

# Implementation of Google Maps API and Firebase for Android Based Photographer Marketplace Information System

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**Abstract:** Nowadays, people increasingly need photography services for personal documentation. They often use social media to share their photography content. Photographers also use social media as a promotional media, however, that does not make it easier for people to get in contact with them. It is because social media such as Instagram or Facebook are not a special platform for providing photography services, in addition, they cannot make photography service transactions easily. An Android-based photographer marketplace information system is the solution to these problems. By using the Google Maps API and Firebase, this system is an application system on the Android platform that is developed to connect photographers and consumers in order to make an easy transaction. This system uses the Google Maps API for mapping the location of photographers, MySQL as user data storage, and the Firebase API for creating messages and notification features in real-time.

**Keywords:** Photographer; Marketplace; Android; Google Maps API; Firebase; Information System

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## 1. INTRODUCTION

A data from the Ministry of Tourism Indonesia in 2013 showed that the photography subsector contributed a gross value added (GVA) of 1% to the GVA total of the creative industry in Indonesia, with an average growth of 6.94% in 2010-2013 [1]. This economic growth also had an impact on the emergence of new photographers because it is considered as a profession with a promising income. However, there are some problems in connecting between photographers and consumers. This problem appears when a consumer travels to a new place and want to find a photographer. The use of local photographer services is a solution to these problems for improving the economy of the local area and it also can ease people's expenses when traveling to an area.

This study tries to develop a system that can be a place where photographers are more easily found. By creating a mobile-based marketplace system, it will be easier for the people to interact and transact with them. In addition, they can take photo sessions more easily wherever they are. Therefore, a mobile-based marketplace can be a suitable place for local photographers in an area.

The developed system consists of 3 systems, namely for consumers, photographers, and also for administrators. This system has supporting features such as an ability in uploading a photography gallery as a photographer's portfolio, giving ratings and reviews to photographers, booking photography services and making payments. The consumers and photographers can also communicate with chat features and get notifications by using Firebase. Another service that can be used is the photographer can determine their available date, therefore the consumers can find them on a specific date. The consumers can also find photography service as they want based on price or the nearest location which uses the Google Maps API. Administrators validate the photographers, as the

result, the registered photographer is the one who has been selected by the administrator.

## 2. LITERATURE REVIEWS

A study related to e-commerce and the benefits of e-commerce in the field of creative industries previously conducted by Aleck C.H [2]. The journal entitled Facilitating Cultural and Creative Industries to Engage the Internet Era: A New E-Commerce Strategic Framework describes the phenomenon of new global economic growth, when Cultural and Creative Industries (CCI) are involved in the Internet era. This study is used as a reference to the importance of implementing digital platforms especially in e-commerce for Cultural and Creative Industries (CCI).

A study on the application of photography services was previously done by Mahdy Arief in 2015. The result of this study is developing a Web-Based E-Commerce Application for Pre-Wedding Photography Services Crowdsourcing Photographer Modules by Using Iterative Incremental Methods [3]. This study is used as a reference in developing e-commerce information systems in the photography business.

A study related to e-commerce information systems by using the Google Maps API as a provider of Geographic Information Systems was previously conducted by Santosa in 2017. The result of this study is Pyle: Web-Based E-Commerce Applications by Using Geographic Information Systems [4]. This study contributes as a reference in developing e-commerce systems and Google Maps API.

A study entitled *Customer to Customer (C2C) Vehicle Rental Information System* by Sugi is a study related to the implementation of the Android-based e-commerce method. This study designed a vehicle rental application called SIRENT. This application aims to improve the quality of business for vehicle owners in marketing their vehicles by using the Customer to Customer method [5]. The use of this

study is as a reference in developing e-commerce systems and geographic information systems.

*FinDoctor-Interactive Android Clinic's Geographical Information System Using Firebase and Google Maps API* conducted by Anisa Rahmi in 2017 is a study related to geographic information systems by using the Android-based Google Maps API. The study proposes mobile and web applications to facilitate the needs of doctors and patient. The results of this study indicate that Firebase has successfully provided a real-time database, push notification, and storage. The Google Maps API has also succeeded in supporting accurate maps and locations [6]. This study contributes as a reference to the use of the Google Maps API and Firebase in the features of the developed application.

### 3. RESEARCH METHOD

#### 3.1 Research Flow

The research flow of Android-based photography business to consumer marketplace information system can be seen in Figure 1.

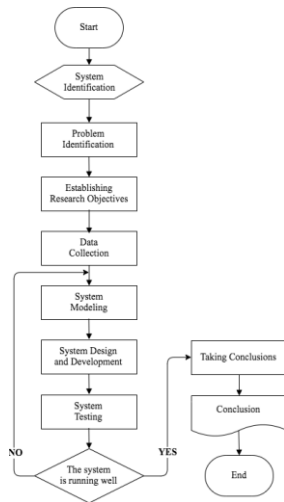


Figure 1. Research Flowchart

Figure 1 is a research flowchart used in designing Android-based photographer marketplace information systems. The process that occurs includes defining the developed system, identifying problems that occur related to the developed system, setting research goals, collecting data and literature study that related in developing the system, modeling the system by collecting and understanding things that can be occur in the system, designing and developing the system by designing database as a location for storing data, making program code for the system, and testing the system and documentation of test results. If the system runs well and correctly, conclusions will be drawn. If it is not, it will return to the system modeling stage.

#### 3.2 General Overview

A general overview of the Android-based photographer marketplace information system can be seen in Figure 2 below.

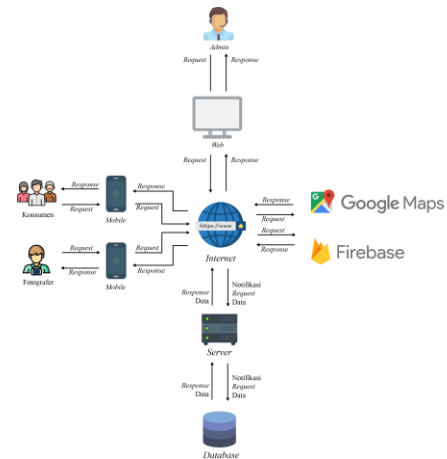


Figure 2. General Overview

Figure 2 is a general overview of the photographer's marketplace information system which is an explanation of the management processes that are implemented in the system. Request data sent by the admin are done by using a server computer that is connected to the internet. Meanwhile, request data sent by photographers and consumers are done by using an Android mobile that is connected to the internet. All results of request data made by admin, photographers and consumers will be stored on a database server that is connected to the internet, and it is distributed back in the form of responses by using third-party services such as Google Maps and Firebase.

#### 3.3 Context Diagram

A general overview of the Android-based photographer marketplace information system can be seen in Figure 3 below.

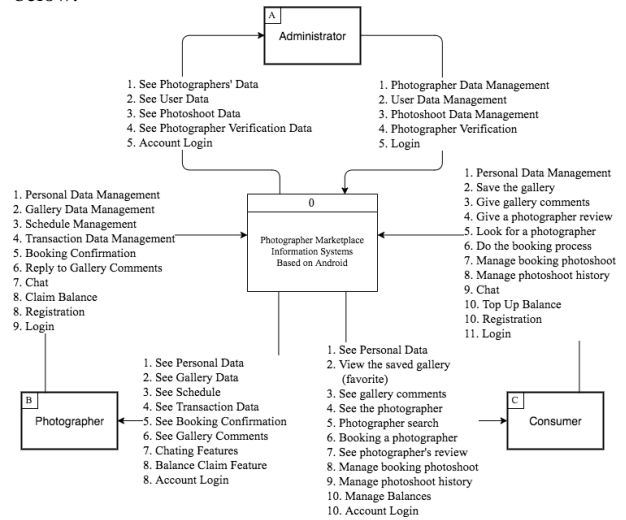


Figure 3. Context Diagram

The context diagram shown in Figure 3 presents that the developed system consists of 3 main entities, namely the admin entity, the photographer entity, and the consumer entity. The admin receives photographer verification requests that are entered by the photographer. Then, they provide feedback to the system by verifying the photographer's data. In addition, they also accepts consumer data and photo shoot data. Data which flows from the admin entity to the system are photographer's data, consumer data, photo shoot data, and also photographer verification data.

Data inputted by photographers into the system are personal data, gallery data, schedules, transaction data, booking confirmations, photographer and consumer chat, and balance claims. Data which flows from the system is the photographer's personal data, photographer's gallery data, schedule status, transaction data, booking confirmation status, photographer and consumer chat, and photographer's balance.

Data inputted by costumer to the system is their personal data includes edited ones, favorite gallery data, gallery review data, photographer review data, photographer search data, photographer booking data, photographer chat, and top-up balance. Data which flows from the system are personal data of consumers, favorite photographer's gallery data, gallery review data, photographer review data, booking status, and customer balances.

### 3.4 Database Design

Database design of the Android-based photographer marketplace information system can be seen in Figure 4 below.

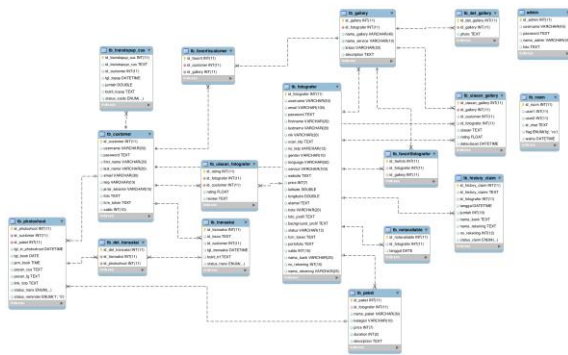


Figure 4. Database Design

Figure 4 is a MySQL database application design that displays relations between tables used in Android-based marketplace geographic information systems. This geographic system has 17 interconnected tables. Here, MySQL database stores data such as photographer's data, consumer data, gallery data, transaction data and available date schedule of photographers. Data files of the photographer's portfolio that wanted to be verified and chat data are stored in Firebase using Firebase Storage. It is used for the purpose of sharing storage loads.

### 3.5 Application Features

The application features of the Android-based photographer marketplace information system can be seen in Table 1 below.

Table 1. Application Features

Administrator	Photographer	Consumer
Web Based	Personal data management	Personal data management
Photographer data management	Create Photo Gallery	Find photographers
Customer data management	Schedule management	Find and leave comment on photographers galleries
Administrator data management	Manage booking request	Booking photographer
Transaction data	Transaction management	Review photographer

management		
Photographer verification	Find other photographer galleries	Phone, instant messaging, chatting
	Find other photographer	Direction to photographer location
	Add favorite gallery	Top up balance
	Comment on own gallery	Register account
	Claim balance	Login account
	Register account	
	Login account	

Table 1 is a feature list that can be used by users. The users of this application are divided into 3 namely consumers, photographers, and admin. It appears that the admin has more important access because they can manage accounts from the user's application and delete or verify users who can use the application. Furthermore, admin can manage data transactions that occur between photographers and consumers. The features owned by photographers and consumers are almost the same. However, for photographers, they can upload a portfolio gallery through the application and can be given a response by the consumers. Photographers and consumers can communicate through the provided chat feature. The consumers can find the photographers with several options such as the nearest photographer, a certain schedule, the lowest price, and the type of service that photographers provide. In addition, they can make payments through this application by topping up the balance first.

## 4. CONCEPT AND TEORIST

### 4.1 Information System

The information system is a sequence of formal procedures where data are grouped, processed into information, and distributed to users [7]. According to Krismaji, information systems are organized methods to collect, enter, process and store data. In addition, it also store, manage, control, and report information in such a way, therefore an organization can achieve its stated goals .

### 4.2 Geographic Information System

Piarsa defines Mobile GIS as a mobile device capable of displaying geospatial data, receiving, processing, and receiving telephone user requests [8]. Mobile GIS can be divided into two types according to how to access data and collect information, namely Fieldbased GIS and Location Based Services.

### 4.3 E-commerce

E-commerce can be classified into several models, namely Business to Business (B2B), Business to Consumer, Business to Government (B2G), Consumer to Business (C2B), Consumer to Consumer (C2C), Consumer to Government (C2G), Government to Business (G2B), Government to Consumer (G2C) and Government to Government (G2G) [9]. The Ministry of Finance Indonesia classifies e-commerce transaction business models into four models, such as Online Marketplace, Classified Ads, Daily Deals, and Online Retail [10].

#### 4.4 API

API or Application Programming Interface is not just a simple set of classes and methods or functions and signatures. API has a main goal to overcome the "clueless" in developing large-sized software, starting from something simple to complex and is a component behavior that is difficult to understand. In general, API or Application Programming Interface can be defined as a link between software to other software.

#### 4.5 Google Maps API

Google Maps offers an API for building web-based applications or mobile-based applications. Android as a mobile-based application allows developers to integrate Google Maps with applications and provide functions such as displaying locations in the form of maps, showing different routes on the map, etc. The Google map API can be used to create distribution mapping data. The advantage of it in Android is that it can support real-time coordinate processes using GPS technology [6].

#### 4.6 Firebase

Firebase is a platform that can help developers in developing high-quality applications. Firebase stores data in the JavaScript Object Notation (JSON) format that does not use queries to insert, update, delete, or add data to it. JSON is the backend of the system that is used as a database to store data [11].

#### 4.7 Android

Android provides an open platform for developers to create their own applications to be used by a variety of mobile devices. Android is commonly used on smartphones and tablet PCs. It functions the same as the Symbian operating system on Nokia, iOS on Apple and BlackBerry OS [12].

### 5. IMPLEMENTATION RESULTS

The features contained in the Android based photographer marketplace geographical information system have different functions and objectives. The features of application system by using a mobile device on client side are as follows.

#### 5.1 Photographer

Important features that can be used by consumer in this Android-based photographer marketplace information system are as follows.

