

The Development of Web-Based Paperless Office System Using CodeIgniter Framework Case Study of Lembaga Pengembangan Cabang Ranting Muhammadiyah

Yerezqy Bagus^{1,*}, Arif Rahman², Bambang Sugiantoro¹

¹Informatics Department, Faculty of Sains and Technology UIN Sunan Kalijaga, Indonesia

²Information System Department Faculty of Sains and Technology Universitas Ahmad Dahlan Yogyakarta, Indonesia
Email*: yerezqybagus@gmail.com

Abstract. Lembaga Pengembangan Cabang Ranting (LPCR) Muhammadiyah Yogyakarta is an institution that often conducts correspondence between institutions. The activity of recording incoming and outgoing mail data at LPCR Yogyakarta still uses the manual method by recording in a ledger. In addition, the length of time required in the letter of submission is also still found in the LPCR. One method that can be used to overcome this is paperless office, where the work environment that uses paper is eliminated or greatly reduced. The use of paperless office in addition to saving paper can also improve the efficiency of data processing and search because the form is already digital. This system was built using the Unified Software Development Process (USDP) development method, with the Unified Modeling Language (UML) modeling. In the initial process, the initial phase is an analysis of requirements for software requirements. Furthermore, at the elaboration stage, the maturation of concepts that have been analyzed in the previous phase is carried out. Then at the development stage, system development is done with the PHP programming language and MySQL database using the CodeIgniter framework. The final phase is the transition carried out alpha testing and beta testing. The alpha test results of the system built went well, while for the beta test results at the Administrator level, the results were 86.8% Strongly Agree and 13.2 Strongly Disagree, 86.4% Strongly Agree and 13.6% Strongly Disagree of Headoffice users, 91.3% Strongly Agree and 8.7% Strongly Disagree from the results of the operators' user answers and 96% Strongly Agree and 4% Strongly Disagree from the results of the Guest user. Based on the test results, the system built is feasible and can be used by LPCR Yogyakarta.

Keywords: CodeIgniter, paperless office, USDP

INTRODUCTION

The development of science and technology has now penetrated into various aspects of human life. Information technology is one of the rapidly developing technological developments, so that information needs will continue to grow and be needed. The development of information technology can be utilized in various fields, one of which is the field of education, in this case specifically the information system in schools (Abidin, 2012).

Lembaga Pengembangan Cabang Ranting (LPCR) Muhammadiyah Yogyakarta is an agency that operates as a facilitator in charge of conditioning the development of Lembaga Pengembangan Cabang Ranting (LPCR) Muhammadiyah Yogyakarta. LPCR Yogyakarta often conducts correspondence between agencies. The activity of recording incoming and outgoing mail data at LPCR Yogyakarta until now is still using the manual method by recording in a ledger. Thus, to find information on letter data, officers must require quite a long time because letter data must be searched one by one by looking back at the agenda data of previous letters sent first.

With more and more data coming in, recording the data of letters by means of this manual requires more

time. It can also affect the letter disclosure activity; ie the letter cannot be disposed as soon as possible.

One of the things that can be used to overcome this is the paperless office. Paperless office is a work environment where the use of paper is eliminated or greatly reduced. This is done by converting documents and other papers into digital form. Paperless office can save money, increase productivity, save space, make documentation and share information easily and make the office environmentally friendly. This concept can also be extended to communication outside the office.

In a paperless office environment, electronic document storage is centralized on the hard drive thereby eliminating the need for physical files, to support the implementation of paperless office, electronic document system management is needed.

One way to deal with the problem above is by "Developing a Web-based Paperless Office System Using the CodeIgniter Framework" which can store incoming mail, outgoing mail and other letter archiving data in digital form, so this can facilitate LPCR officers in sending mail. From the system to be created, it is expected that the institution's performance will be better and provide optimal services.

