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Service Quality Analysis for Online Transportation Services: Case Study of GO-JEK

Shilvia L. Br. Silalahi, Putu W. Handayani, Qorib Munajat*

Faculty of Computer Science, Universitas Indonesia, Depok, 16424, Indonesia

Abstract

This study aims to analyze the service quality of online transportation focusing on the technology aspect. The measurement developed from previous related studies includes three dimensions which are service quality, information quality, and system quality. The research approach is quantitative approach with Entropy technique for data analysis and GO-JEK as case study. The number of respondents for this study is 1,670. The analysis shows that there are 20 criteria that can be used to measure online transportation service quality. From the entropy analysis, each criterion was weighted to rank the quality of the services relatively to each other. It was found that the best three aspects for GO-JEK online transportation services are perceived cognitive, ease of use, and perceived website innovativeness. Meanwhile, the three lowest criteria are compensation, trust and perceived risk.

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1. Introduction

Transportation online is one of the newest service innovation in m-commerce. Online transportation service or ride-sharing is an individual transportation services where a customer can order a ride (car, motorcycle, etc.) through mobile application and the driver can respond the order through the apps (Wallsten, 2015). It provides several benefits such as driver and customer can know each other's location accurately, customer can see the driver and

* Corresponding author. Tel.: +0-000-000-0000 ; fax: +0-000-000-0000 .

E-mail address: qoribmunajat@cs.ui.ac.id

vehicle information, and customer can easily find transportation to commute to other places (time efficiency) (Farin, 2016). These benefits make ride sharing gain popularity among urban people easily.

There are already a number of popular online transportation services in Europe and USA such as Lyft, UberX, Sidecar, and Carpool. Meanwhile in Indonesia, the popular online transportation services are GO-JEK, Grab, Uber, Bajaj App, Transjek, Wheel Line, Bangjek, Ojek Syar'I, and Blue-Jek (Okezone.com, 2015). Among those, GO-JEK, Grab, and Uber are the ones who hold the largest markets share and tightly competing to each other (Pratama, 2016). With the rising awareness of online transportation services in Indonesia, the company who runs the services need to improve its service quality so that they can improve the services and gain competitive advantage over others.

Service quality is an important aspect in m-commerce (Salameh & Hassan, 2015) that can determine customer behavior, satisfaction, and intention to use certain product/service (Bolton & Drew, 1991; Parasuraman et al., 1988; Parasuraman et al., 1994). It is argued that service quality provides long-term success and can be competitive advantage (Caro & Garcia, 2007). Therefore, it is important to assess and measure the service quality especially services provided in m-commerce environment (Huang et al., 2015).

There are several studies conducting research on m-commerce service quality topics such as studies done by Huang et al. (2005), Lu et al. (2009), Stiakakis and Georgiadis (2011), and Salameh and Hassan (2015). Huang et al. (2005), in his study, developed a scale to assess mobile service quality for virtual and physical products named as M-S-QUAL. The study proposed a model with nine (9) dimensions which are *efficiency*, *system availability*, *content*, *privacy*, *fulfilment*, *responsiveness*, *compensation*, *contact*, dan *billing* (Huang et al., 2005). The research method used is questionnaire surveys and used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to analyze the data. Meanwhile, Lu et al. (2009) and Stiakakis and Georgiadis (2011) proposed different set of measurement dimension which are *interaction quality*, *environment quality*, and *outcome quality*. Each dimension is broken-down into sub-dimension and criteria which each study has similarities and differences in defining the criteria. The study conducted by Lu et al. (2009) proposed a multidimensional and hierarchical model to measure mobile brokerage service quality and then test it. This research method was qualitative approach by collecting 338 data. Stiakakis and Georgiadis (2011) study aims to identify the sub-dimensions of mobile service quality and to verify the right sub-dimensions. Another study in m-commerce service quality was conducted by Salameh and Hasan (2015) who proposed a model to measure mobile service quality and identify the relationship between service quality, customer satisfaction, and behavioral intention. This research collected 660 usable questionnaires and the questionnaires were processed by using correlation analysis. The model proposed by Salameh and Hasan (2015) consists of three dimensions which are service quality, information quality, and systems quality. The model was developed to improve SERVQUAL scale.

