Kinetik: Game Technology, Information System, Computer Network, Computing, Electronics, and Control
Journal homepage: http://kinetik.umm.ac.id
ISSN: 2503-2267
Vol. 9, No. 3, August, Pp. 213-220

Service quality analysis of unej digital library using M-S-QUAL and importance performance analysis methods

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Article Info
Keywords:
Service Quality, IPA, Library, M-S-Qual

Article history:
Received: December 03, 2023
Accepted: April 17, 2024
Published: August 31, 2024

Cite:
B. Prasetyo, F. D. C. Ramadhani, and F. Nurman Arifin, "Service Quality Analysis of Unej Digital Library Using M-S-QUAL and Importance Performance Analysis Methods", KINETIK, vol. 9, no. 3, Aug. 2024.
https://doi.org/10.22219/kinetik.v9i3.1918

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Abstract
A lot of library services are impacted by the improvement of technologies. With this modification, the traditional library services are now entirely digital. To carry out this digitalization, the Unej Digital Library (UnejDigiLib) application was created by the University of Jember's library. The purpose of developing this application is to improve the effectiveness of library services, which were previously hindered by the COVID-19 epidemic. The UnejDigiLib developer has not yet evaluated the quality of its services since the application's release, so they are unsure of whether the current services satisfy the user needs. The goal of this study is to combine Mobile Service Quality (M-S-QUAL) and Importance Performance Analysis (IPA) in order to assess the UnejDigiLib service's quality based on users perceptions. The M-S-QUAL is used to determine the service quality indicators and examine the gap between their performance and importance. After that, the service indications are mapped using the IPA based on their priority level. The M-S-QUAL dimensions that used are: compensation, privacy fulfillment, content, system availability, efficiency, and privacy. Data collection was carried out through online surveys and interview. The respondents are Unej students who had used and borrowed e-book from UnejDigiLib. The sample was determined using simple random sampling and obtained 287 respondents. The findings indicate that the user expectations have not been met by the UnejDigiLib service's performance. Meanwhile, the IPA analysis's findings indicate that the following indicators are found in quadrant 1: C3 (completeness of the book collection), C5 (suitability of the book collection with the curriculum), C6 (updates to the book collection), and F3 (download speed). This quadrant's indicators are the primary focus for the improvement. The conclusion from these improvement suggestions is that application service providers must coordinate with stakeholders to complete the e-book collection according to customer needs and also require technical updates starting from the features and internal application system to minimize errors due to the system.

1. Introduction

Digitalization has an impact on many aspects of life, including education, specifically the libraries. The implementation of digitalization in libraries is carried out by providing digital library. By using digital library, librarians can instantly access all material using digital libraries because there are no space or time constraints [1]. The hope is that the existence of a digital library will have a positive impact on the education sector, allowing it to effectively assist the learning process [2].Therefore, this research will discuss the importance of service quality of UNEJ digital library and what things can influence the quality of the service.

The library of University of Jember have improved their services through the development of the UnejDigiLib (Unej Digital Library) application. UnejDigiLib is a mobile-based e-book lending applications launched by Gramedia Asri Media on June 4, 2021. The purpose of this application is to facilitate online literature access for UNEJ academic community. Aside from that, this application was created in part to optimize library services during the Covid-19 pandemic. Libraries must continue to contribute to the learning process even during the pandemic because libraries are useful for assisting students in finding the literature they require [3]. According to the result of the interview with Mr. Taufik, the application manager, the UNEJ Library has not yet evaluated the UnejDigiLib. As a result, the UNEJ Library is unable to determine if the UnejDigiLib service satisfies the user needs. However, based on several feedback from user, the UnejDigiLib was found to be innovative, but the quality of the service was inadequate. Users express dissatisfaction towards incomplete book lists, incorrect book selections, and trouble utilizing program functions. In addition, users complained the inefficiency of the account registration system, which required offline registration at the library.

