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An Integrated M-S-QUAL and Importance-Performance Analysis Approach for Assessing Service Quality of Mobile Commerce Application

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Abstract. In this globalization era, the Internet has arguably influenced the daily business of every sector, especially service sector. As a consequence, most of the current services have been changed from the conventional way with an emergence of the Internet to the electronic commerce (e-commerce). With the convenience of using handled devices, such as Smartphone and tablets, the emergence of mobile commerce (m-commerce) application becomes a demand. As time goes by, an intense competition among the mobile service providers is inevitable, thus, all providers seek to improve their service qualities in order to achieve customer satisfaction. The present research attempted to assess the service quality of the existing m-commerce using the M-S-QUAL scale and combine it with the importance-performance analysis (IPA) model. A case study to exhibit the applicability of the proposed methods was conducted in one of the most popular m-commerce application in Indonesia. This study is expected to provide valuable insights for the managers concerning with the attributes of the service quality that reflect the customers' perception in order to do continuous improvement.

INTRODUCTION

Service providers in this highly competitive global market have progressed dramatically by the provision of the Internet that unquestionably has penetrated and transformed people's lives, especially the method of communication, study, work, and business-related activities. With the support of the Internet, the service providers are alerted for the ability of this new communication technology as it can easily facilitate their activities without any distance and time restriction. Inevitably, they attempted to gain competitive advantage as well as to broaden their market by using electronic transactions or electronic commerce (e-commerce).

The e-commerce is defined as any electronic transaction such as financial transactions, transfer of information, or other services that occur between organizations and stakeholders [1]. It is considered to grow rapidly in this globalization era. In 2017, retail e-commerce sales world-wide amounted to 2.3 trillion US dollars and the revenues are projected to grow to 4.88 trillion US dollars in 2021 [2]. This phenomenon is inevitable since e-commerce delivers many benefits to both buyers and sellers, as indicated by a number of cases [3–9].

Recently, with the development of handheld devices, in particular tablets and Smartphone, it is easier for people to conduct the electronic-based transaction. The advanced mobile communication technologies have facilitated the development of mobile commerce (m-commerce). The m-commerce accounted for 23% of digital expenditure in the United States during the third quarter of 2017. It is forecast to account for nearly 54% of all electronic commerce sales in 2021. Furthermore, this m-commerce sales amounted to over 156 billion US dollars in 2017, and are projected to surpass 420 billion US dollars in 2021 [10].

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As competition increases, mobile service providers that are trying to deliver an excellent service have to understand how customers perceive their mobile services. Consequently, they have to improve their service quality in order to fulfill the customers need. This service quality is considered essential for the success of the retailers due to its close relationship with customer satisfaction [11–13].

Nevertheless, the assessment of the service quality is relatively uneasy and even challenging due to the characteristics of the service, namely simultaneous, heterogeneous, intangible, and inseparable [14]. Some researchers have extensively examined how to assess the service quality[15–17]. However, assessing service quality of m-commerce application is slightly different from that of the traditional service quality since it has four distinct characteristics, i.e., ubiquity, convenience, localization, and personalization [18]. Fortunately, [19] has developed a valid scale to assess m-commerce's service quality called M-S-QUAL. It consists of five dimensions with a total of sixteen item statements (see Section 2 for the detail).

In the present study, we tried to extend the work of [19] by integrating the M-S-QUAL scale with the importance-performance analysis (IPA) by [20]. The inclusion of IPA model in this research is because every organization is constrained by limitations of the resources. Thus, it has to be determined how those limited resources are best organized to achieve customer satisfaction. The IPA model is claimed to be an effective tool to set the priorities. It is a two-dimensional state space where the vertical axis describes the importance of selection attributes, while the horizontal axis describes how well the service provider is performing the service that has to be delivered to the customers. This IPA model has been broadly used in many studies [21–23].

TABLE 1. Dimensions and Item Statements of M-S-QUAL

Dimension		Item Statements
Efficiency	EFF1	This site enables me to access it quickly
	EFF2	It enables me to complete a transaction quickly
	EFF3	It loads its pages quickly
Fulfillment	FUL1	It quickly delivers what I order
	FUL2	It delivers orders when promised
	FUL3	This site makes items available for delivery within a suitable timeframe
Privacy	PRI1	This site protecs my credit card information
	PRI2	It protecs information about my web-shopping behavior
Contact	CON1	It does not share my personal information with other sites
	CON2	Friendliness when reporting a complaint
	CON3	Service agents provide consistent advice
	CON4	It offers the ability to speak to a live person if there is a problem
Responsive	RES1	This site provides a telephone number to reach the company
	RES2	It provides me with convenient options for returning items
	RES3	This site handles product returns well
	RES4	This site offers a meaningful guarantee