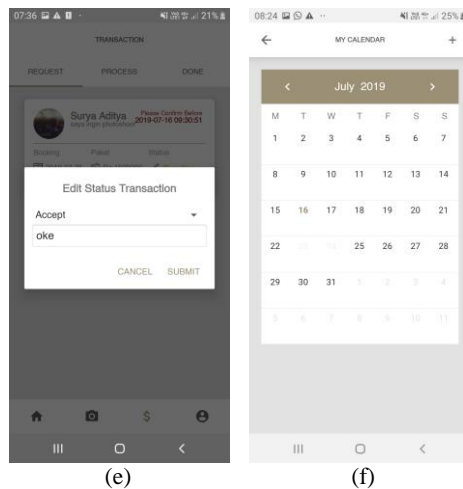
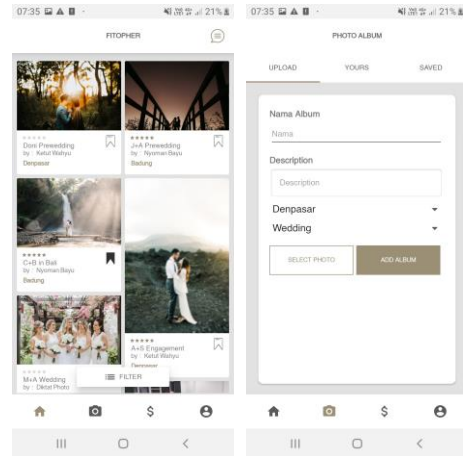
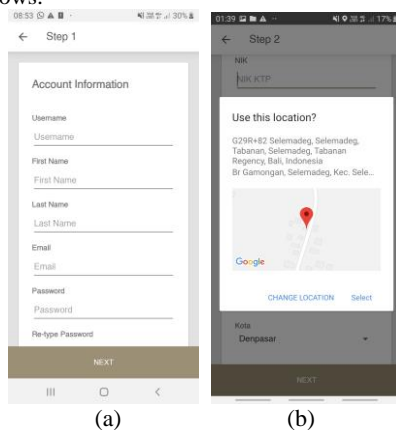


Figure 5. Result on Photographer Application

Figure 5(a) is a screen shot of photographer registration. First, the photographers must register by filling out the registration form which contains the username, email, and password. They must attach their portfolio in the form of a PDF file for a selection process to join in the application. If their status has not been approved by the admin, they cannot use the overall application features such as uploading galleries or accepting bookings from consumers. Furthermore, they can add their locations with the 'place picker' feature that used the Google Maps API, therefore consumers can be easier to find their location as shown in Figure 5(b). Figure 5(c) is the home page that the photographer can access when their account has been verified by the admin. The home page contains photographers' galleries which can be seen and commented by consumers or them. If the admin has verified them, they can upload the gallery, therefore it can be appeared on the home page. They must include more than 1 photo and provide captions to the gallery as shown in Figure 5(d). Figure 5(e) is the photographer's booking approval page. They can choose the status of approval by choosing pending, approve or decline and provide information on the incoming booking list. The consumers can make the booking process with them. The booking data must be approved by the photographer before the transaction can proceed to the payment process. If within 2 hours it is not responded by them or the booking status is still pending, it will be automatically deleted by the system. Another feature for the photographer is that they can determine the date when they cannot accept orders



by setting "not available" date on the application. In addition, they can determine the date when they are not available as seen in Figure 5(f). It is determined by them and it will be in the color of gray. As the result, the customer cannot choose it when making a booking.

## 5.2 Consumer

Important features that can be used by photographers in this Android-based photographer marketplace information system are as follows.

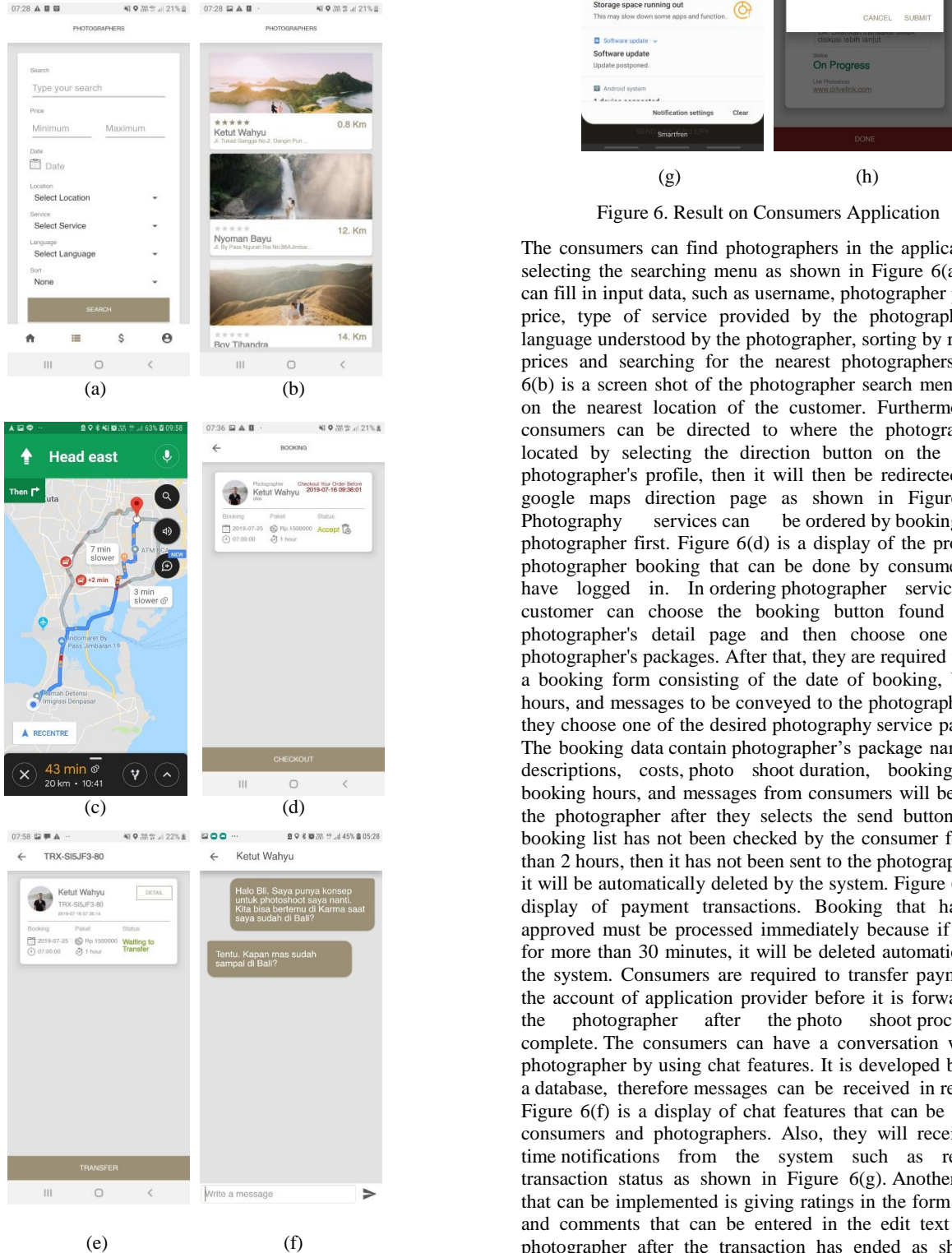


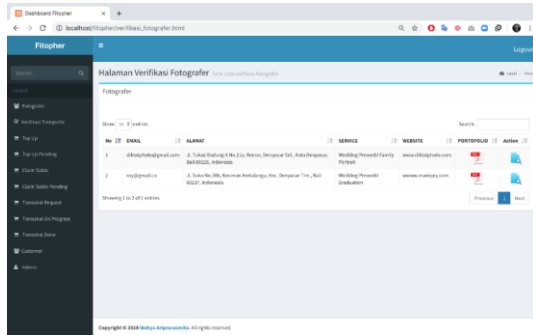
Figure 6. Result on Consumers Application

The consumers can find photographers in the application by selecting the searching menu as shown in Figure 6(a). They can fill in input data, such as username, photographer package price, type of service provided by the photographer, the language understood by the photographer, sorting by rating or prices and searching for the nearest photographers. Figure 6(b) is a screen shot of the photographer search menu based on the nearest location of the customer. Furthermore, the consumers can be directed to where the photographer is located by selecting the direction button on the selected photographer's profile, then it will then be redirected to the google maps direction page as shown in Figure 6(c). Photography services can be ordered by booking the photographer first. Figure 6(d) is a display of the process of photographer booking that can be done by consumers who have logged in. In ordering photographer services, the customer can choose the booking button found on the photographer's detail page and then choose one of the photographer's packages. After that, they are required to fill in a booking form consisting of the date of booking, booking hours, and messages to be conveyed to the photographer after they choose one of the desired photography service packages. The booking data contain photographer's package names and descriptions, costs, photo shoot duration, booking dates, booking hours, and messages from consumers will be sent to the photographer after they selects the send button. If the booking list has not been checked by the consumer for more than 2 hours, then it has not been sent to the photographer and it will be automatically deleted by the system. Figure 6(e) is a display of payment transactions. Booking that has been approved must be processed immediately because if it stays for more than 30 minutes, it will be deleted automatically by the system. Consumers are required to transfer payments to the account of application provider before it is forwarded to the photographer after the photo shoot process is complete. The consumers can have a conversation with the photographer by using chat features. It is developed by using a database, therefore messages can be received in real-time. Figure 6(f) is a display of chat features that can be used by consumers and photographers. Also, they will receive real-time notifications from the system such as receiving transaction status as shown in Figure 6(g). Another feature that can be implemented is giving ratings in the form of stars and comments that can be entered in the edit text for the photographer after the transaction has ended as shown in Figure 6(h). This rating data will go directly to the

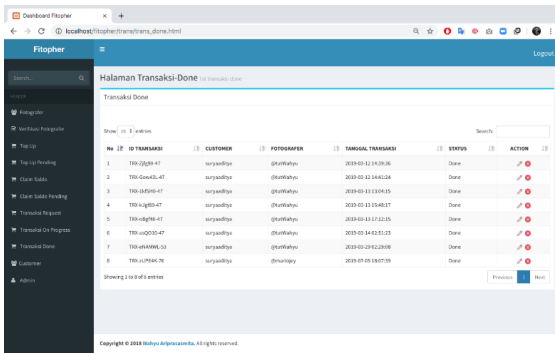
photographer page as a review for potential consumers to consider using the services of the chosen photographers.

### 5.3 Administrator

Important features that can be used by administrator in this Android-based photographer marketplace information system are as follows.



(a)



(b)

Figure 7. Result on Administrator web

Administrator can do a process of selecting photographers who register to the system. Data of photographers who have registered can be seen in Figure 7(a). The administrator has the right to choose a photographer by considering their personal data and attached portfolio. In addition, the administrator has the right to manage data on transactions and users by using web-based applications like in Figure 7(b).

### 6. RESULTS

The conclusion that can be drawn from this study is the photographer marketplace information system is developed by using the Android platform on the client side. Meanwhile, on the server side, website can be used to bring consumers together with local photographers and also as a promotional media for them through their gallery portfolio. This application proposes three panels, including Admin, Photographer, and Consumer. The developed application also contains detailed information from the photographer such as their locations by using the Google Maps API and making it easier for the consumers to meet them. In addition, it successfully applies Firebase real-time database, Firebase push notification, and Firebase storage to

create features in applications such as chat and save the portfolio file data of photographers who register to the application. Features that are created by using the Google Maps API and Firebase can help to solve problems in finding photographers and making transactions with them more easily.

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# Android-Based High School Management Information System

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**Abstract :** Android is a digital platform that often used in current society. It is used by almost all communities, either youngsters or adults, including students and high school teachers. Schools generally apply a conventional way when it comes to the academic process, such as a teacher gives grades by writing them down, students manually write their schedules every semester, giving announcement by gathering the students in the hall and ask students to attend school just to take their report cards. The Android Based High School Management Information System is created to facilitate school academic process. The system can be used by the teachers and students to make the school academic process easier. Furthermore, the student guardians receive the notifications about the student attendance and grade report. This academic process can be applied anytime and anywhere as long as it is connected to the internet. The teachers can input the grades via phone, getting latest school information, seeing the given grades and schedules. The students can see their schedules, getting the latest information, seeing their grades and notifications whenever the teachers have input their grades. The student guardians can get the students attendance and grade report.

Keywords: Android, Schedule, Attendance, Grade, News, Notification.

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## 1. INTRODUCTION

School is an academic institution that is important to children in the world as well as Indonesia. It is not only important to the children, but also to the parents because they also have to send their children to get proper education. School in The Great Dictionary of the Indonesian Language can be interpreted as a place or an institution for learning and teaching or a place to give and receive education. The teacher and student are the two main components in the school academic process. Without neither of those two, the process can not be done accordingly. The school has three educational stages, such as Elementary School, Secondary School, and High School. It generally applies a conventional way in performing several things related to the academic process, such as a teacher gives grades by writing them down, students manually write their schedules every semester, giving announcement by gathering the students in the hall and ask the students to attend school just to take their report cards. The obstacles related to the academic process can be solved by applying the current technology. Nowadays, information technology is developing rapidly and able to give effect to make events and activities easier. By the technology, the academic process can be much easier in both student and teacher sides. Those cases can be simplified by developing a system that can integrate them and can be easily used by the teachers and students. The application of the information system will be helpful if it is done according to the vision and mission and also the aim of the academic institution. [1]

There are some studies related to cloud computing, e-learning, and national exam tryout system that are used as references in this research. The study by Yusuf Bagas Saputro and Yos Richard Beeh with the title “Android Based Student Information System Development: Case Study of SMA Negeri 1 Tenganan (Original title: Pengembangan Sistem Informasi Kesiswaan Berbasis Android Studi Kasus SMA Negeri 1 Tenganan)” was done by developing a mobile-based application in order to display data, like credit point data and announcements [2].

The earlier study entitled “An Overview Of Cloud Computing For E-Learning With Its Key Benefits” by Mansi Bosamia and Atul Patel explains the usage of the cloud computing in e-learning system and the main advantage of it in e-learning [3]. The study by Mentari Harmadya, Gusti Made Arya Sasmita, and Ni Kadek Ayu Wirdiani with the title “Design of the Android-Based Application for Junior High School National Examination (Original title: Rancang Bangun Aplikasi Try out Ujian Nasional Sekolah Menengah Pertama (Smp) Berbasis Android)” was carried out by developing an Android application that can be used by users (Secondary school students) to do the tryouts and exercises. The values and history of using the application can also be seen by the user. Meanwhile, the questions in it were inputted by the system admin [4].

The study by Mohd. Siddik and Akmal Nasution with the title “Android-based Push Notification Application Design (Original Title: Perancangan Aplikasi Push Notification Berbasis Android)” is done by creating a system to make a registration by inputting the email into the system, then it can be verified by them. Furthermore, the mobile application gives a notification to the user in a form of message entitle the content is here [5].

A study related to a cloud based application was done by Putu Satya Saputra, I Made Sukarsa, and I Putu Agung Bayupati entitled “Cloud-Based Information System for Monitoring Children Development in Kindergarten Schools (Original title: Sistem Informasi Monitoring Perkembangan Anak di Sekolah Taman Kanak-kanak Berbasis Cloud)”. It performed by creating a system that could be used to monitor child development in school. It gives information to the parents, such as the lesson sources, weekly report, and also the children's report cards [6].

