

Evaluation of Service Quality and User Experience on Mobile Banking Livin' by Mandiri Using E-Servqual and Usability Testing Methods

Zulvia Arifatul Fadzilah^{1*}, Dwi Fatrianto Suyatno¹ , Bagas Putra Pradana²

^{1*}*Faculty of Engineering, Universitas Negeri Surabaya, Surabaya, Indonesia*
zulvia.21027@mhs.unesa.ac.id, dwifatrianto@unesa.ac.id

²*Finacial Accounting, National Yunlin University of Science & Technology*
d11525006@yuntech.edu.tw

Abstract. Livin' by Mandiri is an application developed by Bank Mandiri that is accessible to both existing and prospective customers. The high volume of user complaints presents a significant challenge for the application's management team. This study aims to evaluate the service quality of the Livin' by Mandiri application and provide recommendations for improving its service quality. To achieve this objective, the study employed the E-SERVQUAL method and usability testing. Data were collected from Livin' by Mandiri users through questionnaires and usability testing sessions. The questionnaire involved 160 participants, while the usability testing involved five participants. The data were analyzed using gap analysis to compare user perceptions and expectations, Importance-Performance Analysis (IPA), and usability analysis using the System Usability Scale (SUS). The results indicate negative gaps across all E-SERVQUAL dimensions. The Importance-Performance Analysis placed the SYS1 dimension in Quadrant I, indicating that it should be prioritized for improvement. The usability testing results showed that the application was relatively easy to use, although an error rate of 0.35 was observed during testing. Additionally, the task completion efficiency was 0.0796 goals per second. User satisfaction received a SUS score corresponding to Grade C, indicating an acceptable level of usability that still requires improvement. Based on these findings, developers are recommended to improve accessibility, clarify feature labels, provide an online issue-reporting feature, and add a "Help" icon to enable users to report problems more quickly and easily.

Keywords: *Services Quality; User Experience; Livin' by Mandiri; E- Servqual; Usability Testing; Mobile Banking*

1. Introduction

The development of sophisticated technology and scientific knowledge has become an integral part of various aspects of life, including the economy. One form of technological innovation in the banking sector is mobile banking. Based on a survey conducted by the Populix research institute involving 1,832 respondents, seven mobile banking applications were identified as popular among Indonesians. One of the most popular mobile banking applications is Livin' by Mandiri, which ranked third as of May 2024.

Livin' by Mandiri is a mobile banking application developed by Bank Mandiri that can be accessed and used by both existing and prospective Bank Mandiri customers. The Livin' by Mandiri application can be downloaded and used on smartphones running iOS and Android. This mobile banking application provides various functions, including financial transactions, balance inquiries, top-ups, QR payments, and other banking services. The rating given by users on the Google Play Store was 4.0 out of 5, while the rating on the App Store was 3.6 out of 5, as recorded on September 3, 2024. Although the Livin' by Mandiri application has a large number of users, this does not rule

out the possibility of receiving negative reviews from users on both the Google Play Store and the App Store. Several user reviews collected in September 2024 indicate that users still encountered various problems when using the application.

The large number of complaints submitted by users presents a challenge that must be addressed by the Livin' by Mandiri management team. The management needs to understand users' expectations regarding the services provided, as well as identify which services need to be improved and enhanced. To address these issues, this study uses the E-SERVQUAL method and usability testing. E-SERVQUAL is an extension of the SERVQUAL method that is applied to electronic services ([Pratiwi, 2023](#)). Service quality in the SERVQUAL model is measured by comparing users' expectations with their perceptions of the actual service received ([Asyifa & Subekti, 2021](#)). Meanwhile, E-SERVQUAL is used to evaluate users' overall assessments of the quality of electronic services ([Pratiwi, 2023](#)). There are seven dimensions used to evaluate service quality, namely efficiency, fulfillment, system availability, privacy, responsiveness, compensation, and contact ([Septia G et al., 2024](#)).

Research has shown that reliability, responsiveness, privacy/security, and fulfillment are critical quality dimensions that significantly influence customer perceptions in electronic commerce contexts ([Sari et al., 2018](#); [Reddy et al., 2024](#)). For instance, inadequate personalization and reliability are often associated with higher negative sentiments, whereas attributes such as trust and website design garner positive evaluations ([Sari et al., 2018](#)). By employing E-SERVQUAL, Livin' by Mandiri can systematically evaluate service quality gaps based on user expectations versus perceptions across the seven electronic service dimensions. This analytical framework identifies specific service attributes—such as system availability issues or responsiveness deficits—that may underlie frequent user complaints. Simultaneously, usability testing reveals potential interface or interaction obstacles that impair user efficiency and satisfaction.

Usability testing is a method used to determine how effectively users can operate and interact with an application. Usability testing consists of four dimensions for evaluating the user experience, namely learnability, efficiency, errors, and satisfaction ([Theresia & Tan, 2021](#)). In practice, usability evaluation results inform iterative design improvements targeting specific weaknesses, such as reducing cognitive load to boost learnability, streamlining navigation to enhance efficiency, implementing clearer feedback to minimize errors, and enriching user interaction to elevate satisfaction ([Ofosu-Asare, 2024](#); [Pant, 2015](#)). Such user-centered design cycles ensure applications remain accessible, intuitive, and enjoyable, thereby maximizing adoption and sustained engagement.