MATERIALS AND METHODS

Study Area

The research subject to be discussed is "Development of a Paperless Office System Using the USDP Method". The research made is expected to provide a correspondence information system that makes it easy for the Lembaga Pengembangan Cabang Ranting (LPCR) Muhammadiyah Yogyakarta to manage incoming and outgoing mail data effectively and with a high degree of accuracy.

Procedures

In this study there are several methods used to collect the data and materials needed, namely:

- *Observation Method*

This method is used to collect data and information that will be used to plan information systems. Researchers make observations by observing the workings of the previous system that works such as recording data entry and issuance of letters with a ledger. Researchers will observe from the ledgers owned by the LPCR.

- *Literature Study Method*

The method of literature study is carried out by collecting and studying information related to correspondence information systems including in the design, data analysis, and implementation. Reference sources used are books, articles, and final project literature related to the topic raised regarding the Utilization of Web-Based Paperless Office Systems using the CodeIgniter Framework.

- *Interviews Method*

Interviews were conducted directly with LPCR employees who were in charge of making and receiving letters which would later become users who would implement the correspondence information system. This interview was conducted with the aim to accommodate the needs of users and also obtain data and information related to this research.

Data Analysis

- *Alpha Test*

Alpha Test is a test carried out when an application is being built or developed by testing the way it operates and examining the suitability of the given input with the output produced. LPCR employees will try to operate the system while the system is being developed. From this experiment we will get shortcomings or things that need to be added or removed.

- *Beta Test*

Beta Test is a test that is done when the system has been built and the test is carried out by direct use. Administrators and officers conduct final testing before the system is actually applied to the LPCR.

RESULTS AND DISCUSSION

Requirements Capture Modelling

The process of analyzing and designing an application using USDP starts with defining/determining requirements. Software requirements are divided into functional requirements and non-functional requirements. This functional requirement will be modeled through a use case diagram. The method used in gathering functional requirements is by conducting interviews and observations of application users. Some functional conditions that must be met by the system include the following:

1. *Incoming Letter*

- a. The system can help users to enter data from incoming mail obtained by the LPCR
- b. The system can display incoming mail data that has been previously saved
- c. The system can help users to make dispositions and display the disposition status of incoming mails

2. *Outgoing Letters*

- a. The system can help users to enter outgoing mail data that has been created by the LPCR
- b. The system can display outgoing mail data that is owned by the LPCR

3. *Letter Templates*

- a. The system can help users to make letters
- b. The system can display mail creation data
- c. The system can help print letters

4. *Disposition*

- a. The system can help users to dispatch letters to other users

Non-functional requirements in operations that must be met by correspondence information systems have the following specifications:

1. The system can be operated on desktop and notebook PCs
2. The system can work on a web browser
3. The system must be accessible on Windows and Linux operating systems

Requirements are described using a use case diagram. Use case diagrams will serve as guidelines for the next step in the analysis and design. There are 4 users who are described using the use case diagram, namely Administrator, headoffice, operator and guest.

Use Case Diagram

Use case diagram System Administrator can be seen in Figure 1.

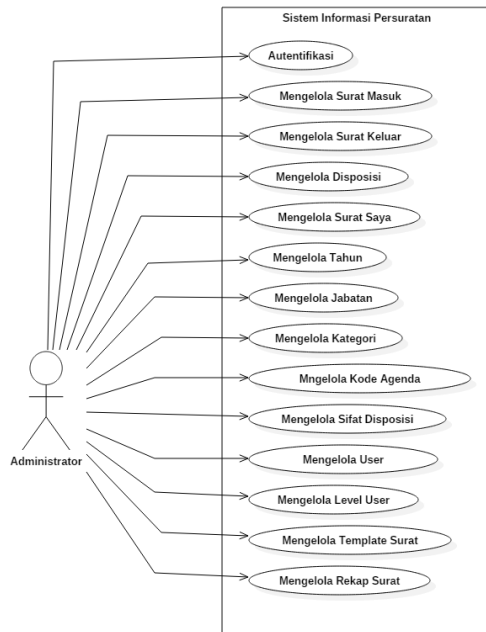


Figure 1. Use Case Diagram Administrator.

