Jurnal Mantik, 5 (2) (2021) 1076-1086

Published by:Institute of Computer Science (IOCS)

Jurnal Mantik

Journal homepage: www.iocscience.org/ejournal/index.php/mantik/index

Optimizing the Use of QR Codes in Web-Based Attendance Information Systems During the Covid-19 Pandemic (Case Study: KONI Salatiga City)

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A R T I C L E I N F O

Article history:
Received: 10/07/2021
Revised: 20/07/2021
Accepted: 01/08/2021

Keywords:
Attendance Information System, QR Code, Waterfall.

A B S T R A C T

The Covid-19 pandemic that occurred in mid-March 2020 caused the situation to change completely, and companies and agencies began implementing physical distancing and work from home. KONI Salatiga City is one of the agencies affected by the Covid-19 pandemic. One of the sectors of the Salatiga City KONI that was affected was the attendance section. Attendance data retrieval conducted at KONI Salatiga City is still done manually by signing in the attendance book. Therefore, by utilizing the right information system technology, it can solve this problem. Namely by building a QR Code-based attendance information system. The method used in building an attendance information system is to use the waterfall method. This method is very effective in conducting system design because it is carried out systematically.

1. Introduction

The development of technology in the current digital era has grown so rapidly, because in the current digital era it is a time when information becomes easy and fast to capture and disseminate through technology, therefore the application of information systems is needed, especially in a company or agency [1]. The application of information systems in companies and agencies provides so many benefits, such as increasing the efficiency and effectiveness of data accurately and in real time, improving a coordinated and systematic work system, and increasing productivity and cost savings [2]. Especially at the beginning of March 2020, where there was a pandemic of the covid-19 virus which caused disruption of business processes in several companies and agencies, The impact of the Covid-19 virus pandemic has caused several companies and agencies to work online or what is often known as work from home, in addition to implementing WFH, employees must also minimize physical activities such as having to implement physical distancing, as well as maintaining distance, and minimizing physical contact. physically to prevent the spread of the Covid-19 virus. However, some companies and agencies have a little difficulty facing the new conditions in today's world of work, therefore some companies and agencies have begun to utilize and develop more than ever before in the application of information systems. Employees must also minimize physical activities such as having to implement physical distancing, as well as maintaining distance, and minimizing physical contact to prevent the transmission of the COVID-19 virus. However, some companies and agencies have a little difficulty facing the new conditions in today's world of work, therefore some companies and agencies have begun to utilize and develop more than ever before in the application of information systems. Employees must also minimize physical activities such as having to implement physical distancing, as well as maintaining distance, and minimizing physical contact to prevent the transmission of the COVID-19 virus. However, some companies and agencies have a little difficulty facing the new conditions in today's world of work, therefore some companies and agencies have begun to utilize and develop more than ever before in the application of information systems.

One of the agencies affected by the corona virus pandemic is KONI (Indonesian National Sports Committee) Salatiga City. The Salatiga City KONI also applies the use of information systems to increase the credibility of work amid the COVID-19 pandemic, some of which include a document filing system, documentation system, budget management system, and asset management system. However, in this study,

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researchers still found that data collection on employee attendance or absenteeism was still done manually with a signature on the attendance book. Recapitulation of employee attendance is also done manually by counting the number of employees who are present, sick, and permits.

From these problems, it can be handled by implementing and optimizing the use of information systems that are in accordance with what is needed, especially in the midst of the COVID-19 pandemic as it is today. By implementing an information system, it can support the activities and performance of employees so that existing business processes can continue to run. To deal with attendance problems at KONI Salatiga City, it is necessary to create a web-based employee attendance information system that applies the use of QR Code [3]. The reason why using the QR Code application is because using a QR Code can reduce physical contact with fellow employees, besides that this QR Code can be scanned using an Android smartphone by using a camera to read the QR Code for employees who are WFH (Work From Home).

The expected result of this research is a web-based Attendance Information System that implements the use of a QR Code, with the aim of improving the attendance system that is currently still running at KONI Salatiga City which is still using the conventional attendance system while also making it easier for employees in the attendance process, and minimizing direct contact with office facilities to break the chain of the spread of the COVID-19 virus. The design of the system that will be used, by applying the waterfall method, where this method is an effective method to use, by applying five (5) stages for system development such as the analysis stage, the design stage, the implementation stage, the testing stage, and the supporting stage. So that the system that is designed can be in accordance with the needs of the user or later users.