Based on the background described above, research on Livin' by Mandiri users is needed to determine the level of service quality and user experience of the application. Therefore, this study is entitled "Evaluation of Service Quality and User Experience of Livin' by Mandiri Using the E-SERVQUAL Method and Usability Testing." The purpose of this study is to comprehensively evaluate the service quality and user experience of the Livin' by Mandiri application, identify aspects of the service and user experience that still require improvement, and formulate appropriate and actionable recommendations to enhance the service quality and user experience of the Livin' by Mandiri application.

2. Methods

The type of research used in this study is quantitative research. Quantitative research is a type of research that develops mathematical models, theories, and hypotheses related to natural phenomena. It focuses on measurement and the analysis of relationships between various variables ([Hardani et al., 2020](#)). This study aims to evaluate the service quality and user experience of the Livin' by Mandiri application and identify aspects that require improvement. To achieve these objectives, the study employs the E-SERVQUAL method and usability testing. The E-SERVQUAL dimensions used to evaluate service quality include efficiency, fulfillment, system availability, privacy, responsiveness, compensation, and contact. Usability testing is used to assess how effectively and efficiently users

can use the Livin' by Mandiri application. Four dimensions are evaluated through usability testing, namely learnability, efficiency, errors, and satisfaction. The stages of this study are as follows.

Figure 1 illustrates the research stages carried out in this study. The study focuses on the Livin' by Mandiri application and is entitled "Evaluation of Service Quality and User Experience of Livin' by Mandiri Using the E-SERVQUAL Method and Usability Testing." This study aims to evaluate the service quality and user experience of the Livin' by Mandiri application and provide recommendations for improving both aspects. The population in this study consists of users who have previously used the Livin' by Mandiri application. A non-probability sampling technique using purposive sampling was employed to select the respondents. The sample selection was based on several criteria, including users who are at least 18 years old, have used the Livin' by Mandiri application for a minimum of one month, and use other mobile banking applications. The size of the user population is considered unlimited, and the exact number of users is unknown. Therefore, the sample size was determined using the Malhotra formula, as applied in the study entitled "The Influence of Service Quality, Price Perception, and Taste on Consumer Satisfaction" ([Mutiara et al., 2020](#)). The study states that the minimum sample size should be four to five times the number of questionnaire items. The minimum sample size can therefore be determined using the following formula.

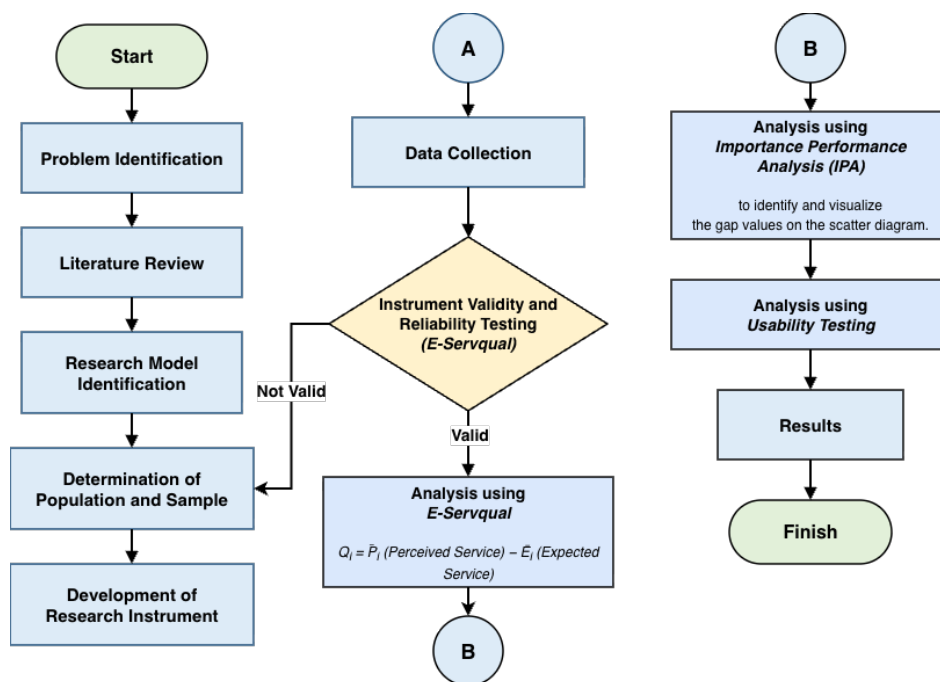


Figure 1 Research Flow

Based on the sample size calculation above, the minimum sample size required for this study is 145 respondents. To minimize the possibility of obtaining invalid or incomplete questionnaire responses, a total of 160 respondents was selected for the E-SERVQUAL method. Meanwhile, usability testing was conducted with five participants. According to Nielsen, usability testing can be conducted with no more than five users to obtain effective results. The following curve illustrates that testing with five participants is sufficient to identify most usability problems ([Theresia & Tan, 2021](#)).

$$\begin{aligned}
 n &= \text{number of indicators} \times 5 \\
 &= 29 \times 5 \\
 &= 145
 \end{aligned}
 \tag{1}$$

Figure 2 shows the curve illustrating usability testing with no more than five participants. According to Nielsen, as cited in the journal entitled “Evaluation of Service Quality and User Experience on Credit Card Application Using E-SERVQUAL Model and Usability Testing,” effective usability testing can be conducted with no more than five users (Theresia & Tan, 2021)

2.1 Instrument Study

In this study, E-SERVQUAL is used to measure service quality through a questionnaire. Table 1 presents the questionnaire used in this study. The questionnaire consists of 29 questions and was distributed to 160 respondents.