Use case diagram System Headoffice can be seen in Figure 2.

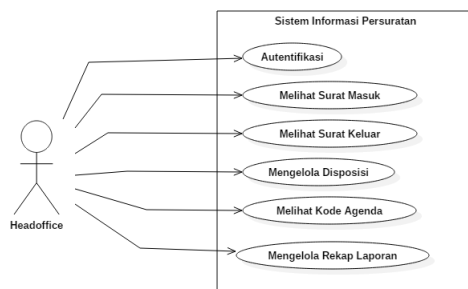


Figure 2. Use Case Diagram Headoffice.

Use case diagram System Operator can be seen in Figure 3.

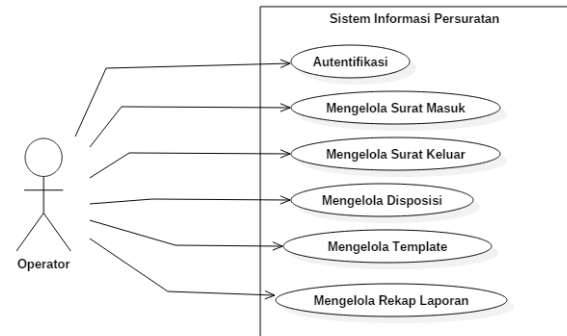


Figure 3. Use Case Diagram Operator.

Use case diagram System Guest can be seen in Figure 4.

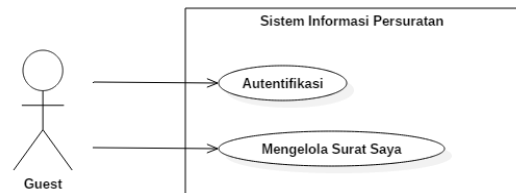


Figure 4. Use Case Diagram Guest.

System Design

In system design activities, the basic activities of the user are identified using the activity diagram.

Class Design

The next activity is class design. The design of this system there is a class diagram that is used to display classes in the system, can be seen in Figure 5.

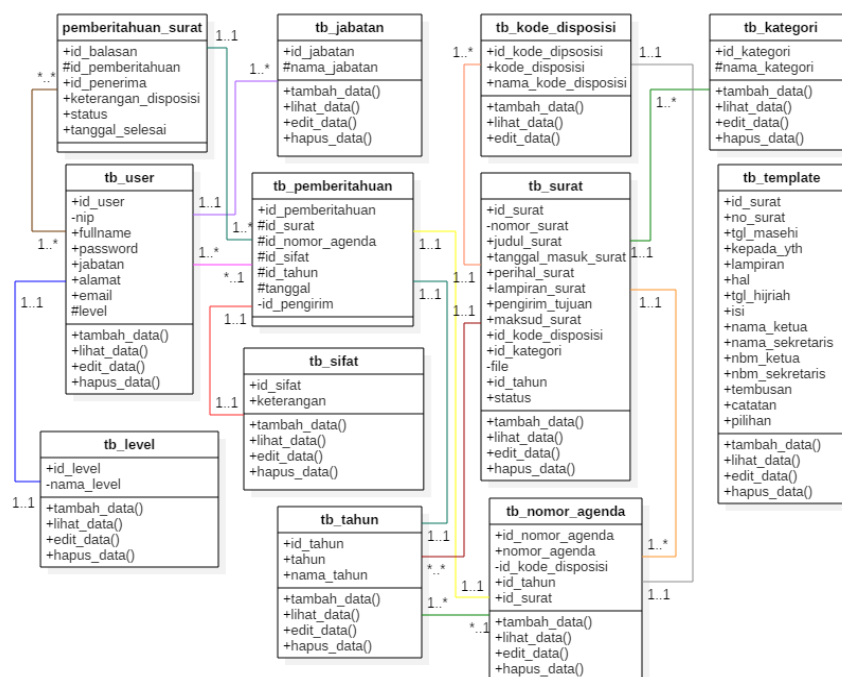


Figure 5. Class Design.