According to the World Health Organization (WHO), coronavirus is a virus that can cause disease in animals and humans. Several types of coronavirus can cause respiratory infections in humans, such as coughs and colds to more serious stages such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS), the disease caused by this virus is called Covid-19.[5]

The research entitled "Persistence of Coronaviruses on inanimate surfaces and their inactivation with biocidal agents" discusses the resistance of the corona virus attached to the surface of inanimate objects. To kill the corona virus using an inactivation strategy with biocidal agents for chemical disinfection. The result of this study is that the use of disinfectants can significantly reduce the infectivity of the corona virus within one minute of exposure.[6]

In the research entitled "Radio Frequency Identifications-Based Student Presence Information System" which discusses the presence system based on a radio-based identification frequency system that identifies automatically through a radio frequency identification reader stored in the system database. Data processing uses Rapid Applications Development in the development and design by utilizing available resources. The results of this study are a radio frequency-based attendance system to print student and lecturer attendance reports that produce more accurate information, and can improve the function of academic services easily, quickly, effectively and efficiently.[7]

In the research "Lecturer Assistant Attendance System Using Android-Based QR Code Scanner in the Information Systems Study Program at Muria Kudus University" which discusses the lecturer assistant presence system to recap attendance and honorariums obtained based on attendance. This system was developed using the waterfall model, the design uses UML, the PHP programming language, and android with My SQL database. The results of this design are in the form of an Android and Web-based application for assistant lecturers in the Information Systems Faculty of Maria Kudus University to facilitate the monitoring process of attendance in recapitulating attendance and work fees.[8]

In a previous study entitled "Implementation of Student Guidance's QR Code Attendance on a Website based on the YII Framework" discussed attendance scanning qrcode to record the attendance of the guidance process, using a penA system (Attendance Assessment) by recording data on Nim, Supervisor, Guidance Room, Attendance Time Guidance, a unique Qrcode code that aims to control student discipline and craftsmanship while following guidance and also to avoid cheating. The results of this study are attendance applications with qrcode scanning based on the yii framework website.[9]

In another study with the title "Implementing QRCode as a Service Media for Attendance on PHP Native-Based Websites" discusses the qrcode attendance system using Pencil (Lab Assistant Assessment) by creating generate qrcode through the pencil.raharja.ad.id website then scanning the qrcode on available devices. The results of this study are the use of a new system called Pencil (Lab Assistant Research) which will make lab assistant attendance more effective and can simplify the QRcode scan attendance process and minimize the occurrence of absent manipulation.[10].

2. Method

The method used in designing a web-based attendance information system is by applying the use of a QR code using the waterfall method. This method is a software development approach commonly called the SDLC (Software Development Life Cycle) method. This method is carried out by taking a systematic approach starting from the identification stage of system requirements until later entering the supporting stage, the steps used must be completed sequentially, therefore this method is called the waterfall method [12]. In presenting research on optimizing the use of web-based attendance by applying the use of QR Code at KONI Salatiga City, the method used is the case study research method, where this is an in-depth study of a particular unit of an agency and the results of the research can provide a broad and in-depth picture of a particular unit that is used as a case study. In addition, this method uses a quantitative approach, where this approach is very suitable for researchers because it will go directly to the field by conducting field observations to obtain certainty of the data needed to design the system [11]. In its application this method is divided into 5 stages, as shown in Fig 1. where this approach is very suitable for researchers because they will go directly to the field by conducting field observations to obtain certainty of the data needed to design the system [11]. In its application this method is divided into 5 stages, as shown in Fig 1. where this approach is very suitable for researchers because they will go directly to the field by conducting field observations to obtain certainty of the data needed to design the system [11]. In its application this method is divided into 5 stages, as shown in Fig 1.