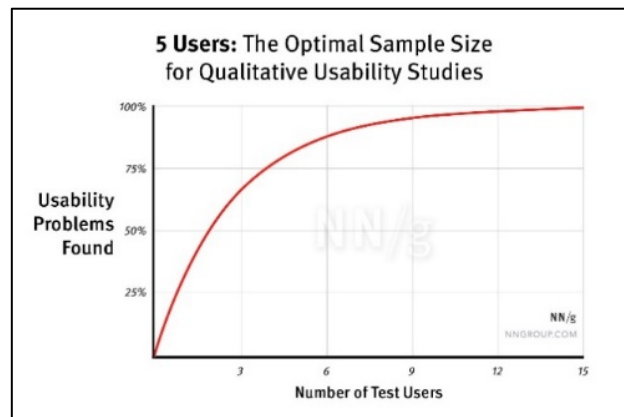


Figure 2 Graph 5 Test Participants

Table 1 Questionnaire E- Servqual

Questionnaire E- Servqual			
Dimensions	Indicator	Question	Variables
Efficiency	Convenience Users	Livin' by Mandiri makes it easy for users to find the features they need (e.g., transfers, Virtual Account payments, and top-ups).	EFF1
		Livin' by Mandiri is easy to access anytime and anywhere.	EFF2
	Process Speed	Pages on Livin' by Mandiri load quickly.	EFF3
		Livin' by Mandiri processes user transactions quickly.	EFF4
	Design Consistency	The information provided on Livin' by Mandiri is well-organized.	EFF5
		The interface design of Livin' by Mandiri is attractive and well-structured.	EFF6

Questionnaire E- Servqual			
Dimensions	Indicator	Question	Variables
Fulfillment	Accuracy Request	Livin' by Mandiri completes transactions according to users' requests.	FULL1
	Punctuality	Livin' by Mandiri processes transactions at the appropriate time.	FULL2
	Compliance Product	Livin' by Mandiri provides the features and services as promised.	FULL3
System Availability	Availability Application	The Livin' by Mandiri application is always available when users need to access it.	SYS1
		Essential services, such as transfers, are always available when users need them.	SYS2
	Problem Service	Livin' by Mandiri functions properly when used.	SYS3
		Livin' by Mandiri does not experience errors or bugs when users access it.	SYS4
		Livin' by Mandiri can always be used to conduct transactions.	SYS5
Privacy	Personal Data Security	Users feel that Livin' by Mandiri protects information about all their transactions.	PRIV1
		Users feel that Livin' by Mandiri does not share their personal information with other applications.	PRIV2
		Users feel that Livin' by Mandiri protects their banking card information.	PRIV3
Responsiveness	Speed Response	Livin' by Mandiri provides information when maintenance is scheduled.	RES1
		Livin' by Mandiri responds quickly to user requests.	RES2
		Livin' by Mandiri resolves users' transaction problems quickly.	RES3
Compensation	Giving Compensation	Livin' by Mandiri provides compensation for problems caused by the application.	COM1
		Livin' by Mandiri provides compensation when the service does not meet users' expectations.	COM2
Contact	Availability Customer Service	Livin' by Mandiri provides online help services.	CON1
		Livin' by Mandiri provides customer service.	CON2
		Livin' by Mandiri provides contact information for reaching the company.	CON3
	Convenience Contact Customer Service	The customer service and online help services provided by Livin' by Mandiri are easy to contact.	CON4
Quality Service	Services Provided	The services provided by the Livin' by Mandiri application are comprehensive.	KL1

Questionnaire E- Servqual			
Dimensions	Indicator	Question	Variables
		The services provided by the Livin' by Mandiri application meet users' needs.	KL2
	Satisfaction Users	Users are satisfied with the services provided by the Livin' by Mandiri application.	KL3

Meanwhile, usability testing is used to evaluate the user experience of the Livin' by Mandiri application. Table 2 presents the scenarios and tasks used in the usability testing, which consist of 15 scenarios and tasks. The usability testing was conducted with five participants selected from the E-SERVQUAL respondents.

Table 2 Usability Testing Scenarios and Tasks

Feature	Scenario	Task	Variables
Login	You have registered and created a Livin' by Mandiri account. You want to log in for the first time.	Please log in to your Livin' by Mandiri account.	T1
Transfer	You are logged in and want to send money to a friend, but your friend's bank account is not with Bank Mandiri.	Please transfer money to your friend.	T2
Virtual Account	You want to purchase goods from an online store, and you choose Bank Mandiri as the payment method.	Please make a payment for a purchase from another application.	T3
QRIS	You want to make a payment using the QR code provided by the seller.	Please make a payment using the QR code until the transaction is successful.	T4
	You want to make a payment using a QR code that you have saved on your device.	Please make a payment using the QR code you have saved on your device until the transaction is successful.	T5
Top Up	You want to top up the balance of your e-wallet.	Please top up your e-wallet balance until the transaction is successful.	T6
Setor/Tarik	You want to withdraw money from an ATM, but you do not have your physical ATM card with you.	Please withdraw cash using the application until the withdrawal token appears.	T7
	You want to deposit money into your account, but you do not have your physical ATM card with you.	Please make a cash deposit using the application until the deposit token appears.	T8
Mutasi	You want to view your transactions from July 2024.	Please view the transactions on your account for July only.	T9
	You want to print your transactions from July 2024.	Please print your transactions from July in PDF format.	T10
Notification	You want to view notifications about activities you have completed.	Please view the notifications related to the activities you have completed.	T11
Profil	You want to change your account password.	Please change your account password and create a new password.	T12
FAQ	You experience a problem with a failed top-up transaction, but your account balance has still been deducted.	Please find a solution to the problem you are experiencing with the application.	T13

