

New Solutions for Instant Payment Problems in Indonesia

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Abstract— Instant payment is a growing payment method in e-commerce in Indonesia. These service providers are generally national banks. Technically instant payment services are web services or APIs provided by the Bank to access e-commerce applications belong to a merchant or marketplace when the buyer wants to make a payment. A problem sometimes arises when the payment transaction is done at the payment gateway but did not succeed in the transaction status update section e-commerce applications. One of the causes of this failure is the internet connection is not stable. This condition causes the customer to the bank account balance is reduced but the purchase transaction in the status of unpaid. Methods of research conducted through three stages of data collection and analysis, schematic design solutions, and evaluation. In the interview we found that 4 out of 10 people we interviewed using the instant payment has experienced such failures, to improve the condition necessary mechanisms troublesome and takes a long time. This paper proposes a payment scheme with an additional mechanism to resolve the issue. The results showed that the scheme proposed in this study has a good performance in overcoming the problem of instant payment.

Keywords— e-commerce; instant payment; internet banking; e-payment scheme

I. INTRODUCTION

E-commerce in Indonesia has grown rapidly. This becomes an opportunity for the company to increase its sales through the internet [1]. Just like how e-commerce grew rapidly, the development of mobile devices is grown rapidly too, in the last decade many emerging Smartphone device influence the increase in mobile usage. This event triggers the development of innovative, intelligent, and interactive applications [2]. The development of information technology sector has influenced the lifestyle in trading activities such as electronic payment [3] replaces traditional transactions [4].

In Indonesia, the use of internet banking is still relatively low. Previous research suggests that the use of internet banking is still widely used to check balances and check transactions, while user transactions ranging from one month up to more than five times [5]. One of the main strategies of banking in Indonesia is the optimization of electronic banking services [6]. Other countries such as Mumbai in India, students who do online shopping prefer this method of payment with Cash on Delivery, a debit card, and the third option is internet banking [7]. In Thailand, characteristics of online shopping will consider the use of m-payment when the m-payment reliable and trust worthy [8]. While in Romania the business strategy adopted by the banking sector

practiced on the 'Cost Oriented' and 'Internet Banking Oriented'. Some banks use internet banking service efficiency to improve the overall performance of the bank [9]. These facts show that the increasing use of e-payment is affected by the satisfaction and trust of consumers. Also from the banking sector will be a business strategy that is effective and efficient.

Inside the e-commerce, one common feature is provided by the marketplace or the merchant is the payment system. Payment system with the option of using a credit card, account transfers, and internet banking [10]. One of the factors of customer satisfaction to the marketplace is an Internet connection and payment methods [11]. In the field of mobile banking, there are three main factors that affect customer satisfaction, namely mobile devices, mobile network providers, and mobile banking provider [12]. Another study says that three factors are safety, cost, and ease of [13]. Likewise, with the evolution of security technology consists of a core identity security, security, mobility, security credentials, and transaction security [14]. Conditions and changes in the dynamics of the consumer must be attentive and calculated by the banking companies to improve their customer satisfaction [15] and the quality of online banking services has been a major concern of researchers and managers of banks [16]. Technologies

developed by companies as payment solutions such as ATMs or payment kiosks have been many people globally. In the utilization of this technology needs to understand the requirements, preferences, and experience of consumers for the consideration of strategy, marketing, and development [17].

Many technologies and payment methods have been developed in Indonesia as an m-payment system with NFC technology (Near Field Communication) [18], payment with barcode technology [19], and payment technology by using OTP [13] or by using a token [20]. A security issue is one of the internal problems in the m-commerce is mainly related to the payment system [21].

To support e-commerce one of the methods used in the payment was instant payment. Many national banks have been providing this payment method like the “BCA KlikPay, Mandiri Clickpay, e-pay BRI, CIMB Clicks, and others. Technically instant payment services are web services or APIs provided by the Bank to access e-commerce application marketplace or the merchant when a buyer wants to make a payment. Problems sometimes arise if the Internet connection is not stable, after authentication of the payment gateway is successful, the transaction process on the merchant web application did not succeed in the update because the breakdown while the internet connection. This condition causes the customer to the bank account balance is reduced but the purchase transaction in the status of unpaid. This does not mean a customer lost his money, but it takes time and a fairly long process to restore it by manual. This is not in accordance with the security system in the electronic payment technology. The trend of software development is to change the activity that was originally done manually to be automatic [22]. Many payment and security technology proposed but not yet provide a solution to this problem. This paper offers a payment scheme which can be used to resolve the issue.

