DESIGN AND EVALUATION OF MOSQUE SYSTEM USING RAD AND CSI

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Abstract: Mosques are places of jamaah and centers of social and economic activity for Muslims. Still, in the process of managing their activities, DKM administrators often face challenges related to efficiency, integration, and transparency of information. This research aims to develop a web-based Mosque Management Information System (SIMMAS) that integrates the management of ZISWAF (zakat, infaq, sadaqah, waqf), qurban, inventory, activity information, and digital payments via QRIS. Using the Rapid Application Development (RAD) method, the system was designed to be developed quickly and in alignment with user needs. The evaluation was conducted using the Customer Satisfaction Index (CSI) approach, involving 60 respondents comprising mosque administrators and congregants. The results show that all SIMMAS services received CSI scores above 85%, indicating a high level of user satisfaction, particularly with the religious lecture scheduling feature. Nevertheless, there remains room for improvement, especially in the responsiveness and empathy aspects of financial and inventory services. This research is expected to serve as a foundation for the continued development of SIMMAS to become more effective, efficient, and digitally integrated in mosque management.

Keywords: user satisfaction; mosque information system; CSI; SIMMAS; ZISWAF

Abstrak: Masjid merupakan tempat ibadah, pusat aktivitas sosial dan ekonomi umat Islam, namun dalam proses pengelolaan kegiatannya, pengurus dkm kerap menghadapi tantangan terkait efisiensi, integrasi, dan transparansi informasi Penelitian ini bertujuan untuk mengembangkan Sistem Informasi Manajemen Masjid (SIMMAS) berbasis web yang mengintegrasikan pengelolaan ZISWAF, qurban, inventaris barang, informasi kegiatan, serta pembayaran digital melalui QRIS. Dengan menerapkan metode Rapid Application Development (RAD), sistem ini dirancang agar dapat dikembangkan secara cepat dan sesuai dengan kebutuhan pengguna. Evaluasi dilakukan menggunakan pendekatan Customer Satisfaction Index (CSI), yang melibatkan 60 responden dari kalangan pengurus dan jamaah masjid. Hasil evaluasi menunjukkan bahwa seluruh layanan SIMMAS memperoleh nilai CSI di atas 85%, mencerminkan tingkat kepuasan yang tinggi, khususnya pada fitur jadwal kajian. Meski demikian, masih terdapat ruang untuk perbaikan, terutama pada aspek responsivitas dan empati dalam layanan keuangan dan pengelolaan inventaris. Penelitian ini diharapkan dapat menjadi dasar pengembangan berkelanjutan SIMMAS dalam mendukung tata kelola masjid yang lebih efektif, efisien, dan berbasis digital.

Kata Kunci: kepuasan pengguna; sistem informasi masjid; CSI; SIMMAS; ZISWAF

INTRODUCTION

The administrative management of the Mosque Prosperity Council (DKM) is still mostly done manually, including financial records, ZISWAF, qurban, and mosque activities [1]. This often leads to errors in the recording process and a lack of financial transparency in the congregation [2].

These limitations indicate the need for digitalization of mosque administration to make management more orderly, fast, and accurate [3]. Several previous research has developed mosque information systems, but there is no integration between finance, qurban, ziswaf, inventory, and mosque activities [4]-[6]. This research aims to design a mosque management information system that can manage finances, ZISWAF, qurban, inventory, and mosque activities digitally and more efficiently.