A case study was conducted in one of the most popular m-commerce application in Indonesia to demonstrate the applicability of the proposed methods. In Indonesia, retail e-commerce sales expenses 7.056 billion US dollars in 2017. In 2022, e-commerce sales are set to surpass 14.4 billion U.S. dollars in revenues [24]. This statistic is corroborated by the huge amount of the mobile phone internet user penetration. In 2017, 28.78% of the Indonesian population accessed the internet from their mobile phone. This figure is expected to grow to 38.22 percent in 2021 [25].

RESEARCH DESIGN

The present study aims to assess the service quality of m-commerce application using the combination of M-S-QUAL and IPA model. To accomplish the objective of the research as well as to exhibit the applicability of the proposed methods, a survey-based case study was conducted in one of the most well-known m-commerce application in Indonesia. The survey was divided into two parts: the first was to assess the service quality performance of the object of the research, and the second was to identify the relative importance of the attributes of the service quality. All statements were measured in a five-point Likert Scale, ranging from 1 (which refers to strongly disagree for performance-type or very unimportant for importance-type statement) to 5 (which is strongly agree for performance-type statement or very important for importance-type).

The service quality of the m-commerce application or the first part of the survey was measured using the M-S-QUAL scale. There are two types of M-S-QUAL which aim to assess the m-commerce shopping experiences, i.e., for virtual products and physical products. Since the present study was conducted to assess the m-commerce application which operates in online tickets purchasing; thus, the second kind of M-S-QUAL was selected. This particular M-S-QUAL scale consists of five dimensions with a total of sixteen item statements (see Table 1 for the detail).

The first dimension is *efficiency* which refers to the ease and speed of accessing and using the application. It means that the application is simple to use, responds quickly, structured properly, and requires minimum information that have to be entered by the users. The second is *fulfillment* which is defined as the degree to which the service provider deals with the troubles related to product availability and order delivery. *Privacy* as the third dimension is defined as the extent to which customers perceive the application to be safe and the degree to which their personal information is being protected. The fourth dimension is *contact*, which refers to the availability of assistance or customer service through telephone or online representative. The last dimension is *responsive*, which refers to assessment of the effectiveness of the service provider to handle the problems and returns it through the mobile application.

The service quality could be measured by multiplying the performance scores with their weights as follows:

$$MQ_j = \frac{\sum_{i=1}^{n}(P_{ij} \,.\, W_{ij})}{n} \tag{1}$$

Where MQ_j refers to the service quality of the m-commerce application of the item statement j; n is the number of the respondents; Pij is the score of the performance of the service quality which has been obtained from an individual I with respect to the item statement j; Wij is the weight of the corresponding item statement j of the individual i. The weight is a standardized form of the importance score that could be calculated as follows:

$$W_{ij} = \frac{I_{ij} - minI_{ij}}{maxI_{ij} - minI_{ij}} \tag{2}$$

where Iij refers to the score of the importance of the item statements j obtained from individual i. The average importance scores for each item statements along with their corresponding performance score were used to establish the IPA diagram. It is a two-dimensional state space where the vertical axis describes the importance while the horizontal axis describes how well the service provider is performing its service.

There are four quadrants in the IPA diagram, i.e., concentrate here, keep up with the good work, low priority, and possible overkill. The lines which divide the diagram into four quadrants are calculated from the average score of the importance and performance. The first quadrant, i.e., concentrate here, is located in the north-west corner. Item statements belong to this quadrant are considered as important but have low performance ratings. They are the priority of the service provider. The second quadrant is keep up with the good work. It indicates that both importance and performance of the item statements are fairly good and should be preserved well. Item statements that are regarded as unimportant and have low performance ratings are located in the third quadrant, i.e., low priority. The last quadrant which is located in the south-east is possibly overkill. There are unnecessary item statements due to having less importance ratings but have good performance. The IPA diagram is shown in Fig.1.

