Analysis and Design of Web-Based Information System for Church Congregations Case Study: Church BNKP Pewarta

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Abstract— **During the COVID-19 pandemic, worship activities at the Church were limited. The lack of preparation and data collection on the congregations who visit to worship regularly every week increases the risk of transmission. It needs to be minimized and anticipated. One effort that can be made to reduce this risk is to collect data on the health condition of the congregation who will attend worship. The data collection process is recorded in writing on the attendance list. This requires an iterative approach to be updated and creates a build-up to the attendance record. In addition, media information about the BNKP Pewarta Church activities is not yet available. To overcome this problem, an information system is needed as a medium for collecting congregation data, storing congregation data and providing general information about the BNKP Pewarta Church. This website-based information system's design was successfully carried out using the Web Development Life Cycle (WDLC) method. The functional testing results carried out using black-box testing show that this website-based information system can store Church congregation data and present general Church information as needed.**

Index Terms— **Church; WDLC; Web based Information Systems**

I. INTRODUCTION

The determination of the micro-based PPKM is aimed at increasing community awareness at the village level against the spread of COVID-19 in accordance with the Instruction of the Minister of Home Affairs Number 03 of 2021 concerning the Enforcement of Restrictions on Micro-Based Community Activities and the Establishment of the 2019 Corona Virus Disease Handling Command Post at the Village and Sub-District Levels. Control of the Spread of Corona Virus Disease 2019 [1].

Due to the impact of the spread of COVID-19, the Church has become one of the public facilities that is temporarily closed. Under these circumstances, churches must rely on technology, both in conveying information and storing data to avoid physical contact. The church has difficulty in obtaining information, because the delivery of information is still in the form of print media and the use of paper. So it has the potential to causing problems in getting church information for the congregation in the church. To prepare for online worship activities and direct worship, it is necessary to make some preparations, one of which is congregational data collection, and one solution that can be done is to create a Church information system [1].

Although the impact of PPKM makes direct worship activities very limited, but it can still be carried out with strict health protocols that have been set by the government, but the risk that must be faced is the health condition of the BBKP Pewarta Church congregation which cannot be monitored and recorded, especially in terms of history of being exposed to the Covid-19 Virus or not. This is quite important to do so that worship activities at the BNKP Pewarta Church can run comfortably and safely.

This research was conducted based on previous research that focused on cruch website development in Indonesia, This study aims to create a website-based application system with the aim of building a service system that can reach the congregation so that the congregation can easily obtain information quickly, precisely, and accurately, and the church can process data more easily [1]. The following research focuses on usability assessment of the websites of the small churches of Zionskirche and Harry United Methodist Church. This study explores specific characteristics that technical and professional communicators must consider when designing and evaluating churches and non-profit websites. The study included a literature review that found that organizations in these categories took longer to adopt web technology than commercial organizations fully. This is the result of several factors, including lack of technical skills and concerns about the impact of trying to duplicate or enhance the face-to-face experience in the digital domain. The survey also revealed that such websites require special consideration, such as rhetorical situations, the

degree of organizational independence, and goals for creating an online presence. These results were applied to usability analysis of the websites of the smaller churches that represent the two affiliated United Methodist churches [2]. The motivation behind next reseacrh is to plan and create an information handling framework for the congregation. Utilizing this framework can work with information handling in the GKPI Buddy Merah Jambi Church. This review utilizes a cascade advancement strategy, a technique that gives a precise and successive way to deal with framework needs examination, plan, execution and unit testing, framework testing and care [3]. The reason for next research is to plan an electronic administration data arrangement of the congregation, sanctification, and marriage administrations to help each faith gathering movement for the assembly. The strategy utilized in fostering the framework is the Cascade technique with planning technique that utilizations Bound together Displaying Language (UML) charts. The consequences of the framework configuration in this review show data connected with chapel, worker sets, church exercises, church news, articles, assembly enlistment administration, sanctification and marriage, reports of enrollment information introduced in realistic structure, baptismal print report and authentication of marriage, just as the administration of all assemblage and church information [4].

II. RESEARCH METHODOLOGY

In the present turn of events, there is no a standard procedure or rule which we can be continued in creating static site. Despite the fact that the course of the web improvement has likenesses with the interaction in ordinary programming advancement life cycle (SDLC) model, still there is a need to have a very much custom fitted or committed methodology for web improvement dependent on explicit prerequisite [4].

The term of web improvement life cycle (WDLC) that is utilized by many web engineer can be misconstrued in term of its degree. Some of them comprehend WDLC as another model of SDLC. Some of them comprehend it as new strategies in WDLC. Additionally, some of them even comprehend it all in all new investigation of SDLC as a result of its overall term of WDLC itself. Notwithstanding of the issues, the thought behind WDLC is to plan a particular methodology for web improvement particularly for static web advancement. The methodology may not be an entirely different model of SDLC yet it could be an inference of SDLC model that infers with the run of the mill interaction of web improvement life cycle.