The study by I Kadek Kris Sanjaya, Putu Wira Buana and I Made Sukarsa with the title “Designing Mobile Transactional Based Restaurant Management” was done by developing a cloud based mobile application in order to simplify the food order in a restaurant. From ordering food to the payment can be done in the developed application [7].

The study by Anisa Rahmi, I Nyoman Piarsa and Putu Wira Buana with the title “FinDoctor–Interactive Android Clinic Geographical Information System Using Firebase and Google Maps Api” shows that the patient can find a doctor through their phones. Then, they will get the queue number and it will be updated by the real-time doctor or doctor's assistant. The use of firebase in this application is to send a notification in real-time to the patient's phone, therefore they do not have to wait too long in the clinic [8].

The earlier study by Salamun titled “Android-Based Student Value Monitoring System (Original title: Sistem Monitoring Nilai Siswa Berbasis Android)” was done by creating an Android based system which contains the grade data, student council data, attendance data, achievement information, and also violation information. [9]

According to the mentioned studies above, those studies can be used as the references in making this study. The Android Based High School Management Information System has an innovation in Android based system, therefore it can be easier to use as long as it is connected to the internet. In addition, in the schedules that are directed to both teacher and student to simplify the schedule management and the grade notification to the student. Therefore, if the teacher has input the grades, the student can be instantly informed and their guardians can also receive the notification about the attendance of the student in class and the grade that is inputted by the teacher.

## 2. LITERATURE REVIEW

This literature Review discusses about supporting theories in conducting the study, such as Android, Android Studio, Database, MySQL, SQLyog, Firebase, Web service and Cloud computing.

### 2.1 Android

Android is a developed operating system for Linux-based mobile devices such as smart phones and tablet computers. In 2005, it has been bought by Google after being developed by Android. Inc. It was officially released on November 5, 2007 and followed by Google that released the codes on Android under the Apache license. The Android operating system is an open source and anyone can develop Android applications.

### 2.2 Android Studio

Android Studio is a platform or an Integrated Development Environment (IDE) to create or develop an Android-based application. It is the official software from Google that was released in 2013 for developers who specifically want to develop an Android application. It is available for three OS platforms, including Windows, Linux and Mac. Android Studio is not the only platform to develop Android apps, but it is more used because it is an official application from Google, therefore there are many tutorials in Android application development by using it.

### 2.3 Database

The database is the collections of some data that are related and stored on the computer, also can be processed to generate information. The database is needed for creating an information system, because there are a lot of data that needed to be integrated in order to avoid data manipulation. It has several functions, such as classifying data accordingly therefore data duplication will not occur; helping to simplify the process of deleting data, editing data and adding data; it is capable of storing large and numerous data, therefore the system will be maintained and integrated well. In developing

a computer based database system, it requires a software called DMBS (Database Management System). DBMS helps to facilitate database users in order to be able to integrate databases in an information system. It also helps in processing large amounts of data, therefore the users can use it based on their needs. There are several database softwares such as MySQL, Microsoft Access, Oracle, Firebird, Microsoft SQL Server, and Fisual FoxPro 6.0.

### 2.4 MySQL

MySQL is one of several Database Management System (DBMS) softwares for computerized database management by using SQL (Structured Query Language). SQL is a special language used for accessing data in the database and MySQL is a database software to run and access the MySQL database by using the Structured Query Language (SQL) itself. It is an open source software that is often used in database management as well as for building a system. Also, it has high reliability, although it is an open source. MySQL can process very large and complex data, even many big companies use their databases such as, New York Times, Wikipedia, Google, and Facebook. It is already purchased and managed by one of the world's largest software management companies, Oracle.

### 2.5 SQLyog

SQLyog is a software or application used to run MySQL databases. It is a widely used software because it has a user friendly and easy to use compared to phpMyAdmin. The main function of SQLyog is actually the same as phpMyAdmin, which is to manage the MySQL database except that there are several other features that are not in phpMyAdmin.

### 2.6 Firebase

Firebase is one of the official services from Google that was released to help developers simplify the development of applications they create. It is a cloud based realtime database service that is widely used by developers. In addition, it provides several services, one of them is Firebase Cloud Messaging (FCM). FCM is one of the features or services provided by Firebase that is used to send realtime notification messages via the same platform or across platforms. It helps in giving message notifications to the current developers in developing their application, because users need fast and realtime information. Therefore, FCM is widely applied to the existing applications. It has a key ability to send both notification messages and data messages, versatile message targeting, and messages from client applications. Firebase Cloud Messaging (FCM) can be implemented by providing two components, such as to create, target and send messages, also to receive messages.

### 2.7 Web Service

Web Service is a software that serves as a link to exchange data or information between a system and application. It is needed because every system or application that wants to do the data exchange is made by different programming languages or platforms. XML format is used by it which is a standard format to exchange data in various systems or applications for various platforms. Web service manipulates the databases' data, then from the manipulated data, it generates an XML format that is a standard data exchange format and connects it to other systems or applications. It is currently used for applications that have two different kinds of platform types, such as Android and web.



## 2.8 Cloud Computing

Cloud computing or in Bahasa Indonesia means komputasi awan is a computerized technology where the services and data of a system or application are no longer stored in a single local computer, but rather stored virtually on the Internet. Therefore, it can be accessed through many platforms and easier to share. According to the National Institute of Standards and Technology (NIST), Cloud Computing is a technological innovation that provides configurable computing needs and resources minimum interaction. It works online on the internet as a server to process data and then can be accessed by connecting computers. Also, it is currently used by world's technology companies such as Apple, Google, Microsoft and the others.

## 3. RESEARCH METHODS

There are some steps in conducting this study. The stages can be seen in Figure 1.

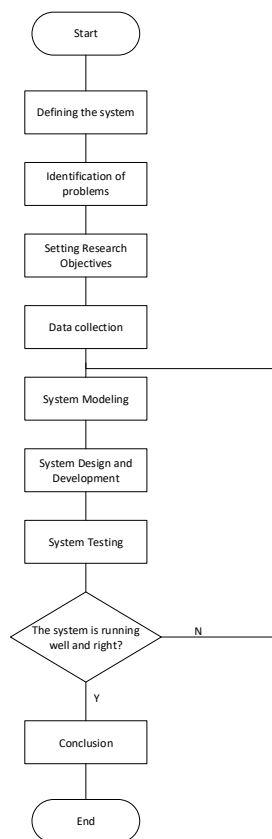


Figure 1. Research phase

The first step is to define the developed system, then identify problems related to the study. The second step is to set study objectives, therefore the readers can understand the purpose of the study. The next step is to collect the data required for the study. If the data have completed, then creating the modeling system to figure the initial image of the system. Then, designing and developing the system, including the database design and system forming. Lastly, testing the system and drawing the conclusions from the whole system.

## 3.1 General Overview of the System

The study of Android-based high school management information system application has an overview that can be seen in Figure 2.

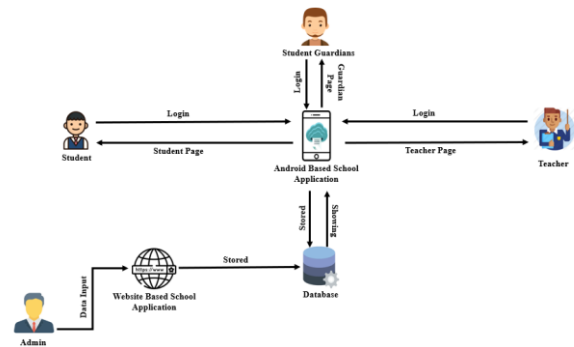


Figure 2. System Overview

The system workflow starts with the new accepted student at school, the admin of the website registers them, then they get a username and password to access the school SIM application. Student guardians also can enter the system by using the username and password that obtained by the students in the school. Teachers are also registered by the system admin and get their username and password to access the school SIM application. After the student login, there are other menu will be displayed in the main menu of daily lesson schedules, such as profile, school grades and news. The profile menu contains student profile, photos, and personal data as well as the parents' data. The school grade menu contains the data of the subjects that is taken by the students. The news menu contains the latest news from the school that is displayed on the login or can be read in the News menu. The main menu contains the schedules of subjects that taken by students from Monday to Saturday, completed with the name of the subjects, the name of teachers as well as the times of the lesson. The students can upload a permission letter if they could not attend a class on a particular day.

The student guardians have several menus which include profile, student grades data and student attendance. The profile menu contains the personal data of the student's parent or guardian. The student grades data contains the grades that obtained by the students, meanwhile the attendance contains the attendance data from the student. The parents or guardians can receive a notification if the teacher has given the scores and if the teacher has done the student attendance check, therefore they no longer need to worry about their children not attending the class.

The teachers have several menus which include schedule as the main menu, profile, grades, add grades, change school and news. Schedule as the teacher's main menu contains the teaching schedule from Monday to Saturday along with the subject name, the time, the name of school where they have to teach and the classrooms. The profile contains the teacher's personal data and education history. Grades, on the teacher's grades menu displays the grades data that already given to each student per class as well as the subject. The Add Grades menu contains the grade input process by the teacher who can be done per class and the subjects. In addition, homeroom teachers can do a verification therefore other teachers who have given the grades cannot change them again and the assessment authority can be given to them. The Change School is a menu that is used to transfer from school A to school B because in this system, the teachers are able to teach in several schools. Therefore, this menu is provided to transfer

schools. The News menu contains the latest news from the school.

### 3.2 Context Diagram

The diagram context is the most basic level in the data flow diagram, which describes only one process that is the overall system creating process. The diagram context of the Android-based high school management information system will be described in Figure 3.

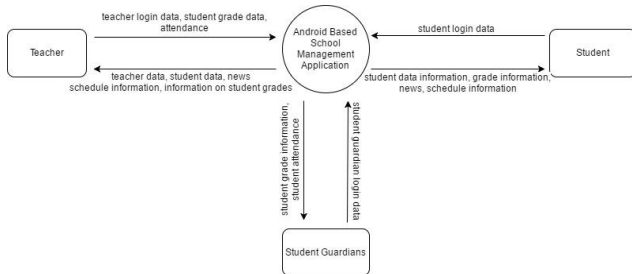


Figure 3. System Context Diagram

Figure 3 is the diagram context of the Android-based high school management information system where there are three user systems: teacher, student and student guardian. The process that occurs, such as teacher can login into the system. After that, they can add grades and do attendance check to students. The exchange that provided by the system is their data after they do a login, the data of the students used by the teachers to input grades, the list of grades that the teacher has input, their news and schedule information who has been input by the admin. The students can login to the system. Then, the system gives the student data information, grade information, lesson schedule information and also news. The guardians can login into the system by using the NISN username and password of the student, then the system gives the student grade information and student attendance.

## 4. RESULT AND DISCUSSION

The results and discussion of the Android based high school management information system includes three users, namely teachers, students and guardians.

### 4.1 Teacher

The teacher has several features that can be used on an Android-Based High School Management Information System

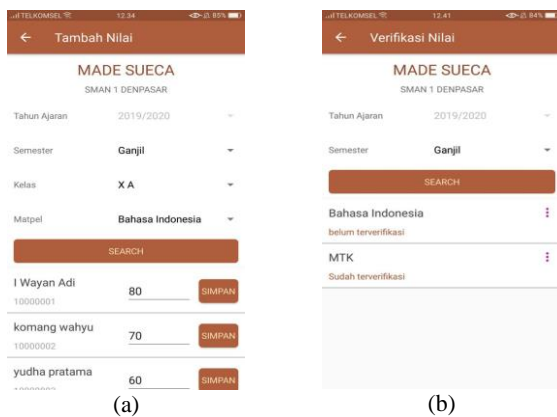


Figure 4. Add grades and view grades Menu.

Figure 4. (a) shows the display of the add grades menu that is used by the teachers in giving grades to the students according to the subject, class, semester, and the active academic year. The teachers can assign the grades by choosing what subjects they want to input, then the class that they taught and selecting the semester. The active academic year automatically displays. After that, they can enter the grade of each student and press save to finish it. The grades that entered by them go to the homeroom teacher. Then, the homeroom can re-edit each student's grade and verify them so they cannot be changed by the teacher who gave the grades earlier. It can be seen in Figure 4. (b).

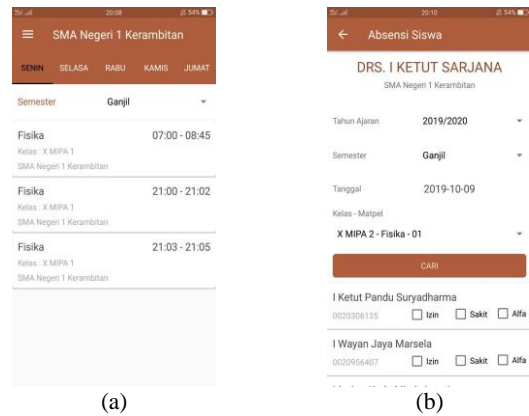


Figure 5. Teacher schedule and Attendance

Figure 5. (a) shows a display of the teacher's main menu in the form of a schedule on the Android-based high school management information System application. The schedule is the main menu of the teacher. They can see the teaching schedules on the display, followed by the subjects that taught by them, the class, the time, and the school where they have to teach. Fig. 5. (b) shows the display of the teacher's attendance menu. The teachers can do attendance check based on dates, classes, and subjects. They can see the permit or sick letters of the students before the attendance check. The parents or guardian of the student will receive a notification about the student's attendance report if they are present or absent in class.

### 4.2 Student

The students have several features that can be used on an Android-based high school management information System.

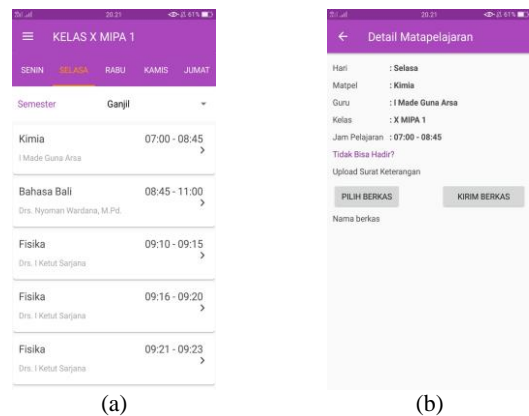


Figure 6. Student schedule

Figure 6. (a) shows a display of the student's main menu in the form of a schedule on Android-based high school

management information System application. The schedule is the main menu for students. They can see the timetable from Monday to Saturday as well as the relevant teachers at the schedule, subjects and time. Figure 6. (b) shows a display of the subject details that used by the students to upload a permission letter if they are unable to attend to the particular subject. The letter will be seen by the teacher during the attendance check.