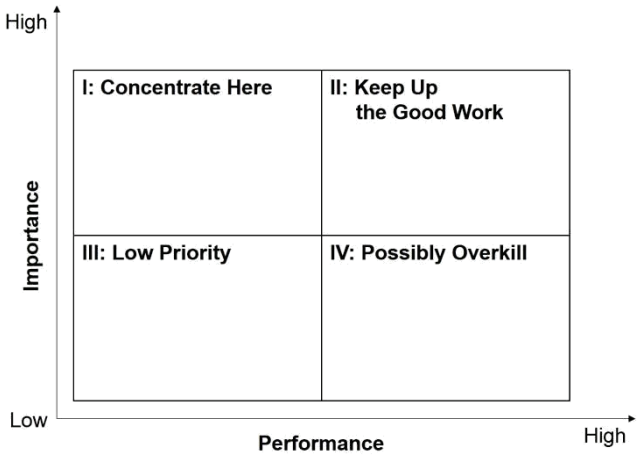

FIGURE 1. IPA Diagram.

CASE STUDY: RESULTS AND DISCUSSION

A case study has been conducted in one of the most popular m-commerce applications in Indonesia. The object of this research is a leading Southeast Asia online travel company that provides a wide range of travel needs in one platform. It offers flights, hotels, trains, attractions and activities, connectivity products, airport transports, and buses. The company has established partnerships with more than 100 domestic and international airlines, serving more than 200,000 routes worldwide. Since its establishment in 2012, the mobile application has been downloaded more than 30 million times, making it the most popular travel booking application in the region.

As many as one hundred and seventy-five respondents were involved in this study. To participate in this study, the respondents must have experiences in doing transaction with the object of the research. They consisted of students, civil servants, employees, etc., indicating plenty of diversity for the purpose of the research. The profile of the respondents is shown in Table 2.

The reliability test with Cronbach's alpha [26] had been conducted to verify if the respondents' answers for any statement tend to relate one and another. The results are shown in Table 3. The results also show all of the dimensions have the value of Cronbach's alpha more than 0.6, indicating that the questionnaire being utilized was reliable [27].

The average values for each item statements were calculated throughout all respondents using (1) and (2). The results are shown in Table 2. respect to each item statement and each section: importance and performance.

TABLE 2. Profile of The Respondents

Variables		Percentage
Age in years:	< 18	1.71
	18-24	64.00
	25-40	23.43
	41-60	10.86
Sex:	Male	41.14
	Female	58.86
Occupation:	Student	63.43
	Civil servant	31.43
	Employee	4.00
	Others	1.14

TABLE 3. Cronbach's Alpha of Each Dimension of M-S-QUAL

Dimensions	Number of Item Statements	Cronbach's Alpha
Efficiency	3	0.786
Fulfillment	3	0.824
Privacy	4	0.769
Contact	3	0.608
Responsive	3	0.763

TABLE 4. Case Study Results

Dimensions		$\frac{\sum_{i=1}^{n} I_{ij}}{n}$	$\frac{\sum_{i=1}^{n} W_{ij}}{n}$	$\frac{\sum_{i=1}^{n} P_{ij}}{n}$	MQ_j
Efficiency	EFF1	4.508	0.877	4.143	3.633
	EFF2	4.480	0.870	4.097	3.564
	EFF3	4.337	0.834	3.811	3.179
Fulfillment	FUL1	4.423	0.856	4.017	3.437
	FUL2	4.503	0.876	4.154	3.638
	FUL3	4.354	0.838	3.989	3.345
Privacy	PRI1	4.514	0.878	3.983	3.499
	PRI2	4.360	0.840	3.983	3.346
	PRI3	4.623	0.906	4.080	3.695
Contact	CON1	4.600	0.900	3.623	3.260
	CON2	4.423	0.855	3.617	3.095
	CON3	4.354	0.8385	3.674	3.081
	CON4	4.463	0.865	3.914	3.388
Responsive	RES1	4.348	0.837	3.617	3.027
	RES2	4.434	0.859	3.669	3.150
	RES3	4.526	0.8815	3.737	3.294
Grand Average		4.453	0.863	3.881	3.352

The dimension of M-S-QUAL with the highest performance average rating was obtained by *fulfillment* with score of 4.053. It means that the object of the research is optimal to deliver the order of the customer as well as to provide information related to item availability. The item statements with the highest average scores of performance for each dimension are as follow: EFF1 for efficiency, FUL2 for fulfillment, PRI3 for privacy, CON4 for contact, and RES3 for responsive. Furthermore, the item statements which have the lowest scores for each dimension were: EFF3 for efficiency, FUL3 for fulfillment, PRI1 and PRI2 for privacy, CON2 for contact, and RES1 for responsive.

In overall, responsive has the lowest performance score among all of the dimensions. It shows that the object of the research has insignificant attention in addressing the problems and returned products.