Feature	Scenario	Task	Variables
Bantuan	You have tried to find a solution to your problem, but you still cannot resolve it.	Please contact the Livin' by Mandiri Call Center through the application.	T14
Logout	You have finished using the Livin' by Mandiri application.	Please log out of your account.	T15

2.2 E-Servqual

In the E-SERVQUAL analysis, the gap between the perception and expectation scores is calculated for each instrument indicator. The following formula is used to calculate the E-SERVQUAL gap (Pangestu et al., 2024)

$$Q = \bar{P} \text{ (Perceived Service)} - \bar{E} \text{ (Expected Service)} \quad (2)$$

Information :

- Q = service quality value
 $\bar{P}$ = average value of perception
 $\bar{E}$ = average expected value

From the results of these calculations, an analysis can be carried out with the following provisions ([Nizar & Adriansyah, 2022](#)).

1. If the gap or disparity result is positive, it can be said that the service is very good.
2. If the gap or discrepancy result is zero, then the service provided is in accordance with user expectations.
3. If the gap value is negative, then the service provided has not met user expectations.

2.3 Importance Performance Analysis

After obtaining the average gap scores for each indicator, the results are presented in an Importance-Performance Analysis (IPA) chart using a scatter diagram. This analysis is used to determine the position of each service indicator of the Livin' by Mandiri application in Quadrants I, II, III, or IV and to identify which indicators require improvement. The Importance-Performance Analysis method is performed by plotting the results for each indicator on a scatter diagram. The diagram consists of four quadrants, namely Quadrant I, Quadrant II, Quadrant III, and Quadrant IV. Each quadrant represents a different level of service priority for improvement. Quadrant I indicates attributes that have the highest priority for improvement. Quadrant II indicates attributes that are performing well and should be maintained. Quadrant III indicates attributes with a low priority for improvement. Quadrant IV indicates attributes that are considered excessive because their performance is high, while their importance is relatively low ([Fadillah et al., 2020](#)).

2.4 Usability Testing

Usability testing analysis is conducted using task scenarios covering the main features of the Livin' by Mandiri application. The testing involves five respondents who use the Livin' by Mandiri application. Participants are asked to perform tasks based on the scenarios provided by the researcher.

During the testing process, the researcher records and calculates the values for learnability, efficiency, and error rates using the following formulas ([Theresia & Tan, 2021](#)).

2.4.1 Learnability

$$\text{Success Rate} = (\text{Success Task} + (\text{Partial Success} \times 0,5)) / (\text{Total Task}) \times 100\% \quad (3)$$

Information:

Success Rate = percentage of task level of ease

Success Task = Total tasks completed

Partial Task = Total failed tasks

Total Task = Total tasks given

The level of task completion can be written as a binary value of '1' if the respondent is able to complete the task and '0' if the respondent is unable to complete the task.

2.4.2 Efficiency

$$\text{Time Based Efficiency} = \frac{\sum_{j=1}^R \sum_{i=1}^N \frac{n_{ij}}{t_{ij}}}{NR} \quad (4)$$

Information:

R = number of participants

n_{ij} = the result of task i by participant j, n_{ij} will be 1 if successful or 0 if failed to complete the task.

t_{ij} = time required by participant j in the task scenario

2.4.3 Error

$$\text{Defective rate} = (\text{Total Defects}) / (\text{Total Opportunities}) \quad (5)$$

The number of errors is calculated by assigning a value of 1 when a user makes an error and a value of 0 when no error occurs. The average number of errors can then be calculated for each task.

2.4.4 Satisfaction

To measure user satisfaction, the System Usability Scale (SUS) is used. The SUS questionnaire consists of 10 questions and is administered to five respondents. After collecting the questionnaire responses, the next step is to calculate the SUS score using the following formula (Sukma et al., 2023).

$$\begin{aligned} \text{SUS Score} = & ((P1 - 1) + (5 - P2) + (P3 - 1) + (5 - P4) \\ & + (P5 - 1) + (5 - P6) + (P7 - 1) + (5 - P8) \\ & + (P9 - 1) + (5 - P10)) \times 2.5 \end{aligned} \quad (6)$$

Information:

P = Question

P1 = Question one

From the SUS score results, the next step is to calculate the average SUS score value using the following equation ([Sukma et al., 2023](#)).

$$\text{SUS} = (\text{Total Assessment})/(\text{Number of Respondents})$$

Information:

SUS = average SUS score

The average SUS score is used to determine the usability category of the application. According to Sauro, the SUS score can be interpreted using several categories ([Sukma et al., 2023](#)). Table 3 presents the interpretation of the SUS score.

Figure 3 shows score interpreted system usability scale use scale interpretation SUS score according to Jeff Sauro, 2018.

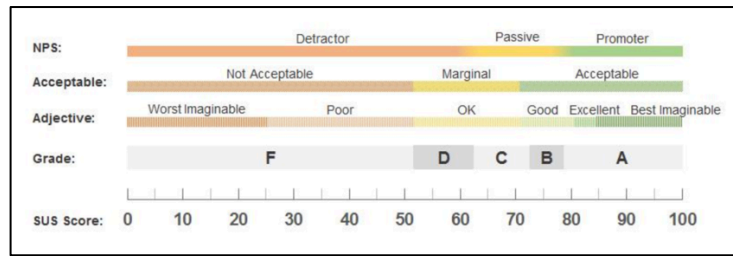


Figure 3 SUS Score

Table 3 SUS Score Interpretation

Grade	SUS	Percentiles Range	Adjective	Acceptable	NPS
A+	84.1 - 100	96 - 100	Best Imaginable	Acceptable	Promoter
A	80.8 - 84.0	90 - 95	Excellent	Acceptable	Promoter
A-	78.9 - 80.7	85 - 89		Acceptable	Promoter
B+	77.2 - 77.8	80 - 84		Acceptable	Passive
B	74.1 - 77.1	70 - 79	Good	Acceptable	Passive
B-	72.6 - 74.0	65 - 69		Acceptable	Passive
C+	71.1 - 72.5	60 - 64		Acceptable	Passive
C	65.0 - 71.0	41 - 59		Marginal	Passive
C-	62.7 - 64.9	35 - 40	OK	Marginal	Passive
D	< 51.7	15 - 34		Marginal	Detractor

