	
☐	Philippines	1	
☐	Kazakhstan	1	
☐	Somalia	1	
☐	Turkey	1	
☐	Russia	1	
☐	Ethiopia	1	
☐	Cameroon	1	
☐	Kuwait	1	
☐	Algeria	1	
☐	Kenya	1	
☐	Libya	1	
☐	Morocco	1	

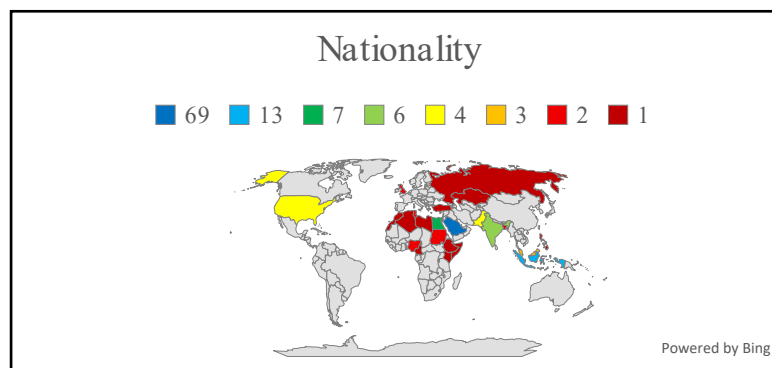


Figure 4. Geographical Distribution of Participants by Nationality.

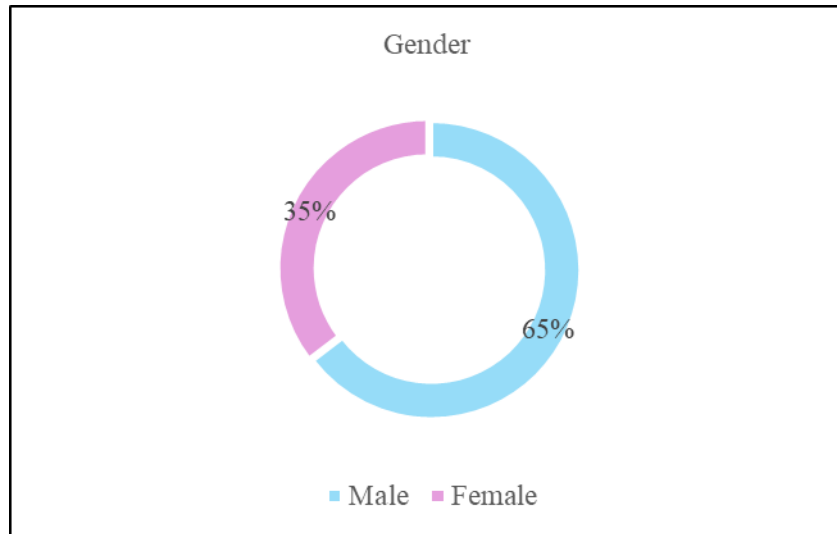


Figure 5. Distribution of Participants by Gender (Male and Female Percentages).

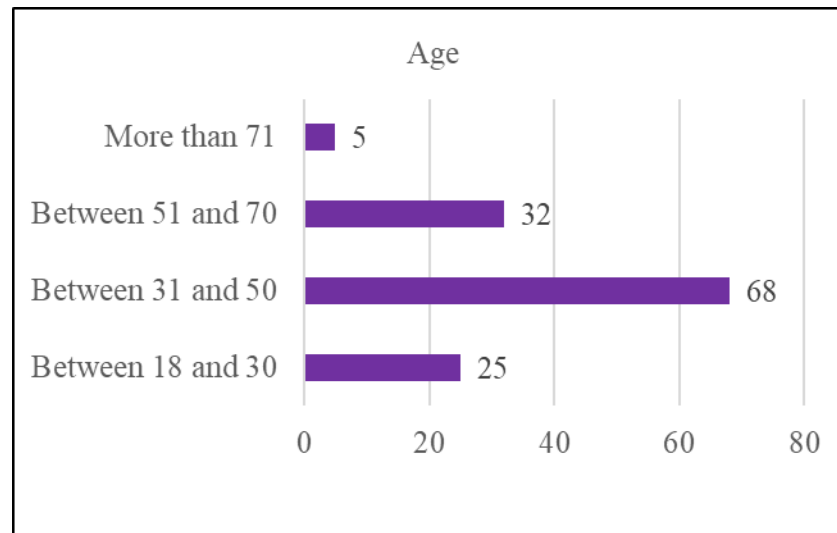


Figure 6. Age Group Distribution of Participants.