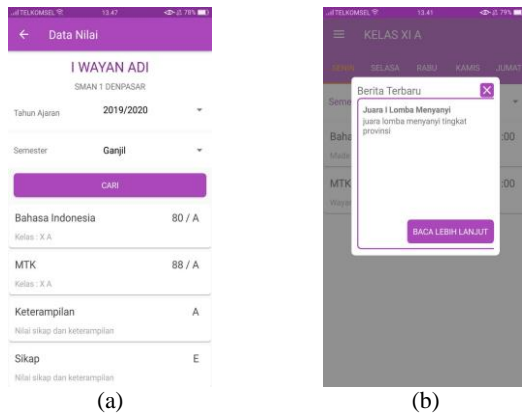


Figure 7. Student grades and latest Pop-up News

Figure 7. (a) shows a display of student grades data in the Android-based high school management application, where the grades data menu displays the grades that have been given by the teacher of the subjects taken. In order to see their grades, the students select the semester in the odd and even semesters based on the academic year. Fig. 7. (b) shows the latest pop-up information display of the student menu. The students who have logged in to the application are shown a pop-up information that contains the latest information from the school. The displayed Pop-up information contains the title and the info preview. The students can directly read the information if they have some time, but they can also read it later on the news menu that has been provided..

### 4.3 Student Guardian

The student guardian has several features that can be used on an Android-based high school management information System.

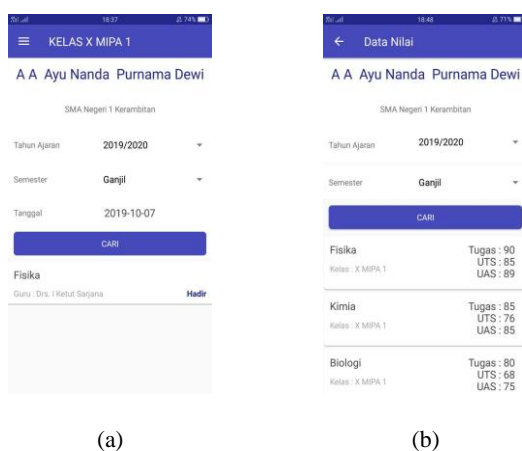


Figure 8. Attendance Report and Student grades

Figure 8. (a) shows the student attendance report for the student's guardian. The guardian will receive a notification if the teacher has done the class attendance check. The notification contains a notice that the student is present or absent in class. The Grade Report contains the grades that already received by the student.

## 5. CONCLUSION

The Android Based High School Management Information System is the application that was created to manage high school academic process. This application can be used by three different users: teachers, students, and student guardian. The teacher has several features that can be used in the application, such as teaching schedule reminder, pop-up information to display the latest school news, attendance, etc. The student in this application has several features, such as lesson schedule reminder, a place to upload the permission letter when they are unable to attend class, pop-up information, and the notification when the teacher has input the grades. The student guardian has two main features which, such as a notification of student attendance in order to know if the student is present or absent and a notification when the teacher has input the student grades.

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# Website-based High School Management Information System

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**Abstract:** Technology development has a great benefit in improving the quality of a school, for example the utilization of technology for value management. Many schools have not benefited yet from the current technological developments. Academic data in the form of value and attendance reports are still manually managed (written), therefore the data storage and management are inefficient. The solution for the related problems is inputting an existing archive into a website-based information system that enhances the efficiency of data management, especially in managing student value information. As the result, school management information system application is created, where it has a feature that can improve school's working quality. The results can be concluded that it has been successfully applied based on the tests that have been conducted, such as testing application directly, conducting an analysis and analyzing the progress of the applied school.

**Keywords:** Technology; Values; Data; School; Efficient

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## 1. INTRODUCTION

The role change of the information technology system is initiated by the role of efficiency, effectiveness to strategic role that develop along with the technological development. The strategic planning of Information System or appropriate education information technology can support the planning and development of the education which later will give additional value in the form of competitive advantage in educational competition. The implementation of the information systems will be useful if it is done according to the vision and mission, also the aim of educational institutions [1].

The academic information system is one of the tools for the educational data management and able to provide facilities to manage various academic data, such as student data, values, teachers and so on [2]. SMA Negeri 1 Kerambitan is a public high school located in Jalan Kukuh Mandung, Kukuh, Kerambitan, Tabanan Regency, Bali. The value management system in there is still manually. The report card is still in written form and distributed to the students or student guardian every semester. Creating the existing data which is in the written form resulting in how the data is not stored well and it requires a lot of time. The utilization of information technology is expected to improve the education quality, time efficiency and school resources for both teaching and learning activities as well as in creating a report card [3]. There is a way to increase the efficiency in managing student value information which is by building a website-based information system. It is a system that uses web technology and the Internet, where it can become the media of school publications in managing the academic data for teachers and students. Web features can simplify the data management, helping to improve the quality and maximize the student value management of the SMA 1 Kerambitan. The research by Siahhaan et al. [9] Titled " Web-Based Academic Information System at SMPN 20 Bekasi (Original title: Sistem Informasi Akademik Berbasis Web pada SMPN 20 Bekasi)" has proven that the use of the web can provide the effectiveness of teachers' performance in managing the academic data and

facilitates the students to access information such as task announcements, attendance, course schedule and values.

## 2. LITERATURE REVIEW

Literature Review discusses supporting theories in conducting the research, such as value, Database, MySQL, Website Cascading Style Sheet (CSS), Cloud Computing, Report Card, Assessment, and The school Information System.

### 2.1 Value

Value in English is derived from the Latin word *valere* means useful, capable, empowered, applicable, and powerful. The values are traits or (things) that are important or useful to humanity. It is an appreciation or a quality to something fundamental in the behavior of a person, something interesting or useful or profitable, and also a belief system [4].

### 2.2 Database

Database is a collection of data that is organized and stored neatly in the computer. It can be processed or manipulated by using a software resulting as an information. A Database is a logical collection of data or data descriptions that can be shared and created to obtain the information needed by the company [5].

### 2.3 MySQL

MySQL is a first database that was supported by a programming language script for the Internet (PHP and Perl). MySQL and PHP are considered to be the ideal software pairs for creating web application. MySQL is most commonly used to create web-based applications. Generally, in developing its application, it uses the PHP script programming language.

MySQL is a database that contains one or a number of tables. The tables consist of a number of rows and each row contains one or a number of tables. Furthermore, the table consists of rows and each row contains one or more tables [6]. Some of the advantages of using MySQL are high performance which allows users to work quickly; low fees or may not include any fees; licenses are open source; it is easy to learn and use. Nowadays, many databases use SQL because it remains easy to use on similar products. MySQL is portable and can be



used in several operating systems, such as Linux and Windows. The availability of source code is same as PHP, users can also modify the MySQL source code.

## 2.4 Website

Website or web is a collection of hyperlinks that go from one address to another with the HTML language (Hypertext Markup Language). The web can accommodate and provide a wide range of information needed with extensive coverage, since the information spreads globally through the website. Each of these websites provides its own information. It also has the ability to display text, graphics, sound and video simultaneously. In addition, The Web is also possible to design a multimedia-based online information system, therefore it can be accessible to anyone who access Internet by using Web Browser [7].

## 2.5 Cascading Style Sheet (CSS)

Cascading Style Sheet (CSS) is one of the Web programming languages to organize multiple components or elements in a web. Therefore, it is more structured and even with HTML or scripts [3]. It also has been supported by many browsers, especially the new version, therefore the layout placement is more flexible. Creating HTML using tagminimal affects the file size, it can display the main content first while the image and the other can be displayed afterwards.

## 2.6 Cloud Computing

Cloud Computing is a technology in which services and data on a system or application is no longer stored in a local computer, but rather stored virtually on the internet. Therefore, it can be accessed through many platforms and also easier to be shared with fellow users

## 2.7 Report card

Report card is the report of a student's learning activities for a certain period that is implemented in the form of value from a group of subjects. It is also followed by the assessment of personality, attitude and behavior. The study period entered in the form of a semester (6 months). [10]

## 2.8 Assessment

Assessment is the process of collecting and processing information to measure the achievement of student's learning outcomes. The assessment of learning outcome by educators is the process of collecting information/evidence of the student's learning achievement competences. It can be seen from spiritual and social attitudes, knowledge competencies, and skills competencies that are systematically done during and after the learning process. It also has the function to monitor the learning progress, learning outcomes, and detect the urge for continuous improvement of student learning outcomes.

## 2.9 The school Information System

The school Information System is the collection of information that supports the process of fulfilling the needs of the information. It is responsible for providing information in a unit process which aims to improve services on School.

## 3. RESEARCH METHODS

There are four steps that are performed on the methodology of this research. The steps of the study can be seen in Figure 1.

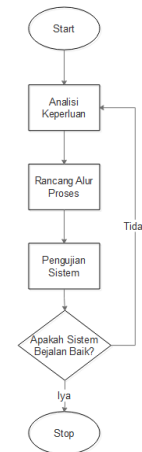


Figure 1. Research steps

The first step is analyzing the needs of the school, the teacher and the students. The analysis stage is to determine the application design in order to answer the needs of the user. The second stage is designing the process flow. Designing a process flows system is done in order to make the system to run according to defined procedures. The third stage is creating a system that suits the user needs. The fourth stage is conducting the system test. The applications that have been created are tested to know the errors and flaws that are present. If there are many errors or malfunctions in the system, then the workflow needs to be re-designed in order to fix the system malfunctions.

## 3.1 General Overview of the System

The research of the Website-based high school management system application has an overview that can be seen in Figure 2.

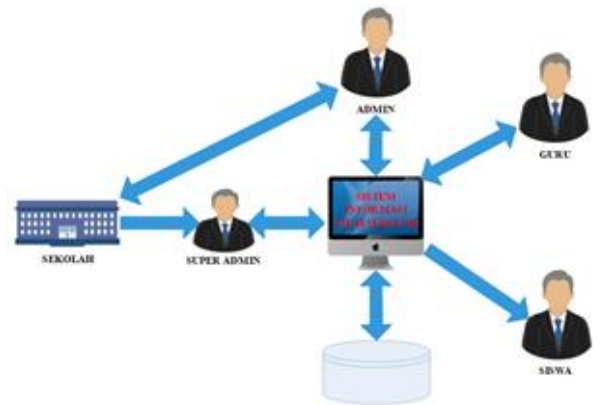


Figure 2. System Overview

This process starts from enrolling the school to the Information System (SI) and gets the authorization as an admin at each school. Then, new students that get accepted at the school are enrolled by admin, therefore they can access SIMANSE. Furthermore, they will get the display of student page that contains the profile, values and schedule.

## 3.2 Diagram Context

The diagram context aims to map the entire system in which there are three entities: Admin, teacher, and student. The diagram context of a Website-based high school management system will be described in Figure 3.

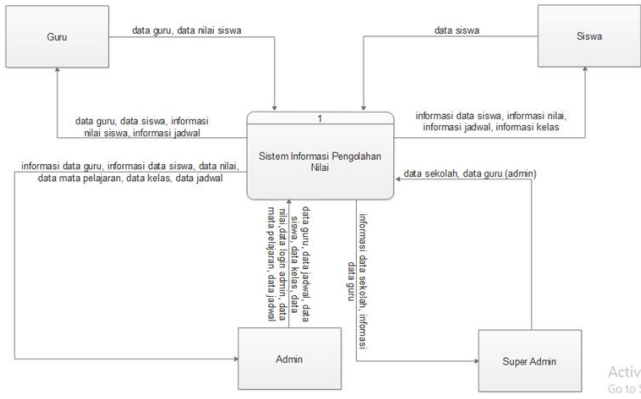


Figure 3. System Context Diagram

Figure 3 is the diagram context of the Website-based high school management system in which there are four entities: Super Admin, Admin, teacher, and student.

### 3.3 Data Flow Diagram

DFD Level 0 describes the data flow diagram that displays the entire system management process for each user. It will be described in Figure 4.

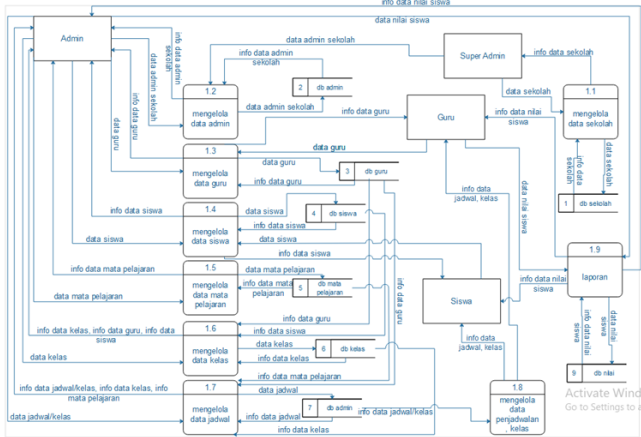


Figure 4. Data Flow Diagram

Data Flow Diagram (DFD) from a Website-based high school management information system that has been created. The DFD describes the data flow and explains the entire system management process of each user. Each flowline explains where the process takes place in managing the created system. The DFD of the system is managing the teacher data, student data, the subject data, student value data, student-class data, and print reports.

### 3.4 Entity Relationship Diagram

Entity Relationship Diagram is a design system tool that can display the overview of the inter-database relations design for the designed system.

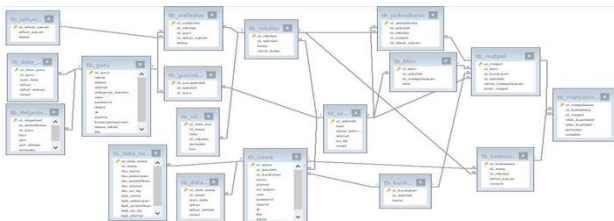


Figure 5. Entity Relationship Diagram

Figure 5 is a design of the created Web-based high school management information system. There are eighteen tables in the design of the database.

## 4. RESULT AND DISCUSSION

The results and discussion of the High school management Information system include system design results and website-based trial applications.

### 4.1 Home Display

Home display is the first place where the user will be redirected. Home displays the news from the registered school. In addition, it has a login module, download specific mobile applications and other functions.



Figure 4. Home

Figure 4. The home display has a function as the web's main display, which displays news. In order to run the module, the user must be logged in first and obtain the access rights.

### 4.2 Teacher's Dashboard

Teacher's dashboard is the initial display when the teacher has logged in. It is a place where the teachers can display student data. They also can manage the personal data, inputs student value, and print the report card if the teacher is the homeroom teacher.