3. Results and Discussion

3.1 Validity

This study began with the online collection of questionnaire data from 160 respondents using 29 questions. The respondents met the following criteria: they were over 18 years old, had used the Livin' by Mandiri application, and had been using the application for more than one month. The validity and reliability tests were conducted using SmartPLS. The results showed that 19 questionnaire items were valid, while 10 items were found to be invalid.

3.1.1 Validity Test Convergent

In the convergent validity test, validity is determined based on the outer loading value, with a threshold of greater than 0.70. Of the 29 questionnaire items, several items had outer loading values below 0.70. Therefore, these items were considered invalid and were eliminated from further analysis. The invalid items identified in the expectation and perception questionnaires were EFF2, EFF3, EFF4, EFF5, EFF6, SYS4, SYS5, PRIV2, RES2, and KL3. The following presents the outer loading values of the expectation and perception questionnaire items after the invalid items were eliminated. Table 4 presents the outer loading values of the expectation questionnaire after the elimination of invalid items. All remaining items have outer loading values greater than 0.70. Therefore, all remaining items are considered valid.

Table 4 Outer Loading Expected Value Results After Elimination

Variabel	EFF	FULL	SYS	PRIV	RES	COM	CON	KL
EFF1	1,000							
FULL1		0,917						
FULL2		0,946						
FULL3		0,708						
SYS1			0,833					
SYS2			0,875					
SYS3			0,866					
PRIV1				0,897				
PRIV3				0,912				
RES1					0,866			
RES3					0,922			
COM1						0,976		
COM2						0,893		
CON1							0,924	
CON2							0,843	
CON3							0,770	
CON4							0,889	
KL1								0,940
KL2								0,950

Table 5 Outer Loading Perception Value Results After Elimination

Variabel	EFF	FULL	SYS	PRIV	RES	COM	CON	KL
EFF1	1,000							
FULL1		0,877						
FULL2		0,958						
FULL3		0,856						
SYS1			0,877					
SYS2			0,854					
SYS3			0,735					
PRIV1				0,899				
PRIV3				0,899				
RES1					0,843			
RES3					0,914			
COM1						0,978		
COM2						0,946		

Variabel	EFF	FULL	SYS	PRIV	RES	COM	CON	KL
CON1							0,705	
CON2							0,826	
CON3							0,840	
CON4							0,891	
KL1								0,917
KL2								0,946

Table 5 presents the outer loading values of the perception questionnaire after the elimination of invalid items. All remaining items have outer loading values greater than 0.70. Therefore, all remaining items are considered valid.

3.1.2 Validity Test Discriminant

In this study, discriminant validity was assessed using the Fornell-Larcker criterion. According to the Fornell-Larcker criterion, discriminant validity is established when the square root of the Average Variance Extracted (AVE) for a particular construct is greater than its correlations with other constructs. The following presents the results of the Fornell-Larcker criterion test for the expectation and perception questionnaires.

Validitas Diskriminan								
☒ Kriteria Fornell-Larcker	☒ Cross Loadings	☒ Rasio Heterotrait-Monotrait (HTMT)	☒ Rasio Heterotrait-Monotrait (HTMT)	Salin ke Clipboard:		Format Ex		
	Compensation	Contact	Efficiency	Fulfillment	Kualitas Layanan	Privacy	Responsiveness	System Availa...
Compensation	0.935							
Contact	0.634	0.859						
Efficiency	0.274	0.473	0.837					
Fulfillment	0.205	0.434	0.833	0.864				
Kualitas Layanan	0.304	0.543	0.584	0.562	0.945			
Privacy	0.196	0.391	0.611	0.571	0.694	0.904		
Responsiveness	0.546	0.679	0.483	0.432	0.809	0.531	0.895	
System Availa...	0.519	0.660	0.658	0.623	0.718	0.724	0.626	0.858

Figure 4 Validity Test Results Expectancy Discriminant

Figure 4 presents the results of the discriminant validity test for the expectation questionnaire. All dimensions in the expectation questionnaire have square root AVE values that are greater for their respective constructs than their correlations with other constructs. Therefore, the expectation questionnaire meets the criteria for discriminant validity.

3.2 Reliability Test

Reliability is determined based on a Composite Reliability value greater than 0.70 and a Cronbach's Alpha value greater than 0.70. A construct can be considered reliable and have good internal consistency when both values meet these thresholds. The following presents the results of the reliability test for the expectation and perception questionnaires.

Validitas dan Reliabilitas Konstruk		
Matriks	Cronbach's Alpha	Reliabilitas Ko...
	Cronbach's Al...	Reliabilitas Ko...
Compensation	0.872	0.933
Contact	0.884	0.918
Efficiency	0.787	0.875
Fulfillment	0.844	0.897
Kualitas Layanan	0.881	0.944
Privacy	0.778	0.900
Responsiveness	0.754	0.889
System Availab...	0.823	0.893

Figure 5 Cronbach's Alpha and Construct Reliability Results Expectations

Figure 6 shows that all dimensions of the expectation questionnaire have Cronbach's Alpha and Composite Reliability values greater than 0.70. Therefore, all dimensions of the expectation questionnaire meet the reliability criteria.