The current measurement model in the existing studies was developed in general m-commerce perspectives and there is still few research specifically addressing online transportation service quality. Online transportation services have unique characteristics among other m-commerce services in term of the nature of its services. It has distinct services process, involves inseparable physical services (i.e. drivers, vehicle, etc.) and the user's tendency to use the services repeatedly. Therefore it is important to study online transportation services. This study aims to develop a measurement model based on the existing studies and use it to measure online transportation service quality in Indonesia. For that purpose, GO-JEK is selected as the case study of online transportation services to show how the model is used to measure the service quality. GO-JEK is chosen as the case study because GO-JEK has the largest number of users among other online transportation services in Indonesia.

2. Theoretical Background

2.1. Online Transportation Services

Online transportation services are already well-known and well accepted in developed countries such as USA and Europe countries. In Indonesia, this type of service is now getting popular and many international companies were already started to expand their market in Indonesia. However, what is exactly online transportation service? Some studies use the term ride sharing to define online transportation services. It is called ride sharing due to the cars/vehicle used is owned by individual (private cars) which is then 'shared' with other (the customer) when delivering the services (Wallsten, 2015). Watanabe et al. (2016) explained that ride sharing is an on-demand

services connecting passengers and vehicle owners (drivers) in real time using mobile technology. Online transportation service or ride sharing is now becoming a common means for people to fulfill their commuting needs.

Online transportation service is a part of m-commerce services which is defined as transaction performed in mobile networks. In m-commerce, customers or users can put order of products or services through internet without using PC (personal computer) (Clarke III, 2001). As the technology of mobile phone is getting more advanced, more people are using m-commerce and consequently more commercial services are provided by business people. Mobile commerce is attractive due to its unique characteristics. Clarke and Flaherty (2003) defines three characteristics of m-commerce which are ubiquity, convenience, localization and personalization. Xiaojun et al. (2004) add one more characteristic, which is accessibility, due to its power to be accessed anywhere, anytime. These characteristics apply to online transportation service as well which is one of varieties of m-commerce products. With its uniqueness, it is important to study the quality of service of online transportation.

2.2. Online Transportation Services in Indonesia

In Indonesia, the hype of online transportation was started when GO-JEK was founded in 2010. GO-JEK began with 20 drivers and now they already have more than 200 thousand drivers in several big cities in Indonesia. The application for GO-JEK was launched in early 2015 and now being continuously upgraded. In 2014, Uber entered Indonesia market and followed by Grab in 2015. Those three are now the top three of online transportation services in Indonesia. However, GO-JEK is leading with the largest number of users and drivers in many cities in Indonesia.

2.3. Service Quality

Service quality has been an important issue in e-commerce domain. Service quality, along with information quality and system quality, are included in updated DeLone & McLean IS Success Model to measure e-commerce success (DeLone & McLean, 2004). There are two perspectives in defining service quality (Caro & Garcia, 2006). The first perspective stated that service quality is the comparison between customer expectation and customer perception towards experienced services (Caro & Garcia, 2006). The second perspective argued that service quality is only measured by what customer perceived. Based on the first perspective, Parasuraman et al. (1998) developed SERVQUAL scale which became one of the most influencing research in service quality (Salameh & Hassan, 2015). Awasthi et al. (2011) explained that there are five (5) service quality dimensions in SERVQUAL which are Tangibles, Reliability, Responsiveness, Assurance, and Empathy. Parasuraman et al. (2005) then developed E-S-QUAL to measure electronic service (e-service) quality delivered through website. E-S-QUAL also covers technical aspect such as efficiency, fulfillment, system availability, ease of use, speed of browsing, privacy, and security issues. In mobile aspects, Huang et al. (2015) developed another measurement model specifically for mobile services. Another study in mobile services is from Choi et al. (2007) who explained six factors namely network, device, contents, security, convenience, and customer support. Meanwhile, Lim et al. (2006) identified 8 dimensions which are pricing plans, network quality, data services, messaging services, entertainment services, locator services, billing system, and customer service. Van der Kar et al. (2006) developed five (5) dimensions based on SERVQUAL to measure mobile service quality; they are reliability, responsiveness, user interface, trust, and customization.