Mosque digitalization is needed to reach more worshipers through an application and facilitate access to information. DKM Khairul Amal Mosque is located at Bukit Reuma II No. 17, Sadang Serang, Coblong, Bandung, has used the help of client-server-based SIKEMAS (Mosque Financial Information System) and SIQUR (Qurban Information System) from previous research results. SIKEMAS is used to manage ZISWAF and expenditure of operational funds for mosque activities and SIQUR is used for qurban data management. Based on the results of calculating the satisfaction of SIKEMAS and SIQUR users, the satisfaction percentage index is 99%. This means that users are helped in managing ziswaf, operational, financial, and qurban management [7]-[9].
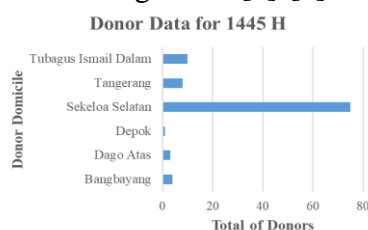

Figure 1. Khairul Amal Mosque donors in 2024/1445 H

According to the interview with the head of DKM, there is a problem that SIKEMAS and SIQUR only reach donors in the mosque area, and there is no transparency of mosque finances to the congregation. Figure 1 shows that 100 donors are residents around the mosque.

To overcome these problems, a SIMMAS application was developed that can integrate SIKEMAS, SIQUR, mosque inventory system, mosque activity system and QRIS. Management Information System is a concept that integrates various components such as technology, processes, and human resources to produce accurate and relevant information [10]. It is concluded that SIM is the process of processing data into information that can be used in decision making [11]. The research aims to create a web-based application SIMMAS to manage data processing in mosques and measure user satisfaction with SIMMAS service quality. Online service quality refers to how well a site or application can purchase, sell, and deliver products and services efficiently and effectively [12]. This research method of measuring user satisfaction uses the Customer Satisfaction Index (CSI) method. Users here are DKM administrators and jamaah. Customer satisfaction must be assessed to obtain helpful feedback and input for companies designing and implementing plans to increase satisfaction levels [13]. The higher the quality of service provided, the more customers will feel satisfied and comfortable when using system. The lower the quality of service, the more customers experience dissatisfaction and discomfort in using system.

User satisfaction with SIMMAS services is measured through user perceptions of tangible, reliability, responsiveness, assurance, and empathy. The five indicators show user perceptions of specific dimensions in measuring service user satisfaction [14].

METHOD

The research method is a scientific way to get data with specific purposes and uses. This research adopts a quantitative approach, with the system development method Rapid Application Development (RAD), which is a system development that focuses on rapid application development by going through several iterative stages and repeated reviews [15-17]. The RAD method was chosen because it accelerates system development by producing prototypes quickly and getting direct feedback from users for continuous improvement. The method of measuring user acceptance of SIM-MAS uses the CSI. The customer satisfaction index method is a measurement instrument for customer satisfaction with the services received and focuses on physical settings [18-19]. The stages carried out are adapted from RAD stages :
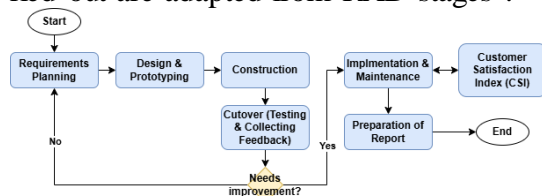

Figure 2. Research stages

1. Requirement Planning
   At this stage, the focus is on collecting clear and specific system requirements and needs from mosque administrators and worshipers through interviews and observations. Specifications of user needs regarding the features to be developed is ziswaf, qurban, inventory, mosque services, online payments and mosque financial reports.
2. Design and Prototyping
   Design a web-based system prototype with a simple and responsive user interface. The prototype will be developed and demoed to mosque administrators and jamaah to get feedback.
3. Construction
   System development using Laravel web framework technology. MySQL to store and manage ziswaf transaction data, sacrifices, mosque activity services, inventory of mosque goods, and mosque financial reports. Integrating the system with online payments using QRIS will make it easier for jamaah.
4. Cutover
   Testing the system that has been developed ensures that the system runs according to the needs of mosque administrators and jamaah. The system is evaluated using black box testing. The mosque management and jamaah-conducted a trial use of this system..
5. Implementation and maintenance
   This stage implements the system at the Khairul Amal mosque by providing training to mosque administrators for the use of the system, providing direction for post-implementation system maintenance, measuring user satisfaction with the effectiveness of the application using the CSI method.