II. MATERIAL AND METHOD

The methodology used in the study consisted of four phases of data collection and analysis, design scheme solutions, implementation of the scheme, and evaluation of the scheme. In detail, phases of the methodology can be seen in Fig. 1.

Stage of data collection and analysis is done in two ways: interviews and literature studies. Interviews were conducted to obtain primary data associated with online transactions, the use of instant payment, and the problems that arise when using instant payment. Interviews were conducted for approximately 1 hour with questions relating to the payment system to make use of instant payment. The literature study was conducted to obtain secondary data associated with instant payment technology.

Design scheme solutions are the stage to design a new scheme that can be used as an alternative solution to the problem of instant payment. This design is based on the previous analysis stage.

After the design of the scheme, the next stage is the implementation phase. The implementation phase of the scheme is a step being done to implement schemes to pay into the system online. Scheme implemented using a

simulation example payment gateway and the merchant application.

Evaluation phase is the stage to evaluate the performance of existing schemes designed and implemented in the previous stage. This phase was conducted to determine how the performance of the proposed scheme to solve the problem or not.

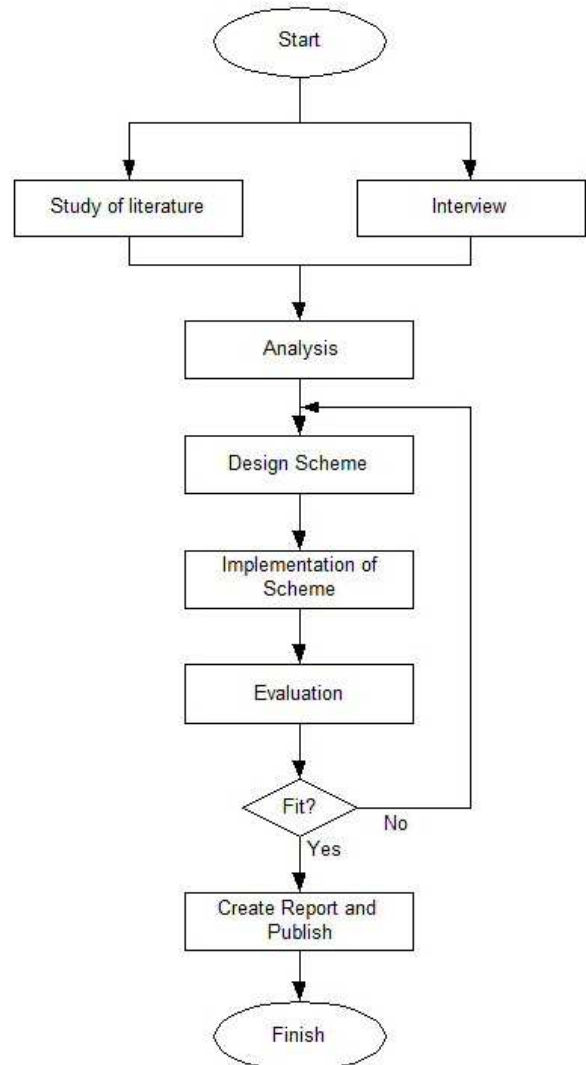


Fig. 1 Methodology

A. Problem Analysis

Instant payment is an electronic payment system that uses web services technology or API. Communication is performed between the application of e-commerce and payment gateway that is owned by a bank. In Indonesia, many national banks that provide this facility as BCA KlikPay, Mandiri Clickpay, e-pay BRI, CIMB Clicks, etc.

A customer who wants to use instant payment facilities can register at a bank payment gateway. Customer will then get an account for authentication at the time of going to conduct the transaction.