There are several other studies discussed the measurement of mobile service quality focusing in different aspect of quality. This study focuses on the development on measurement model on the technological aspect. The criteria are identified based on several previous studies. The main referred studies are from Salameh and Hasan (2015), Huang et al. (2015), Lu et al. (2009), and Stiakakis and Georgiadis (2011). The dimensions are based on Salameh and Hassan (2015) which are service quality, information quality, and system quality. Meanwhile, the criteria for each dimensions were derived by aggregating and combining criteria identified by Huang et al. (2015), Lu et al. (2009), and Stiakakis and Georgiadis (2011). Table 1 contains the result of the model development.

Table 1. Dimensions and Criteria to Measure Online Transportation Services Quality on Technological Aspect.

Service Dimensions	Service Criteria	Referred Studies
Service Quality	Website Design	Salameh and Hassan (2015)
	Reliability/Fulfillment	Salameh and Hassan (2015)
	Responsiveness	Salameh and Hassan (2015)
	Trust	Salameh and Hassan (2015)
	Personalization	Salameh and Hassan (2015)
	Perceived Risk	Salameh and Hassan (2015)
	Perceived Cognitive	Salameh and Hassan (2015)
	Privacy	Huang et al. (2015)
	Compensation	Huang et al. (2015)
	Contact	Huang et al. (2015)
Information Quality	Billing	Huang et al. (2015)
	Punctuality	Huang et al. (2015)
	Valence	Lu et al. (2009), Stiakakis and Georgiadis (2011)
	Content Usefulness	Salameh and Hassan (2015)
System Quality	Content Adequacy	Salameh and Hassan (2015)
	Ease of Use	Salameh and Hassan (2015)
	Accessibility	Salameh and Hassan (2015)
	Interactivity	Salameh and Hassan (2015)
	Perceived Website Innovativeness	Salameh and Hassan (2015)
	System Availability	Huang et al. (2015)

3. Research Methodology

Research methodology defines how the research is conducted including the research process and approach. As for the process, there are several steps in this study which is initiated by problem statement and ended by conclusion formulation. The following figure is the steps for this study.

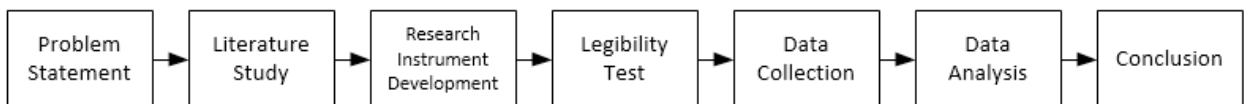


Fig. 1. Research Process

Table 2. Example of Statement in Questionnaire

Criterion	Statement
Ease of Use	Online transportation application is easy to use
Accessibility	Online transportation application can be accessed fast
Interactivity	Online transportation application enable interaction among service provider, customer, and other customers.

This study used quantitative approach and the data collection was conducted by using survey distributed through various media such as social networks, chat groups, and internet. Online survey is chosen because it can be easily distributed, have wide reach, and relatively costless. In the questionnaire, there are two parts of question. The first

part is a question about respondent demographics. The second part contains statements that represents the criteria to be analyzed. Therefore, each criterion is represented in one statement and respondent will rate the statement in Likert scale. There are five scale as follows: 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree. Table 2 shows the example of statement.

As for data analysis, entropy technique is used. Entropy is a technique to process quantitative data by assigning weight to each criterion. This technique was selected because it can rank the aspect of measurement to identify which was the best or worst quality measured. According to Hsu and Hsu (2008) in Handayani et al. (2014), the processes for Entropy analysis are as follows:

1. Normalize data collected by subtracting all the score with the highest score among all the criteria
2. The normalized score is divided by the sum of all score. The formula for this step is (1). In formula (1), $m > 1$, $i = 1, \dots, n$; $j = 1, \dots, m$, where n is the sum of determinants and m is the number of criteria
3. Calculate the Entropy score, dispersion, and weight for each criterion from step 2. The formula used is (2). Meanwhile, the dispersion for each criterion is calculated using the formula (3). Finally, weight for each criterion is calculated using formula (4).

$$a_{ij} = \frac{k_{ij}}{\sum_{i=1}^m \sum_{j=1}^n k_{ij}} \quad (1)$$

$$E_j = \left[\frac{-1}{\ln(n)} \right] \sum_{j=1}^n [a_{ij} \ln(a_{ij})] \quad (2)$$

$$D_i = 1 - E_i \quad (3)$$

$$w_i = \frac{D_i}{\sum D_i} \quad (4)$$

The result from entropy analysis is then analyzed and presented. Entropy analysis can rank by assigning weight for each score relative to other scores and the total weight for all criteria should be 1. To test the reliability and validity of the data, we first checked the data with the same number/email. Redundant data will be deleted. Then, we checked and deleted the outlier data.

