



Design of Service Information System at the Social Service of West Sulawesi Province

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Abstract

This research was developed to facilitate data processing and information dissemination. This study aims to determine the results of the design of a web-based service information system at the West Sulawesi provincial social service based on ISO 25010 quality standards. This study uses a prototype development model. The data collection technique uses interview techniques, questionnaires and documentation. The system testing uses ISO 25010 which focuses on testing functional suitability, reliability, portability and usability. The results of the system testing using the ISO 2010 standard are in the functional suitability test tested by system experts by filling out a questionnaire containing 114 questions related to the functions designed in the developed system, the functional suitability test value is in the good category; in the reliability test using the help of webserver stress tool 8 which consists of three types of tests, namely click test, time test and ramp test and it is stated that the information system developed has met the reliability aspect; in the portability test of the West Sulawesi provincial social service information system, it was carried out using browserstack.com and it was stated that the information system developed has a high portability aspect; In the usability test, a questionnaire containing 25 questions was used with 30 respondents and the responses obtained from respondents were that the information system developed was in the very feasible category.

Keyword: Information System Design, Social Service, Website, Functional Suitability, ISO 25010.

1. Introduction

In the current era of globalization, the development of science and technology is increasingly rapid, especially in the field of information technology. The need for information in a complex work system now encourages an agency to do various ways to provide services using information technology (Fountain, 2004); (Suryana & Rizki, 2017). The Social Service is one of the Regional Work Units (SKPD) of West Sulawesi Province which carries out its duties and functions in the fields of Social Empowerment, Social Institutions, social protection and social security, and social rehabilitation for citizens, as well as carrying out the task of implementing good and clean governance (Good and Clean Governance).

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fields of Social Empowerment, Social Institutions, social protection and social security, and social rehabilitation for citizens, as well as carrying out the task of implementing good and clean governance (Good and Clean Governance).

This study aims to develop a design for an information system for services in West Sulawesi Province based on a website and to test the system based on ISO 25010 (Fath-Allah et al., 2018); (Nurunnisa et al., 2024); (Sivaji et al., 2014). The importance of conducting this research to develop a design for a website-based information system for services in West Sulawesi Province is based on the need to increase efficiency, transparency, and accessibility of public services in the region. By utilizing web-based technology, this system can make it easier for the public to access information and services without being limited by distance and time, while supporting the digitalization of government. System testing based on ISO 25010 is needed to ensure that the system meets the criteria for software quality to run well so that the system developed not only functions optimally but is also safe, easy to use, and reliable in the long term, so that it can have a positive impact on the quality of public services.

2. The Art of Research

1. System Information

Information system is a system in an organization that meets the needs of daily transaction processing that supports the functions of the organization that are managerial in nature in the strategic activities of an organization to be able to provide reports required by certain external parties (Pearlson, 2019). In addition, the information system can be defined as a system in an organization that is a combination of people, facilities, technology, media, procedures and controls aimed at obtaining important communication channels, processing certain types of routine transactions, providing conditions to management and others for important internal and external events and providing a basis for information for intelligent decision making (Rainer et al., 2020); (Yusof et al., 2008).

2. Web Programing

According to Simarmata (2010) argue that the web is a system with information presented in the form of text, images, sound, and others stored in an internet web server presented in hypertext form. The web can be accessed by web client software called a browser (Heinzl et al., 2009). The browser reads web pages stored in the web server through a protocol called HTTP and Web-based software can be developed using HTML (Hyper Text Markup Language) and PHP programming language (Williams & Lane, 2004).