The dimension of M-S-QUAL with the highest importance average rating is privacy with score of 4.499. It means that the firm must ensure the privacy of the customers while they are doing transaction. The item statements with the highest average scores of importance for each dimension are as follow: EFF1 for efficiency, FUL2 for fulfillment, PRI3 for privacy, CON1 for contact, and RES3 for responsive. The dimension that has the lowest importance score is fulfillment. It seems that the customers do not put a big concern regarding to item availability.

The overall performance of the object of the research was considered good, based on the grand average score which was 3.352 from the maximum score of 5.00. It implies the m-commerce application has many measures to enhance its service performance as a part of continuous improvement. The IPA model then can be utilized to create strategies to achieve customer satisfaction based on the performance and the importance of the item statements from customers' point of view. This model combines both the performance and importance facets on a unique diagram to give a valuable insight through the firm's performance corresponding with its importance. The IPA diagram of M-S-QUAL can be seen in Fig.2 .

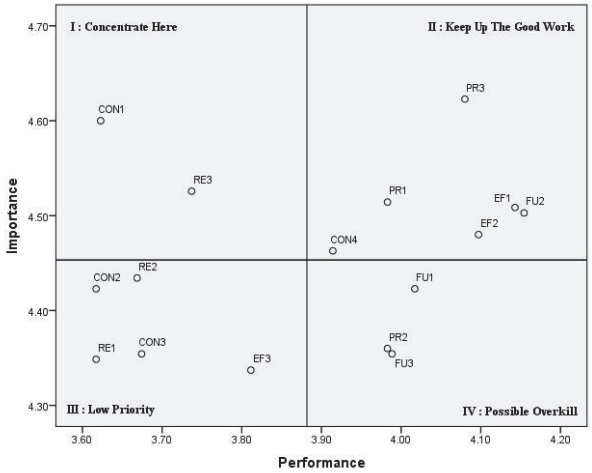

FIGURE 2. Result of the IPA Diagram.

Based on the diagram, only two item statements were classified into the first quadrant, i.e., CON1 and RES3 of contact and responsive dimensions, respectively. It implies that the customers perceived those item statements as important but the object of the research had poor service. This result indicates that the firm must provide friendly service agent or customer service to the customers. The management must also provide more responsive online service and offer a meaningful guarantee for the customers.

The second quadrant, i.e., keep up the good work, contains PRI1 and PRI3 of privacy, EFF1 and EFF2 of efficiency, FUL2 of fulfillment and CON4 of contact. These item statements were considered to have excellent performance and are importantly perceived by the customers. This result indicates that the mobile service is quite efficient and safe. The management has to keep these aspects to improve customer's satisfaction.

The item statements which were classified in the low priority quadrant were RES1 and RES2 for responsive, CON2 and CON3 for contact, and EFF3 for efficiency. This quadrant referred to the item statements that were not satisfactory and they are considered to be less important by the customers. Only one item statement for responsive and one for contact dimensions which were not positioned in this quadrant. It implies the customers do not give big attention in handling return products responsively. In this context, the management should not make a high investment to chase the improvement of the corresponding aspects.

The last quadrant of possible overkill consisted of FUL1 and FUL3 for fulfillment and PRI2 for privacy dimensions. These item statements included in this quadrant had excellent performance but they were not importantly perceived by the respondents. They were deemed as unnecessary activities. It means that the management could reduce the investment in this aspect for avoiding excessive investment.

CONCLUSION

The finding of the present study has demonstrated how to assess the service quality of the m-commerce application using the combination of M-S-QUAL and IPA model. The M-S-QUAL scale is used to measure service

quality performance according to five dimensions that comprise sixteen item statements. The result of the case study shows that the overall service quality performance of the object of the research is slightly good, i.e., 3.352 from the maximum score of 5.00. However, the management should not be proud of this result since there are many aspects for improvement.

To determine attributes that should be improved to gain customer satisfaction, the management can utilize the IPA diagram to identify the attributes that are perceived as important by the customers. The entire attributes have to be improved on a regular basis. It can reduce the excessive investment spent by the management. In overall, the proposed method is relatively easy to be implemented, relatively simple to be interpreted, and also inexpensive to be conducted. It also has many potential benefits for the management as it can gain valuable insight about particular attributes that should be improved according to their performance scores and importance scores derived from the customers' perspective.

For future research, it is recommended to implement a revised version of the IPA model to assess the service quality performance since the existing model is being criticized for several reasons [28]–[31], combine importance-performance and gap analysis [32], or use customer zone of tolerance-based service quality (CZSQ) and CZSQ-based IPA [33], [34]. Comparing the result of this research with those methods is an interesting area to be pursued.

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