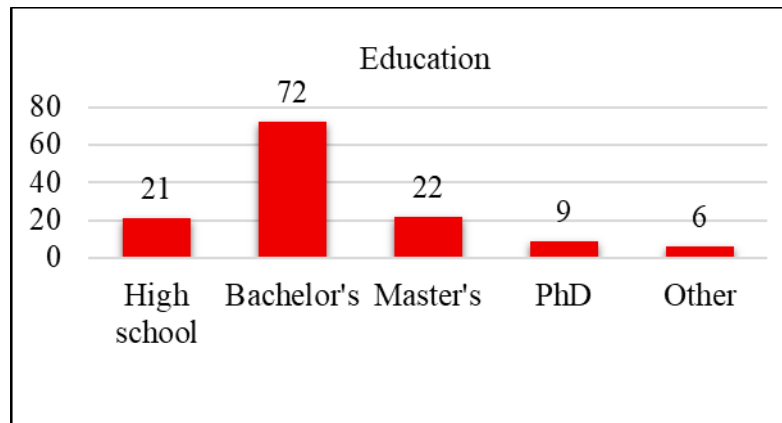


Figure 7. Educational Background of Participants.

Pilgrimage Satisfaction Questionnaire Analyses was divided into two parts. The first part involved a reliability analysis to measure internal consistency, which was calculated using Cronbach's alpha. The second step involved a validity analysis to examine the factors using the KMO test, the Bartlett's test, and principal components analysis, as presented in Tables 3 and 4.

Since values of Cronbach's alpha range from 0.7 to 1, they are considered an indicator of high consistency and reliability. This is considered good because it has been studied before that the value 0.7 is the acceptable limit. Regardless of the existence of values for Corrected Item-Total Correlation less than 0.3, which is considered weak consistency for the dimension by Cristobal et al. (2007), but since Cronbach's alpha is higher than 0.7, the items were kept as they were and no modification was made. The Bartlett test for the Expectations and Perception scales was 0.00, which is significant. The statistics are less than 0.05. Therefore, we can say that the data are valid and appropriate, and that the items are highly correlated. Since all factor loadings are greater than 0.40, this indicates that the questions measuring the dimension are valid, as presented in Tables 3 and 4.

Table 3. Cronbach's alpha and KMO Test, Bartlett's Test, and PCA of the Pilgrimage Satisfaction Model scale for Expectations.

Reliability and Validity of the Pilgrimage Satisfaction Model scale for Expectations in this study (n = 130)					
Pilgrimage Satisfaction Model Dimension	ID (Items)	Reliability	Validity		
		Cronbach's Alpha	Principal Component Analysis(Factor Loadings).	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity (Sig.)
Spiritual Guidance and Support		0.698		0.869	0.000
	GS1		0.828		
	GS2		0.803		
	GS3		0.776		
Safety And Security		0.777			
	SS1		0.844		
	SS2		0.882		
	SS3		0.767		
Comfort And Convenience		0.828			
	CC1		0.696		
	CC2		0.738		
	CC3		0.738		
	CC4		0.632		
	CC5		0.835		
	CC6		0.763		

Health And Medical Services		0.819			
	HM1		0.841		
	HM2		0.829		
	HM3		0.795		
	HM4		0.753		
Communication And Information		0.838			
	CI1		0.802		
	CI2		0.814		
	CI3		0.878		
	CI4		0.794		
Ritual Facilities And Infrastructure		0.803			
	RI1		0.853		
	RI2		0.878		
	RI3		0.795		
Environmental And Sanitary Conditions		0.806			
	ES1		0.740		
	ES2		0.839		
	ES3		0.843		
	ES4		0.751		
Emotional And Psychological Support		0.850			
	EP1		0.923		
	EP2		0.942		
Accessibility For Special Needs Pilgrims		0.899			
	SN1		0.908		
	SN2		0.932		
	SN3		0.920		
	SN4		0.748		
Cultural Sensitivity And Respect		0.872			
	CR1		0.933		
	CR2		0.951		
Ethical And Transparent Services		0.775			
	ET1		0.763		
	ET2		0.844		
	ET3		0.880		
Spiritual Atmosphere And Reverence		0.857			
	AR1		0.939		
	AR2		0.934		