3. Development of Research Concepts and Theories

The Social Service is one of the Regional Work Units (SKPD) of West Sulawesi Province that carries out its duties and functions in the field of social empowerment, social institutions, social protection and social security, and social rehabilitation for the community, as well as carrying out the task of implementing good and clean governance. One of the areas of work owned by the social service is social empowerment which handles social protection and handling of the poor. To obtain data on the poor, the social service utilizes the facilities provided by the government through the National Team for the Acceleration of Poverty Reduction (TNP2K), namely the Integrated Database (BDT) (Gibson & Bell, 1992). BDT is used as a single data reference to obtain data on the poor and as a reference in the formation of work programs in handling the poor (Saunders & Heflinger, 2004). In the use of BDT, the West Sulawesi provincial social service still finds obstacles, namely the occurrence of Inclusion Errors and Exclusion Errors. Inclusion error is an error that occurs because people who are not entitled to receive benefits are included in the database as beneficiaries. While exclusion error is an error that occurs because people who are entitled to receive benefits are not

included in the database as beneficiaries. Of course, if this obstacle continues, it will result in losses for residents who are classified as poor but are not included in the BDT data collection. The web-based social service information system can be used as a means for complaints to the social service regarding residents who are classified as poor and have not been recorded in the BDT, so that they can receive proper handling. With this system, it is hoped that poor residents who are not recorded in the BDT can be identified and receive treatment. This information system can also be used as a means of improving services by providing information on what activities are carried out in social protection and handling the poor.

4. System Testing Using ISO/IEC 25010 Standard

ISO/IEC 25010 is a system quality model that can be used to determine the quality of the system model through the usage model, product quality model, quality model data (Estdale & Georgiadou, 2018); (Peters & Aggrey, 2020). According to Pratama & Mutiara (2021) there are 8 measures of software quality characteristics according to the ISO 25010 standard, namely: Functional suitability, compatibility, usability, reliability, security, portability, performance efficiency, maintainability.

3. Method

This research is a type of Research and Development research using the system development life cycle development model with the final output in the form of a prototype (Ruparelia, 2010). This development model was chosen because the design process of this application requires intense communication between developers and system users. This prototype-based research design development model will start from collecting needs or analyzing user needs, building prototyping, evaluating prototyping, coding the system, testing the system, evaluating the system and using the system.

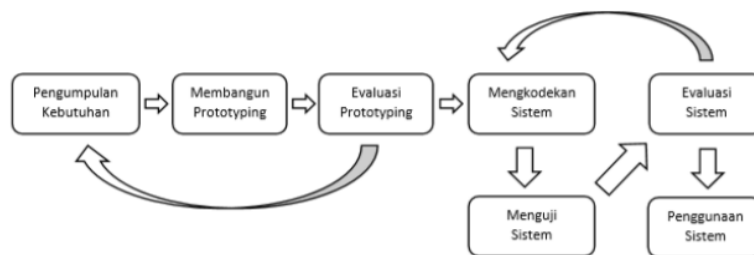


Figure 1. Prototype Model Development Stages

The data collection technique used in the study was conducted directly to the Social Service consisting of direct observation of the service process, interviews with several stakeholders and distributing questionnaires to employees. The instrument used in this study was a quality analysis of software developed by ISO 25010u to test the functional suitability, usability, portability and maintainability aspects of the resulting software. Furthermore, the validity test of the research instrument will be carried out with an assessment by experts in accordance with the provisions developed by Haoues et al. (2017).

4. Result

1) Prototype Development

Building prototyping by creating a temporary system design that focuses on presenting to users based on the analysis of application media needs in the first stage. The prototyping that is built is creating data flow diagrams (DFD) level 0 and level 1, use case diagrams, flowcharts, interface design, and data dictionaries.



a. Data Flow Diagram Design Level 0 and Level 1

The context diagram is the highest level of DFD that describes all inputs into the system or outputs from the system that provide an overall picture of the system. The context diagram of the system to be developed is presented in Figure 2 below.

