SOA Implementation of E-Banking Unified Bill Payment in Measuring Customer Satisfaction on XYZ Bank

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Abstract: *A rapid market growth has forced banking industry to study a new technological development, in order to make sure IS/IT strategies that has been implemented are align with the existing business goal. XYZ Bank is one of the reputable banks in Indonesia and has several trusted services that can be used by many customers. Payment mechanism that is offered by XYZ Bank is not only from internet banking, but it also has another payment mechanism, which was called Unified Bill Payment (UBP). In this case, Service Oriented Architecture (SOA) allows UBP to integrate with various platforms, operating systems, or technologies. So it can operates well with the corresponding procedures that want to be achieved.*

Keywords: SOA, UBP, E-Banking, Customer Satisfaction

1. Introduction

A. Background
Banking industry is one of the business fields that has high level of competition. By giving better services for prospective customers and customers, it will affect the bank improvement. Rapid growth of market competition has forced customer to demand banking industry to know every existing technological environment, to make sure IS/IT strategy that has been implemented are align with the existing business goal.

XYZ Bank is one of reputable banks, and it has trusted services which is used by many customers. Various kind of services are offered by XYZ Bank, and now the bank is also offering the ease of payment mechanism. One of the payment method which was provided by XYZ Bank is Mandiri Click Pay, which use internet banking process. XYZ Bank doesn't only provides internet banking, but it also has another payment system, which is called Unified Bill payment (UBP). UBP is a future payment activity for several corporates, such as Telkom, PLN, TV Bills, etc. This activity requires an e-banking, such as mobile banking or internet banking.

In this case, SOA allows UBP to integrate with various kind of platforms, operating systems, or technologies, so it can run well and fit with the corresponding procedures that want to be achieved. So it can gives more trust and a better services to customers. This paper will answer a question about, Does Unified Bill Payment which is one of the services intended by XYZ Bank has succeeded in giving customers satisfaction to XYZ Banks's customers?

B. Problem Statement
As previously explained, customer satisfaction is highly upheld for measuring the success achievement of SOA-based UBP e-banking services. Service quality has several factors that can be a benchmark for measuring success in banking industry. In this case, UBP success will be measured with customer satisfaction in XYZ Bank.

So the research question in this paper is: Does service quality factors in SOA based UBP e-banking affects customer satisfaction in XYZ Bank?

C. Purpose
Based on the introduction and problem statement that has been described above, the purpose of this research is to analyze and get the results of whether UBP e-banking customers are satisfied with UBP system. This system contains SOA which become the architecture system foundation which integrates between business and system.

D. Benefits
The result of this paper are expected to be bring several benefits:
1) **Theoretical Benefits**
As a reference material for future research in the field of e-Banking service quality, which SOA becomes an architecture for existing systems in the future. As well as an additional material in the marketing field based on existing applications in reality.

2) **Practical Benefits**
It can be used as a source of information for banks in an effort to improve core banking service quality using the implementation of SOA. In this case, SOA will act as an architecture to integrate business services in order to achieve customer satisfaction, which is a point of success in the banking industry.

2. Literature Review

A. E-Banking (Electronic Banking)
Clarke (2009) stated that e-banking is a provision of banking services in the retail and small scale sectors through electronic channel.

The complexity of industrial competition forces every company to focus on customer desires and satisfaction. Relationship between the company and the customer is very

important, not only concerning increasing sales and sales reputation, but also concerning long-term guidance. E-banking channel includes; ATM, phone banking, internet banking, SMS banking.

B. UBP (Unified Bill Payment)
Unified Bill Payment has the same meaning as Automatic Bill Payment, where transferring money are scheduled on the specified date to pay recurring bills. UBP e-banking system has been implemented in XYZ Bank. It allows customers to do several online payment activities. And it facilitates them to make a payment for certain agencies. UBP in XYZ Bank works together with certain agencies, such as PLN, Telkom, TV bills, and so on.

C. SOA (Services Oriented Architecture)
Service Oriented Architecture (SOA) is a set of services. Service within the scope of SOA include a set of functions, procedures, or processes that will respond to a client's request and bring it to the server. Service is a unit of work done by the service provider to achieve desired end result of customer service.

D. Service Quality
Nasution (2004: 47) states, service quality is an effort to meet the needs and desires of customers, as well as the provision to meet customer expectations. The main point of service quality is to show all forms of service actualization activities that satisfy those who receive services in accordance with responsiveness (responsivenss), foster assurance (assurance), physical evidence (tangible) that can be seen, according to (empathy) from people who provide reliability-based services carry out the duties of service that are consequently given to satisfy those who receive service.