From the merchant or the market place, the application of e-commerce has a feature to choose the method of payment. One of the methods of payment that can be selected is to use instant payment. When users choose this method of payment,

e-commerce application will access a service provided by the bank payment gateway. The payment gateway will then ask the customer to log in. Customers who successfully logged in will get a form of payment for the completed transaction. Payment gateway then sends the OTP code to the customer via SMS (short message service) to do the verification. Customers then enter this OTP code into the payment gateway applications. If successful, the payment gateway will provide the status of successful payment to a merchant's e-commerce applications. In detail, this payment scheme can be seen in Fig. 2.

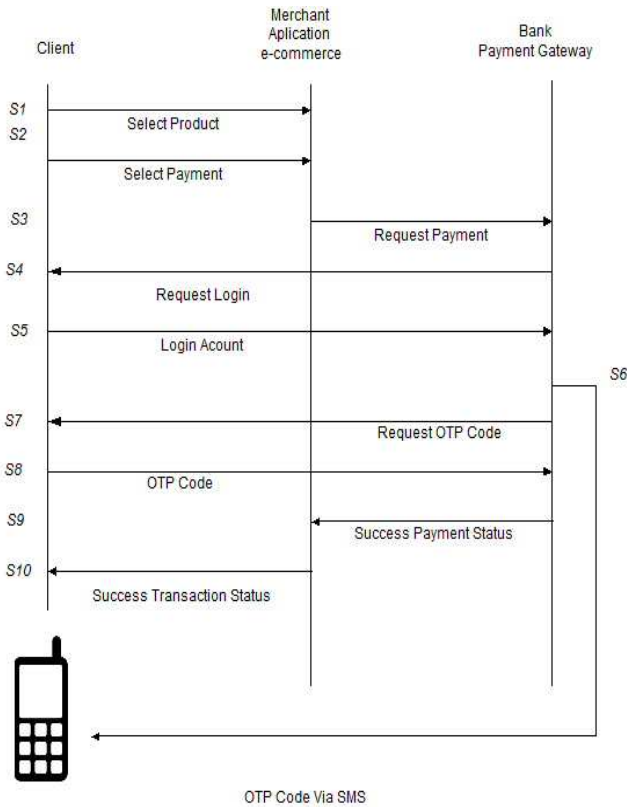


Fig. 2 Instant payment scheme

From Fig. 2 it appears there are ten steps in the payment of instant payment as described earlier. Description of the steps contained in table 1. The payment scheme performs well in normal conditions, especially a stable internet connection. In this study, conducted interviews with people who often conduct online transactions. The authors ask about their activities online transactions using instant payment within six months. Usually, the people who use these services are businesses or consumers online. Interviews were conducted by asking a few questions to get answers related to m payment transactions. Here is a list of the question used in the interview contained in Table 2.

10 people have been interviewed and we found four of them have experienced such failures. To resolve this dispute, they should report to the Bank that their money is returned. This process can take a long time is a maximum of 14 working days.

Indonesia is a country that has uneven IT infrastructure deployment [6] so an internet connection is also sometimes unstable. Sometimes the problem arises when the Internet

connection was not stable. This problem occurs in step S9 when the payment gateway should report the successful payment status to the application of e-commerce, internet connection suddenly cut off temporarily so that the process is not successfully reported. The balance is owned by the customer has been cut off while the e-commerce application establishes that the transaction has not been paid (failed). If you want to repeat the payment, there will be a payment twice. Failed payment scheme of this process can be seen in Fig. 3.

TABLE I
STEPS OF INSTANT PAYMENT SCHEME

Step	Description
S1	Customers choose products on e-commerce applications
S2	Customers choose a payment method on the application of e-commerce
S3	E-commerce applications requesting service payment on a bank payment gateway.
S4	Bank payment gateway will request the customer to log in
S5	Customer will enter account login
S6	Bank payment gateway sends an OTP code to the customer via SMS.
S7	Bank payment gateway request the customer to enter the code OTP which was sent via SMS
S8	Customer enter OTP code which has been received via SMS
S9	Payment gateway successful payment status report on the application e-commerce merchant
S10	The e-commerce merchants reported a successful transaction to the customer.