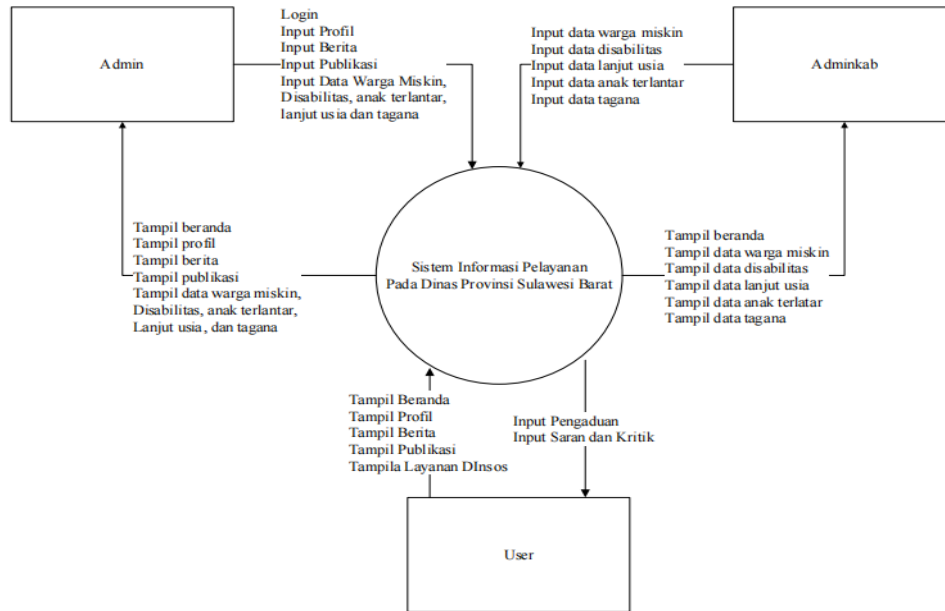


Figure 2. Level 0 Data Flow Diagram Design

Furthermore, the development of DFD Level 1, which is a development of context diagram 0, will be presented in Figure 3.

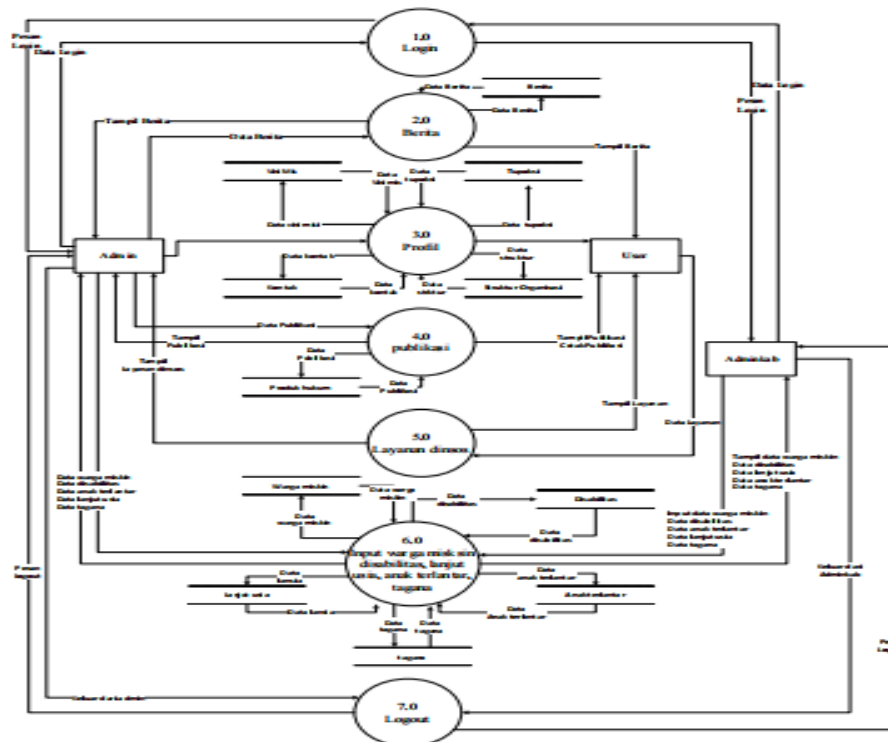


Figure 3. Level 1 Data Flow Diagram Design

b. Use Case Diagram Design

The use case diagram in this study illustrates the graphical actors, use cases, and interactions between components in the system design to clarify the steps and roles of each actor in the system being worked on. The use case design in this study can be seen in Figure 4.

c. Flowchart Design

A flowchart is a graphical representation of the steps that must be followed in solving a problem consisting of a set of symbols, where each symbol represents a particular activity. The flowchart design in this study can be seen in Figure 5.