It is evident from the information provided that the users are dissatisfied with the services they received. User satisfaction can have an impact on the quality of an information system [4]. User satisfaction is a user's emotional response to an experience when using a service. In an era of rapid technological development, the customer's online satisfaction can be defined as an overall assessment of the quality of the services offered [5]. To meet the user satisfaction, service providers must first understand the quality attributes of UnejDigiLib services perceived by students, then the necessary actions are implemented to improve the overall quality of its services with the aim of fulfilling the user satisfaction [6]. Therefore, in order to meet the needs of its users, UnejDigiLib needs to be evaluated in order to improve the quality and performance of its services.

However, there have been several methods for evaluating service quality generally, such as Service Quality, E-Service Quality, and E-RecService Quality methods [7]. Mobile Service Quality (M-S-QUAL) is a method that can measure the service quality of mobile application, which has nine indicators dimensions: Efficiency, Fulfillment, Responsiveness, System Availability, Compensation, Privacy, Contact, Content, and Billing [8]. Because M-S-QUAL is designed specifically to measure mobile service quality, it differs from conventional ways of measuring service quality [9].

In order to evaluate UnejDigiLib service quality, this study combines the Importance Performance Analysis (IPA) and M-S-QUAL method. Service Quality indicators is mapped using the IPA approach based on its priority level [10]. M-S-QUAL indicators will be mapped into four analysis quadrants in the IPA method: first quadrant (High Importance & Low Performance), second quadrant (High Importance & High Performance), third quadrant (Low Importance & Low Performance), and fourth quadrant Low Importance & High Performance). The aim of combining these two methods is to make it easier for service providers to improve the quality of their services based on their priority level. This allows service providers to plan carefully and minimize unexpected expenses due to service improvements The indicators that need the most improvement can be identified by looking at the first quadrant of the IPA analysis [11]. Therefore, this research will discuss the process of evaluating the quality of UnejDigiLib application services using the M-S-Qual and IPA methods.

There are several service quality studies that have been conducted. One of the studies regarding digital library quality was conducted by Sanghamitra Dalbehera entitled "Measuring Service Quality in Digital Library Services by the Research Scholars of S.O.A University of Odisha Using E-S-Qual Model". Then, the other research to measure service quality was carried out by Muhammad Mujiya Ulhaq et al. in 2019 entitled "An Integrated M-S-QUAL and Importance Performance Analysis Approach for Assessing Service Quality of Mobile Commerce Application". Apart from that, there is similar research regarding service quality conducted by Maharani Fuji Lestarai et al. entitled "Design Quality Service Improvement towards Expert Course through Mobile Applications Using Mobile Quality Service Methods and Refined Kano". From these three studies, it can be concluded that the M-S-Qual method can successfully measure the quality of a service. Then, the IPA method succeeded in showing the priority of services that needed improvement. However, the difference between these researches and the present research is the dimensions applied. The present research applies the dimensions of M-S-Qual Method, namely Efficiency, System Availability, Content, Privacy, Fulfillment, and Compentation. A detailed explanation of the use of research dimensions will be explained in the following paragraph.

2. Research Method

Figure 1 illustrates the steps that will be followed in this research.