E. Customer Satisfaction
Satisfaction is a situation where people can feel happy or disappointed which appears after comparing their perception with performance, or a real product with their expectation. (Kotler, 2002: 42). So the satisfaction level of customer act as a function to differentiate between perceived performance and expectations. If performance is below expectations, customers will be disappointed. In the other side, if the performance is in line with expectations, customers will be satisfied. Satisfied customers will be loyal for a long period, less sensitive to prices and give good comments on company performance.

3. Research Methodology

A. Theoretical Framework
In this case UBP that can be accessed from anywhere is the result of SOA implementation, it integrates various sources of information from different source code or platforms. This research was conducted on the customer, to find out whether the customer feel satisfied by using UBP. In this case, satisfaction analysis will be carried out on the use of SOA-based UBP e-Banking. Measurement of the factors of service quality based on Christopher Lovelock, in the form of; Tangible, Reliability, Responsiveness, Assurance, and Empathy.
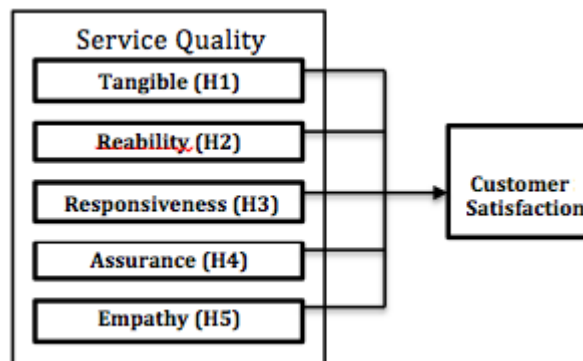

Figure 1: Measurement of The factors of Service Quality

B. Variable Measurement
Calculation method that are used on likert scale is done by giving some statements to respondents, and they give feedback in answers. Data collected from the questionnaire will be measured with a counting weight of 1 to 5, as follows:

Table 1: Likert Scale

No.	Initial	Description	Value
1	SS	Strongly Agree	5
2.	S	Agree	4
3.	N	Neutral	3
4.	TS	Disagree	2
5.	STS	Strongly Disagree	1

Below is the operational table which describe the variables and its indicators.

Table 2: Operational Variables

Variable	Indicator (Statement)
1.*Tangible* (**XI**)	X1.1. Modern e-Banking facilities. X1.2. Visually attractive e-Banking facilities. X1.3. Accessible in various places.
2. *Reliability* (**X2**)	X2.1 Data accuracy. X2.2 Transactions are fast and reliable. X2.3 Minimum transaction error.
3. *Responsiveness* / Daya Tanggap (**X3**)	X3.1. Can be used from anytime and anywhere. X3.2. Connect quickly. X3.3. Informative and easy to use.
4. *Assurance*/ (**X4**)	X4.1. It's easier to make e-Banking payments. X4.2. Feel safe / trust in each use. X4.3. Get clear proof of payment .
5. *Empathy* (**X5**)	X5.1. To understand and facilitate customer needs. X5.2. Ease of system accuracy. X5.3. No limitation of operating hours.
6. *Customer Satisfaction*/ (**Y**)	Y1. Feel the overall satisfaction of Mandiri UBP e-Banking system service. Y2. Recommend to other parties to use the UBP Mandiri e-Banking system. Y3. Have an intention to always make future payments using the UBP Mandiri e-Banking system.

C. Data Collection and Measurement

In this research, data gathered are divided into primary and secondary data. Primary data are obtained from observation, interview, and questionnaire.

And Total sample will be get based on Slovin formula; the expected level of trust (Za) is 95% (or the actual level is (5%), so z = 1.96. Then the proportion variance (p) is 50% = 0.5 and the margin of error (e) will be taken ie 10% = 0.1. Through the calculations for the components described above, the number of samples (n) is obtained, which is equal to 96.04 rounded up to 100 samples.

D. Data Analysis

1) Validity and Reliability Test (Outer Model)

Data is considered as valid if it tightly and accurately measured. Validity test was done to know the instrument (questionnaire) which was used are really capable to measure the variables. And reliability test is useful for determining whether an instrument in the questionnaire can be used more than once, at least by the same respondent.