Table 4. Cronbach's alpha and KMO Test, Bartlett's Test, and PCA of the Pilgrimage Satisfaction Model scale for Perceptions.

Reliability and Validity of the Pilgrimage Satisfaction Model scale for Perceptions in this study (n = 130)					
		Reliability	Validity		
Pilgrimage Satisfaction Model Dimension	ID (Items)	Cronbach's Alpha	Principal Component Analysis(Factor Loadings).	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity (Sig.)
Spiritual Guidance and Support		0.700		0.872	0.000
	GS1		0.695		
	GS2		0.795		
	GS3		0.770		
	GS4		0.642		

Safety And Security		0.794			
	SS1		0.856		
	SS2		0.859		
	SS3		0.825		
Comfort And Convenience		0.835			
	CC1		0.702		
	CC2		0.746		
	CC3		0.779		
	CC4		0.667		
	CC5		0.796		
	CC6		0.754		
Health And Medical Services		0.846			
	HM1		0.823		
	HM2		0.845		
	HM3		0.871		
	HM4		0.769		
Communication And Information		0.808			
	CI1		0.752		
	CI2		0.795		
	CI3		0.853		
	CI4		0.784		
Ritual Facilities And Infrastructure		0.756			
	RI1		0.887		
	RI2		0.861		
	RI3		0.723		
Environmental And Sanitary Conditions		0.798			
	ES1		0.665		
	ES2		0.895		
	ES3		0.841		
	ES4		0.765		
Emotional And Psychological Support		0.885			
	EP1		0.945		
	EP2		0.949		
Accessibility For Special Needs Pilgrims		0.901			
	SN1		0.882		
	SN2		0.915		
	SN3		0.863		
	SN4		0.854		
Cultural Sensitivity And Respect		0.847			
	CR1		0.926		
	CR2		0.936		
Ethical And Transparent Services		0.760			
	ET1		0.772		
	ET2		0.830		
	ET3		0.863		
Spiritual Atmosphere And Reverence		0.858			
	AR1		0.939		
	AR2		0.933		

Descriptive Statistics: A positive number represents a good relationship between expectations and perceptions, while a negative number indicates a gap in the service in question.

It is worth noting that Figure 8 shows the highest positive value for the SS1 service benefit, at 0.077. This is followed by AR1 with 0.069, followed by HM2 with 0.054, followed by AR2 with 0.046, followed by HM1, CI4, and CR1, with 0.038, followed by GS2 and HM4 with 0.031, followed by SS2 with 0.015, followed by CC5, CC6, CI2, and ES4, with 0.008. This does not represent a service gap; on the contrary, the service quality is excellent, and their experience exceeded expectations. RI2, EP2, and SN3, with 0.00, representing no service gap, followed by CC2, and SN1, with -0.015, and CI3, and ET3, with -0.023, followed by RI1, ES2, and SN2, with -0.031, followed by GS1, and SS3, with -0.038, followed by ET1, with -0.062, followed by SN4, and HM3, with -0.069, followed by CC1, and CR2, with -0.077, followed by ET2, and EP1, with -0.085, followed by CI1 with -0.092, followed by CC3, with -0.100, followed by CC4, with -0.108, followed by GS3, with -0.123, followed by RI3, with -0.146, followed by ES1, with -0.154, followed by ES3, with -0.192 followed by GS4, with -0.208, as this represents a service gap that must be addressed.