TABLE III
LIST OF QUESTIONS IN INTERVIEW

No	Question
1	Have you ever conduct transactions with Instant payment systems like BCA Klik pay, Mandiri Clickpay, e-pay BRI, CIMB Clicks, or Others?
2	What is the type of instant payment ever you used in the last 6 months?
3	Have you ever failed payment transactions with instant payment system?
4	Have you ever experienced the failure of payment when using instant payment but your balance is reduced?
5	Do you go to the bank to submit your complaint, When you experience failure of payment but your balance is reduced?
6	What action should be taken, to restore your balance?
7	Do you think that had to do complicated procedures?
8	How long time is required by the bank to restore your balance is reduced?

From Fig. 3, can be seen that in step S9 payment has been successfully carried out by the customer through the payment gateway but not successfully report the status of these payments to the application of e-commerce because the Internet connection is lost while. As the result, the application of e-commerce report that the customer transaction or fail when unpaid balances belonging to customers has been reduced.

B. Design Scheme Solution

When a problem occurs, the payment gateway does not successfully report the successful payment status and transactions on e-commerce applications are considered unpaid then need trustworthy other mechanisms to update the status briefly. This process must be done without the cumbersome procedure, but secure and trustworthy.

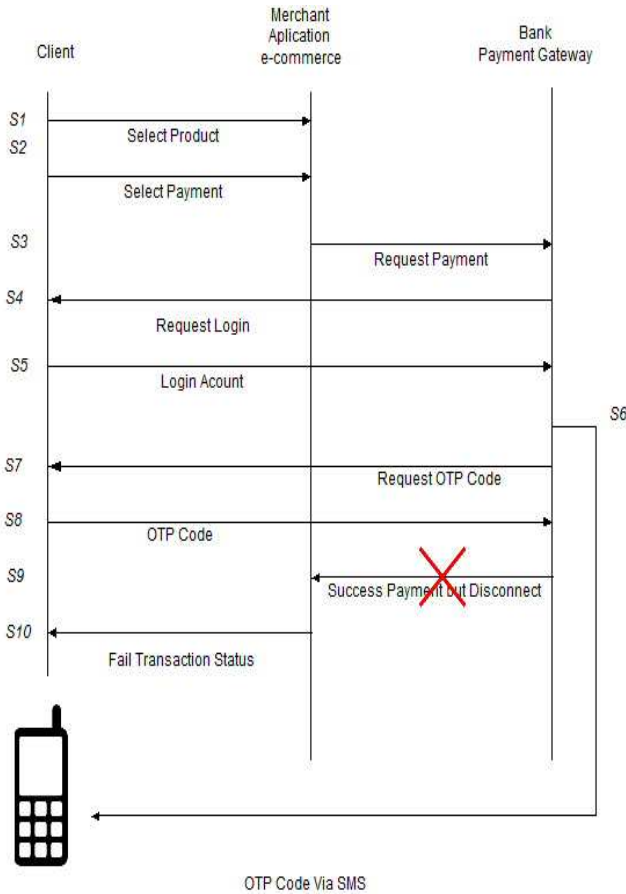


Fig. 3 Instant payment scheme failed

We propose a scheme to solve the problem with the transaction reference code. This scheme does not change from what is already there but adding a few steps to instant payment methods have become more secure and trusted to use.

Instant payment scheme by using a transaction reference code that we have proposed can be seen in Fig. 3. This scheme adds a few steps from the previous scheme to 17 main steps. The addition is delivery reference code to the customer via SMS transactions such as payment gateway sends OTP code. The reference code is sent when the payment is verified by the payment gateway and the process is successful, the payment gateway sends the transaction reference code in addition report payment status on the application of e-commerce.

Description of steps in Fig. 4 is in Table 3. Steps S12 to S17 is an extra step that can be used if the payment gateway does not successfully report the payment status in step S9.