2) Hypothesis Testing (Inner Model)

Statistically use regression; Satisfaction(Y) as the dependent variable and service quality factors(X) as independent variables, with the following functional relationships:

$$Y = α + β1X1 + β2X2 + β3X3 + β4X4 + β5X5 + Ɛ \ .... \ (1)$$

Data processing will be done using statistical tools which is called SmartPLS. It was used to do a t Test. From regretion model (**1**), statistical hypothesis can be tested, as mentioned below:

1. Tangible Variable
   Ho : $β1 = 0$
   H1 : $β1 ≠ 0$
2. Reliability Variable
   Ho : $β2 = 0$
   H1 : $β2 ≠ 0$
3. Responsiveness Variable
   Ho : $β3 = 0$
   H1 : $β3 ≠ 0$
4. Assurance Variable
   Ho : $β4 = 0$
   H1 : $β4 ≠ 0$
5. Empathy Variable
   Ho : $β5 = 0$
   H1 : $β5 ≠ 0$

4. Result and Analysis

A. Research Object

From a total of 130 questionnaires distributed and sent, 100 questionnaires were filled out and returned.

Table 3: Research Objects

Category	Total	Percentage
Gender:		
Male	54	54%
Female	46	46%
Age:		
<20	7	7%
20-30	37	37%
30-40	27	27%
>40	29	29%
Occupation:		
Student	19	19%
Government Employee	20	20%
Private Employee	24	24%
Entrepreneur	15	15%
Others	22	22%
Total Sample	100	100%

Based on the table above, it is known that there are more male respondents than women. The number of male respondents is 54 people (54%) and women is 46 people (46%). Most of the respondents were come from 20 to 30 years old, their amount are 37 people (37%). 29 people (29%) are respondents over 40 years old. 27 people (27%) are respondents between 30 and 40 years old. And respondents who are less than 20 years old are 7 people (7%).

By the type of occupation, Private Employees respondents had the highest percentage of 24 people (24%). While the number of respondents who have other jobs, such as State Employees are 20 people (20%). Respondents who work as an Entrepreneur are as many as 15 people (15%). Respondents who are students are 19 people (19%), and respondents with other jobs there are 22 people (22%).

B. Data Analysis

Path Diagram were made to process the data to evaluate Outer model and Inner model in a research model using analytical tools which is called SmartPLS.
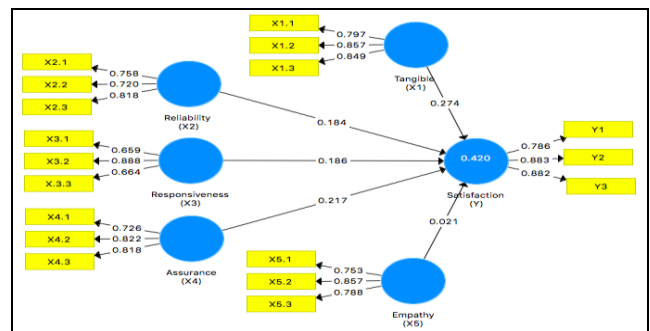

Figure 2: Path Diagram from SmartPLS

C. Validity and Reliability Test

1) Validity Test

In this research, validity test will be observed with *Convergent Validity*. *Convergent Validity* is capable to measure the validity of reflexive indicators as variable measurement that can be seen from each Outer Loading variables indicators. According to Chin, 1998 (in Ghozali, 2006), the initial research phase of developing scale measurement, the loading values from 0.5 to 0.6 were considered sufficient. In this study, the loading factor limit of 0.60 will be used.

Table 4: Validity Test Result

Variable	Item	*Outer Loading*	Notes
Tangible	X.1.1	0.797	*Valid*
	X.1.2	0.857	*Valid*
	X.1.3	0.849	*Valid*
Reliability	X.2.1	0.758	*Valid*

	X.2.2	0.72	*Valid*
	X.2.3	0.818	*Valid*
	X.3.1	0.659	*Valid*
	X.3.2	0.888	*Valid*
Responsiveness	X.3.3	0.664	*Valid*
	X.4.1	0.726	*Valid*
	X.4.2	0.822	*Valid*
Assurance	X.4.3	0.818	*Valid*
	X.5.1	0.753	*Valid*
	X.5.2	0.857	*Valid*
Empathy	X.5.3	0.788	*Valid*
	X.6.1	0.786	*Valid*
Customer	X.6.2	0.883	*Valid*
Satsfaction	X.6.3	0.882	*Valid*

2) Reliability Test

Reliability Test is a set of measurement or measurement tools which has a great consistency if the tools was reused. An instrument is considered as reliable if it has Cronbach Alpha coefficient getting closer or equal to 0.6, the higher of coefficient of reability (Nunnally, 1967, dalam Imam Ghozali, (2007:42).

Table 5: Reliability Test Result

Variable	*Cronbachs Alpha*	Notes
Tangible	0.784	*Reliable*
Reliability/	0.655	*Reliable*
Responsiveness	0.617	*Reliable*
Assurance	0.697	*Reliable*
Empathy	0.718	*Reliable*
Customer Satsfaction	0.808	*Reliable*

D. Hypothesis Testing

Based on research has been done on research problems: Are UBP e-banking service quality factors based on SOA influencing customer satisfaction in UBP e-banking Bank XYZ users? Hypothesis Testing based on the values found in the structural model analysis, the significance level of the path coefficient is obtained -t value.the value limit of hypothesis testing in this study is -t value. The value limit of hypothesis testing in this study is;

- t-*statistic value* > 1.965.
- p-*value* < 0.05.