Customer Satisfaction Index

CSI is a method used to determine the overall level of visitor satisfaction by examining the importance of product or service attributes [20-21]. CSI is a quantitative analysis based on the percentage of satisfied customers in a customer satisfaction survey. The steps taken to calculate CSI are determining the Mean Importance Score (MIS), Mean Satisfaction Score (MSS) for each variable, determining the Weight Factor value for each factor, determining the Weight Score for each factor, and calculating the CSI value [22-23]. The following is the cost calculation for each service:
1. Mean Importance Score (MIS)

MIS is calculated by finding the average score given by pilgrims and officer respondents for each factor.

MIS=(Pilgrims score+DKM Oficer)/2 (1)

2. Mean Satisfaction Score (MSS)

MSS is calculated in the same way as MIS, but using satisfaction data, namely the average score given by congregational respondents and DKM officers for each factor.

MIS=(Pilgrims score+DKM Oficer)/2 (2)

3. Weighting Factor (WF)

In this case, WF will be assumed to be the same for all factors, as no specific weights are assigned. Therefore, it is assumed that WF =1 for each factor.

4. Weighting Score (WS)

WS is calculated by multiplying MIS by WF. Since WF = 1, WA will be equal to MIS.

$$WS=MIS \times WF \qquad (3)$$

5. Customer Satisfaction Index (CSI)

CSI is calculated using the average of all WS within a service.

CSI=(Sum of each factor score)/ Number of factors) (4)

If the CSI value is 81%-100% = very satisfied, 61%-<80% = satisfied, 41%-<60% = quite satisfied, 21%-<40% = less satisfied and 0%-20% = not satisfied.

Some indicators that can affect user satisfaction are tangible, reliability, responsiveness, assurance, and empathy [24]. The following is an explanation of these five dimensions associated with SIMMAS:

1. Tangible, where this factor relates to the appearance that can be felt by users. In SIMMAS, interface design, hardware, infrastructure that supports the system that is presented visually and according to user needs can affect user experience.

2. Reliability, where this factor measures the extent to which the system can provide services that are consistent and as expected. In the context of SIMMAS, reliability means that the system must work properly every time it is used without frequent failures.

3. Responsiveness is the factor relating to the system's ability to respond to user needs and requests within a reasonable time. For example, a system that is quick to respond to user input or provides adequate technical support when there is a problem.

4. Assurance, where this factor refers to the level of trust that users feel towards the system and the organization that manages the system. Users feel confident that their data is safe and that services will be provided professionally and reliably.

5. Empathy, this factor measures the extent to which the system or organization shows concern for the individual needs of users. This includes features such as responsive customer service or the system's ability to provide a personalized experience for users.

Using these five factors to measure quality is a very appropriate mix, as it covers various important aspects of the user experience and service.

Determination Of The Number Of Respondents

In this research, the number of respondents was determined using the Sloving formula, which is used to estimate the sample size based on a certain population with the desired margin of error [25]. The Sloving formula is expressed as follows:

$$n = N / 1 + N \times e^2 \qquad (5)$$

n = number of respondents (samples)
N = total population
e = margin of error (in decimal)

In this research, the total popula-

tion (N) was 150 people, consisting of jamaah and DKM administrators. The error rate (e) used is 10% or 0.1. So, the calculation of the number of respondents is n = 150 / 1 + 150 x $(0.1)^2$ = 150 / 2.5 = 60. Based on the results of these calculations, the number of respondents used in this research was 60 people. This number is representative to describe user perceptions of SIMMAS services with an error rate of 10%.

RESULT AND DISCUSSION

SIMMAS is an application that integrates various existing systems, namely SIKEMAS, SIQUR, inventory management, mosque activity and the payment process on the SIMMAS already uses QRIS, making it easier for donors to donate to the mosque. Currently, the SIMMAS application for donors can access this page https://simma sa-mal.com and DKM administrators can access this page https://simmasa mal.com/login.