Figure 4. Part of the Design of the Research Use Case Diagram

d. User Interface

User Interface is a connecting part between web-based service systems and users. The program is in the form of choices where users can easily select the required tabs related to the information needed. Then the system will process the data provided/received by the user. The user interface design in this study will be presented in Figure 6.

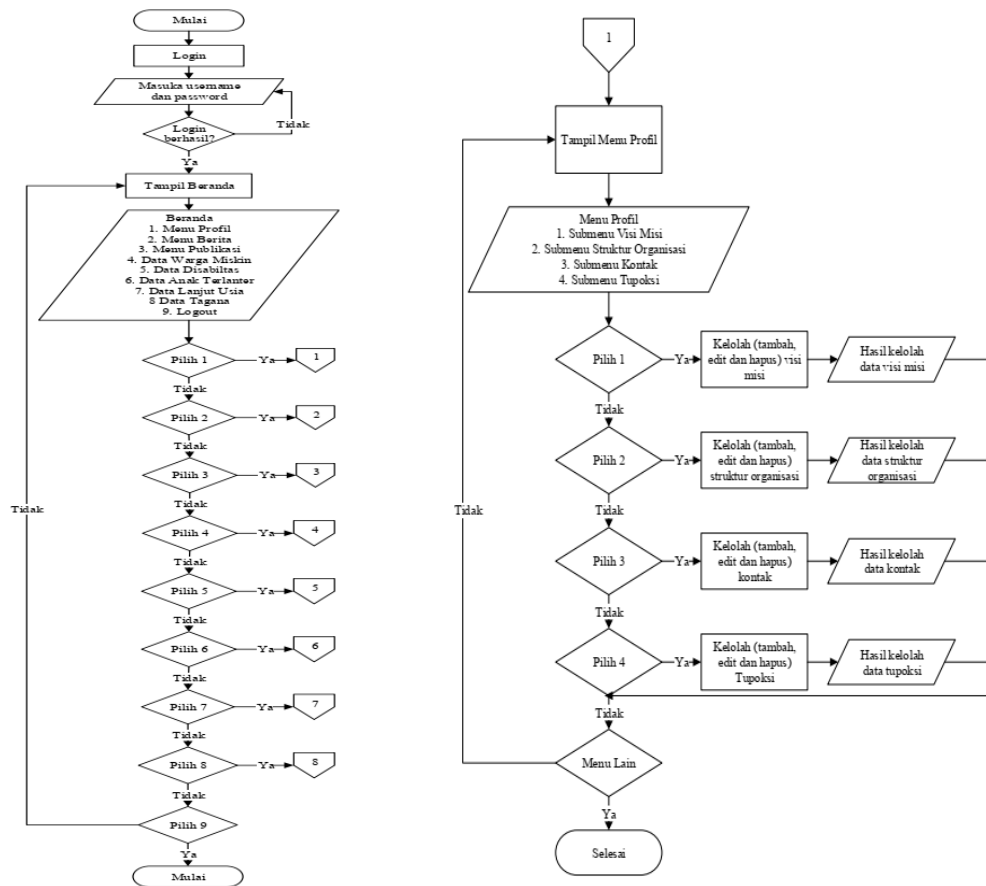


Figure 5. Part of the Research Flowchart Design

System Homepage



TUPOKSI Page

Vision Mission Page



People Data Page

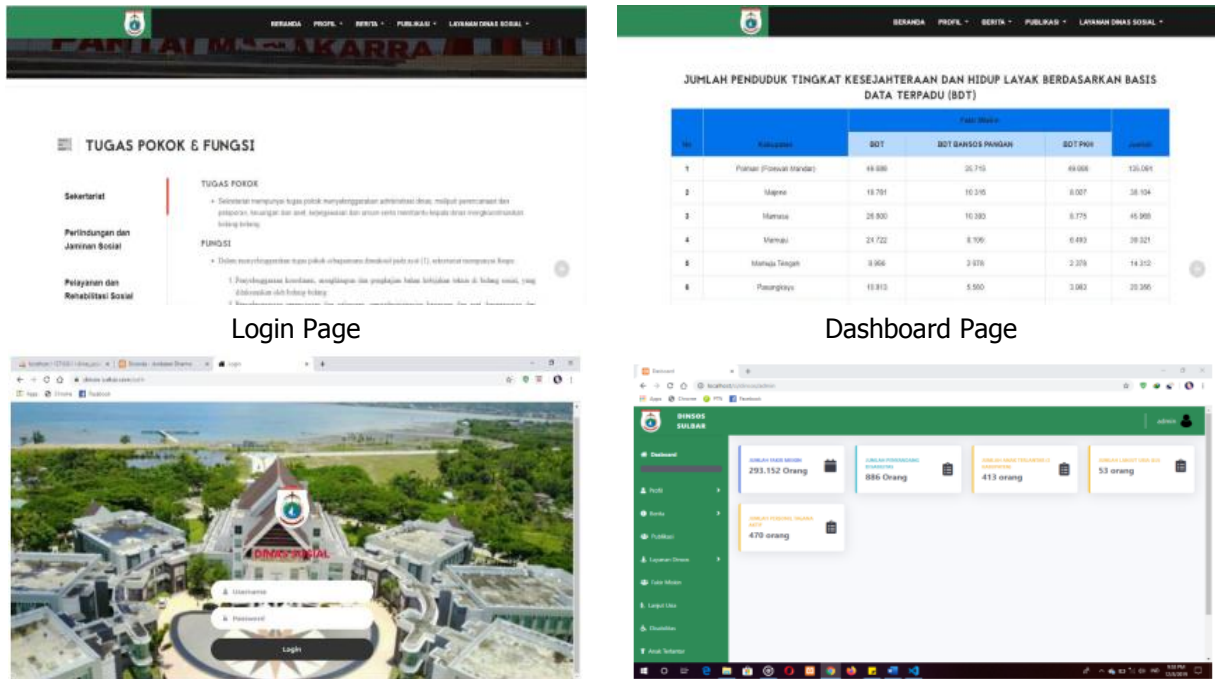


Figure 6. Collection of several system website UI designs

2) System Testing

The system that has been developed by the researcher will be tested using ISO 25010 which consists of functional suitability aspects, reliability aspects, and portability aspects.

a. Functional Suitability

The media expert validation test functions to determine the feasibility of the information media that has been created (Yang & Chan, 2008). The results of the media expert validation test are then used as material for improving the information media that is being developed. Each function is assessed by 2 (two) media/system experts. For each function that runs well, the tester/validator will give a checklist mark in the "yes" column, but if the function does not run well, a checklist mark will be given in the "no" column on the instrument provided. The summary of the test results presented in table 1 shows that the software quality test for the functionality suitability aspect has good quality.

Table 1. Functionality Suitability Test Results

Answer	Score by Validator		Maximum Score	Total Score	X	Category
	Validator 1	Validator 2				
Yes	114	114	228	228	1	Good
No	0	0	0	0	-	-

b. Reliability Testing

System reliability testing is carried out using a web server stress testing application to see a large number of website visitor simulations (Byrne et al., 2010) and this testing model consists of click tests, time tests, and ramp tests.

- Click test is a test (run test) with a constant load until the user meets the number of clicks that have been generated for 10 active users to determine the delay in the number of clicks as many as 10 times and the results show (see figure 7) zero error rate, average click time between 606-



3,588 ms, and the time for sending from the server between 2,388,599-2,537,996 bytes and the time required to access the page is 173.67-669.86 kbit/s.