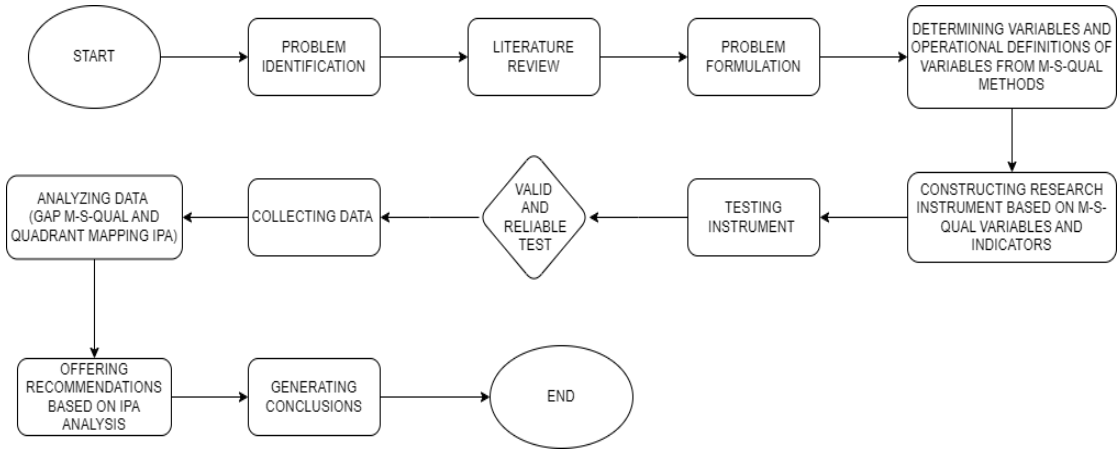

Figure 1. The Research Flowchart

According to Figure 1, this research was started by identifying the problem, where problem identification is useful for determining the problems in order to aid the research process. After that, a literature review was conducted, in which several references or theoretical bases related to the research issue were sought. Following that, the problem formulation was carried out, which explained the issues and scope that were covered in the research. The variables and research tools were then determined based on the method used. After the instrument has been created, it was tested for validity and reliability. If the instrument is valid and reliable, data collection can begin. Following the collection of data, data analysis was performed, recommendations were made, and conclusions were reached.

This research is classified as quantitative research. Quantitative research is defined as research that employs statistical approaches to process and acquire research data [12]. This research was survey-based, with each survey divided into two assessments, namely performance and importance assessments. This research was measured on a 4-point Likert scale, with scores ranging from strongly agree to strongly disagree for performance evaluation and strongly important to strongly unimportant for importance evaluation. The goal of utilizing this four-point Likert scale is to avoid a double connotation result (undeciden) [13].

This study combined two methods, namely M-S-QUAL and IPA. M-S-QUAL is a method that can measure the quality of mobile-based application services [14]. M-S-QUAL contains nine dimensions and 53 indicators, but in this study not all dimensions and indicators were implemented. M-S-QUAL dimensions and indicators can be determined according to the application conditions [15]. Six of the nine M-S-QUAL dimensions were used in the present study, including Efficiency, System Availability, Content, Privacy, Fulfillment, and Compensation. The Responsiveness, Contact, and Billing dimensions weren't implemented since the application lacks features that relate to these characteristics.

2.1 Validity and Reliability Test

After identifying the dimensions, research indicators were created. The instrument was tested on 30 respondents by using validity and reliability test. SPSS 25 and MS Excel software were used to test the instrument. The validity test was calculated by correlating the item score (r count) to the total item score (r table). The following Equation 1 explains how to calculate the validity test.

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{(N\sum X^2 - (\sum X^2))(N\sum X^2 - NY^2)}} \quad (1)$$

Where r is the correlation coefficient, X represents the score of each item, Y is the overall item score, N is the number of instrument test samples, $\sum X$ is the number of scores in the X distribution, and $\sum Y$ is the number of scores in the Y distribution.

After the validity of the research instrument has been determined, a reliability test was performed. An instrument can be considered reliable if it gives consistent results despite being used many times over a period of time [16]. The instrument can be considered reliable if the Cronbach's Alpha value is >0.6 [17]. The following Equation 2 is used to calculate the reliability test.

$$R = \alpha = \frac{N}{N-1}\frac{s^2(1-\sum s_i^2)}{s^2} \quad (2)$$

Where α is the Cronbach's Alpha reliability coefficient, s^2 is the variance of the overall score, and s_i^2 is the variance of each item.