According to Kotler and Keller (Zikri, et al., 2022 p. 925) consumer satisfaction is a person's feeling of pleasure or disappointment that arises after comparing the performance or results he expects [26]. From this opinion, satisfaction can be interpreted as a pleasant feeling that arises when obtaining something and the action fulfills one's needs and desires. To measure user satisfaction this research is done by measuring the CSI value of the five primary system services in SIMMAS is ZISWAF activities, operational, financial, mosque schedule, Qurban management, and mosque inventory system service. The respondents involved were 60 respondents consisting of donors and DKM administrator, with the score of the questions asked for each factor for the five services on a Likert scale. For example, how to calculate CSI for service 1: Mosque operational financial system, the way to calculate CSI for other services is the same.

Table 1. Calculated values of MIS, MSS, WF, WS Service 1

Factor	Question	Average Pilgrims Answer	Average Answer of DKM Officers	MIS	MSS	WF	WS (MIS x WF)
Tangible	The financial system interface is easy to understand and use.	4.2	4.5	4.35	4.35	1	4.35
Reliability	The system records and reports financial transactions accurately.	4.0	4.7	4.35	4.35	1	4.35
Responsiveness	The system responds quickly when inputting transaction data.	3.9	4.6	4.25	4.25	1	4.25
Assurance	You feel confident that your financial data is secure and not easily altered.	4.5	4.8	4.65	4.65	1	4.65
Empathy	The system makes it easy to understand financial reports according to user needs.	4.0	4.4	4.2	4.2	1	4.2

CSI=(4,35+4,35+4,25+4,65+4,2)/5=21,8/5=4,36

Based on the results of the CSI calculation for each service system, the

CSI scores for each service are as follows: the Mosque Operational Financial System scored 4.36 (87.2%), the Financial System and ZISWAF Activities scored 4.42 (88.4%), the Islamic Study Schedule System scored 4.48 (89.6%), the Qurban Management System scored

4.41 (88.2%), and the Mosque Goods Inventory System scored 4.35 (87.0%). It can be seen that the CSI value of all services has value above 80%, meaning that the level of user satisfaction is very high and worth maintaining or developing further.

The following is the interpretation of the CSI measurement results for the five system services in SIMMAS:
Service 3 (Study Schedule System) has the highest CSI, with a score of 4.48 or 89.6%. This shows that, almost all users are very happy with this system because the features make it easier to find mosque schedules. Correct and actualized data greatly benefit this service. Service 2 (Financial System and ZIS-WAF Activities) also obtained a high CSI of 4.42 or 88.4%, indicating that almost all users were quite satisfied with the ZISWAF service system, especially related to trust in fund management and distribution.
Service 4 (Qurban Management System), with a CSI of 4.41 or 88.2%, has a relatively high level of satisfaction, although slightly lower than services 2 and 3. Users feel confident that the selected sacrificial animals will be carried out according to Islamic law. The Qurban service system is beneficial in choosing sacrificial animals according to their existing abilities. Service 1 (Mosque Operational Financial System) has a CSI of 4.36 or 87.2%, This includes a medium level, but some parts, such as responsiveness and empathy, are slightly lacking compared to almost all other services.

Service 5 (Mosque Inventory System) obtained a CSI score of 4.35 or 87.0%, indicating slightly lower satisfaction than most other services but still indicating that this system is quite effective in managing the inventory of mosque. Based on the interpretation of the results of the CSI measurement of the five services with tangible, reliability, responsiveness, assurance, and empathy factors, the following improvement recommendations can be given for the development of SIMMAS. With the highest CSI value among the five services, service 3 and 2 can be prioritised for further improvement because they get the highest CSI value. As for service 1 and 5 there needs to be further evaluation in terms of Responsiveness and Emphaty which can be the main focus of improvement.