4. Result and Analysis

4.1. Respondents Demographic

The respondents for this study is Indonesian people who has experiences in using GO-JEK online transportation application. The survey is distributed widely without any restrictions on age, occupation, location, or gender. Data collection was conducted from 12 March 2017 until 12 April 2017. The number of respondents is 857 which is dominated by female. Table 3 comprises the demographic data of respondents.

The result showed that most of respondents are living in Jabodetabek which is a metropolitan and urban city area. In urban areas, mobility is very important (Benevolo, Dameri, & D'Auria, 2016) and it drives the need for public transportation (Utari & Sharif, 2016). Therefore, online transportation services are popular in Jabodetabek since it accommodates the needs for commuting in urban areas. In addition, the respondents are dominated by female due to the tendencies of female not driving motorcycle or car in Indonesia; therefore, female uses public transportation more frequently than man. Duchène (2011) also stated that the number of female having private vehicle is less than male. Meanwhile, they tend to have more trips such as going to store, beauty shop, picking up their children, etc. These became the factors causing the number of online transportation service female users is significantly more than male.

As for ages, the number of users who ages 20-30 years old is significantly more than other age category. One of the factors influencing the phenomenon is that people within those age range (millennials generation) is easier to adapt to technological development, one of which is online transportation service (Dutzik, Inglis, & Baxandall, 2014). From education category, we can see from the result that there are a lot of users from Elementary/Junior High

School/Senior High School category (54,84%) followed by Bachelor Degree category (36.17%). This result is different with Vugo (2017) study where he found that 53,9% of ride-share users have Bachelor degree. It might be caused by the different of users' demographic in Indonesia. Other demographic result shows that there are a lot of student using online transportation services and more than half of respondents (62.19%) are frequent user of online transportation services.

Table 3. Demographic Respondents

	Demographic Variable	Number	Percentage
Address/ Residence	Jakarta, Bogor, Depok, Tangerang, Bekasi (Jabodetabek)	686	80.05%
	Java island (exclude Jabodetabek)	102	11.90%
	Others	69	8.05%
Gender	Male	218	25.03%
	Female	639	74.56%
Age	<20 years old	222	25.90%
	20-30 years old	628	73.28%
	31-40 years old	7	0.82%
	>40 years old	0	0.00%
Education	Elementary School/Junior High School/Senior High School	470	54.84%
	Diploma	66	7.70%
	Bachelor Degree	310	36.17%
	Master Degree	11	1.28%
	Doctoral Degree	0	0.00%
	Student	653	76.20%
Occupation	Public Service Officer / Government Officer	10	1.17%
	Private Sector Employee	134	15.64%
	Entrepreneur	17	1.98%
	Not working	21	2.45%
	Others	22	2.57%
Online Transportation Service Usage Frequency	1-5 kali	157	18.32%
	6-10 kali	167	19.49%
	>10 kali	533	62.19%

4.2. Service Quality Assessment Result

Data analysis is performed by weighting each criterion using Entropy technique. The higher the weight indicates better service quality perceived by users. The result of Entropy analysis is presented in Table 4 and 5.

The highest-weighted criterion in the online transport service quality analysis is perceived cognitive. Perceived cognitive shows how the flow in the online transportation application matches the understanding of the user (e.g. when the user orders an online transport service, the user will get an approximate distance and price). Cognitive belongs to perceived control dimensions that requires a person to predict the probability of a plot of an event and the implications (Ajzen, 1991). Ajzen (1991) also argued that this control is very important among all dimensions of perceived control. This control can reduce uncertainty (Imada & Nageishi, 1982) and increase the value of service perceived by users (Bateson, 1985). With perceived cognitive having the highest weight, it indicates that service quality in this criterion is the best compared to other criteria.