The methodology depends on the current innovation and might be shifts later on. Concerning

today, the generally utilized of web content administration framework (CMS), progressed web composing instruments that can facilitate the most common way of prototyping to execution stage are major contributing variables of why this methodology is present at the primary spot.Consequently, it is important to comprehend SDLC which incorporates the philosophies and the models inside every one of them. Additionally it is likewise essential to comprehend the site trademark and its sort like static site and dynamic site. Besides, understanding the most recent and ordinary advancement process patterns is likewise significant as it will recognizes the advances includes in it. Thus, the data will assist with deciding the suitable model of SDLC and consequently can be inferred by web improvement life cycle patterns. The design method using the WDLC (Web Development Life Cycle) model is a step in developing the website cycle model. Although the Waterfall model introduced in the SDLC (System Development Life Cycle) model provides a sequential structure for Software Development, but WDLC provides a basic structure that also includes various guidelines for meeting the requirements with the final product. It can be adopted by all types of web application development processes such as waterfall, prototyping, and spiral. This model can also be modified to include a Prototyping structure to improve the quality of the website [13] [4].

Structured analysis and design is an approach to solving problems in a business activity into small parts that can be compiled and linked and then can be put back together into a single unit that can be used to solve problems. Structured techniques focus on data and processes [4]. Structured analysis and design are used because it is a method that is commonly known in various industries, is relatively simple and easy to understand, and has been applied for a long time so that this method is feasible to use, relatively simple, and easy to understand [5]. The system design includes the CRUD (Create, Read, Update and Delete) functions on the Content Management System (CMS) of the Church Information System Website [6].

Figure 1. WDLC Model

A. Planning

The planning stage is the initial stage of designing a website using the WDLC method. Identifying the goals and objectives of the website to be built is the first step in the planning process. After the purpose is known, it must understand the criteria for system users. Then determine the website technology that will be used and identify who will later be involved

in the website. After that, determine where the information will be distributed later.

B. Analysis

At this stage, user needs are identified by collecting information from users, systematically analyzing the function of the system to be created, what data is needed and where the data is collected, and what results from you want to get from the system. After this is done, then the Analysis of the function of the system can be carried out by considering the processes needed to support the features on the website [12].

C. Website Design and Development

At this stage, prepare a blueprint for the website to be created. Then also various diagrammatic representations of logical and physical objects. The main objects include the data model, process model, and presentation model. Next, document the system design. The website composition stage includes planning site format and acquires the imaginative UI-UX creators to the cutting edge. The format includes planning an unpleasant sketch, which might be graphical, to get a vibe of the plan of the site. The reason for the design is to introduce a data structure, empowering a visual visit through the substance and base highlights for your customers.

The wireframe planned in the last stage is changed into buttons, tabs, menus, dashboards, shading topics, typography, and illustrations to make a base design of the site.

D. Testing using Black-box Testing

The testing stage shows how the work of the website builder is, whether the results of the website that have been created are the same as the expectations of the users, from the information needed to the performance obtained. The components tested in this stage include content, functionality, usability, and system accuracy. The outcome of this research will be tested using Black-Box testing, a software testing method in which the functionalities of software applications are tested without having knowledge of internal code structure, implementation details and internal paths. Black Box Testing mainly focuses on input and output of software applications and it is entirely based on software requirements and specifications. There are three types of Black Box Testing such as: Functional testing, Non-Functional testing and Regression testing. The test focuses on the functions of the system to ensure that the user can use the existing functions on the system [7].

E. Website Implementation and Maintenance

In the implementation phase, the website is placed in the user's computer to interact directly with the system, and the user gets the opportunity to work on it for the first time [8].

F. Bootstrap CSS Framework

Bootstrap is a CSS framework that was developed by Twitter developers in mid-2010. Before it officially became open source, Bootstrap was known as Twitter Blueprint. Until now, bootstrap version 3.3.7 has been released and has become one of the most popular front-end frameworks and an open-source project in the world. Bootstrap is described as simple CSS but built with a preprocessor which provides more power and flexibility than standard CSS. Bootstrap already provides CSS classes and integrates with JQuery. Responsive layout in CSS bootstrap with 12 column grid system produces a website layout that automatically adjusts to the width of the user's browser. This is what causes Bootstrap to support all types of devices such as smartphones, tablets, laptops, or desktop PCs. In addition, bootstrap also supports HTML 5 and CSS 3 [9].

G. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Abbreviations that incorporate periods should not have spaces: write "C.N.R.S.," not "C. N. R. S." Do not use abbreviations in the title or heads unless they are unavoidable.