Data Management Design

Based on the class design, a database for the information system was created named smas with relations between tables

Testing

System testing is done to find out whether the correspondence information system application can run well. After the application is complete, the new system can be tested. There are 2 methods in conducting the system testing phase, namely alpha test and beta test. The system can be seen running well after the respondent fills in the system testing questionnaire.

Alpha Test

Alpha testing is done while the system is still on the side of the developer. This test is carried out to ensure all technical things can run as expected. If there is an answer "No", then the system will be repaired until it gets an answer "Yes". The formula used to calculate the percentage of the results of this test response is as follows:

$$\Sigma \text{Total Test Points} = \Sigma \text{Question} \times \Sigma \text{tester} \quad (1)$$

The answer "Yes" indicates that the system has been running properly according to when used by users. The tester in this test is a user who understands information systems. The alpha test tester data can be seen in Table 1.

Table 1. List of alpha testing testers.

No	Nama	Pekerjaan
1	Aris Munandar, S.Kom	Back End Developer
2	Anggi Surya Permana, S.Kom	Frelance Web Developer

Each alpha test tester will test in 4 levels, namely: Administrator, headoffice, operator and guest. Testers on alpha test testing amounted to two people giving responses "Yes" to the point being tested. Based on the results of alpha testing, the system can run as expected. Alpha test results can be seen in Table 2.

Table 2. Alpha test results.

No.	Pertanyaan	Jawaban	
		Ya	Tidak
1	Apakah proses login dan logout sistem pada setiap level pengguna berjalan dengan baik ?	2	-
2	Apakah hak akses pengguna terhadap sistem sesuai dengan level yang diberikan ?	2	-
3	Apakah menu yang tersedia pada sistem dapat berfungsi dengan baik ?	2	-
4	Apakah fitur mengubah password pada setiap level pengguna dapat berjalan dengan baik ?	2	-
5	Apakah fungsi menambah, mengubah, menghapus pada data surat masuk pada level Administrator dapat berjalan dengan baik ?	2	-
6	Apakah fungsi menambah, mengubah, menghapus pada data surat keluar pada level Administrator dapat berjalan dengan baik ?	2	-
7	Apakah fungsi menambah, mengubah, menghapus pada data disposisi pada level Administrator dapat berjalan dengan baik ?	2	-
8	Apakah fungsi menambah, mengubah, menghapus pada data master pada level Administrator dapat berjalan dengan baik ?	2	-
9	Apakah fungsi edit email pada level Administrator dapat berjalan dengan baik?	2	-
10	Apakah fungsi pembuatan surat pada level Administrator dapat berjalan dengan baik?	2	-
11	Apakah fungsi lihat hasil pembuatan surat pada level Administrator dapat berjalan dengan baik?	2	-
12	Apakah fungsi rekap laporan surat masuk dan surat keluar pada level Administrator dapat berjalan dengan baik?	2	-
13	Apakah fungsi rekap laporan nomor agenda pada level Administrator dapat berjalan dengan baik?	2	-
14	Apakah dapat mencari data surat masuk dan surat keluar pada level Headoffice dapat berjalan dengan baik?	2	-
15	Apakah fungsi disposisi pada level Headoffice dapat berjalan dengan baik?	2	-
16	Apakah fungsi pembuatan surat pada level Operator dapat berjalan dengan baik?	2	-
17	Apakah fungsi lihat hasil pembuatan surat pada level Operator dapat berjalan dengan baik?	2	-
18	Apakah fungsi balasan disposisi pada Guest dapat berjalan dengan baik?	2	-
Jumlah		36	-

Beta Test

Every tester in the beta test will test the system according to the level of the existing system user. This test is presented in the form of questions, then the tester

will provide responses in the form of choices, including Very Agree (SS), Agree (S), Doubt (RR), Disagree (TS), and Strongly Disagree (STS).