2.2 M-S-QUAL Analysis

The M-S-QUAL method consists of 9 dimensions as explained in the Figure 2. The first dimension is Efficiency, which describes how quickly and precisely the program responds as well as how simple it is to use [18]. The second dimension is System Availability, which explains the application's capacity to perform technical duties as well as the accuracy of service promises made [19]. The third dimension is Content, which illustrates how the application can produce high-quality information. The fourth dimension is Privacy, which describes the application's capacity to give users a sense of security and comfort in protecting their personal data [20]. The fifth dimension is Fulfillment, which describes how the application may fulfill product delivery services and the availability of commodities [21]. Responsiveness, which explains the effectiveness of the application in dealing with problems that occur. Compensation, which describes the application's ability to compensate for errors [19]. Contact, which explains the availability of applications to provide customer service to users. Billing, which explains how the application can provide a sense of security and comfort when making transactions or making purchases on the application [9]

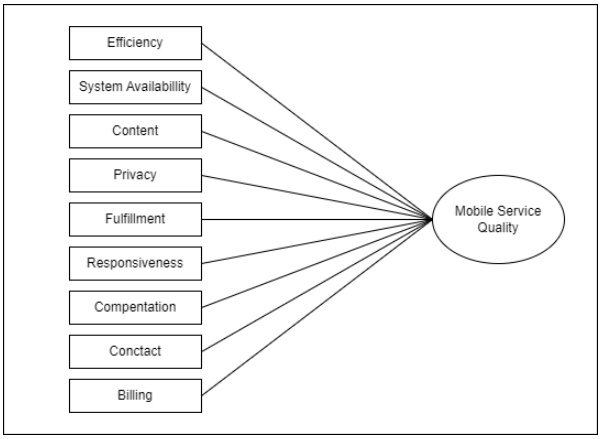

Figure 2. M-S-QUAL Dimension

After the instruments were considered reliable, data for 287 samples were collected. Following the data collection, the M-S-QUAL gap analysis was calculated using the difference between performance and importance values. If the gap (Qi) is high (>0), the service quality exceeds user expectations; if the gap (Qi) is negative (<0), the service quality does not meet user expectations. If the gap value (Qi) is equal to 0, the service quality meets user expectations [22]. The following equation 3 describes the formula utilized.

$$(\mathrm{Qi}) = (\mathrm{Pi}) - (\mathrm{Ii}) \tag{3}$$

Where Q_i is the Level of gap, P_i is the performance value and I_i is the value of importance.

2.3 IPA Analysis

The IPA analysis is used to map the service indicators into four analysis quadrants based on performance and importance levels. The results of this mapping could determine the level of priority for each indicator. In the IPA method, there are two steps of analysis. The first is suitability analysis. The level of suitability is determined by the percentage difference between the performance and importance values. If the value is less than 100%, the service performance has not met the user's expectations, whereas if the number is greater than 100%, the performance has exceeded the user's expectations. If the value equals 100%, the service meets customer expectations [23]. The formula utilized is presented in Equation 4 as follows.

$$\mathrm{TKi} = \frac{Xi}{Yi} \times 100\% \tag{4}$$

TKi represents the respondent's level of harmony, Xi represents the performance score, and Yi represents the importance score. After that, the average value of each indicator is plotted on a four diagram analysis. The diagram is shown in figure 3 below.

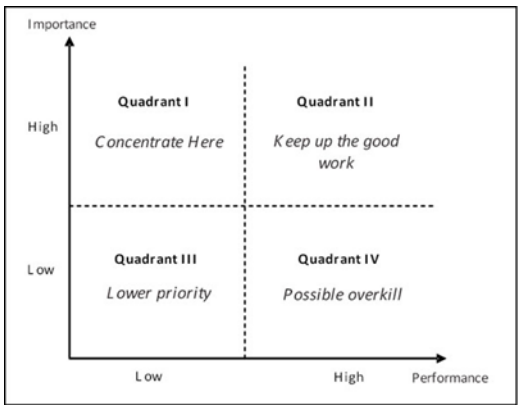

Figure 3. Quadrant of Importance Performance Analysis (IPA)