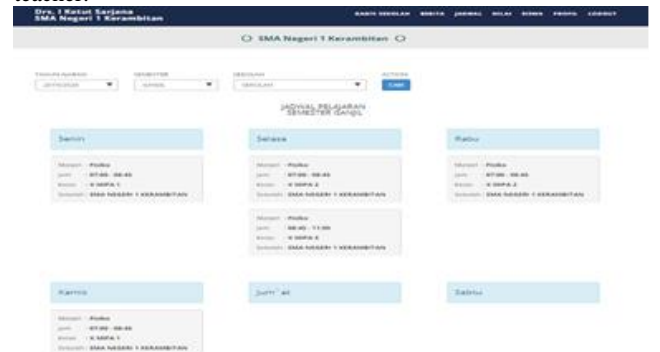


Figure 5. Teacher's Dashboard

Figure 5. Form of Dashboard when it is logged in by using teacher's access rights. It is a place where the teacher can display the teaching schedule, student value data or based on. The teacher has an access in inputting the value to their students based on the subject.

### 4.3 Student's Dashboard

Student's dashboard is the display when the student has logged in. It displays the schedule according to the class that they attend. They can manage their own personal data and there are several modules according to their functions.



Figure 6. Student's Dashboard

Figure 6. Student's Dashboard Form, where student can only see student value data, schedules, and school news. The students have their personal data that can be changed at any time if there are some changes in their data, such as address, phone number, and so on.

#### 4.4 Value Input Form

Value input form that the teacher owns is the form that is used to input the value of their students.

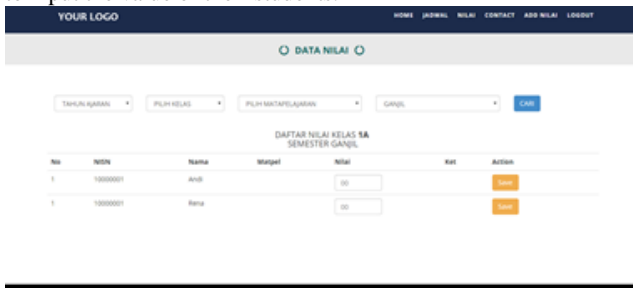


Figure 7. Value Input

Figure 7. The display when the teacher selects the value module in the previous Teacher Dashboard display. The teacher can input the value and it will come out automatically in the student's value. Also, they can see what the average value is earned by the students in that class.

#### 4.5 School Admin

School admin is held by an admin in every registered school. They assist the school in filling the data owned by the school.

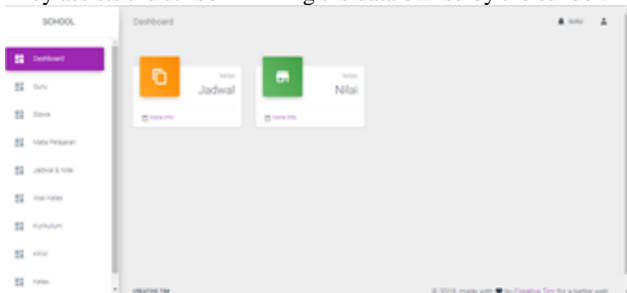


Figure 8. Home Admin

Figure 8. is a display of the school admin which consists of the teacher data, student, class, subjects, schedule and so on. It is based on what is needed in the learning and teaching process.

#### 4.6 Student Report

Student report is a feature that only owned by the homeroom teacher, which contains a summary of the student's value and attendance for the whole semester.

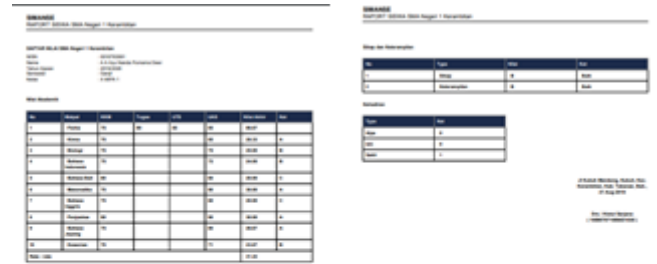


Figure 9. Student Report

Figure 9. is the display of the report of each student, where the report can be downloaded by the homeroom teacher on the Student menu.

#### 4.7 Additional Features

This application has several additional features, such as school news and student attendance that can only be accessed by school admins.



Figure 10. News

Figure 10. is the display of the news features that published by the school's admin, which contains news or announcements aimed at teachers and students in the school.

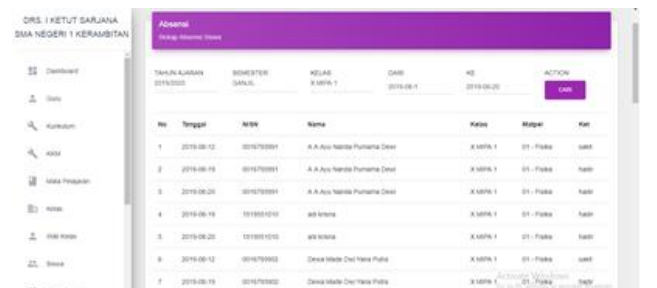


Figure 11. Student Attendance

Figure 11. is the display of the student attendance feature, where it summarizes the student attendance based on the start date until the end date of learning process. It is determined based on the required attendance data by the school admin.

#### 4.8 Super Admin Dashboard

Super Admin Dashboard has 3 modules, such as School module, teacher module, and dashboard module. The Super

Admin is the web owners who regulates the school and school admins.



Figure 12. Super Admin Dashboard

Figure 12. is the display in the Super Admin or the web owner itself. The purpose of it is to not overwhelm the web owner when organizing school data, as in students and classes

## 5. CONCLUSION

The High School Management Information system is a web-based application that aims to increase the efficiency in managing the student value information and assist in managing school academic data. The system testing shows that it is successfully making the teacher manages the academic data easier and helps the student to access schedule and value information. Furthermore, the application can still be developed for the display and new features, such as Android implementation and the Web student Attendance feature. As the result, it will be easier to see their activeness in school.

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# E-Readiness System E-Government ( Case of Communication and Information Office of Badung Regency)

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**Abstract:** The development of technology has an impact in various fields, one of them is government. Transferring works manually to the technology system tends to have certain problems, one of them comes from employees who use the system. E-Readiness is an E-Government system which applies Technology Acceptance Model (TAM) method. It is an analysis that is conducted towards the readiness of employee of Communication and Information Office of Badung Regency in using the E-Government system. The analysis of employee readiness is performed in order to support the development of the E-Government system. Therefore, it can be used as needed and help the performance of the Communication and Information Office of Badung Regency. The results of the study showed that the employees are ready to use the E-government system. This study used questioners that are distributed to 100 respondents who are the employee of Communication and Information Office of Badung Regency.

**Keywords:** E-Government; Technology Acceptance Model (TAM); E-Readiness; technology; employee.

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## 1. INTRODUCTION

The development of technology in various fields also influence the government sector. An application of technology in an institution has a risk of failure which is not small. However, in its development, information technology provides the possibility of transformation and increases productivity [1]. E-Government is the implementation of information and communication technology applied by the government in order to help their performance in terms of work and community service. The purpose of E-Government is indeed to improve government performance and services to the community. Sometimes, in implementing an E-Government product, there are several factors that cause it is not working as it should or even useless at all.

Communication and Information Office of Badung Regency is one of the government offices in Bali Province which implementing E-Government. It certainly requires readiness from the users. In this case, the users are the employee and the community who also felt the impact of E-Government. The success of an E-Government product depends on collaboration between system developers and managers in planning and implementing changes for various government activities and practices.

E-Readiness is a study of readiness of an individual or a company in accepting the application of information and communication technology. It also takes a role as the first step in order to make the E-Government products can be used properly. The Technology Acceptance Model (TAM) tells the main factors in accepting technology and explaining the behavior of the end user.

## 2. OBJECTIVE OF THE STUDY

This study aims to find out the level of readiness of employees at the Communication and Information Office in Badung Regency in using the E-Government system.

## 3. LITERATURE REVIEW

"Application of the Technology Acceptance Model (TAM) in Testing the Regional Financial Information System Acceptance Model (Original Title: Penerapan Technology Acceptance Model (TAM) Dalam Pengujian Model Penerimaan Sistem Informasi Keuangan Daerah)" is a study which analyzes the factors that influence the use of SIPKD by using the Technology Acceptance Model (TAM) approach. There are two variables, namely the independent variables, such as the use of technology (Perceived Usefulness) and ease of using technology (Perceived Ease of Use); and the dependent variable which is technology acceptance variable, as in this study, it is the acceptance of the Regional Financial Information System. The results showed that civil servants in the Yogyakarta region thought that the Regional Financial Information System was easy to use, therefore it could be accepted and used in supporting the work [2].

A similar study related to the analysis of readiness level in accepting a system was also conducted by Endang Fatmawati with the title "Technology Acceptance Model (TAM) for Analyzing The Acceptance of Library Information Systems (Original Title: Technology Acceptance Model (TAM) Untuk Menganalisis Penerimaan Terhadap Sistem Informasi Perpustakaan)". In analyzing, this study used several variables, namely: ease of use perception, usefulness perception, attitudes towards the use of information systems, intensity of information system users' behavior, actual use of information systems, and acceptance. The analysis of information systems acceptance in the library is conducted in order to determine the user attitude in accepting a technology that can be seen from the perception of ease of use and usefulness [3].

"Literature Study of the Integration of Two Methods of Readiness and Users Acceptance of Information and Communication Technology. (Original title: Studi Literatur

Pengintegrasian Dua Metode Kesiapan Dan Penerimaan Pengguna Terhadap Teknologi Informasi Dan Komunikasi)” discussed some common methods that are used to measure the level of readiness of users in using or adopting information and communication technologies. The technologies are Technology Readiness (TR) and Technology Acceptance Model (TAM), as well as the development of both methods namely Technology Readiness and Acceptance Model (TRAM). The measurement of usability and ease in using TAM specifically refers to a system. Technology Readiness is specifically for individuals who believe in using technology generally. This is the basis which tells that TAM and TR methods are intuitively related to one another. Combining these two methods resulting in a new method called as TRAM. It can explain why people who have high scores on TR do not always adopt new technology because the characteristic of the system, such as usability and ease of use also dominate the decision of making a process in adopting behavior [4].

“Readiness Level of E-Learning Implementation in High School of Yogyakarta City (Original Title: Tingkat Kesiapan Implementasi E-Learning Di Sekolah Menengah Atas Kota Yogyakarta)” analyzed school readiness and critical success factors in implementing E-Learning by using E-Learning Readiness (ELR) method by Chapnick. It can be classified into 8 categories, such as Psychological Readiness, Sociological Readiness, Environmental Readiness, Human Resource Readiness, Financial Readiness, Technological Skill (Aptitude) Readiness, Equipment Readiness, and Content Readiness. Based on assessments of the 8 ELR factors, high schools in Yogyakarta are quite ready in implementing E-Learning [5].

## 4. CONCEPTS AND THEORIES

### 4.1 Information System

System is a network of various kinds of interconnected work processes. The process may be different, but it carries out an activity together to accomplish a certain goal. Information is the result of processing a model, design, formation, organization or a change in the form of data that has a certain value and it can be used to increase knowledge for those who receive it. Information systems can be interpreted as a combination of information technology and individuals who use technology to help in management settings where there are determined procedures in it. In addition, it provides information about management in building company operations and making decisions. The purpose of this system is to process data into information that is right on target and useful for the recipients [6].

### 4.2 E-Government

The World Bank Group defines E-Government as information technology used by government to support their relations with the community, business cooperation, and other parties. In addition, it is also considered as a process of transaction between the government and the community through the use of automated systems and internet networks. According to Kumrotomo, there are many failures often happened in the implementation of e-government. It is due to different opinion regarding the definition of e-government. In Indonesia, the meaning of e-government often refers to the use of computers in service procedures administered by government organizations. In fact, e-government as in the international meaning refers to the administration of government through the use of internet technology [7].

### 4.3 E-Readiness

E-Readiness is a new concept. It derives from the word ‘Readiness’ which means ready physically and mentally to do something. The concept of readiness is not only about physical maturity, but it is also a combination of emotional stress and situations as a result of the learning environment and new operations.

### 4.4 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is a development of the Theory of Reasoned Action (TRA) which is directed to model user acceptance towards information systems. Davis (1986) developed the TAM based on the theory of TRA in order to understand the causal relationship between users’ beliefs, attitudes, and internal intentions, as well as to predict and explain the acceptance of computer technology [2]. The use of TAM theory is able to determine the effect on beliefs, attitudes, and goals of its users. Beside it is based on a strong theoretical basis, the advantage of the TAM model is that it can answer doubtful question because of many failures in the application of technological systems [3]. The purpose of TAM is to explain the determining factor in the general acceptance of information-based technology and the behavior of the information technology end-user with a fairly wide variation, as well as user population. TAM has 5 main variables, such as (1) Perceived Usefulness, (2) Perceived Ease of Use, (3) Attitude toward Using Technology, (4) Behavioral Intention to Use, and (5) Actual Technology Use. In this study, the TAM model will add external variables, namely Self-efficacy, Complexity and Lack of Time.

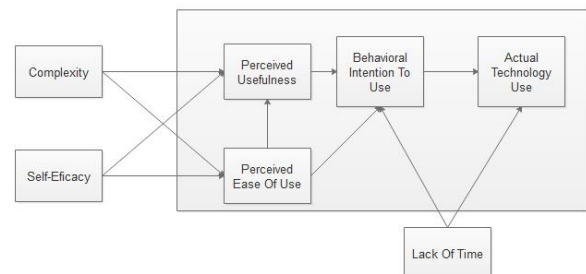


Figure. 1 Technology Acceptance Model

## 5. RESEARCH OF METHODOLOGY

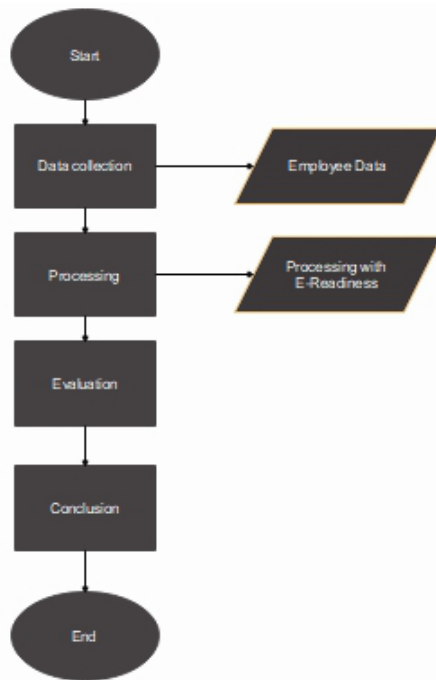


Figure. 2 Research Flow

The first step is collecting questionnaire data from the employees of Communication and Information Office of Badung Regency. The questionnaires were distributed to 100 respondents in various fields of the office. The second step is processing questionnaire data. After distributing questionnaires, it will be processed with a processing application. The third step is evaluating the results. The evaluation is carried out in order to review the results of data processing. The fourth step is obtaining conclusions from data processing and the evaluation of it. The last step is results.