According to Nazir (2005), there are measurements taken to find out whether the response to a statement is positive or negative. The measurement uses a Likert Scale. On the Likert Scale, there is a weight rating for each answer. The assessment conducted in this test is an assessment using positive questions. These assessments include the following:

- Score 1: Very (disagree/ bad/ very poor)
- Score 2: No (agree/ good/) or less
- Score 3: Neutral/Enough
- Score 4: (Agree/ Good/ Like)
- Score 5: Very (agree/ good/ like)

The formula used to calculate the percentage of test response results is as follows:

$$\text{Total Score} = \text{Number of Response Responses} \times \text{Response Score} \quad (2)$$

After getting the results, then the interpretation of the calculation score will be searched. The results of interpretation can be obtained by calculating the highest score (X) and the lowest score (Y) for assessment items using the following formula:

$$\text{Total Questions} = \text{Number of Questions} \times \text{Number of Tester} \quad (3)$$

$$Y = \text{Highest Likert Score} \times \text{Total Questions} \quad (4)$$

$$\text{Formula Index\%} = \text{Total Score} / Y \times 100 \quad (5)$$

To find out the interval of assessment based on the percentage it is necessary to calculate the interval first with the following formula:

$$I = 100 / \text{Total Score (Likert)}$$

$$\text{Then} = 100/5 = 20$$

$$\text{Results (I)} = 20$$

Based on the results of the calculation of intervals, the criteria for interpretation of scores are as follows:

- Figures 0% - 19.99% = Very (disagree / bad / very poor)
- Figures 20% - 39.99% = Disagree / not good
- Figures 40% - 59.99% = Sufficient / Neutral
- Figures 60% - 79.99% = (Agree / Good / Like)
- Figures 80% - 100% = Very (agree / good / like)

Here is a list of testers in a beta test. List of beta test tester data can be seen in table 3.

Table 3. List of beta testing testers.

No	Nama	Jabatan	Level Pengguna
1	Aji Gunawan	Staff LPCR PP	Administrator
2	Johan Setiawan	Programmer	Administrator
3	Rahmat Hidayat	Back End Developer	Administrator
4	Isgnaidi	Sekretaris LPCR PP	Headoffice
5	Septiyan Hariyanto	Freelancer	Headoffice
6	Aris Munandar	Back End Developer	Headoffice
7	Adi Sucipto	Staff LPCR PP	Operator
8	Surya Pamungkas	Mahasiswa Sistem Informasi	Operator
9	Oktama Pangestu	Programmer	Operator
10	Ella Yussy	Staff LPCR PP	Guest
11	Slamet Riko F	Mahasiswa Sistem Informasi	Guest
12	M. Anshar Sara	Mahasiswa Sistem Informasi	Guest

Administrator level

From the Beta Test results table at the administrator user level, it can be seen in Table 4.

Table 4. Beta Test Result Administrator Level.

No	Pernyataan	Jawaban				
		SS	S	RR	TS	STS
1	Tata letak tampilan program menarik dan memudahkan akses fungsi-fungsi yang disediakan.	2	1	-	-	-
2	Pengelolaan data surat masuk dapat dilakukan dengan lebih mudah	2	1	-	-	-
3	Pengelolaan data surat keluar dapat dilakukan dengan lebih mudah	-	3	-	-	-
4	Pengelolaan data disposisi dapat dilakukan dengan lebih mudah	1	2	-	-	-
5	Dalam hal pencatatan data surat masuk tidak lagi dijumpai kehilangan data	-	3	-	-	-
6	Dalam hal pencatatan data surat keluar tidak lagi dijumpai kehilangan data	-	3	-	-	-
7	Dapat mendisposisikan surat dengan lebih mudah	1	2	-	-	-
8	Pembuatan surat dapat dilakukan dengan lebih mudah	1	2	-	-	-
9	Waktu yang dibutuhkan dalam pendisposisian surat dapat lebih pendek daripada pendisposisian sebelumnya tanpa menggunakan sistem	1	2	-	-	-
10	Untuk mencari data surat masuk dan surat keluar dilakukan dengan lebih mudah	2	1	-	-	-
	Jumlah	10	20	-	-	-