CONCLUSION

Based on the results of measuring user satisfaction with various services in SIMMAS, it was found that the study schedule system and ZISWAF financial system have a very high level of satisfaction, with CSI values of 4.48 (89.6%) and 4.42 (88.4%), respectively. The qurban management service also showed a good level of satisfaction with a CSI of 4.41 (88.2%), while the mosque operational finance system and the mosque goods inventory obtained slightly lower CSI scores of 4.36 (87.2%) and 4.35 (87.0%). Nonetheless, overall, users are satisfied with SIMMAS. However, some aspects, especially responsiveness and empathy, need improvement to improve user experience. For further development of SIMMAS, it is necessary to prioritise the improvement of services with high CSI, such as the recitation schedule system and the ZISWAF financial system and need to be maintained and further improved by paying attention to features that facilitate users. In addition, improvements need to be made to responsiveness and empathy related to mosque operational and financial system services and inventory of mosque to speed up the process and pay more attention to user

needs. In addition, it is necessary to increase transparency and ease of access, where the development of systems that allow greater transparency, such as allowing donors to monitor mosque finances in real-time, will increase trust and wider community involvement.

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BIBLIOGRAPHY

[1] W. Kurniangsish, "Pengelolaan Dana Zakat, Infak, dan Sedekah Berbasis Masjid Perspektif Hukum Ekonomi Syariah," J. Huk. Ekon. Syariah, vol. 5, no. 2, p. 153, 2022.

[2] Z. Horriye, A. Baijuri, N. Azise, S. Informasi, U. Ibrahimy, and K. Pos, "Sistem Informasi Manajemen Masjid Berbasis Website Study Kasus Masjid Besar Baitul Muttaqin Jangkar Abstrak," SNIV, vol. 3, no. 1, pp. 516–523, 2024

[3] Sutono, Ai Musrifah, and Repi Maulana Risyan, "Digitalisasi Sistem Informasi Manajemen Masjid Modern," INFOTECH, vol. 9, no. 1, pp. 1–10, 2023.

[4] B. Yudha and S. Nasution, "Perancangan Sistem Aplikasi Pengelolaan Keuangan Masjid," MATECH, vol. 2, no. 1, pp. 18–27, 2023.

[5] J. Maulindar, Y. Bahtiar, T. Mutiara Diva, and S. Umar, "Sistem Pengelolaan Kurban Di Masjid Al-Falah Kebak Wirun Mojolaban Berbasis Web," J. MISI, vol. 5, no. 2, pp. 140–150, 2022.

[6] N. Puspitasari, N. Rosyidah, and S. Syaifudiin, "Pemberdayaan Dana ZISWAF (Zakat, Infaq, Sedekah dan Wakaf)," Int. Conf. Islam. Econ., vol. 3, no. 1, pp. 171–186, 2024.

[7] D. Effendi, R. P. Dhaniawaty, M. Fitriawati, and M. Y. Mumtaz2, "Design and Development of Financial Flow Mosque Information System (SIKEMAS) Using Client Server-Based Object Oriented," JURTEKSI, vol. 9, no. 3, pp. 399–408, 2023.

[8] D. Effendi, R. P. Dhaniawaty, M. Fitriawati, D. Cancerina, and R. Nugraha, "Pendampingan Layanan Zakat Menggunakan Sistem Informasi Arus Keuangan Masjid pada Dewan Kemakmuran Masjid," AD-MA, vol. 4, no. 2, pp. 365–374, 2024.

[9] D. Effendi, R. P. Dhaniawaty, M. Fitriawati, D. Cancerina, and A. Ramadhan, "Design and Development of Qurban Service Information System Using Research and Development Method," JESTEC, vol. 19, no. 5, pp. 1588–1599, 2024.

[10] M. L. Nuryana, T. Ibrahim, and O. Arifudin, "Implementasi dan Transformasi Sistem Informasi," Jurnal Tahnisia, vol. 5, no. 9, pp. 1325–1337, 2024.

[11] N. D. Maharani Sabban, Y. Putranto Sabban, and A. Arnida, "Peran Sistem Informasi Manajemen dalam Pengambilan Keputusan Bisnis UMKM Berbasis E-Commerce," Co-Value, vol. 15, no. 1, 2024.