In the PLS statistical test of each hypothesized relationship is carried out using simulation.IN this case the bootstrap method is performed on the sample.The result of testing with bootstrapping (on the path coefficient) of the PLS analsysis are :

Table 6: Bootstarpping Test Result

	T *Statistics*	P *Values*
Tangible -> Satisfaction	2.773	0.006
Reliabilit-> Satisfaction	2.193	0.029
Responsiveness-> Satisfaction	2.124	0.034
Assurance-> Satisfaction	2.031	0.043
Empathy -> Satisfaction	0.240	0.810

1) Hypothesis Testing 1 (Tangible has significant effects on customer satisfaction)

Hypothesis 2 in this study is tangible or direct evidence has a positive effect on customer satisfaction, so that the higher tangible or direct evidence, the higher customer satisfaction.Testing Hypothesis 1 produces p-value of 0.006 and t statistic of 2.773. This shows the results that meet the requirements, namely the value of the t statistic above 1.96 and the p-value below 0.05, it can be concluded that Hypothesis 1 in this study is acceptable.

2) Hypothesis Testing 2 (Reliability has significant effect on customer satisfaction)

Hypothesis 2 in this study is Reability or Reliability has a positive effect on Customer Satisfaction, so that the higher the Reability or Reliability, the higher Customer Satisfaction. Testing Hypothesis 2 produces p-value of 0.029 and t statistic of 2.193. This shows the results that meet the requirements, namely the value of the t statistic above 1.96 and the p-value below 0.05, it can be concluded that Hypothesis 1 in this study is acceptable.

3) Hypothesis Testing 3 (Responsiveness has significant effect on customer satisfaction)

Hypothesis 2 in this study is Responsiveness has a positive effect on Customer Satisfaction, so the higher the Responsiveness or Response, the higher Customer Satisfaction. Testing Hypothesis 3 produces p-value of 0.810 and t statistic of 2.124. This shows the results that meet the requirements, namely the value of the t statistic above 1.96 and the p-value below 0.05, it can be concluded that Hypothesis 3 in this study is acceptable.

4) Hypothesis Testing 4 (Assurance has significant effect on customer satisfaction)

Hypothesis 2 in this study is Assurance or Guarantee has a positive effect on Customer Satisfaction, so the higher Assurance or Guarantee, the higher Customer Satisfaction. Testing Hypothesis 4 produces p-value of 0.043 and t statistic of 2.031. This shows the results that meet the requirements, namely the value of the t statistic above 1.96 and the p-value below 0.05, it can be concluded that Hypothesis 4 in this study is acceptable.

5) Hypothesis Testing 5 (Empathy has significant effect on customer satisfaction)

The results of testing Hypothesis 5 show that Empathy or Empathy relationships show a p-value of 0.810 with a t value of 0.240. The result of t statistic is not greater than 1,965, therefore Empathy or Empathy is not significant to Customer Satisfaction, which means it is not in accordance with Hypothesis 5 where; Empathy or Empathy has a significant effect on Customer Satisfaction, it can be concluded that Hypothesis 5 in this study was rejected.

Based on the results of this study, the rejection of Hypothesis 5 indeed contradicts one of the research journals that was the reference in this study. The research journal by Lahdhari & Morales (2011) states that "Empathy is the most important predictor for both satisfaction and loyalty" has conflicting results because Empathy is not significant towards Customer Satisfaction. Though as Empathy is supposed to be a form as a Bank gives sufficient attention and care to understand customer needs, and ultimately the customer will feel satisfaction Yavas et al. (1997). This shows that there is a lack of attention or concern from the XYZ Bank, namely; UBP e-Banking system, so that customers do not feel satisfied with

the Empathy factor of the UBP e-Banking system at Bank XYZ. This can be a concern for Bank XYZ to increase awareness and attention to customer needs in the use of UBA's e-Banking system based on SOA.

5. Conclusion

Based on partial analysis, the result of this research found that only four independent variable that is Tangible, Reability, Responsiveness, Assurance, has a positive effect on dependent variable that is customer satisfaction.

It means that, the independent variable are considered important when it comes to serving customers in the bank. And according to customers, Emphaty has a negative effect. The Emphaty variable needs to be improved because it cannot yet serve customers. If it has not been improved, then the quality of Emphaty given to customers has no effect.

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