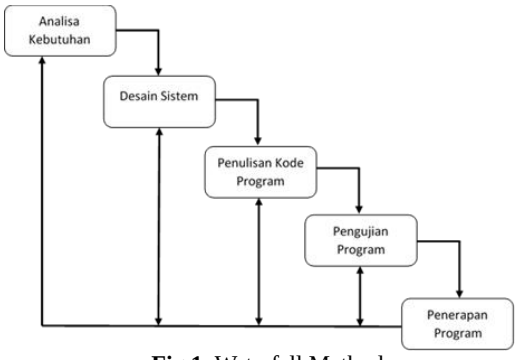

Fig 1. Waterfall Method

Fig 1 illustrates the steps taken in carrying out research at KONI Salatiga City. From Fig 1, it can be explained for the first stage, namely the Analysis stage, at this stage it is carried out to obtain the information needed in the design of the attendance system at KONI Salatiga City, in order to get an overview of the system to be designed and find out what functions the system needs This information is in the form of employee data, such as NIP, employee name, position, and field of work. Second, the Design Stage. From the requirements analysis stage that has been carried out, it can be concluded what the system requirements are, then at this stage it can be implemented into a design form. At this stage, the system architecture design is carried out using the Unified Modeling Language or UML.

Next, the coding stage, at this stage is the implementation of the design stage. The designs that have been made need to be translated into the JAVA programming language and start by building a user interface by creating program code using Visual Studio Code. The result of this stage is a system program that is in accordance with the system design that has been made at the design stage [14]. The next stage, the testing stage, at this stage testing the system that has been made previously at the coding stage, to ensure that the attendance information system application has been running according to the needs of the agency [15]. The last stage, the implementation stage, at this last stage the system design that has been made is ready to be operated at the Salatiga City KONI office.

At the data collection stage, it was carried out by interviewing one of the staff at KONI Salatiga City with the aim of finding out what problems were going on, in addition to discussing the needs of the system to be designed. In addition, data collection also applies the observation method to find out firsthand how the business processes are implemented so that they can be realized into the design of the system to be built [16]. While the testing method is carried out using the Black Box testing method or commonly known as Black Box Testing, where this test is used to test software without the need to know the internal structure of the

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program code, so that the tester can easily understand how the system works [17].

3. Results and Discussions

The design of a web-based attendance information system application by implementing the use of a QR Code using a smartphone, where later employees who register users will get a QR Code that has been registered by the admin, then employees can download and save images from the QR Code on the employee's smartphone. The QR Code is what will be scanned by the admin who manages the system that has been integrated with the server computer. QR Code is used in the implementation of system design because it can help KONI employees of Salatiga City in an effort to suppress the spread of the covid-19 virus, and minimize the risk of being exposed to the covid-19 virus, therefore researchers are trying to use QR Code in this attendance application so that the purpose of designing this system can walk. This system will be designed by the researcher, this system design consists of use case diagrams and class diagrams as well as user interface design. Here is the system design:

3.1. System planning

In the Use Case Diagram table it can be explained what actors can do on the system, namely there are two actors, including employees and admins. Where employees can view attendance data, register accounts for which employees will get a QR code, and can take attendance. As for admins, they can manage employee account data, as well as scan employee QR Codes.

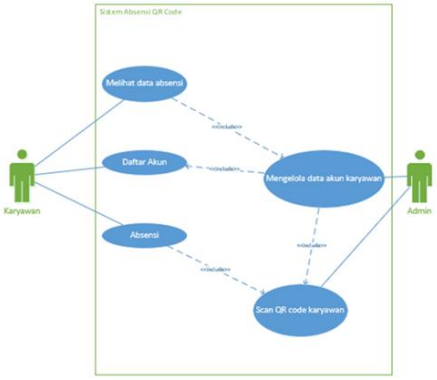

Fig 2. Use case diagram

As for activity diagrams. Activity Diagram is a diagram that is used to describe the workflow of the system, this diagram is a UML diagram that uses an object-oriented approach, from this activity diagram can be used as an information system application development paradigm.

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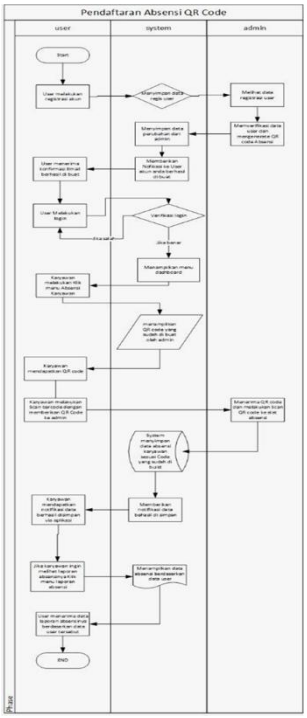

Fig 3. Activity Diagram

In Fig 3. Explains how the workflow of the attendance information system will be used at KONI Salatiga City. Where this workflow starts from a user who does not have an account, then the user must register an account first, the admin will laterverifyuser account so that the user will get a QR Code on the attendance information system. The QR Code that has been obtained by the user will later be displayedscanby the admin, so that user attendance data will be recorded in the system such as user name, NIP, attendance time, and so on. Attendance history can also be seen by the user himself on the attendance information system.