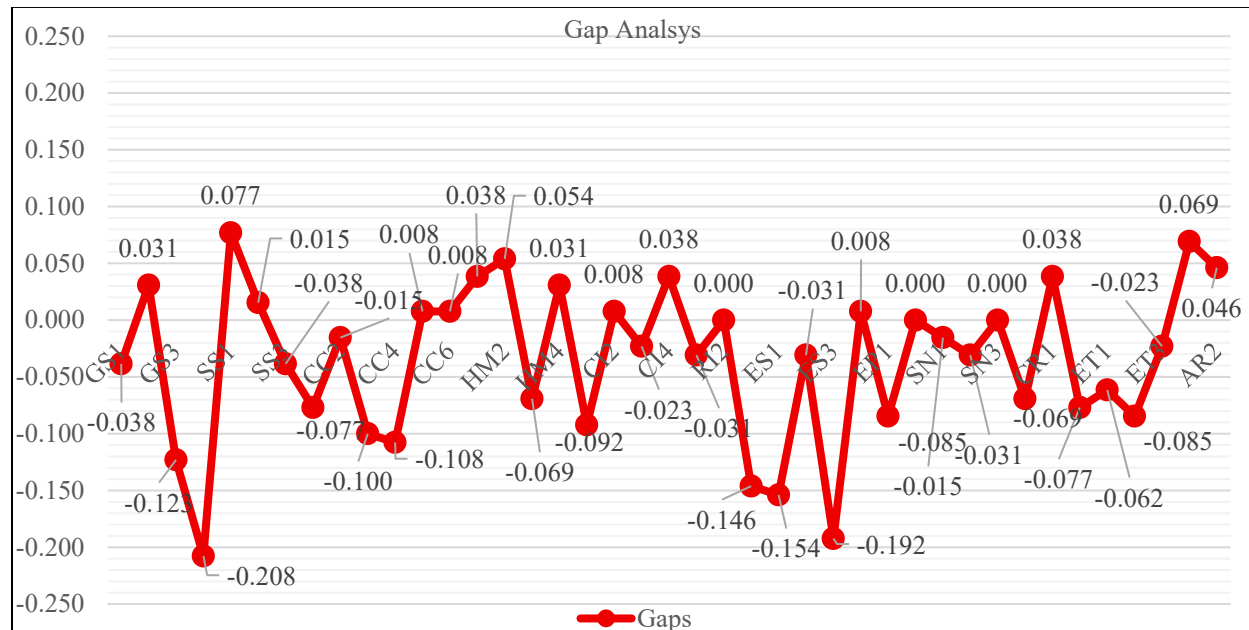


Figure 8. Service Gaps

5. Conclusions and Future Research

The research employs the Pilgrimage Satisfaction Model based primarily on SERVQUAL model and proposes 12 key service dimensions to assess the quality of Hajj services. It focuses on determining key aspects, including Spiritual Guidance and Support, Safety and Security, Comfort and Convenience, Health and Medical Services, Communication and Information, Ritual Facilities and Infrastructure, Environmental and Sanitary Conditions, Emotional and Psychological Support, Accessibility for Special Needs Pilgrims, Cultural Sensitivity and Respect, Ethical and Transparent Services, Spiritual Atmosphere and Reverence to propose sustainable service innovations aligned with Saudi Vision 2030. The process was carried out as follows: First, the questionnaire was developed by experts, service providers, and evaluators of Hajj and Umrah services, and most agreed that the Comfort and Convenience dimension should be developed further. Then the results showed that it had been developed, and three additional items were added to make it comprehensive. Then, the results showed that the sample had previously performed Hajj rituals, numbering 130 out of 363, belong to various nationalities, with the largest group consisting of 69 participants from the Kingdom of Saudi Arabia, followed by Indonesia with 13 participants, Egypt with 7, India with 6, Pakistan with 4, United States with 4, Malaysia with 3, Bangladesh with 2, Nigeria with 2, Tunisia with 2, United Kingdom with 2, Sudan with 2. The smallest groups, each with 1 participant, were from Philippines, Kazakhstan, Somalia, Turkey, Russia, Ethiopia, Cameroon, Kuwait, Algeria, Kenya, Libya and Morocco. Then, distributed by gender, with 84 males (66%) and 46 females (34%), Then, divided into four age groups to analyze differences in opinions based on age. The first group consisted of 25 participants aged 18 to 30 years. The second-largest group included those aged 31-50 years, with 68 participants. The third group consisted of participants aged 51-70 years, totaling 32 participants. The fourth group included only 2 participants aged 71 or older. The results show that the largest group consisted of those holding a bachelor's degree, with 72 participants. This was followed by high school graduates (21 participants), master's degree