The first quadrant is the top priority for improvement since the indicators in this quadrant have a high relevance value but low perceived performance. As a result, the company must focus on improving their services in this indicator. The second quadrant must be maintained because its performance and perceived importance are in accordance with user expectations. As a result, service providers must maintain the quality of their performance on this metric. The third quadrant is a low-priority area because service indicators are regarded as unimportant and perform poorly. As a result, service providers do not need to prioritize improving these indicators. The fourth quadrant is the area of excess. This section has indicators with good performance but is viewed as less significant by users, therefore, service providers would be better off investing resources in indicators with high priority [4].

3. Results and Discussion

This study was conducted both online and offline. The online study was conducted by sending questionnaires using social media platforms such as WhatsApp, Instagram, Email, Telegram, and Sister for Student (SFS) application. Offline research was conducted by attaching brochures with a Google Form link and asking students who had used the UnejDigiLib application in the library nearby. Respondents in this study were UNEJ students who were UnejDigiLib users who had borrowed e-books on the application, where the sample required based on the Slovin formula calculation is 287 respondents.

3.1 Validity and Reliability Testing Result

The purpose of the validity test is to assess whether or not the research instrument is valid. An instrument is considered valid if it can expose data appropriately and does not depart from the actual situation [12]. In this study, the validity test sample consisted of 30 respondents with a degree of freedom (df = N-2) of 28. The r-table value was 0.361 with a two-tailed test significance level 95% and error tolerance 5%. After processing the data with the SPSS 25 tool, it was found that the r-value for the 32 statement indicators in each assessment of importance and performance was higher than the r-table value. As a result, all of the indicators in this study are valid.

Reliability testing is useful for determining an instrument's consistency. An instrument is considered reliable if it produces consistent results when utilized repeatedly at different times [16]. After all indicators have been confirmed to be valid, reliability testing is performed. Data processing results show that the Croncbanch's alpha value in each dimension is greater than 0.6. These results demonstrate that all indicators in the assessment of importance and performance are considered reliable.

3.2 M-S-QUAL Gap Analysis Result

M-S-QUAL gap analysis is useful for determining the quality of UnejDigiLib services which is obtained from the difference between performance values and importance values. The results of the M-S-QUAL gap analysis can be seen in Table 1.

Table 1.Result of Gap Analysis M-S-QUAL

Dimension	AVE Importance (I_i)	AVE Performance (P_i)	Gap (Q_i)
Efficiency	3,59	3,31	-0,28
System Availability	3,46	2,87	-0,60
Content	3,45	2,68	-0,76
Privacy	3,43	3,06	-0,38
Fulfillment	3,48	3,18	-0,31
Compensation	3,47	3,17	-0,30
Total Average	3,48	3,05	-0,44

Basen on Table 1 the total average importance value is 3.48, indicating that overall users believe the services provided by the UnejDigiLib program are very important. The total average performance number is 3.05, indicating that users assume the service performance offered is quite good. Based on the results of gap calculations by item, dimension, or overall, it obtains a negative value of -0.44, with the highest gap value in the content dimension, precisely -0.76, and the lowest gap in the efficiency dimension. This proves that the total service performance perceived by users is not up to the expected expectations. As a result of the gap analysis, the UnejDigiLib application should be able to improve the quality of its services so that they can meet the requirements and needs of the users.

3.3 IPA Analysis

According to the results of the IPA method's suitability analysis, the percentage level of conformance in each dimension and overall is under 100%. This shows that the perceived service performance does not meet to the user's expectations or needs. The overall percentage acquired was 87.5%, and the dimension with the highest percentage

was the efficiency and fulfillment dimension, which received a value of 92%. The lowest percentage was observed in the content dimension, with a value of 78%. As a result of the IPA suitability analysis, a quadrant mapping analysis was performed to identify the priority scale for improving each research indicator.