Σ Tester = 3 people, Σ Statement = 10, Σ SS = 10 points, Σ S = 20 points, Σ RR = 0 points, Σ TS = 0 points, Σ STS = 0 points

The calculation obtained is as follows:

$$\text{Total Questions} = 10 \times 3 = 30$$

$$\text{Total Score} = 10 \times (5) / 3 + 20 \times (4) / 3 = 16.7 + 26.7 = 43.4$$

$$Y (\text{Highest Score}) = 5 \times 10 = 50$$

$$\text{Index Formula} = \text{Total Score} / Y \times 100 = 43.4 / 50 \times 100\% = 86.8\%$$

The percentage of results is 86.8% which is in the category of "**Very (Agree/ Good/ Like)**", while the remaining 13.2% is in the category of "**Very (Disagree/ Poor/ Very Poor)**".

Head Office level

From the beta test results table at the headoffice user level, it can be seen in Table 5.

Table 5. Beta Test Result Headoffice Level.

No	Pernyataan	Jawaban				
		SS	S	RR	TS	STS
1	Tata letak tampilan program menarik dan memudahkan akses fungsi-fungsi yang disediakan.	2	1	-	-	-
2	Melihat data surat masuk dapat dilakukan dengan lebih mudah	-	3	-	-	-
3	Melihat data surat keluar dapat dilakukan dengan lebih mudah	1	2	-	-	-
4	Pengelolaan data disposisi dapat dilakukan dengan lebih mudah	-	3	-	-	-
5	Dapat mencari data surat masuk dan surat keluar dengan lebih mudah	2	1	-	-	-
Jumlah		5	10	-	-	-

Σ Tester = 3 people, Σ Statement = 5, Σ SS = 5 points, Σ S = 10 points, Σ RR = 0 points, Σ TS = 0 points, Σ STS = 0 points

The calculation obtained is as follows:

$$\text{Total Questions} = 5 \times 3 = 15$$

$$\text{Total Score} = 5 \times (5) / 3 + 10 \times (4) / 3 = 8.3 + 13.3 = 21.6$$

$$Y (\text{Highest Score}) = 5 \times 5 = 25$$

$$\text{Index Formula} = \text{Total Score} / Y \times 100 = 21.6 / 25 \times 100\% = 86.4\%$$

The percentage of results is 86.4% in the category of "**Very (Agree/ Good/ Like)**", while the remaining 13.6% are in the category of "**Very (Disagree/ Poor/ Very Poor)**".

Operator level

From the beta test results table at the administrator user level, it can be seen in Table 6.

Table 6. Beta Test Result Operator Level.

No	Pernyataan	Jawaban				
		SS	S	RR	TS	STS
1	Tata letak tampilan program menarik dan memudahkan akses fungsi-fungsi yang disediakan.	2	1	-	-	-
2	Pengelolaan data surat masuk dapat dilakukan dengan lebih mudah	2	1	-	-	-
3	Pengelolaan data surat keluar dapat dilakukan dengan lebih mudah	1	2	-	-	-
4	Pengelolaan data disposisi dapat dilakukan dengan lebih mudah	1	2	-	-	-
5	Pembuatan surat dapat dilakukan dengan lebih mudah	1	2	-	-	-
6	Untuk mencari data surat masuk dan surat keluar dilakukan dengan lebih mudah	3	-	-	-	-
Jumlah		10	8	-	-	-

Σ Tester = 3 people, Σ Statement = 6, Σ SS = 10 points, Σ S = 8 points, Σ RR = 0 points, Σ TS = 0 points, Σ STS = 0 points

The calculation obtained is as follows:

$$\text{Total Questions} = 6 \times 3 = 18$$

$$\text{Total Score} = 10 \times (5) / 3 + 8 \times (4) / 3 = 16.7 + 10.7 = 27.4$$

$$Y (\text{Highest Score}) = 5 \times 6 = 30$$

$$\text{Index Formula} = \text{Total Score} / Y \times 100 = 27.4 / 30 \times 100\% = 91.3\%$$

The percentage of results is 91.3% which is in the category of "**Very (Agree / Good / Like)**", while the remaining 8.7% is in the category of "**Very (Disagree / Poor / Very Poor)**".