Validitas dan Reliabilitas Konstruk		
Matriks	Cronbach's Alpha	Reliabilitas
	Cronbach's Al...	Reliabilitas Ko...
Compensation	0.923	0.961
Contact	0.841	0.889
Efficiency	1.000	1.000
Fullfillment	0.899	0.926
Kualitas Layanan	0.849	0.929
Privacy	0.763	0.894
Responsiveness	0.711	0.871
System Availab...	0.763	0.864

Figure 6 Results of Cronbach's Alpha and Construct Reliability of Perception

Figure 7 shows that all dimensions of the perception questionnaire have Cronbach's Alpha and Composite Reliability values greater than 0.70. Therefore, all dimensions of the perception questionnaire meet the reliability criteria.

3.3 Analysis E- Servqual

After conducting the validity and reliability tests, the next step is to analyze the gap between users' perceptions and expectations to calculate the E-SERVQUAL scores.

Table 6 Calculation Results Analysis E- Servqual

Calculation Analysis E- Servqual					
Dimensions	Indicator	Average (P)	Average (E)	Q	Qij
Efficiency	EFF1	3.65	3.75625	-0.10625	-0.10625
Fulfillment	FULL1	3.66875	3.6625	0.00625	-0.05417

Calculation Analysis E- Servqual					
Dimensions	Indicator	Average (P)	Average (E)	Q	Qij
System Availability	FULL2	3.6375	3.725	-0.0875	
	FULL3	3.58125	3.6625	-0.08125	
	SYS1	3.39375	3.6375	-0.24375	
	SYS2	3.38125	3.63125	-0.25	-0.20833
	SYS3	3.4625	3.59375	-0.13125	
Privacy	PRIV1	3.61875	3.7125	-0.09375	
	PRIV3	3.6625	3.69375	-0.03125	-0.0625
Responsiveness	RES1	3.325	3.60625	-0.28125	
	RES3	3.46875	3.61875	-0.15	-0.21563
Compensation	COM1	3.225	3.5	-0.275	
	COM2	3.21875	3.5125	-0.29375	-0.28438
Contact	CON1	3.48125	3.69375	-0.2125	
	CON2	3.4875	3.675	-0.1875	
	CON3	3.26875	3.50625	-0.2375	-0.23125
	CON4	3.3125	3.6	-0.2875	
Quality Service	KL1	3.53125	3.625	-0.09375	
	KL2	3.58125	3.65625	-0.075	-0.08438

Table 6 presents the results of the E-SERVQUAL analysis for the dimensions of efficiency, fulfillment, system availability, privacy, responsiveness, compensation, contact, and service quality. The results of the E-SERVQUAL analysis show that all dimensions have negative gap values, indicating that the services provided have not yet met users' expectations.

3.5 Importance Performance Analysis

Based on the E-SERVQUAL analysis results, an Importance-Performance Analysis (IPA) was conducted to determine the distribution of service attributes across the four quadrants.

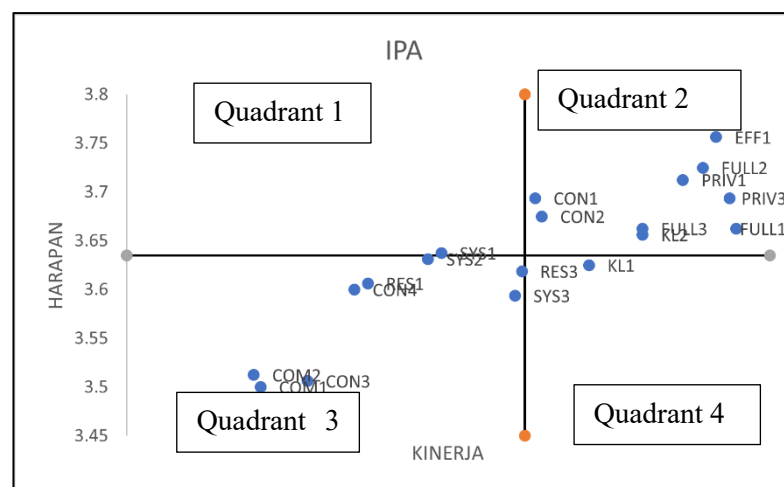


Figure 7 Importance Performance Analysis Results

Figure 8 presents the distribution of the variables on the scatter diagram. Quadrant I represents the highest priority for improvement because the variables in this quadrant are considered highly important, but their performance does not meet users' expectations. The variable located in Quadrant

I is SYS1. Quadrant II contains variables that are considered important and whose performance has met users' expectations. The variables located in Quadrant II are EFF1, FULL1, FULL2, FULL3, PRIV1, PRIV3, CON1, CON2, and KL2. Quadrant III contains variables that are considered less important and whose performance does not meet users' expectations. The variables located in Quadrant III are SYS2, SYS3, RES1, RES3, COM1, COM2, CON3, and CON4. Quadrant IV contains variables that are considered less important but whose performance has met users' expectations. The variable located in Quadrant IV is KL1.

3.6 Analysis Usability Testing

The usability testing analysis evaluates four aspects: learnability, efficiency, errors, and satisfaction.