## 6. RESULT DATA PRESENTATION & ANALYSIS

### 6.1 Self Efficacy

Variable data of Self-Efficacy in the questionnaire consisted of 2 statements using 2 alternative answers "yes" and "no". The Self-Efficacy has a minimum value of 0 and a maximum value of 2. It is obtained based on the answer of each questionnaire item. The questionnaire data are processed through SPSS. Then, it obtained an average value of 1.7889, a median value of 2.00 and a mode value of 2.00, a standard deviation value of 0.55068 and a variant value of 0.303. Then, the total value is classified into 2 criteria, namely confidence and not confidence. The result reveals how the employee confidence in using E-Government. It shows that 89.4% of employees feel confident and 10.5% of them feel unconfident.

### 6.2 Complexity

In the questionnaire, the variable data of Complexity consisted of 3 statements using 2 alternative answers "yes" and "no". The Complexity has a minimum value of 0 and a maximum value of 3. It is obtained based on the answer of each questionnaire item. The questionnaire data are processed through SPSS. As the result, it obtained an average value of

0.6333, a median value of 0.00 and a mode value of 0.00, a standard deviation value of 0.94155 and a variant value of 0.887. The total value is classified into 2 criteria, such as complicated and uncomplicated. The result shows that 21.1% of employees feel the use of the E-Government system is quite complicated and 78.8% of them feel it is not.

### 6.3 Lack Of Time

Variable data of Lack of Time in the questionnaire consisted of 3 statements using 2 alternative answers "yes" and "no". The Lack of Time has a minimum value of 0 and a maximum value of 3. It is obtained based on the answer of each questionnaire item. The questionnaire data is processed through SPSS and it obtained an average value of 1.0222, a median value of 1.00 and a mode value of 1.00, a standard deviation value of 1.00535 and a variant value of 1.011. Then, the total value is classified into 2 criteria, namely limited and unlimited. In learning and using the E-Government system, the result shows that 34.07% of employees have limited time and 65.92% of them have no time constraints.

### 6.4 Perceived of Usefulness

In the questionnaire, the variable data of Perceived of Usefulness consists of 6 statements using 2 alternative answers "yes" and "no". The Perceived of Usefulness has a minimum value is 0 and a maximum value of 6. It is obtained based on the answer of each questionnaire item. The questionnaire data is processed through the SPSS application. Furthermore, it obtained an average value of 5.7, a median value of 6.00 and a mode value of 6.00, a standard deviation value of 0.85394 and a variant value of 0.729. The total value is classified into 2 criteria, such as useful and useless. In helping the employee with their work, the results of it show that 95% of them think it is useful and 5% of them think it is useless.

### 6.5 Perceived Ease of Use

Variable data of Perceived Ease of Use in the questionnaire consisted of 6 statements using 2 alternative answers "yes" and "no". The Perceived Ease of use has a minimum value of 0 and a maximum value of 6. It is obtained based on the answer of each questionnaire item. The questionnaire data is processed through SPSS. It obtained an average value of 5.1444, a median value of 6.00 and a mode value of 6.00, a standard deviation value of 1.26811 and a variant value of 1.608. Then, the total value is classified into 2 criteria: easy and hard. The results show that 85.7% of employees think that the E-Government system is easy to use and 14.2% of them think it is hard.

### 6.6 Behavioral Intention to Use

In the questionnaire, the variable data of Behavioral Intention To Use consisted of 5 statements using 2 alternative answers "yes" and "no". The Behavioral Intention to Use has a minimum value of 1 and a maximum value of 5 obtained based on the answer of each questionnaire item. The data is processed through SPSS. Then, it obtained an average value of 4.7222, a median value of 5.00 and a mode value of 5.00, a standard deviation value of 0.67087 and a variant value of 0.450. The total score is classified into 2 criteria, namely high and low. The results of the processing show that the intention of the employee using the E-Government system. It reveals that 94.4% of employees having high intention and 5.5% of them having low intention of the E-Government system.

## 6.7 Actual Technology to Use

Variable data of Actual Technology to Use in the questionnaire consisted of 6 statements using 2 alternative answers "yes" and "no". The Actual Technology to Use has a minimum value of 1 and a maximum value of 6. Then, it is obtained based on the answer of each questionnaire item. The questionnaire data was processed through SPSS. As the result, it obtained an average value of 4.4778, a median value of 4.00 and a mode value of 6.00, a standard deviation value of 1.41602 and a variant value of 2.005. The total value then is classified into 2 criteria, namely using and not using. The results show that 74.6% use the E-Government system and 25.3% do not.

## 7. CONCLUSION AND RECOMMENDATION

The results of this study showed that the variable factors, such as Self Efficacy, Lack of Time, and Complexity are external factors that have an influence on the use of E-Government in the Communication and Information Office of Badung Regency. The results reveal how the employees react to the e-government system. The reactions are 78.8% of them feel it is uncomplicated; 89.4% of them feel confident in using it; 65.92% of them feel they have no time constraints on learning and using it; 95% of them think that it is useful in helping their works; 85.7% of them think that it is easy to use; 94.4% of them have a high intention towards it; and 74,6% of them use it directly.

The suggestions that can be given after conducting a study on E-Readiness of the E-Government System at the Communication and Information Office in Badung Regency are as follows:

1. Holding some special training to provide opportunities for employees of the Communication and Information Office in Badung Regency to learn more about the E-Government system.
2. Supervising the employees in using the E-Government system gradually starting from the introduction to the use of the system.
3. For the developer, the system should be adjusted, therefore it can be easier for the users to use the system (user-friendly).
4. For the following research developer, it is expected that the variables used can be added or further developed with other methods in order to find out the level of acceptance that is not yet available in this study method.

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# Notification Features on Android-Based Job Vacancy Information System

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**Abstract:** Job vacancy is an information created by a company that contains certain requirements. There are many job vacancies that are published by the company. However, the range in delivering and spreading their information is still limited. Therefore, it is very hard to discover this information. Submission of job applications is generally still in the conventional way, which is by printing the application, then coming to the company to submit it. This job application process becomes an obstacle for job applicants because they have to pay more for transportation and printing cost. Another obstacle is the difficulty in getting information about the status of their applications that have been submitted. An Android-based job application is developed in the Android platform to overcome the problems related to the job vacancy. The implementation process utilizes Web Service, Firebase System, PhpMyAdmin, and Android smartphones. This Android-based job information system with the notification features is a solution to improve the quality of service and spread job vacancy information from a company. Furthermore, it also can help the applicants in sending applications at the intended company.

**Keywords:** information system; notification; job vacancy; android; firebase.

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## 1. INTRODUCTION

Job vacancy is an information created by a company that contains certain requirements. There are many job vacancies that are published by the company. However, the range in delivering and spreading their information is still limited. Therefore, job applicants have a hard time to discover this information. Generally, the submission of job applications is still in the conventional way, which is by printing the application, then coming to the company to submit it. This job application process becomes an obstacle for job applicants because they have to pay more for transportation and printing cost. Another obstacle is the difficulty in getting information about the status of their applications that have been submitted. Information technology is currently utilizing the internet in the delivery of information because it is real-time and it does not cost a lot in its use. The internet can be accessed through many devices such as computers, laptops, smartphones, and even televisions. Delivering information by using the internet has more advantages because it has a very wide range. The information published on the internet can be seen by people all over the world. Notification feature is an example of the use of the internet in information technology. In addition, it is used to convey information in real time. The notification feature is used in this study to overcome problems related to the job vacancy information delivery and job application status that has been sent to the system.

A solution offered for this problem is in the form of an Android-based Job Vacancy Information System application which aimed at job applicants. The notification features in the application are intended to overcome the problems experienced by job applicants. As the result, they do not have to spend money for transportation and printing cost because they can submit and send their applications online to the company by using the system. In addition, the system also utilizes this feature as a place for delivering the latest information about the status of applications that have been submitted by the job applicant in real-time.

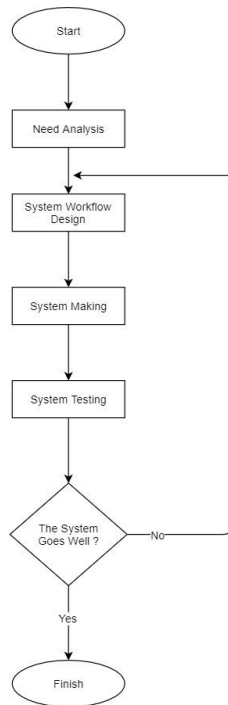
## 2. LITERATURE REVIEW

A study by Siti Maisaroh discusses an Android-based and web services information system of job vacancy in Tangerang. The developed Android-based applications can link the relationship between the job providers and job applicants efficiently. It is because there is an information facility of the company in the Android application. The web service is used to make it easier for administrators to update and manage job information. All data that is displayed on the Android application can be managed through a web service [1].

A study by Natas Dwi Renggo discusses an application for CV. Cakra Surya Nusantara. The application applies firebase notification as a means of delivering information about honey stock to customers. It aims to control the customer's honey stock and make it easier for owners to run their business [2].

## 3. RESEARCH METHODS

There are four steps in conducting this research, namely requirements analysis, system workflow design, system development, and system testing. If the step of system testing has been going well, then the step of system developed has been successfully completed. The display of the research method is shown in Figure 1.

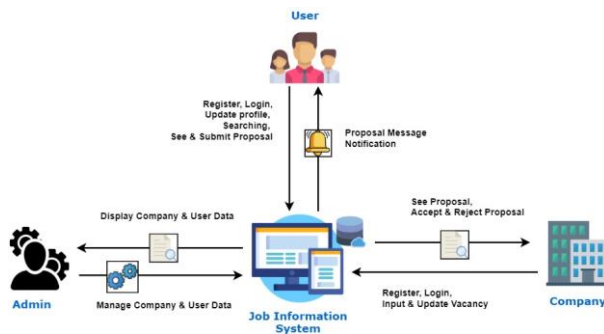


**Figure. 1 Reaserch Method**

The first step is analyzing the needs of both the applicant and the company. This step is carried out to determine the design of the developed application and the needs of both parties. The second step is designing the system workflow. The design needs to be done, therefore the system is able to function according to specified procedures. The third step is creating a system, both an Android system for applicants, and a web service intended for companies as a place to manage data. The fourth step is system testing. The developed application is then tested to find out whether there are errors in the system. If yes, then a redesign of the system workflow is performed in order to correct errors in it.

### 3.1 System Overview

The Android-Based Job Vacancy Application with Notification Feature has a general overview which contains applicants, companies, and admins. It can be seen in Figure 2.



**Figure. 2 System Overview**

Companies can register, log in, input & update vacancies (containing requirements, expertise). Admin functions as a data receiver and data processor from users and companies. The job vacancy information system functions as a forum for delivering user information and applications sent to companies. Job seekers can register, log in, input & update profiles, search, and submit applications in the job information system. Job applicants get notifications, such as

their application status that is processed, accepted or rejected by the company.

## 4. CONCEPTS AND THEORIES

This section contains supporting theories in conducting this research, such as Android, web server, firebase, cloud computing, and MySQL.

### 4.1 Android

Android is a linux-based operating system used for mobile devices. It is the first operating system that can be downloaded for free, designed by Google [3]. The android information system applications are divided into three developments, namely the development of PHP and Java programming languages (hybrid applications), development of PHP programming languages (web applications), and development of Java programming languages (Java applications) [4].

### 4.2 Web Server

A web server is a hardware (server) and software that provides an access service for users through HTTP and other types of communication protocols such as HTTPS and FTP over documents stored at a URL for users [5].

### 4.3 Firebase

Firebase is a technology that allows developers to create web applications without server-side programming, therefore its development is easier and faster. It also allows developers to use the Firebase Cloud Messaging (FCM) feature. The main capability of FCM is that it can send messages in the form of notifications and data. The Firebase provides a capacity of 10 gigabytes for data transfer and an additional 1 gigabyte for storage [6].

### 4.4 Cloud Computing

Cloud computing technology is a technology where most of the computing and processes are located on the internet. As the result, the users can access the desired service at all locations as long as it has internet access. The cloud computing is also a technology that allows IT resources to be used in various types of platforms, different systems, and program codes. Therefore, it can be integrated with various types of services and uses. In addition, it is a service model that utilizes a configured computing resource (for example servers, networks, systems, storage, and services) and can be run through the internet. The advantage of cloud technology is that users can store data in a structured and centralized manner in one server on the services provided by service providers [7].

### 4.5 MySQL

MySQL is a management system of SQL Database that is very popular because it is open source. The MySQL Database System has several supporting features such as the SQL Database management system (DBMS), multiuser, and multithreaded [8].

## 5. RESULTS AND DISCUSSION

The results and discussion of the Job Vacancy Information System application include direct system testing, Black Box Testing, and questionnaire testing. The results of these three tests will be discussed as follows.

### 5.1 System Testing

The job applicants can view and submit their job applications in selected vacancies. In addition, they can receive and view notification messages from the company when their submitted

job applications are in the process of checking. This test is carried out directly by using the Job Vacancy Information System application. Job vacancies and application submissions are shown in Figure 3.

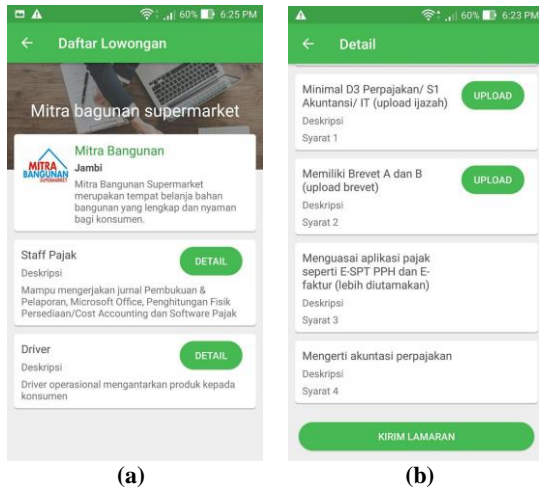


Figure 3 Application Submit Feature

Figure 3 shows a step in sending a job application to the company through the application of a job applicant. Figure 3(a) is a detailed view of the job vacancies in which it contains the required skills in the vacancy. Figure 3(b) is a display of the expertise details, in which the applicant must complete the requirement file (upload) required by the company before sending their job applications. Display notifications and notification messages related to the job applications that have been sent are shown in Figure 3.