holders (22 participants), and PhD holders (9 participants). Additionally, 6 participants indicated an educational level categorized as "Other." After that, the reliability results, using Cronbach's alpha, showed that the highest value was 0.899 for the Scale for Expectations (Accessibility for Special Needs Pilgrims) and the lowest was 0.698 for Spiritual Guidance and Support. The highest value was 0.901 for the Scale for Perceptions (Accessibility for Special Needs Pilgrims), and the lowest was 0.700 for Spiritual Guidance and Support. Then, using the Kaiser-Meyer-Olkin test, the Scale for Expectations showed a KMO value above 0.5. The p-value was below 0.05, indicating validity, and the Scale for Perceptions showed that the KMO value was above 0.5, also indicating validity. After that, the validity results using factor extraction showed that the highest value was 0.951 for the Scale for Expectations (CR2) and the lowest was 0.454 for the Scale for Perceptions (GS4). The highest value was 0.949 for the Scale for Perceptions (EP2), and the lowest value was 0.642 for the Scale for (GS4). Then, the validity results were shown through Bartlett's Test: Scale for Expectations, with all values below 0.05, and Scale for Perceptions, with all values below 0.05. Then, the results of Descriptive Statistics showed that services (GS4, ES3, ES1, RI3, GS3, CC4, CC3, CI1, EP1, ET2, CR2, CC1, HM3, SN4, ET1, GS1, SS3, RI1, ES2, SN2, CI3, ET3, CC2, SN1) its value ranges from (-0.192 to -0.015) as this represents a service gap that must be addressed. The satisfaction and safety of pilgrims, in addition to ensuring excellence in service delivery during the Hajj season, are among the responsibilities of the Kingdom of Saudi Arabia. Through this study, it can be argued that we must shift from a technology-based approach to a comprehensive strategy that focuses on service quality, given both: 1. The diversity among pilgrims and their different categories; 2. Operational scalability (increasing pilgrims) and consistent quality; and 3. Significantly contributes to achieving the 2030 goals for religious tourism. The concept of Hajj Service Quality (Pilgrimage Satisfaction model) captures the comprehensive experience of pilgrims during the Hajj rites. It encompasses several dimensions that reflect a specific service, measuring service quality from different perspectives, including the extent to which the service meets the customer's expectations. Surveying all pilgrims of different educational levels, age groups, and others. This may yield varied results, but it remains difficult to understand their actual level of satisfaction. Improving the quality of services for pilgrims is challenging, as several factors influence it. Also, there is a lack of communication among the pilgrims and with the Hajj management authority. Addressing why providing agents who do not know multiple languages cannot communicate with the pilgrims at a satisfactory level is very important. Furthermore, not delving into research on Hajj quality negatively affects other researchers. This may prevent Hajj stakeholders from benefiting from academic research.