When the payment gateway successfully reduced customer balances to pay, the payment gateway will generate a reference code of this transaction. Payment

gateway then sends the transaction reference code to the customer via SMS. When the step S9 failed because the connection is interrupted temporarily, the customer has the option to make a payment confirmation on e-commerce applications using this reference code. E-commerce applications can then check the status of customer payment to the payment gateway based on the reference code entered by the customer.

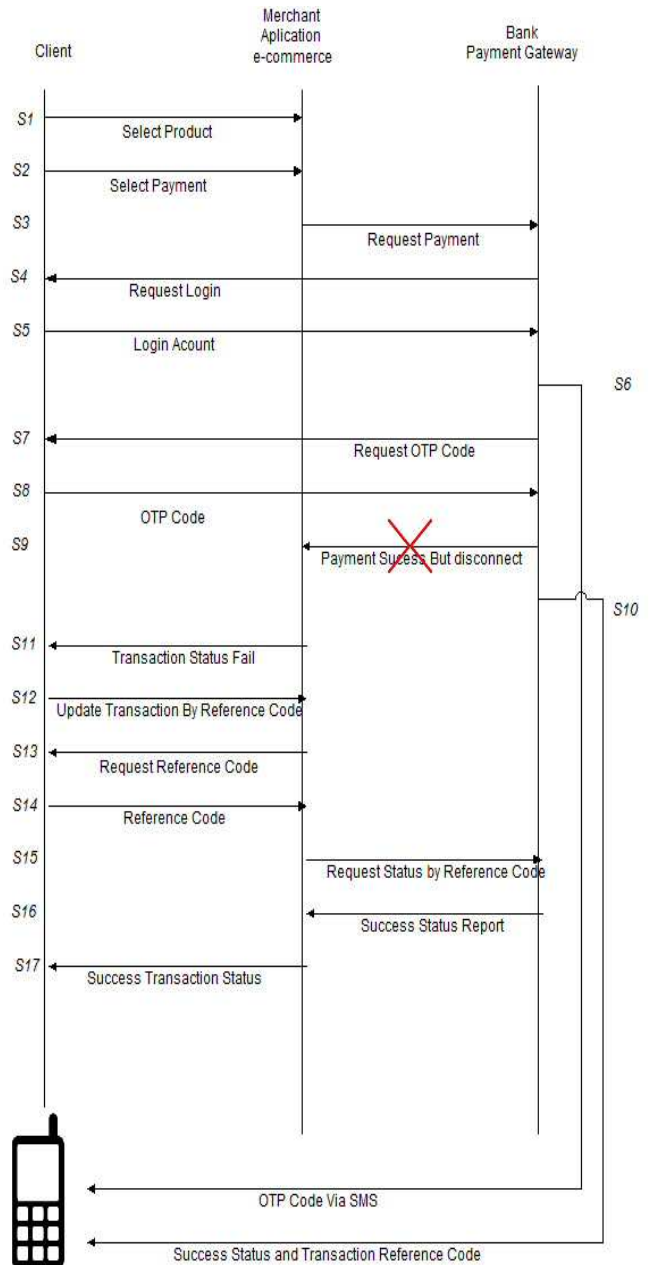


Fig. 4 Instant payment scheme with transaction reference code

C. Implementation of Scheme

In order for the proposed scheme can be seen in their performance, it is necessary to implementation into a system. The system was developed to connect the web e-commerce (merchant) with a bank payment gateway service with a web service. On the web, application e-commerce has facilities with the instant payment system. E-commerce site also has the facility to update the status of payments that can be used by the user if the payment transaction fails but the user's

account balance is reduced. On the payment of the purchase transaction which exists in e-commerce web designed to make payments with instant payment. By selecting this instant payment system, e-commerce web will request access to the simulation program payment gateway.