3.6.1 Learnability

Table 7 Calculation Results Aspect Learnability

Participant	Success Task	Partial Success	Total Task	Percentage Success
P1	13	2	15	93,33%
P2	14	1	15	96,67%
P3	12	3	15	90,00%
P4	13	2	15	93,33%
P5	8	7	15	76,67%
Average	90,00%			

The following are the results of the level calculation convenience which is processed using Microsoft Excel. Table 7 shows a success rate of 90%. This indicates that users were able to successfully complete 90% of the tasks when using the Livin' by Mandiri application.

3.6.2 Efficiency

The following presents the calculation results for the efficiency indicator.

$$\begin{aligned}
 \text{Time Base Efficiency} &= \frac{(1,55 + 1,51 + 0,69 + 1,31 + 0,91)}{15 \times 5} \\
 &= \frac{5,97}{75} \\
 &= 0,0796 \text{ goal/sec}
 \end{aligned}$$

The calculation results for the efficiency indicator show a value of 0.0796 goals per second. This indicates that users were able to complete approximately 0.0796 goals per second when using the Livin' by Mandiri application.

3.6.3 Error

The following presents the calculation results used to determine the error rate of the Livin' by Mandiri application, which were processed using Microsoft Excel.

$$\begin{aligned}
 \text{Defective Rate} &= \frac{\text{Total Defects}}{\text{Total Opportunities}} \\
 &= \frac{26}{75} \\
 &= 0,35
 \end{aligned}$$

Based on the calculations above, the error rate in this study is 0.35. This indicates that users still encountered interaction errors when using the Livin' by Mandiri application.

3.6.4 Satisfaction

The following presents the calculation results for the satisfaction indicator of the Livin' by Mandiri application.

Table 8 Calculation Results Satisfaction

Respondents	Total Questions		Score	Total (Scorex2,5)
	Odd	Even		
R1	14	15	29	72.5
R2	10	14	24	60
R3	11	15	26	65
R4	13	14	27	67.5
R5	10	13	23	57.5
Total Rating				322.5
SUS Value				64.5

To determine the level of user satisfaction with the Livin' by Mandiri application, the average SUS score obtained is interpreted using the SUS score interpretation scale. The following presents the user satisfaction level based on the SUS score interpretation scale.

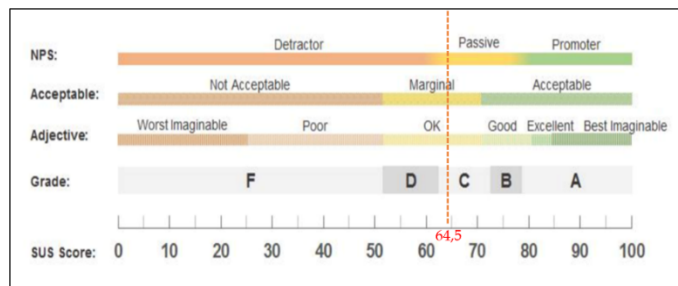


Figure 8 System Usability Scale Score Interpretation Results

Based on Figure 4.10, the System Usability Scale (SUS) score of the Livin' by Mandiri application is 64.5, which is classified as Grade C-. Based on the adjective rating, the Livin' by Mandiri application is categorized as "OK," while its acceptability range is classified as "Marginal." This indicates that the Livin' by Mandiri application is still acceptable to users; however, improvements are needed to enhance its usability and overall user experience.

4. Conclusions

Based on the results of the E-SERVQUAL analysis, the data were processed by calculating the gap between users' perceptions and expectations. Initially, this study consisted of 29 questionnaire items across seven dimensions used to measure service quality, namely efficiency, fulfillment, system availability, privacy, responsiveness, compensation, and contact. After conducting validity and reliability tests, 10 items were found to be invalid and were eliminated. Therefore, 19 valid items were used to collect data from 160 respondents. The collected data were then analyzed using E-SERVQUAL and Importance-Performance Analysis (IPA). The results of the E-SERVQUAL

analysis showed that all dimensions had negative gap values, namely efficiency (-0.106), fulfillment (-0.054), system availability (-0.208), privacy (-0.062), responsiveness (-0.215), compensation (-0.284), contact (-0.231), and service quality (-0.084). These results indicate that the services provided by Livin' by Mandiri have not yet met users' expectations. Furthermore, the Importance-Performance Analysis showed that the SYS1 attribute was located in Quadrant I, indicating that it is a high-priority attribute for improvement. Based on this finding, the recommended improvement is to implement server distribution to improve system availability and application performance. The usability testing results show that the Livin' by Mandiri application is relatively easy to use, with a learnability success rate of 90%. In addition, the efficiency score, measured based on the time required by users to complete the tasks, was 0.0796 goals per second. However, the usability testing results also indicate that users still experienced errors, with an error rate of 0.35. User satisfaction was measured using the System Usability Scale (SUS), which resulted in a score of 64.5. This score corresponds to Grade C- and is classified as "OK" based on the adjective rating and "Marginal" based on the acceptability range. The usability testing also identified several problems related to service features, including cash deposits and withdrawals without a physical ATM card, the FAQ feature, the Call Center feature, printing transaction statements for a specific month, and submitting complaints. Based on these findings, the recommended improvements include adding an online complaint feature and redesigning the application to improve the accessibility and usability of these features.

Acknowledgments

The author would like to express sincere gratitude to all parties who contributed to the completion of this research. The author would especially like to thank the thesis supervisor from Surabaya State University for providing valuable guidance, direction, and support throughout the preparation of this article. The author hopes that this scientific article will provide useful information and knowledge for readers. For future research, a larger number of usability testing participants is recommended to obtain more representative results. Future researchers can also consider grouping participants based on age or application usage habits. In addition, the research questionnaire can be expanded or further developed to provide a more comprehensive evaluation.