[12] I. Wulan, S. Safuan, and E. Erwin, "Tinjauan Pustaka Dampak Keandalan E-Servqual Terhadap Kepuasan Pelanggan Dalam E-Commerce,"

Jesya, vol. 7, no. 2, pp. 1911–1925, 2024.

[13] W. Wisnel, E. Wirdianto, and T. Cantika, "Analysis of the Effect of E-Service Quality on E-Commerce Customer Satisfaction and Loyalty," Motiv. J. Mech. Electr. Ind. Eng., vol. 4, no. 3, pp. 209–222, 2022.

[14] F. Meida, M. Astuti, and H. Nastiti, "Pengaruh Kualitas Pelayanan dan Kepercayaan terhadap Kepuasan Pelanggan E-Commerce Sociolla di Era Pandemic Covid-19," J. IKRAITH-EKONOMIKA, vol. 5, no. 2, pp. 157–166, 2022.

[15] V. Y. P. Ardhana, "Perancangan Sistem Informasi Kedai Kopi Menggunakan Metode Rapid Application Development (RAD)," JDMIS J. Data Min. Inf. Syst., vol. 2, no. 1, pp. 43–49, 2024.

[16] M. Raihan and A. T. Hidayat, "Rapid Application Development (RAD) in the Development of Mobile Based E-Commerce Application Rapid Application Development (RAD) dalam Pengembangan Aplikasi E-Commerce Berbasis Mobile," MALCOM, vol. 5, no. 1, pp. 93–100, 2025.

[17] M. K. Pradana, A. Andrianto, and Y. A. Auliya, "Pengembangan Sistem Informasi Desa Terpadu Menggunakan Metode Rapid Application Development (RAD)," INFORMAL, vol. 7, no. 2, p. 64, 2022.

[18] A. Manurung, Y. Batara, P. Siriongoringo, and J. L. Marpaung, "Satisfaction Analysis of The Establishment of a Website-Based Rank System Using Customer Satisfaction Index (CSI) And Importance Performance Analysis (IPA) Methods," Sink. J. dan Penelit. Tek. Inform., vol. 8, no. 2, pp. 1233–1240, 2024.

[19] M. Ermila Sari and A. Hermawansyah, "Analisis Kepuasan Pengguna Aplikasi Jamride Berbasis Kerangka Kerja Customer Satisfaction Index (CSI) Di PPU," J. Impresi Indones., vol. 1, no. 4, pp. 436–449, 2022.

[20] V. D. Kumenap, L. Sitanayah, and B. F. Oentomo, "Penerapan Metode Customer Satisfaction Index untuk Pengukuran Kepuasan Layanan pada Biro Promosi dan Admisi UKDLSM," JOINTER, vol. 4, no. 01, pp. 14–18, 2023.

[21] A. Angelina, D. Y. Hardiyanti, and D. Lestarini, "Analisis Kualitas Pelayanan Untuk Mengetahui Kepuasan Pelanggan Berdasarkan Customer Satisfication Index Menggunakan Metode E-Service Quality," JUSTIN, vol. 11, no. 2, p. 301, 2023.

[22] R. Rinaldi, "Analisa Kepuasan Pelanggan Terhadap Pelayanan Jasa Mutiara Laundry Dengan Metode Customer Satisfaction Index," JII-FKOM, vol. 3, no. 1, pp. 35–42, 2024.

[23] M. Praseptiawan, M. O. N. Gultom, and M. C. Untoro, "The Evaluation of E-Commerce Using the Customer Satisfaction Index and Importance Performance Analysis," J. Sisfokom, vol. 11, no. 1, pp. 60–65, 2022.

[24] Anang Ahmad Ainul Yahya, Rio Candra Pratama, and Ardana Putri Farahdiansari, "Analysis of Service Quality to Customer Satisfaction with CSI and Servqual Methods," J. Inf. Syst. Technol. Eng., vol. 1, no. 4, pp. 104–119, 2023.