TABLE III
STEPS OF INSTANT PAYMENT SCHEME PROPOSED

Step	Description
S1	Customers choose products on e-commerce applications
S2	Customers choose a payment method on the application of e-commerce
S3	E-commerce applications requesting service payment on a bank payment gateway.
S4	Bank payment gateway will request the customer to log in
S5	Customer will enter account login
S6	Bank payment gateway sends an OTP code to the customer via SMS.
S7	Bank payment gateway request the customer to enter the code OTP which was sent via SMS
S8	Customer enter OTP code which has been received via SMS
S9	Payment gateway successful payment status report on the application e-commerce merchant
S10	Payment gateway sends the transaction reference code to the customer via SMS. The message states that the payment was successful and customer balances have been truncated.
S11	The e-commerce merchant report the status of the transaction to the customer.
S12	Customer requested payment update by using transaction reference code
S13	E-commerce application asks the user to enter the transaction reference code
S14	Customer enters the transaction reference code to the application of e-commerce
S15	E-commerce applications request payment by the customer transaction reference code is entered
S16	Payment gateway reported that the status of the payment with reference code is entered valid and successful customer to e-commerce applications.
S17	Applications merchant reported that the transaction has been paid to the customer

Users can use instant payment after registration to the bank payment gateway of the. Users must register their mobile phone number which will be used for the delivery of OTP code and transactions reference code. Users will get a username and password as authentication login.

Bank payment gateway provides service to payment and checks the status of the payment by transaction reference code. Bank payment gateway should also provide SMS gateway service. SMS gateway service is used to send the OTP code and transaction reference code from payment gateway server to the user. OTP code used to authenticate the transaction. If the transaction is successful, the payment gateway sends the payment status to web e-commerce succeed. This transaction will also generate transaction reference code that will be sent to the user via SMS.

When a system failure in the process of updating the web e-commerce transaction status, whereas the payment process successfully carried out by bank payment gateway then the user can update the status of the payment by transaction

reference code received. Update the status of the payment can be done via a web e-commerce by selecting the payment status update feature.

Status update feature in web e-commerce payment will be connected with the payment gateway to check the status of payments. The e-commerce site will require the user to enter the transaction reference code obtained from the payment gateway via SMS. After the user to enter the transaction reference code, the e-commerce site will ask for the status of payments to the bank payment gateway based transaction reference code entered by the user. Based on the transaction reference code, the payment gateway will check the existing transaction data. If the data is found, then the bank payment gateway sends the payment status to web e-commerce. Web commerce receives the payment status of the payment gateway. Based on this payment status, e-commerce web will update the status of payments of purchases made by the user to have been paid. This process is performed by the user in e-commerce web (web merchant). If the connection process is impaired so that the status update process does not succeed then the user can repeat it again.

D. Evaluation of Scheme

In this study, evaluations have been conducted to test the proposed scheme. Testing was conducted with a simulation program and payment gateway e-commerce to implement the proposed scheme.

Before doing the evaluation, the preparation that must be done is the user must have an account and have money in your account balance user. For an account, the user must register on the web payment gateway. This step is done so that the user has access to the system payment gateway. User account registration is done on a bank payment gateway should include a telephone number the user mobile phone. The phone number of this phone will be used to send the OTP code and a transaction reference code via SMS. After the user has an account in the payment gateway, the user should increase the balance so that the user has enough money to be able to perform payment transactions.

How to evaluate the scheme is to look at the performance of the system. The evaluation was conducted in two stages. The first phase is to test the system with payment processing transactions without failure. The second step is to test the system with transactions that have failed the delivery process payment status. This failure occurs because the connection is interrupted so that the bank payment gateway could not send the payment status to web e-commerce that the payment was successful.

1) *Test The System with Payment Processing Transactions without Failure:* Test steps in the first phase, namely the payment transaction in e-commerce web using instant payment payouts. Users select the product to be purchased and then continue the checkout process. At the time of the checkout process, the user chooses the payment method with one instant payment. The e-commerce site will then display the payment gateway page to login.

After the user successfully logs in, the bank payment gateway site will display the payment transaction page. This page will display the account payee and the amount of money that must be paid. Once the user makes sure it's

appropriate to submit payment. Bank payment gateway sends a code OTP to the user via SMS. The payment gateway will show the page of authentication using OTP code. This page serves to request the code OTP to the user. Users can enter the code received with through SMS OTP later did submit.

Bank payment gateway will check authentication. If authentication is successful, the bank payment gateway will reduce the user balance. Bank payment gateway will transfer the amount of money from a user account to the merchant account.