For the description of the system design, it is shown in the class diagram, where: Class Diagram is a picture that describes the classes in a system and the relationship between one class and other classes, usually this class diagram is also known as Entity Relationship Diagram (ERD). This ERD design is very helpful in the database creation process.

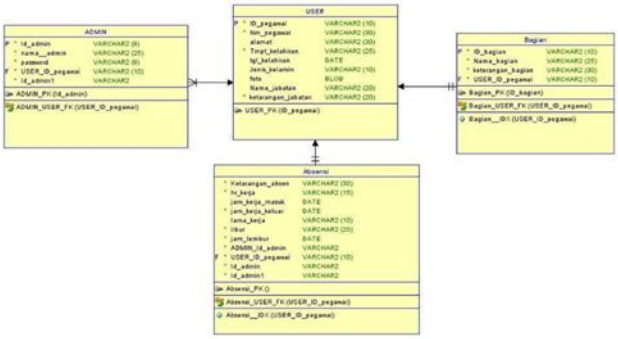

Fig 4. Class Diagram

Figure 4 explains that the class diagram of the Attendance Information System at KONI Salatiga City consists of several classes, namely User Class, Admin Class, Section Class, and Attendance Class. In this attendance class, there will be a QR Code that is used as an attendance code for employees. In the Class Diagram there is an admin class that is related one to many with the user class where the admin class here has attributes such as id_admin as the primary key, admin name, and user id as a foreign key from the user class,

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then the user class has a one to one relationship with the subclass. , the user class here has attributes such as id_pegawai as the primary key, employee_name, address, photo, and id_section as a foreign key of the section class, besides that the user class also has a one to one relationship with the attendance class where attendance has attributes such as clock in, time out , weekdays, and id_pegawai as foreign key of the user class.

3.2. Implementation System

At the system implementation stage, the implementation of the system design that has been made such as the attendance information system user interface, as the login page interface display on the Salatiga City KONI attendance information system can be seen in Fig 5.

Fig 5. Employee Login Display

In the login screen, for employees there is a form to fill in the employee's email and password, if the employee has registered for an account, the employee will fill in the email and password according to his account, so that the employee can login to the system.

As for the display of the login user interface for the admin, it can be seen in Fig 6.

Fig 6. Admin Login Display

For the admin login page, which can login to the Admin, only employees who have a user account as admin only.

Meanwhile, the interface for the registration page for users who do not have an account is as shown in Fig 7.

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Fig 7. Registration Form

For employees who do not have an account, it is necessary to register as a user to be able to do the login process, registration is done by filling in the employee's complete biodata.

Next for the main page view. The main page interface displays the dashboard.

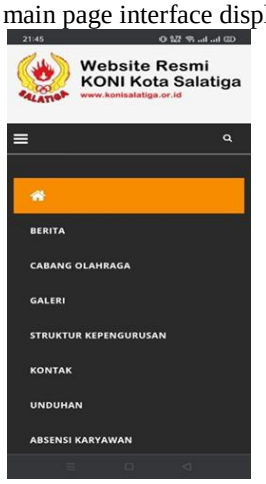

Fig 8. Dashboard Display

This Dashboard menu is used by employees to be able to enter the attendance page, by pressing the Employee Attendance feature.

As for the employee attendance page display. on the interface display of this employee attendance page is used to generate a QR Code that will be used in the attendance process.

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Fig 9. Display of employee attendance page

On the employee attendance page, later the employee will get a QR Code which will later be used for attendance by being scanned by the TU officer for employee attendance. The QR Code here is very helpful in terms of breaking the chain of spread of Covid-19 because it is done by scanning, thereby reducing physical contact between employees and physical contact with office infrastructure.