III. RESULTS AND DISCUSSION

In the description of the current procedure, it can be described as follows:

1) Congregants of the BNKP Pewarta church will regularly attend worship activities every Sunday at the church.

2) The routine worship activities are carried out according to the 4M health protocol (wearing masks, washing hands, maintaining distance, and avoiding crowds).

3) The day before the service begins, church officials will collect data by providing an attendance list via the WhatsApp Group application and recording it in the congregation's attendance recap.

4) On the day of worship, before starting the worship service, body temperature will be checked with the aim that it can be detected if there are congregations whose body temperature is above 37.3 Celsius and are not allowed to attend worship.

A. Proposed Use Case Diagram

Designing the Use Case Diagram serves to make it easier to understand the system. Where this picture consists of actors as actors who interact with the system, and there are various series of activities that occur. The following is an figure of the Use Case Diagram, namely: [10] [12].
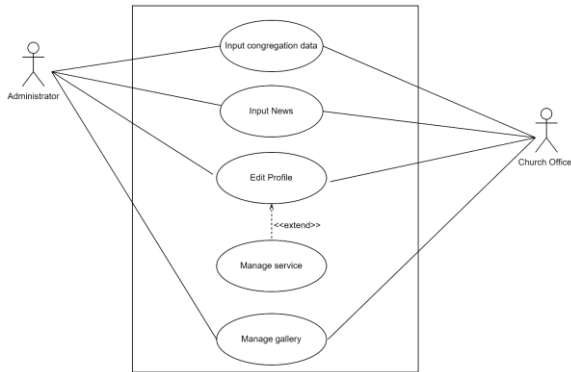

Figure 2. Use Case Diagram Proposed System

Users who will use the information system website are Church Administrators and Officers with the following functions: Login, Access user Dashboard pages, CMS News, CMS Gallery, CMS File Download, Congregational Data, and Logout [11].

B. Proposed Activity Diagram

Activity diagrams are made with the aim of making it easier to understand the processes that occur in the system. The proposed Activity Diagram in designing the BNKP Pewarta Church information system website is as follows:
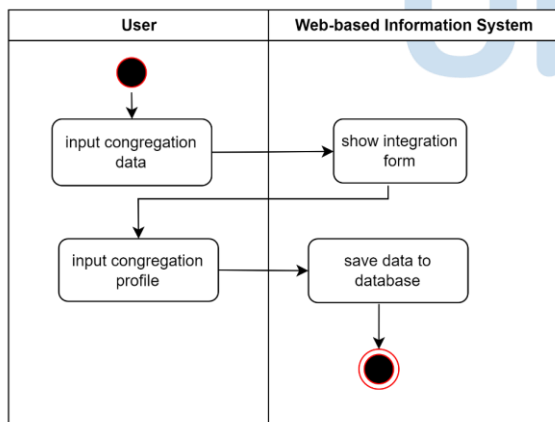
Figure 3. Activity Diagram add data congregation

This activity diagram shows the flow when a user (church officer) will input congregation data into a website-based information system.
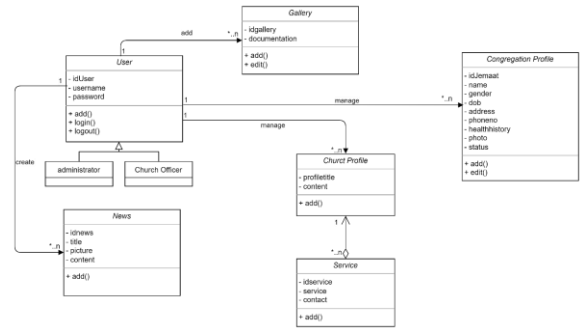
C. Proposed Class Diagram

Figure 4. Class Diagram Proposed System

From Figure 4, there are 4 (four) classes and each Attribute that will be made in the design of the BNKP Pewarta Church information system website.

D. User Interface

The result of this research is an information system website for the BNKP Pewarta Church, which is able to display information about the Church, monitor and collect data on the congregation who will carry out worship directly. The following is a screenshot from the BNKP Pewarta Church information system website that has been successfully created:
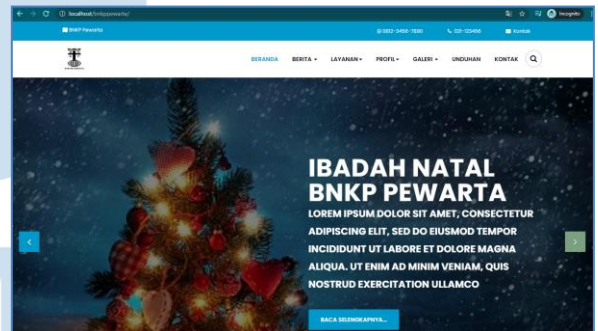