Figure 4 shows the findings of the IPA quadrant analysis. Research indicators in quadrant 1 are the main priority for improving their performance because the indicators have low performance but according to users their importance value is high. The service indicators included in this quadrant are explained as C3, C5, C6, and F3. While in quadrant 2 there are indicators whose performance needs to be maintained. This quadrant has attributes with equally high performance and importance values. The indicators included in this quadrant are E1, E2, E3, E4, E5, E6, E7, E8, SA1, F1, F4, and F6. Then indicators in quadrant 3 are indicators that do not need improvement because they have the same low level of performance and importance, so indicators in this quadrant are called low priority. The indicators included in this quadrant are SA2, SA3, SA4, C1, C2, C4, C7, and P1. Meanwhile, indicators in quadrant 4 have high performance but low perceived importance. Therefore, the performance of this indicator is excessive. The indicators included in quadrant 4 are F2, F7, F8, F9, P2, CP1, and CP2.

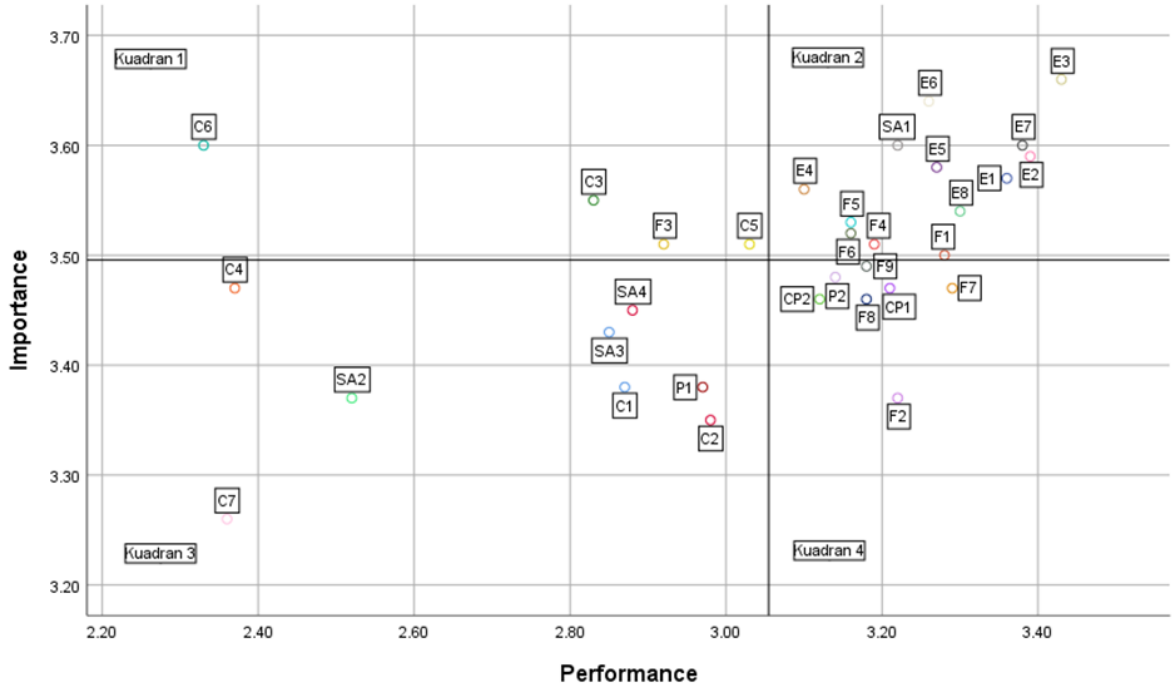

Figure 4. The Result of Quadrant IPA

According to the result of the IPA quadrant analysis, there are four indicators in quadrant 1 that are the top priorities for service providers to improve the quality of their services. Users report that service performance in this area is very low, but perceived importance is very high. These indicators are C3 (e-book collection completeness). This can be proven according to the user experience, they find it difficult to find the specific e-book they need. C5 (suitability of e-book collection with the curriculum), based on the user experience while searching e-book the existing e-books are not used as reference e-books, but as e-books to support lectures. C6 (e-book collection updates), users also feel that e-book updates are not in line with the times. F3 (e-book download speed), users often experience failed or slow downloads when downloading e-books with large file sizes.