Logfiles	Results per User (Complete Test)				Results per URL (Complete Test)		
User No.	Clicks	Hits	Errors	Avg. Click Time [ms]	Bytes	kbit/s	Cookies
1	50	50	0	606	2,537,996	669.86	
2	50	50	0	2,338	2,537,870	173.67	
3	50	50	0	933	2,537,802	435.38	
4	50	50	0	3,044	2,508,561	131.87	
5	50	50	0	1,314	2,537,676	309.01	
6	50	50	0	945	2,537,618	429.46	
7	50	50	0	3,588	2,388,599	106.51	
8	50	50	0	802	2,537,586	506.57	
9	50	50	0	1,521	2,537,664	266.87	
10	50	50	0	869	2,537,734	467.19	

Figure 7. Results of the Click Test Pressure Process

- Time test is a test with a constant load at a specified time within 10 minutes with 10 virtual users and no delay time for each user and the results show that 10 users obtained 613-827 clicks, in this time test no errors or zero error rate were found. Avg. click time between 632-842 ms and the time for sending from the server is 31,062,298-41,973,557 bytes and the time required to access the page is 460.27-642.91 kbit/s.

Logfiles	Results per User (Complete Test)				Results per URL (Complete Test)		
User No.	Clicks	Hits	Errors	Avg. Click Time [ms]	Bytes	kbit/s	Cookies
1	640	640	0	842	32,431,601	481.42	
2	793	793	0	661	40,198,379	613.67	
3	787	787	0	667	39,944,035	608.38	
4	756	756	0	695	38,371,156	583.92	
5	827	827	0	632	41,973,557	642.91	
6	782	782	0	671	39,590,419	603.55	
7	784	784	0	694	39,691,756	583.36	
8	613	613	0	880	31,062,298	460.47	
9	810	810	0	645	41,060,432	628.69	
10	808	808	0	648	41,009,590	626.27	

Figure 8. Time Test Phase Test Results

- Ramp test is a test with an increasing amount of load at a predetermined time. Ramp test is carried out for 10 minutes, with 10 virtual users, and there is no delay time between users and the results show that the ramp test (see figure 9) found no errors or zero error rate. Avg. click time between 1,098-4,700 ms and the time for sending from the server is 1,116,684-11,014,179 bytes and the time required to access the page is 45.96-369.69 kbit / s.

Logfiles	Results per User (Complete Test)				Results per URL (Complete Test)		
User No.	Clicks	Hits	Errors	Avg. Click Time [ms]	Bytes	kbit/s	Cookies
1	218	218	0	2,660	11,014,179	151.97	
2	165	165	0	3,248	8,323,792	124.26	
3	105	105	0	4,700	5,278,580	85.57	
4	52	52	0	8,666	2,588,837	45.96	
5	24	24	0	1,279	1,217,956	317.38	
6	26	26	0	1,127	1,319,594	360.36	
7	23	23	0	1,290	1,167,359	314.70	
8	22	22	0	1,350	1,116,684	300.78	
9	25	25	0	1,178	1,269,027	344.75	
10	27	27	0	1,098	1,370,453	369.69	

Figure 9. Figure 8. Ramp Test Phase Test Results

c. Portability Testing

Portability testing of this system uses the help of a web testing tool (Leotta et al., 2016), namely browserstack.com, namely testing is carried out with cross browser testing and several browser applications on PC, Laptop and HP devices. The results shown in table 2 obtained an average portability test value of 1, meaning that the service information system developed has a high portability aspect and the information system developed can run on several different browsers.

Table 2. Portability Test Results on Several Types of Browsers with Different Devices

No	Test Type/ Operating System	Browser Type	Result
1	Windows 11	Google Chrome	1
2	Windows 10	Mozilla	1
3	Windows 10	Yandex	1
4	Windows 8.1	Google Chrome	1
5	Oppo A9	Google Chrome	1
6	Realme 9 pro	UC Browser	1
7	Iphone 13 (IOS)	Safari	1

3) System Evaluation

System evaluation or product user trial stage is the stage of implementing an information system to determine user responses to the information system being developed. Usability testing is carried out by testing directly to users with a total of 30 respondents and the results show (see table 3) that the percentage of respondents in the usefulness aspect is 92%, the ease of use aspect is 93%, the easy of learning aspect is 93% and satisfaction is 92%, so it can be concluded that the usability test is stated as "very feasible" and has met the usability aspect.