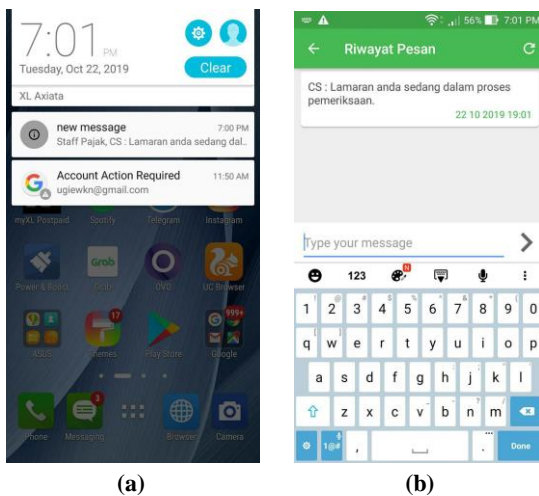


Figure 4 Notification Feature

Figure 4(a) is a notification display where the job applications that have been sent previously are processed by the company. Figure 4(b) is a display of the message history or notification message details that the company sends to the job applicant. In addition, the job applicant can send messages directly through Job Vacancy Information System application.

## 5.2 Black Box Testing

Black box testing is a technique of testing functional systems based on specific test cases. The test is carried out to evaluate the system on interface display (external) without knowing what is happening in the coding section. The purpose of black box testing is to find out failures or errors in the systems that

cover operational, system scenarios, and capabilities. The black box testing table can be seen in Table 1.

Table 1. Black Box Testing

Test Name	Expected results	Test result	Result
Create an Account	Entering registration data and make a registration	Job applicants successfully entered registration data and make a registration	[x] Accepted [ ] Rejected
Verification	Receiving verification email	Job applicants successfully received a verification message in the email	[x] Accepted [ ] Rejected
Login into the application	Registration data has been verified and can be logged into the application	Registration data are valid and successfully used to enter the application	[x] Accepted [ ] Rejected
Find a job vacancy	Displaying the name of the job vacancy	The name of the job vacancy was successfully displayed	[x] Accepted [ ] Rejected
See the job vacancy information	Displaying company information and available expertise	Successfully received company information and available expertise	[x] Accepted [ ] Rejected
See expertise information	Displaying the requirements needed in the chosen expertise	The requirements of the chosen expertise were successfully displayed	[x] Accepted [ ] Rejected
Upload a requirement file	Selecting files to upload according to the requirement of the chosen expertise	Successfully selected, entered and displayed the name of the uploaded file	[x] Accepted [ ] Rejected
Submit a job application	Sending a job application can be performed	The job application was successfully sent to the selected expertise	[x] Accepted [ ] Rejected
Job Application History	Displaying the job application history data that have	Successfully showed the submitted job application history data	[x] Accepted [ ] Rejected

	been submitted		
Cancel Job Application	Sending job application cancellation messages and canceling job applications that have been made	Successfully canceled the job application and delivered a cancellation message	<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected
Message history	Displaying message history and the message sent	Successfully showed message history and the message sent	<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected
Receive Notifications	Receiving notification messages on an Android device	Successfully received notification in the form of a pop up notification on an Android device	<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected
Receive Reminder	Receiving notifications and reminder messages about the information on job interview	Successfully received a notification and reminder message when the interview will be held	<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected
Update Profile	Displaying job applicant data and can change the data	Successfully showed job applicant data and the data successfully changed	<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected
Exit Application	Returning to login display	Successfully returned to login display	<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected

The result of black box test in Table 1 shows that the job applicants can create an account on the Application. After the account is created, they will receive a verification email containing a link for the activation of the registered account. Then, they can login to the application by entering the correct email and password. The job applicants also can find for the desired job vacancies in the search column. Furthermore, they can see information about the chosen vacancy. The required information that is needed in the chosen expertise can be shown. Then, they can upload files on the requirement that needed file uploads. After all the requirements have been fulfilled, then the job applicant can send their job applications directly through the Application. A list of their submitted job applications can be seen in the application history. In addition, the job applicants can cancel their submitted job application and include the reasons. Furthermore, they can see and send messages to the company. They will receive a notification if their submitted job application has been processed by the company. A reminder notification for interviewing will also be received by them. Profile data that

was filled in during registration can be changed. The job applicant can exit the application if they want.

### 5.3 Questionnaire Testing

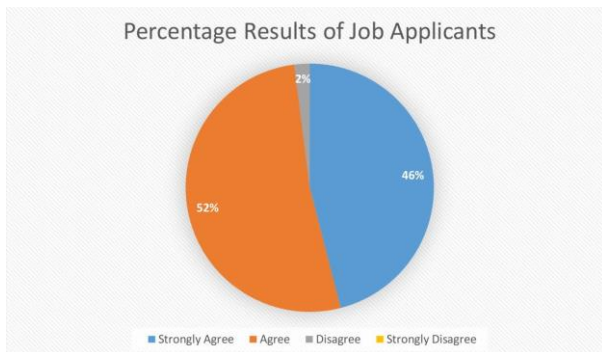
Besides black box testing, the questionnaire is also used in testing Job Vacancy Application. The questionnaire was distributed to 35 respondents, such as 30 respondents for job applicants and 5 respondents for companies. A table of 30 job applicant respondents can be seen in Table 2.

**Table 2. Test Results of Job Applicant Respondent**

Question	SA	A	DA	SDA
Is the display provided by this application easy to understand?	57%	43%		
Are the features provided in the Application easy to use?	53%	47%		
Does the vacancy information provide on this Application suit your needs?	20%	80%		
Is this application easy to learn?	47%	40%	13%	
Is this application easy to operate?	47%	43%	10%	
Have you easily avoided mistakes when using the Application?	33%	57%	10%	
Is the menu display in the Application easy to recognize?	47%	50%	3%	
Are you helped by the Notification feature as a service media?	47%	53%		
Are you helped by the Reminder feature as a service media?	50%	50%		
Are you helped by the Message feature and Message History as a service media?	53%	47%		
Do you feel comfortable with the Verify email as a security feature?	40%	60%		
Are you helped by the Send Job Application feature as a service media?	60%	40%		
Are you satisfied with the features provided in this application?	47%	53%		
Are you interested in finding a job with this application?	47%	53%		
Are you interested in inviting your family or friends to use this application?	43%	57%		
<b>Total</b>	<b>46%</b>	<b>52%</b>	<b>2%</b>	

The total percentage of the questionnaire result that is distributed to 30 job applicant respondents is 46% of answers strongly agree, 52% of answers agree, and 2% of answers disagree. The percentage diagram of the total results from the questionnaire calculation is shown in Figure 5.





**Figure. 5 Percentage Results of Job Applicants**

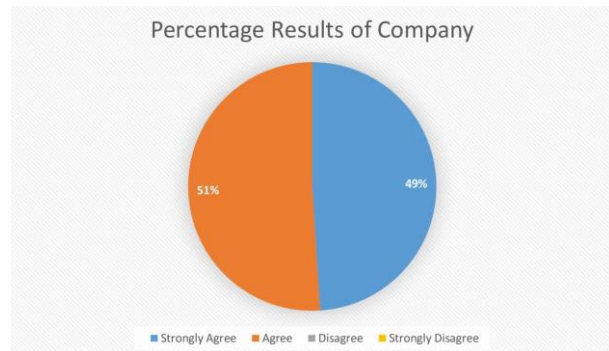
Figure 5 displays the result percentage of the job vacancy application test by using questionnaire media towards job applicant respondents. The questionnaire was also distributed to 5 companies with a total of 15 questions. It was performed to see the results from the company's point of view regarding the developed application. Table of test results of the job vacancy application for company respondents can be seen in table 3.

**Table 3. Test Results of Company Respondent**

Question	SA	A	DA	SDA
Is the display provided by this application easy to understand?	80%	20%		
Are the features provided in the Application easy to use?	80%	20%		
Does the job vacancy information provide on this Application suit your needs?	60%	40%		
Is this application easy to learn?	40%	60%		
Is this application easy to operate?	40%	60%		
Have you easily avoided mistakes when using the Application?	60%	40%		
Is the menu display in the Application easy to recognize?	80%	20%		
Are you helped by the Notification feature as a service media?	40%	60%		
Are you helped by the Reminder feature as a service media?	60%	40%		
Are you helped by Message feature and Message History as a service media?	40%	60%		
Do you feel comfortable with the Verify email as a security feature?	60%	40%		
Are you helped by the Send Job Application feature as a service media?	40%	60%		
Are you satisfied with the features provided in this application?	20%	80%		
Are you interested in finding a job with this application?	20%	80%		

Are you interested in inviting your family or friends to use this application?	20%	80%		
<b>Total</b>	<b>49%</b>	<b>51%</b>		

The total percentage of the questionnaire result that is distributed to 5 company respondents is 49% answers strongly agree and 51% answers agree. The percentage diagram of the total results from the questionnaire calculation is shown in Figure 6.



**Figure. 6 Percentage Results of Company**

Figure 6 shows the result percentage of the job vacancy application test by using questionnaire media towards the company. It shows 49% strongly agree and 51% agree.

## 6. CONCLUSION

Job Vacancy Information System is designed and applied in the form of an Android mobile application. The application is designed as a medium for delivering job vacancy information to job applicants. It is developed specifically for mobile devices with the Android platform that can be used by the job applicants. The process of storing and processing data is carried out by an application by using MySQL to support a centralized database service. In addition, it utilizes the Firebase Cloud Messaging (FCM) feature as a delivery medium for notifications on Android mobile devices. Notifications are delivered by the company on the web service to the Android mobile of the job applicants. It is sent when a new job vacancy has been published, job applications are in the process of examination or interview, and accepted or rejected.

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# Quality Analysis of Website E-Commerce XYZ Service Using Webqual 4.0 and Importance Performance Analysis (IPA) Methods

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**Abstract:** Website is an entity which is not separated in e-commerce industry, quality and reliability of website needs to be concerned by stakeholders in e-commerce industry. WebQual 4.0 is a method of quality measurement of website through user perceptions based on three dimensions includes usability, information quality, and service interaction quality. The population of this research are the active users who access website e-commerce XYZ amounted 100 respondents which are selected using purposive sampling. The research method used in this research is survey with WebQual 4.0 based questionnaire which is analyzed using IPA (Importance Performance Analysis) to find out the level of user satisfaction which is comparison or GAP between interest and performance. The results of the validity and reliability test showed that the whole questionnaire items were valid and reliable because they had fulfilled the requirements and were understood by the respondents. The results showed that of the 22 items analyzed by the IPA method were grouped into quadrant I (6 items), quadrant II (4 items), quadrant III (5 items) and quadrant IV (7 items). The items that are considered important and need to be improved are located in quadrant I, which are the provision of accurate, detailed information, appropriate format, security when making transactions, ease of communication with parties of e-commerce XYZ, and compatibility of products to be delivered.

Keywords: E-Commerce, WebQual 4.0, Importance Performance Analysis

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## 1. INTRODUCTION

Internet which presents in society has changed system and arrangement in all life aspects, one of which is business world. The presence of internet has provided new ideas in business world with the system of online transaction through e-commerce. E-commerce as new, easy and fast transaction media provides great benefits for many parties such as sellers and buyers where the process of buy and sell can be conducted without facing the people directly and it is not wasting time.

In general, e-commerce transaction process is conducted through internet media such as website. E-commerce really depends on the amount of people who visit website, conduct transaction, and website use intensity. If website has attractive displays and easy to use, the consumers will feel comfortable when visiting website to see the products and more often conduct transactions. Concerning the importance of website for e-commerce, then need the service quality measurement of website to fulfill users expectations.

At present there aren't many online buying and selling sites that measure the quality of their websites. Measurement of website quality is very important to do to increase the level of website usage [1]. Website quality measurement which based on perception and expectation of the users needs to be conducted to maintain the existence and success of website. In order to maintain existence and fulfill user expectations, an analysis of service quality is needed for website e-commerce XYZ to find out the level of user satisfaction towards website e-commerce XYZ. Website service quality analysis is conducted based on user point of view using WebQual 4.0 method. WebQual 4.0 method is compiled based on three variables as benchmark

which are usability, information quality, and service interaction [2]. The data obtained is analyzed using Importance Performance Analysis (IPA) to get indicators that need improvement or needs to be maintained based on perception and expectation of users.

## 2. LITERATURE REVIEW

The research about website service quality analysis entitled "Quality Analysis of Website E-commerce Berrybenka Service Towards Visitors Satisfaction Using WebQual 4.0 and Importance Performance Analysis (IPA) Methods". The analysis result shows the compatibility value of Berrybenka website for 94,91% and average result of discrepancy analysis (GAP) -0,0901 which shows that Berrybenka website has fulfilled user expectation. Based on IPA method, Berrybenka website is still has main priority to be conducted improvement on website which is indicator 11 concerning accuracy of the given website information [3].

Analysis of website service quality using the WebQual 4.0 method has also been conducted by Robby Yuli Endra and Deni Hermawan in a journal entitled "Analysis and Testing of Tokopedia.com Website Users Using the WebQual Method". The results of the research on the Tokopedia.com website using the Likert scale, three variables in the WebQual 4.0 method, which are usability indicating quality scale, quality information variables addressing quality scales, and quality interaction variables showing sufficient quality scales [4].

Ike Putri Kusumawijaya and Cut Maisyarah Karyati in their journal entitled "Quality Measurement of Website fashion E-commerce Using WebQual 4.0 Method", conducted research related to quality of website with case study of Tokopedia E-commerce towards its user satisfactory. Respondents in the

study were 100 students of the Department of Information Engineering at Gunadarma University. The analysis result of the dimensions of quality assessment questions for the highest category obtained is the usability dimension. Based on the analysis of the question subcategory, the subcategory that has the highest value is design, while the empathy subcategory has the smallest value have two different kinds of platform types, such as Android and web [5].

### 3. RESEARCH METHODS

This research uses descriptive analysis with quantitative methods. The determination of the number of samples using the Slovin formula and obtained a minimum of 100 respondents. Data collection was conducted using a questionnaire distributed online. After the data is collected, the data is tested using a validity test of product moment and alpha cronbach reliability test to prove that the data are reliable and valid. The data that have been tested then processed using WebQual 4.0 and Importance Performance Analysis (IPA) method to be analyzed if the website performance has compatible with users expectations and find out indicators that needs improvement. The next step is was conduct conclusion taking and improvement suggestion.