3.4 Recommendation

Recommendations are determined based on user feedback or suggestions, standards for measuring the quality of library services, and similar previous studies. The following recommendations for improving the indicators covered in the first quadrant are based on the results of the IPA quadrant analysis. First, C3 indicator, completing the e-book collection in the UnejDigiLib program in accordance with user needs. The UnejDigiLib application service provider could collaborate with the Jember University Center to increase funding and administration for the development of the UnejDigiLib e-book collection [24].

Second, C5 indicator, update existing e-books to lecture requirements. UnejDigiLib application service providers could cooperate, for example, by arranging comprehensive meetings with lecturers from each faculty or university research group to discuss the need for e-book collections relevant to lectures [25].

Third, C6 indicator, update the e-book collection with the most recent publications that meet the needs of the user. Service providers must monitor for irrelevant e-books and update or replace them on a regular basis. Aside from that, service providers must pay attention to feedback from users in order to gain an understanding of the specific subject that the consumer needs. To make it easier for customers to submit e-books, service providers might implement an e-book submission input feature [26].

Last, F3 indicator, reduce the number of factors that can affect download speed. Service providers must optimize the file size or content offered in each of their services. Service providers must optimize the file size or material available in each e-book without reducing quality in order to make it easier for users to download the e-book [27].

The author's contribution to the solution provided is through becoming a communicator to service providers and stakeholders of the UnejDigiLib application to continue to improve the service quality based on the solutions from the results of this research.

4. Conclusion

The conclusions of this study demonstrate that based on gap analysis using the M-S-QUAL approach, the performance of the UnejDigiLib application service has failed to satisfy the expectations of its users. The analysis results show that the average importance and performance values obtained are 3.48 and 3.05, respectively, with a -0.44 gap between these values. Meanwhile, based on the results of the IPA suitability analysis, the average percentage value for all dimensions is 87.5%. According to the findings of the IPA suitability analysis, the overall quality of the UnejDigiLib application service falls short of user expectations.

Based on the IPA quadrant results and analysis, there are four indicators in quadrant 1 that are the top priorities for service providers to enhance and improve the quality of their services. These indicators are C3 (e-book collection completeness), C5 (e-book collection suitability with the curriculum), C6 (e-book collection updates), and F3 (e-book download speed). Improvement suggestions have been made for each of these indicators.

For future researchers, it is recommended to conduct research on the service quality of the UnejDigiLib application using qualitative research methods or other service quality measurement methods to obtain research results from various points of view. Afterwards, for research objects, it is recommended to continuously improve the quality of UnejDigiLib application services by paying attention to all elements that can influence the quality of digital library services in order to meet user needs.

Notation

r : Correlation Value
X : Score of Each Item
Y : Total Item Score
N : Number of Instrument Test Sample
$\sum X$: Number of Scores In Distribution X
$\sum Y$: Number of Scores In Distribution Y
R : Cronbach's Alpha Reliability Coefficient
s^2 : Overall Score Variance
s_i^2 : Variance of Each Item
Q_i : Level of Gap
P_i : Performance Value
I_i : Importance Value
TKi : Level of Suitability
Xi : Performance Score
Yi : Importance Score

Acknowledgement

Thank you to the lecturers and the entire academic community of the Faculty of Computer Science University of Jember for their assistance in writing this research article. Hopefully, this research will be valuable to science and become a reading source for comparable research.

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