Table 3. Evaluation Results and User Responses to Information System Design

No	Rated aspect	Σ Score of 30 respondents	Score Max	Percentage (%)	Category
1	Usefulness	966	1050	92	Very good
2	Ease of Use	1250	1350	93	Very good
3	Ease of Learning	557	600	93	Very good
4	Satisfaction	691	750	92	Very good
Average				92	Very good

5. Discussion

The Social Service Information System in this study aims to provide convenience to the social service to manage data, information and social service services to be more effective and efficient. This information system is intended to provide convenience for admins (operators and staff) for complaint services, processing and delivering information to the public. This information system has 3 levels of users, namely the public, staff, and admin. The public level can view profile information, news, publications from the social service and can send complaints or request services according to the services provided by the information system and according to the needs of the community, the staff level can manage news data and complaints or service requests received from the public, the admin level can manage profile data, news, publications and complaint services or service requests received from the public.

Complaints received by the social service through this information system will be followed up by providing a response to the public who need services (complaint services or social services). The next procedure will be determined after the complaint is confirmed, and determine the handling time according to the type of complaint received from the information system. This service information system is built using the PHP programming language and the database storage is MySQL where XAMPP is a stand-alone server (localhost). This makes it easy for developers to redevelop this system. In addition, the application in several operating systems can make it easier for users to access the information system. This information system was developed using a prototyping development model. The stages in Prototyping development generally include collecting system requirements, building prototypes, evaluating prototypes, coding systems, testing systems, evaluating systems and implementing systems.

Functional suitability testing is carried out to assess the extent to which the software is able to provide functions that meet the needs that can be used under certain conditions. Testing is carried out by providing instruments to media/system experts, which have a very good scale. The functional suitability aspect has several characteristics, namely: Functional completeness, the extent to which the functions provided cover all user tasks and objectives physically, Functional correctness, the extent to which the product or system provides the correct results according to needs, and Functional appropriateness, the extent to which the functions provided are able to facilitate the completion of certain tasks and objectives. The assessment consists of 114 questions related to the function of each part and features of the system that has been built. From the test results, it was concluded that this system is running well.

Reliability testing is done to see the software's ability to maintain a certain level of performance when used under certain conditions. This test is done using a web server stress tools application. In the Reliability test, 3 tests were carried out, namely the Click Test, time test, and ramp test. The percentage of successful access from the three tests was 100%, and had met the Reliability test success standards. Portability testing is done to test the extent to which the effectiveness and efficiency of a system, product or component can be moved

from one hardware, software or used in a different environment. Portability testing is done using the help of browserstack.com where testing is done with cross browser testing or system testing using various browsers on the desktop and mobile OS and that this service information system can run on various browsers, so it can be concluded that the information system has met the Portability testing standards.

Usability testing is done to assess the extent to which a product or system can be used by certain users to achieve goals effectively, efficiently, and with certain satisfaction in the context of use. Usability testing is done using respondent responses as end users of this system. The questionnaire was distributed to 30 respondents by introducing the respondents to the system, then asked to fill out a questionnaire that had been previously validated by an instrument expert. The test results from the usability aspect obtained the results of the respondents' responses, which were 92%.

6. Conclusion

The stages in developing Prototyping which generally include collecting system requirements, building prototypes, evaluating prototypes, coding systems, testing systems, evaluating systems and implementing systems can be used for developing website information system designs at the Social Service of West Sulawesi Province. Based on the results of the study of the Social Service information system after being validated and tested using the ISO 25010 standard which is reviewed in terms of functional suitability, reliability, usability, and portability, it can be concluded that the Social Service information system can be used by end users.

This study has several limitations, including the scope that only focuses on the West Sulawesi Provincial Social Service so that the results cannot be generalized to other agencies. In addition, this study is limited to the functional aspects of the service information system and has not included an in-depth analysis of data security and integration with external platforms. Time and resource limitations also affect the depth of user needs analysis and system testing, so further development recommendations may be needed to optimize system functions.

The results of this study are expected to provide positive implications for the West Sulawesi Provincial Social Service, namely increasing the efficiency and transparency of public services through an integrated information system. With this system design, the process of submitting and distributing social assistance can be faster, more accurate, and more easily accessible to the public, thereby reducing administrative errors and data duplication.

Acknowledgments

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