Figure 5. Website home page

This is the result of the design of the home page display from the BNKP Pewarta church website. The layout color is white, and the menu bard color is blue. This home page contains several menus, such as Home; News; Services; Profile; Gallery; Resources; Contact and search bar.
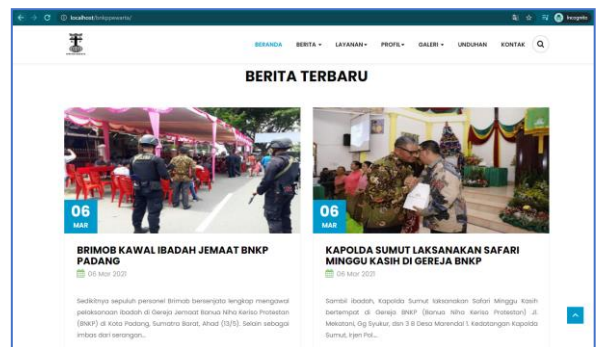

Figure 6. News content in the website

Figure 6 shows the latest news about the BNKP Pewarta Cruch, such as events, community services, and many more.
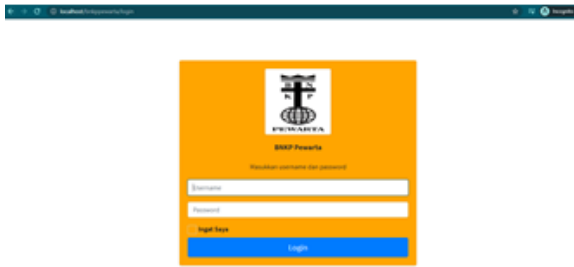

Figure 7. Users login form

On Figure 7, we can see the login form for the users of web-based information systems BNKP Pewarta Cruch. It has two fields to input username and password and one button for login. It also has a checkbox to remember the users' login profile to make it easier to log in.
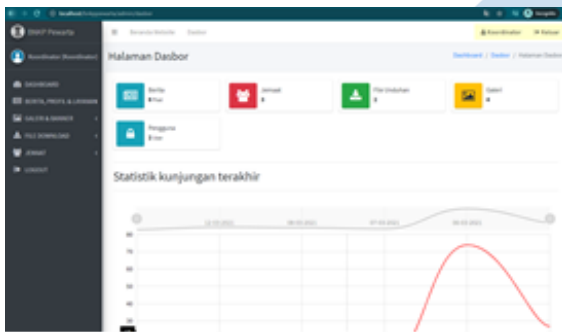

Figure 8. User dashboard

Figure 8 shows the user's dashboard that can be used to manage the website content, also known as Content Management System (CMS). The user can add some new content or edit and delete it in this dashboard. There are several menus in this dashboard similar to the home page.
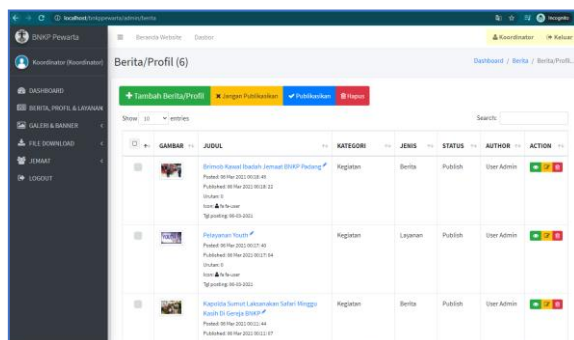

Figure 9. Content management system

From Figure 9, the users can create, read, update and delete the congregation data such as name, gender, birth date, address, phone number, congregation status, photos, and health conditions.

E. Testing Results

TABLE 1. BLACK-BOX TESTING RESULTS

Description	Case	Status
Landing page (home page)	The landing page of the website has successfully created and the users can access the website through localhost/webgereja	PASS
Login page	Administrator and Church Officer (Users) of this website can login using account and password on the Login button at the landing page to manage the website	PASS
Manage the website for Content, News and Gallery.	Users can manage the website using Content Management System (CMS) for Create, Read, Update and Delete (CRUD) the content, news and Gallery.	PASS
CRUD Congregation Data	Users can add new Congregation data, and modify such as Read, Update and Delete.	PASS

At the testing stage, after testing the system using black-box testing, it can be seen that the results of testing the main functionality of the website have been in accordance with the design objectives.

IV. CONCLUSION

After going through the stages of designing an information system website for the BNKP Pewarta church, the following conclusions can be drawn:

1). The design of an information system website at the BNKP Pewarta Church to collect congregation data has been successfully deployed with WDLC methods. The website can be accessed on localhost.
2). The users on this website have been given the CMS feature to create, read, update and delete congregation data.
3). The information/news content upload feature on the information system has been successfully created and can be displayed on the website.

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