Guest Level

From the beta test results table at the administrator user level, it can be seen in table 7.

Table 7. Beta Test Result Guest Level.

No	Pernyataan	Jawaban				
		SS	S	RR	TS	STS
1	Tata letak tampilan program menarik dan memudahkan akses fungsi-fungsi yang disediakan.	2	1	-	-	-
2	Dapat melakukan balasan disposisi dengan lebih mudah	3	-	-	-	-
3	Informasi dapat diakses dengan mudah melalui email	2	1	-	-	-
Jumlah		7	2	-	-	-

Σ Tester = 3 people, Σ Statement = 3, Σ SS = 7 points, Σ S = 2 points, Σ RR = 0 points, Σ TS = 0 points, Σ STS = 0 points

The calculation obtained is as follows:

Total Questions = $3 \times 3 = 9$

Total Score = $7 \times (5) / 3 + 2 \times (4) / 3 = 11.7 + 2.7 = 14.4$

Y (Highest Score) = $5 \times 3 = 15$

Index Formula = Total Score / Y $\times 100 = 14.4 / 15 \times 100\% = 96\%$

The percentage results are 96% in the category of "**Very (Agree / Good / Like)**", while the remaining 4% are in the category of "**Very (Disagree / Poor / Very Poor)**".

From the results of the questionnaire above, it can be concluded that the system is running well. In alpha test testing, the tester has given all the answers "Yes" to 18 questions. Then for beta test testing, the Likert scale results obtained 86.8% Strongly Agree and 13.2% Strongly Disagree from the results of the users Administrator answers, 86.4% Strongly Agree and 13.6% Strongly Disagree from Headoffice users, 91.3% Strongly Agree and 8.7% Strongly Disagree from the results of user answers Operators and 96% Strongly Agree and 4% Strongly Disagree from the results of Guest users.

Discussion

Based on the results of research conducted in accordance with the stages of the USDP system development method, it can be seen some changes in business processes before and after the system was built, including in: Before the system was built, the Administrator requires a long time because they have to write and enter data according with columns in the book. After that enter the letter file into the folder according to the desired identity. It also takes quite a long time too if you want to look for incoming or outgoing mail data that has been previously written. In this correspondence system, the Administrator only enters the required mail data after that it scans the mail file and stores it in the system. in the case of searching letters, the administrator also does not require a long time because only by typing the identity of the letter you want to search in the search field and the mail data will be found immediately.

Then in the process of dispensing a letter, before the system is built up the administrator needs a long time to dispose of the letter. This is because the Administrator must meet with the officer who gets the assignment in the letter. After that, the Administrator must write a statement back to the letter that the disposition has arrived. After the system is built, the Administrator does not need much more time because the disposition is conveyed via email notification. After entering the disposition data, the disposition officer will receive an

email notification to immediately open the letter and carry out the tasks stated in the letter.

CONCLUSIONS

The alpha test results of the system built went well, while for the beta test results at the Administrator level, the results were 86.8% Strongly Agree and 13.2% Strongly Disagree, 86.4% Strongly Agree and 13.6% Strongly Disagree of Headoffice users, 91.3% Strongly Agree and 8.7% Strongly Disagree from the results of the operators' user answers and 96% Strongly Agree and 4% Strongly Disagree from the results of the Guest user. Based on the test results, the system built is feasible and can be used by LPCR Yogyakarta

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