References

- Al Qurtuby, S., The development and innovation of religious, secular, and archaeological tourism in Saudi Arabia, *Journal for Interdisciplinary Middle Eastern Studies*, vol. 10, no. 1, pp. 33–69, 2024.
- Al-Ayed, S., & Al-Tit, A. H. M. A. D., Factors affecting the adoption of blended learning strategy, *International Journal of Data and Network Science*, vol. 5, no. 3, pp. 267–274, 2021.
- Al-Tit, A. A., Al-Ayed, S., Alhammadi, A., Hunitie, M., Alsarayreh, A., & Albassam, W., The Impact of employee development practices on human capital and social capital: The mediating contribution of knowledge management, *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 8, no. 4, 218, 2022.
- Hassan, T. H., Abdou, A. H., Abdelmoaty, M. A., Nor-El-Deen, M., & Salem, A. E., The Impact of religious tourists' satisfaction with Hajj services on their experience at the sacred places in Saudi Arabia, *GeoJournal of Tourism and Geosites*, vol. 43, no. 3, pp. 1013–1021, 2022.
- Islam, M.M., The Satisfaction of Bangladeshi Pilgrims: Service gaps in spiritual tourism based on gender and expenditure, *The international journal of religious tourism and pilgrimage*, vol. 9, no. 1, pp. 106–117, 2021.
- Jabnoun, N., Development of Hajqual: A marketing research tool to measure Hajj service quality, *Journal for International Business and Entrepreneurship Development*, vol. 1, no. 1, pp. 22–28, 2003.
- Eid, R., Towards a high-quality religious tourism marketing: The case of Hajj service in Saudi Arabia, *Tourism Analysis*, vol. 17, no. 4, pp. 509–522, 2012.
- Darfoon, M., An examination of service quality and satisfaction in a religious tourism setting, *Clemson University TigerPrints (Doctoral dissertation)*, 2013.
- Sakr, T., HAJJ 2024: Saudi Arabia's Technological Revolution Enhances Pilgrim Experience, *Leaders Magazine*, no. 91, pp. 46–49, 2024.
- A. Al-Tawfiq, J., & Memish, Z. A., The Hajj 2019 Vaccine Requirements and Possible New Challenges, *Journal of Epidemiology & Global Health*, vol. 9, no. 3, pp. 147–152, 2019.
- Alqurashi, A. M., Al-otibi, A. M. A., Alotaibi, F. D. S., Alfulayt, M. S. E., Alharbi, R. A., Alotaibi, N. M. S., Alnemari, M. F., & Alharthi, M. Q., Common medical challenges in Hajj season: A survey of the most prevalent diseases and health disorders, *Arab Journal for Scientific Publishing*, vol. 7, no. 73, pp. 37–42, 2024.

- Alqarihi, S. M., Alsubhi, K. S., Almtuairi, N. M., Majrashi, A. A., Mousa, W. A., Hawsawi, A. A., Alghamdi, K. A., & Kutub, N. A. B., Analysis of patterns of injuries and emergency cases in Hajj: Challenges of health infrastructure and ways to improve response, Arab Journal for Scientific Publishing, vol. 7, no. 73, pp. 17–24, 2024.
- Alruwais, M. A., Al-Harbi, M. F., Alotaibi, N. F., Alotaibi, A. F., Barakat, O. A., Alghamdi, A. A., Alqahtani, D. A. S., Almuqati, F. T. H., & Alyasi, E. M., Preparing for health emergencies in Hajj: Analyzing the Impact of population density on emergency health care delivery, Arab Journal for Scientific Publishing, vol. 7, no. 73, pp. 59–64, 2024.
- Cook, C., & Thompson, B., Reliability and validity of SERVQUAL scores used to evaluate perceptions of library service quality, The Journal of Academic Librarianship, vol. 26, no. 4, pp. 248–258, 2000.
- Nunnally, J. C., Psychometric theory, McGraw-Hill, 1978.
- Park, D.-I., Development and validation of a knowledge, attitudes and practices questionnaire on COVID-19 (KAP COVID-19), International Journal of Environmental Research and Public Health, vol. 18, no. 16, 8493, 2021.
- Maskey, R., Fei, J., & Nguyen, H.-O., Use of Exploratory Factor Analysis in Maritime Research, The Asian Journal of Shipping and Logistics, vol. 34, no. 2, pp. 91–111, 2018.

Biographies

Othman Talal Kurdi received his bachelor's degree in architectural engineering from Taibah University in 2021. He is currently pursuing a master's degree in Master of Science in Engineering Management and Technology at the Islamic University of Madinah. He has professional experience in architecture, urban design, and project management through his work with firms such as Zuhair Fayez Partnership Consultants, SETS, and Orbit Engineering. In 2025, he received an appreciation award from the Royal Commission for Makkah City and the Holy Sites for his role in overseeing service quality and transportation guidance during projects at the Holy Sites during the Hajj season.

Prof. Dr. Rahmat Nurcahyo is a professor of Industrial Engineering from the Universitas Indonesia. He currently serves at the Islamic University of Madinah. His research interests include quality management, maintenance management, and sustainability management. He has various publications in reputable journals and is active in IEOM conferences.