As for the page interface for admins who will do attendance scanning, it is as shown in Fig 10.

Fig 10. Admin Attendance Scanning Page Display

For the attendance scanning page for admins, later on this page the employee QR Code will be scanned with a tool, and display a display like this when scanned, after the QR Code is scanned, the attendance data will automatically enter the database and the attendance report page.

As for the attendance report page display. This page is used to view attendance reports on the attendance information system.

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Fig 11. Display of the attendance report page

In Fig 11. This is a page to view attendance reports for employees, here you can see the attendance history of employees as long as they have been absent.

Meanwhile, the interface for the attendance report page for the admin is as shown in Fig 12.

Fig 12. Attendance Report on Admin

As for the appearance of the attendance report page interface for the admin, the history of that day is visible, any employee who has performed attendance, all recorded according to the attendance database on the admin attendance report page.

3.3. System Test

Testtem system is carried out to ensure whether the system built is in accordance with the needs of the Salatiga KONI in the attendance section. This test is carried out using the Black Box testing method. The results of this Black Box test are shown in table 1.

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Table 1.
Blackbox Test

Tested function	Condition	Expected output	System-generated output	Testing Status
Login	Username and the password is correct	Log into the system, display the dashboard	Log into the system, display the dashboard	Valid
Login	Username and wrong password	Unable to log in to the system, displays the wrong password pop-up	Unable to log in to the system, displays the wrong password pop-up	Valid
Registration	User don't have an account yet	There is a pop up to display the registration form	There is a pop up to display the registration form	Valid
QR Code	User already has an account	Generate results from employee QR Code	Generate results from employee QR Code	Valid
Attendance	Already have a QR Code	A pop up appears, if the attendance is successful.	A pop up appears, if the attendance is successful.	Valid
Attendance Report	Already doing attendance	Can see the attendance recapitulation from his account and successfully add the latest attendance data into the system	Can see the attendance recapitulation from his account and successfully add the latest attendance data into the system	Valid
Attendance Report	No attendance yet	Can only see the attendance recapitulation from his account.	Can only see the attendance recapitulation from his account.	Valid
Scanning	Admin gets QR Code from employee	Scanning can be done and the scan results immediately appear on the attendance report page	Scanning can be done and the scan results immediately appear on the attendance report page	Valid

In the blackbox test table there are several functions of the system being tested, such as the Login function, if the username and password are correct, they can enter the system, while if they are incorrect, a pop-up will display the wrong username and password. Registration for users who do not have an account, it will display a registration form that must be filled in, a QR Code that will appear on employee attendance, when scanned for attendance then the data will enter the attendance information system, attendance reports for employees will display a recapitulation of attendance from the account Meanwhile, for the admin of the attendance report, it will show all the data of employees who do attendance

3.4. The Role of the System in Overcoming the Covid-19 Pandemic.

After the Attendance Information System can be implemented at KONI Salatiga City, the role of this attendance information system is confirmed to be able to assist in suppressing the spread of the covid-19 virus because this system is run without any physical contact with public facilities for employees as explained at the beginning of this journal, objects can be a means of spreading the covid-19 virus, therefore it is important for the Salatiga City KONI to implement the Attendance Information System that has been created as one of the steps to prevent the covid-19 virus where this system uses QR Code technology, only by scanning the QR code which has been obtained on the website by each employee later. By reducing the physical contact that occurs during absenteeism, In addition, this attendance information system also reduces the use of office objects that allow the spread of viruses to occur, such as books, stationery, and so on. Therefore, the use of this attendance information system can help the government in overcoming the COVID-19 pandemic which is currently a world outbreak.

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4. Conclusion

Based on the results of research conducted at KONI Salatiga City, it can be concluded that the Attendance Information System that has been designed can help KONI Salatiga City employees to perform attendance by continuing to apply Physical Distancing to break the chain of Covid-19 spread, namely by utilizing QR Code technology to reduce physical contact with office facilities. In addition, this Attendance Information System uses the waterfall method, so the output produced is in the form of an application that is in accordance with user needs because it has been analyzed and focused on what the user needs. Then the features contained in this application, employees will get a QR Code which will later be scanned by the admin as a sign of the presence of KONI employees of Salatiga City. In addition, employees can also view their attendance history as long as they have been absent at the office.

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