Table 4. Entropy Analysis Result

Rank	Criterion	Weight	Rank	Criterion	Weight
1	<i>Perceived Cognitive</i>	0.051645	11	<i>Responsiveness</i>	0.050179
2	<i>Perceived Website Innovativeness</i>	0.051568	12	<i>Personalization</i>	0.050072
3	<i>Ease of Use</i>	0.05154	13	<i>Punctuality</i>	0.04993
4	<i>Billing</i>	0.051183	14	<i>Content Adequacy</i>	0.049721
5	<i>Valence</i>	0.050894	15	<i>System Availability</i>	0.049531
6	<i>Accessibility</i>	0.050756	16	<i>Privacy</i>	0.049066
7	<i>Reliability/Fulfillment</i>	0.050612	17	<i>Interactivity</i>	0.048902
8	<i>Website design</i>	0.050357	18	<i>Compensation</i>	0.048877
9	<i>Contact</i>	0.050329	19	<i>Trust</i>	0.047674
10	<i>Content Usefulness</i>	0.050314	20	<i>Perceived Risk</i>	0.046849

Table 5. Summary Entropy Analysis Result

Dimension	Highest Weight	Lowest Weight
Service Quality	<i>Perceived cognitive</i>	<i>Perceived risk</i>
Information Quality	<i>Content usefulness</i>	<i>Content adequacy</i>
System Quality	<i>Ease of use</i>	<i>Interactivity</i>

In information quality dimension, the highest weighted criterion is content usefulness. Content usefulness means that the information provided is trusted, useful, up-to-date, and accurate. Usefulness is related to the relevancy and clarity of the information. Up-to-date means that information is constantly updated and accurate means the information system is error free (Salameh & Hassan, 2015). It is important to have services with high content usefulness. Users perceived that GO-JEK already have decent content usefulness; however, it should be noted that in overall comparison, content usefulness is ranked ten (10).

In system quality dimension, ease of use has the highest weight among others. According to Zeithaml et al. (2002), transactions made in internet appears to be more complex and intimidating to customers. Therefore, ease of use is considered an important thing. Costabile et al. (2005) argued that the use of systems in the m-commerce environment will increase if the system is easy to use in meeting customer needs and providing support services. This shows that ease of use has an important role in determining the quality of service perceived by customers (Costabile et al., 2005). Respondents perceived that GO-JEK is easy to use. One of the factor is that the user interface is continuously improved by GO-JEK to meet user's expectation.

Meanwhile, perceived risks, content adequacy, and interactivity are the three lowest weighted criteria in each respectful dimension. In overall ranking, compensation, trust, and perceived risk fell in the three-bottom rank. This result can be used by GO-JEK to identify which aspect of service quality they are still lacking. According to this result, trust and perceived risks are still an issue in online transportation services in Indonesia.

5. Implications and Future Works

This study contributes to m-service quality domain by identifying criteria to assess the service quality of online transportation services in technology perspectives. The criteria are based on previous studies in service quality. This study also shows how the criteria can be used to measure the service quality of online transportation services by using entropy analysis. The practical implication of this study is that the online transportation service providers can evaluate the service quality in technological perspectives using the criteria derived from this study. This will help the online transportation services to improve their quality of service. This study has established the foundation to develop online transportation service quality models. However, it is still not empirically validated. Therefore, future works are required to validate the identified criteria empirically by survey or expert judgment.

6. Conclusions

This study was conducted to analyze the services quality of online transportation and take GO-JEK as the object of case study. This study uses quantitative approach by distributing online questionnaires to respondents who have been using online transportation service in the last three months. Based on literature study, we identified 20 criteria that can be used to measure online transportation service quality. The 20 criteria were then used to evaluate GOJEK service quality by employing entropy analysis. From the entropy analysis, each criterion was weighted to rank the quality of the services relatively to each other. For GO-JEK, the order of the criterion from the highest weight are (1) perceived cognitive, (2) perceived website innovativeness, (3) ease of use, (4) billing, (5) valence, (6) accessibility, (7) reliability/fulfillment, (8) website design, (9) contact, (10) content usefulness, (11) responsiveness, (12) personalization, (13) punctuality, (14) content adequacy, (15) system availability, (16) privacy, (17) interactivity, (18) compensation, (19) trust, and (20) perceived risk. The result of analysis can be used by company to determine which aspect are still lacking and need to be improved.

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