Bank payment gateway sent payment status to web e-commerce that the payment has been completed. This process resulted in the user balance is reduced and balance the merchant will increase. After successful transfer balance from user to the merchant, bank payment gateway sends transactions reference code to the user via SMS.

After successful payment transactions, web e-commerce will receive the status of the payment was successful from the bank payment gateway. E-commerce site then updates the transaction that the transaction made by the user has paid off.

2) *Test The System with Transactions that Have Failed the Delivery Process Payment Status:* The first step in this test is the same as testing without failure. Only when the payment gateway is able to authenticate and transfer balances from the user to the merchant, e-commerce web connection is disconnected so do not accept payment status. This resulted in the status of purchase transactions done by the user is still in a state has not paid off.

User check purchase transactions on the web page e-commerce. Users find the unpaid purchase transaction. On the other hand, the user is notified successful payment status by accepting a transaction reference code. Users then update the payment status on the web e-commerce.

At this stage of the update status of this payment, e-commerce web page displays that asks the user to enter the transaction reference code. Users enter the transaction reference code then submit this page. E-commerce site then connects to bank payment gateway through service checks the status of transactions, based on the transaction reference code entered by the user. Payment gateway then checks the transaction based on the transaction reference code. Payment gateway found that transactions with the reference code have been successfully paid. Payment gateway then sends the transaction status to web e-commerce. The e-commerce site will receive a return value of the service requested that the payment was successful then e-commerce web will update the status of payments on transactions made by the user.

III. RESULT AND DISCUSSION

Results of the evaluation showed that the system succeeded in paying for purchases made by the user when there is no failure in the payment transaction process. The system is able to provide the value of a successful payment status to web e-commerce.

In the second stage of evaluation, the system was tested with a transaction that is experiencing the failure of the delivery process payment status. The system can send a transaction reference code to the user via SMS. The system

is able to update the status of the payment by entering a transaction reference code received by the user. Status purchase transactions on the web e-commerce previously in unpaid condition can be updated to be paid by the system using transaction reference code. The data in Table 4 below shows that the scheme performance gives the final result of the transaction successfully done with the payment status paid in the condition of internet access is stable or unstable.

TABLE IV
RESULTS OF SCHEME PERFORMANCE

Internet Access Condition	Process	Result	Final Result
Internet access is stable	Select Product	Success	Transaction successfully done with payment status has been paid
	Select Payment	Success	
	Request Payment	Success	
	Request Login	Success	
	Login Account	Success	
	Sending OTP Code Via SMS	Success	
	Request OTP Code	Success	
	Input OTP Code	Success	
	Sending Success Payment Status	Success	
	Sending Success Transaction Status	Success	
Internet access is unstable	Select Product	Success	Transaction successfully done with payment status has been paid
	Select Payment	Success	
	Request Payment	Success	
	Request Login	Success	
	Login Account	Success	
	Sending OTP Code Via SMS	Success	
	Request OTP Code	Success	
	Input OTP Code	Success	
	Sending Success Payment Status	Fail	
	Sending Success Status and Transaction Reference Code via SMS	Success	
	Sending Success Transaction Status	Fail	
	Update Transaction By Reference Code	Success	
	Request Reference Code	Success	
	Input Reference Code	Success	
	Request Status by Reference Code	Success	
	Sending Success Status Report	Success	
Sending Success Transaction Status	Success		

The system developed has shown that the system is able to function properly. The results showed that the performance evaluation system is appropriate and can be used as a solution to the problem of the instant payment

system. This test shows that the proposed scheme can work well. The performance of the scheme can solve problems that arise in the instant payment mechanism.

IV. CONCLUSIONS

Internet infrastructure condition in Indonesia is still uneven and unstable internet access sometimes causes problems in the system of instant payment. Instant payment scheme with transaction reference code proposed in this study is a scheme to overcome the problem in the instant payment. This payment scheme we view as an appropriate solution to the condition of the development of e-commerce and payment systems in Indonesia. Using this scheme then such failure fully resolved.

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