Conflict of Interest

The author declares that there is no conflict of interest in the conduct and completion of this study.

Author Contributions

Conceptualization, [ZAF and DFS]; Methodology, [ZAF and DFS]; Investigation, [BPP]; Formal analysis, [ZAF] and DFS; Supervision, [DFS and BPP]; Writing – original draft, [ZAF]; Writing – review & editing, [DFS]. All authors have read and agreed to the published version of the manuscript.

Ethics Statement

This study used Livin' by Mandiri reviews data freely accessed on Google Play Store and App Store. The study did not involve direct recruitment or interaction with human participants. Ethical approval was not applicable to the data analysis conducted in this study.

AI Use Declaration

The authors utilized ChatGPT (OpenAI) as a generative AI-assisted tool during the preparation of this manuscript, particularly to support language editing, grammatical improvement, and the enhancement of clarity and overall organization. All AI-assisted outputs were carefully reviewed and verified by the authors, who retain full responsibility for the accuracy, originality, interpretation, and final content of the published manuscript.

References

- Asyifa, N. N., & Subekti, I. (2021). Pengaruh Kualitas Sistem, Kualitas Informasi, Kualitas Layanan, dan Kemudahan Penggunaan Terhadap Kepuasan Pengguna Sistem Informasi Akademik Mahasiswa (SIAM) Universitas Brawijaya. *Jurnal Ilmiah Mahasiswa FEB*, 9(2).
- Fadillah, H., Hadining, A. F., & Puspa Sari, R. (2020). Analisis Kepuasan Pelanggan ABC Laundry dengan Menggunakan Metode Service Quality, Importance Performance Analysis (IPA) dan Customer Satisfaction Index (CSI). In *Jurnal Teknik Industri* (Vol. 15, Issue 1).
- Hardani, Andriani, H., Ustiawaty, J., Utami, E. F., Istiqomah, R. R., Fardani, R. A., Sukmana, D. J., & Auliya, N. H. (2020). *Buku Metode Penelitian Kualitatif & Kuantitatif* (H. Abadi, Ed.). Pustaka Ilmu. <https://www.researchgate.net/publication/340021548>
- Mutiara, S., Hamid, R. S., & Suardi, A. (2020). Pengaruh Kualitas Layanan, Persepsi Harga dan Cita Rasa Terhadap Kepuasan Konsumen. *Jesya (Jurnal Ekonomi & Ekonomi Syariah)*, 4(1), 411–427. <https://doi.org/10.36778/jesya.v4i1.300>
- Nizar, R. M., & Adriansyah, G. (2022). Analisis Pengukuran Tingkat Kualitas Pelayanan Terhadap Kepuasan Pelanggan Menggunakan Metode Servqual dan IPA (Outlet Bebicare Desa Wiyung). *Journal Of Industrial And Systems Optimization*, 5(2), 122–129.
- Ofosu-Asare, Y. (2024). Enhancing user experience in online learning environments: Design, evaluation, and usability techniques. *Journal of Graphic Engineering and Design*, 15(4), 45–59. <https://doi.org/10.24867/jged-2024-4-045>
- Pangestu, M. Y., Saputra, E., & Hamzah, M. L. (2024). Analisis Kualitas Sistem SLIMS Terhadap Kepuasan Mahasiswa Dengan Metode E-Servqual dan Importance Performance Analysis. *Jurnal Inovtek Polbeng - Seri Informatika*, 9(1), 2024.
- Pant, A. (2015). Usability evaluation of an academic library website. *The Electronic Library*, 33(5), 896–915. <https://doi.org/10.1108/el-04-2014-0067>
- Pratiwi, W. J. (2023). Pengaruh E-Service Quality dan Information Quality terhadap Kepuasan Konsumen Melalui Keputusan Pembelian Daring di Aplikasi Shopee (Studi Pada Konsumen Shopee di Kota Jambi). *Jurnal Manajemen Terapan Dan Keuangan (Mankeu)*, 12(01).
- Reddy, N. N., Ramaprasad, M. V., M. J., & Bung, P. (2024). Evaluating the Impact of E-Service Quality Attributes on Customer Satisfaction and Purchase Intentions for Electronic Gadgets and Home Appliances, India. *Journal of Ecohumanism*, 3(8). <https://doi.org/10.62754/joe.v3i8.4910>
- Sari, P. K., Alamsyah, A., & Wibowo, S. (2018). Measuring e-Commerce service quality from online customer review using sentiment analysis. *Journal of Physics: Conference Series*, 971(1), 012053. <https://doi.org/10.1088/1742-6596/971/1/012053>
- Septia G, A., Mustuka U, E., Divara A, A., & Borroek, M. R. (2024). Analisis Kualitas Layanan Pada Akun Instagram Sebagai Media Informasi Bagi Siswa/i dengan Metode E Servqual. *TIN: Terapan Informatika Nusantara*, 4(9), 571–580. <https://doi.org/10.47065/tin.v4i9.4881>
- Sukma, A. P., Yusuf, R., & Dai, R. H. (2023). Analisis Pengukuran Usability Sistem Informasi Manajemen Baznas (SIMBA) Menggunakan Metode System Usability Scale (SUS). *Journal Of System and Information Technology*, 3(2).
- Theresia, S., & Tan, H. Sen. (2021). Evaluation of service quality and user experience on credit card application using e-SERVQUAL model and usability testing. *IOP Conference Series: Earth and Environmental Science*, 794(1). <https://doi.org/10.1088/1755-1315/794/1/012095>