### 4. CONCEPTS AND THEORIES

#### 4.1 Website

Website is a system with universally accepted protocols for storing, retrieving, formatting, and displaying information through architecture client/server. The common protocol is HTTP, which stands for hypertext transport protocol. Website in its development is used as a media provider of information, promotion and sale of a product. This makes it easy for businesses to market products and make website as part of customer relationship management process.

#### 4.2 Website Quality

Website quality is divided into five dimensions [6] includes information which is dimensions which includes of content, usage, completeness, accuracy, and relevance of content in the website. Security is dimensions that are given trust, privacy, and security guarantee. Convenience, which is the dimension that contains trust, privacy and security guarantee. Related to it, wich is dimensions that contain visual appeal, emotional attraction, creative and attractive design of online service and customer service.

#### 4.3 Electronic Commercial (E-Commerce)

Electronic Commerce (e-commerce) is purchasing, sale, or exchange of products, service and information through computer systems [7]. E-commerce can also be interpreted as a business process using electronic technology that connects companies, consumers and the public in the form of electronic transactions and the exchange / sale of goods, services, and information electronically.

#### 4.4 WebQual 4.0

WebQual is method measures quality of a situs based on user perception developed by Stuart Barnes. WebQual uses basis of Quality Function Development (QFD). WebQual 4 consists of 3 main components includes usability, information quality, interaction and service [8]. The following are question indicators of these 3 variables.

1.	Usability	Find the site easy to learn to operate
2.		My interaction with the site is clear and understandable
3.		I find the site easy to navigate
4.		I find the site easy to use
5.		The site has an attractive appearance
6.		The design is appropriate to the type of site
7.		The site conveys a sense of competency
8.		The site creates a positive experience for me
9.	Information Quality	Provides accurate information
10.		Provides believable information
11.		Provides timely information
12.		Provides relevant information
13.		Provides easy to understand information
14.		Provides information at the right level of detail
15.		Presents the information in an appropriate format
16.	Service Interaction Quality	Has a good reputation
17.		It feels save to complete transaction
18.		My personal information feels secure
19.		Creates a sense of personalization
20.		Convey a sense of community
21.		Makes it easy to communicate with the organization
22.		I feel confident that goods/services will be delivered as promised

### 4.5 Importance Performance Analysis (IPA)

Importance Performance Analysis is a technique used to identify the attributes of the product or service most needed by users [9]. Analysis used in IPA are three which are, analysis of compatibility level, analysis of discrepancy level (GAP), and analysis of IPA quadrant.

#### A. Compatibility Analysis

Conformity analysis is the result of comparing the percentage of performance level assessment with expectation level assessment. Compatibility analysis is used to find out whether the website performance results are in line with the expectations or interests of its users. Assessment of suitability analysis will later be a priority scale of improvement in the IPA quadrant analysis (Cartesian quadrant) with equation 1 as follows.

$$Tki = (\sum xi) / (\sum yi) \times 100\% \quad (1)$$

Information:

$Tki$  = suitability level of the respondent

$\sum xi$  = performance rating score

$\sum yi$  = scoring of interest

**Table 1 WebQual 4.0 Indicator**

No	Category	WebQual 4.0 Questions
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## B. Discrepancy Analysis (GAP)

Discrepancy analysis is difference between performance value with interest value or user expectation. Discrepancy analysis is used to find out the quality level of website studied that is, between the quality that is felt right now and the quality that users expect. This gap analysis will be used as an evaluation of what actions are needed to reduce the gap or improve the performance expected in the future. Quality level of website or system is said to be good showed by great discrepancy value of 0 ( $Q_i \geq 0$ ). This means that the quality expected by the user is in accordance with the current quality. Conversely, if the gap value is less than 0 ( $Q_i < 0$ ), then system or website is said to be deficient or have not fulfilled users expectations. Discrepancy analysis is obtained by using these two equations.

$$Q_i(\text{Gap}) = \text{Perf}(i) - \text{Imp}(i) \quad (2)$$

Information:

$Q_i$  (Gap) = gap level

$\text{Perf}(i)$  = value of performance

$\text{imp}(i)$  = value of importance

## C. Analysis of Importance Performance Analysis (IPA) Quadrant

The interpretation of the IPA quadrant chart is divided into four quadrants based on the results of measurements of importance and performance. Performance attributes are drawn along the X-axis and importance attributes are drawn along the Y-axis [9]. IPA quadrants consists of 4 quadrant includes quadrant I (concentrate here), quadrant II (keep up the good work), quadrant III (low priority), and quadrant IV (possible overkill).



Figure 1 Quadrant IPA

## 5. RESULT AND DATA ANALYSIS

Characteristics of the respondents contained in this study indicate the number of female respondents is greater than the number of male respondents, where the percentage obtained for women is 69% and the percentage of men is 31%. Based on current job segmentation, 87% are students, 6% are private employees, 2% are civil servants, 2% are entrepreneurs and other jobs are 3%. Based on usage time segmentation of website e-commerce XYZ, from 100 respondents, 17% are new users of e-commerce XYZ with period of 3 months when the filling of this research questionnaire. 17% respondents are users with time span of 3-6 months, 12% users has used e-commerce XYZ in period of 6-11 months, 37% respondents are users with period of 1-2 months, and 17% respondents are old users of e-commerce XYZ which has accessed website for more than 2 years.

### 5.1 Validity Test

Validity test is used to measure the validity level of a questionnaire. The questionnaire is valid if the value of  $r$  table  $> r$  is calculated with the value of  $r$  table that is 0.1966. Based on the validity test using the SPSS program, 22 indicators of

questions about the level of performance and user interest of the XYZ e-commerce website are valid and the respondent intentions and purposes are understood.

### 5.2 Reliability Test

A questionnaire is said to be reliable or trusted of respondents answer towards statements is are consistent or stable continuously. Reliability test is seen showed by Alpha Cronbach value is greater than 0,7 [2]. Based on reliability test using program of SPSS, Alpha Cronbach value in question indicator of performance level and user expectation towards website e-commerce XYZ is  $> 0,7$  so that it can be concluded that the question instruments are reliable and respondent answers consistency is achieved.

Table 2 Results Reliability Test

Variable	Alpha Cronbach	
	Performance	Importance
Usability	0,814	0,923
Information Quality	0,881	0,939
Interaction Quality	0,760	0,883

### 5.3 WebQual Index (WQI)

WebQual Index is used to determine the standard (benchmark) of the overall website. WebQual Index website value is obtained from the average value of interest value (Mean of Importance), Weighted Score (Wgt. Score), and maximum score (Max. Score).

Table 3 Results WebQual Index (WQI)

#	Question	MoI	MoP	Max Scr	Wgt. Scr	WQI
1	Find the site easy to learn to operate	4,25	4,04	21,25	17,17	0,81
2	My interaction with the site is clear and understandable	4,22	3,85	21,1	16,25	0,77
3	I find the site easy to navigate	4,24	3,84	21,2	16,28	0,77
4	I find the site easy to use	4,32	3,91	21,6	16,89	0,78
5	The site has an attractive appearance	4,26	3,72	21,3	15,85	0,74
6	The design is appropriate to the type of site	4,24	3,75	21,2	15,90	0,75
7	The site conveys a sense of competency	4,22	4,04	21,1	17,05	0,81
8	The site creates a positive	4,25	3,92	21,25	16,66	0,78

	experience for me					
9	Provides accurate information	4,28	3,71	21,4	15,88	0,74
10	Provides believable information	4,27	3,7	21,35	15,80	0,74
11	Provides timely information	4,26	3,95	21,3	16,83	0,79
12	Provides relevant information	4,26	3,6	21,3	15,34	0,72
13	Provides easy to understand information	4,41	3,95	22,05	17,42	0,79
14	Provides information at the right level of detail	4,29	3,72	21,45	15,96	0,74
15	Presents the information in an appropriate format	4,28	3,65	21,4	15,62	0,73
16	Has a good reputation	4,29	3,93	21,45	16,86	0,79
17	It feels save to complete transaction	4,39	3,7	21,95	16,24	0,74
18	My personal information feels secure	4,44	3,88	22,2	17,23	0,78
19	Creates a sense of personalization	4,18	3,94	20,9	16,47	0,78
20	Convey a sense of community	3,89	3,68	19,45	14,32	0,74
21	Makes it easy to communicate with the organization	4,35	3,79	21,75	16,49	0,76
22	I feel confident that goods/services will be delivered as promised	4,4	3,72	22	16,37	0,74
Total				469,95	358,86	0,76

Table 3 is result of data processing using WebQual Index (WQI). Total value of Max Score calculation and Wgt. Score value overall are 469,95 and 358,86 so that the result is WQI for 0,76 or 76%. This shows that the quality service of website e-commerce XYZ based on user final perception is in index 76% with interpretation of “Good”.

#### 5.4 Analysis of Website Compatibility Level

Conformity analysis is obtained by using the formula in equation 1 with an average index yield of 89%. The average results show that the performance level of XYZ e-commerce

website is quite good and quite compatible with the expectations of its users.

#### 5.5 Analysis of Discrepancy Level (GAP)

The results of the gap level analysis show that all indicators are valued negative. This shows that the quality of website e-commerce XYZ is not yet compatible with user expectation. The GAP average value for usability variable is -0,37, information quality variable is -0,54, interaction quality is -0,47.

Table 4 GAP Results

No	Question	Yi	Xi	GAP
1	Find the site easy to learn to operate	4,25	4,04	-0,21
2	My interaction with the site is clear and understandable	4,22	3,85	-0,37
3	I find the site easy to navigate	4,24	3,84	-0,4
4	I find the site easy to use	4,32	3,91	-0,41
5	The site has an attractive appearance	4,26	3,72	-0,54
6	The design is appropriate to the type of site	4,24	3,75	-0,49
7	The site conveys a sense of competency	4,22	4,04	-0,18
8	The site creates a positive experience for me	4,25	3,92	-0,33
9	Provides accurate information	4,28	3,71	-0,57
10	Provides believable information	4,27	3,7	-0,57
11	Provides timely information	4,26	3,95	-0,31
12	Provides relevant information	4,26	3,6	-0,66
13	Provides easy to understand information	4,41	3,95	-0,46
14	Provides information at the right level of detail	4,29	3,72	-0,57
15	Presents the information in an appropriate format	4,28	3,65	-0,63
16	Has a good reputation	4,29	3,93	-0,36

17	It feels save to complete transaction	4,39	3,7	-0,69
18	My personal information feels secure	4,44	3,88	-0,56
19	Creates a sense of personalization	4,18	3,94	-0,24
20	Convey a sense of community	3,89	3,68	-0,21
21	Makes it easy to communicate with the organization	4,35	3,79	-0,56
22	I feel confident that goods/services will be delivered as promised	4,4	3,72	-0,68

### 5.6 Analysis of Importance Performance Analysis (IPA) Quadrant

Based on the calculation of performance level and user expectation is obtained result of IPA quadrant analysis as in Figure 2.

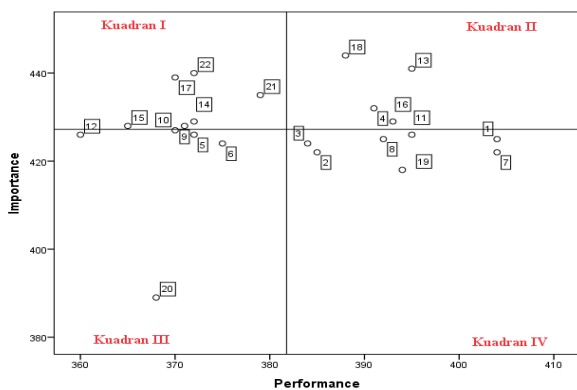


Figure 2 Quadrant (IPA)

Figure 2 is the quadrant of the Importance Performance Analysis (IPA) results. Analysis of each quadrant is explained as follows

#### A. Quadrant I (Concentrate Here)

Quadrant I is indicator that needs improvement, because in that quadrant, the website performance is not yet satisfied the users. Several changes or improvements of performance must be conducted to increase user satisfaction.

Table 5 Quadrant I Indicator

Quadrant	No.	Question
I	9	Provides accurate information
	14	Provides information at the right level of detail
	15	Presents the information in an appropriate format
	17	It feels save to complete transaction
	21	Makes it easy to communicate with the organization
	22	I feel confident that goods/services will be delivered as promised

Indicator of question 22 “I feel the products sent are as promised” is main priority to conduct improvement because user expectation value is higher than website performance this time.

#### B. Quadrant II (Keep Up The Good Work)

Quadrant II is an indicator that needs to be maintained, because in the quadrant the performance of the website is in accordance with user expectations.

Table 6 Quadrant II Indicator

Quadrant	No	Question
II	4	I find the site easy to use
	13	Provides easy to understand information
	16	Has a good reputation
	18	My personal information feels secure

Question indicator 13 "Information provided by the website is easy to understand" is an indicator with the highest level of performance and user expectations for these indicators are also high. Website performance is currently in accordance with the user expectation and performance needs to be maintained.

#### C. Quadrant III (Lower Priority)

Quadrant III is indicator that has low performance and low expectation.

Table 7 Quadrant III Indicator

Quadrant	No	Question
III	5	The site has an attractive appearance
	6	The design is appropriate to the type of site
	10	Provides believable information
	12	Provides relevant information
	20	Convey a sense of community

The existence indicator is considered not too important by the user, so the e-commerce party does not need to make improvements and pay special attention.

#### D. Quadrant IV (Possible Overkill)

Quadrant IV is indicator that has high performance but the user expectation is low. Quadrant IV is considered as excessived by the user.

Table 8 Quadrant IV Indicator

Quadrant	No.	Question
IV	1	Find the site easy to learn to operate
	2	My interaction with the site is clear and understandable
	3	I find the site easy to navigate
	7	The site conveys a sense of competency
	8	The site creates a positive experience for me
	11	Provides timely information
19	Creates a sense of personalization	

Excessive performance on this indicator can be allocated to other indicators that require high performance due to high user expectations.

## 6. CONCLUSION

Based on analysis result of website e-commerce XYZ performance quality which is focused on three dimensions based on WebQual 4.0, users feel that website e-commerce XYZ overall in in category good and satisfied for the users. WebQual index shows website e-commerce XYZ is in good scala with percentage of 76%.

The highest percentage is in indicator of usability website which valued 78%. Based on analysis of importance performance analysis (IPA) quadrant, indicator of question number 22 “I feel the products sent are as promised” is main priority to conduct improvement because the user expectation value is higher than website performance this time.

## 7. REFERENCES

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