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Employee Presence and Payroll Information System Using Quick Response Code and Geolocation

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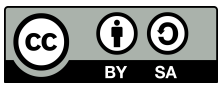
ABSTRACT

The presence in the institution still uses the conventional method of affixing a signature on the attendance sheet. Presences that have been carried out so far are felt to be less effective and efficient because sometimes attendance is filled towards the end of the month, which causes the validity of attendance data to be questioned. Even errors are often found in the recording, which causes the nominal to be inappropriate and must be revised. This research aimed to design an information system using the Quick Response Code to increase the effectiveness of employee attendance and payroll, supported by geolocation, to make it more efficient. The method used in this research was the waterfall method, using the stages of communication, planning, modeling, construction, and deployment. This research produced an information system that could make it easier for employees to attend, speed up determining employee salaries and filing financial disbursements, and increase employee presence and salary validity. The test results showed that 90% said they were satisfied with the performance of the system being built.



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1. INTRODUCTION

Presence in an institution or institution is something important [1]; this is because attendance can affect the productivity of the institution and the amount of salary that employees will receive [2]. Presence itself can be one of the considerations for institutions in measuring work productivity and employee activity [3]. Control of attendance is important to monitor performance and the costs incurred by institutions to pay employees [4]. While the salary itself is a reward or wages given to employees according to the agreement or rules set by each institution [5–7]. The attendance model applied to institutions today is still commonly found using attendance sheets, which will be signed later [8]. At the end of the month, the officer will recapitulate the attendance sheet to be used as one of the calculations in awarding employee salaries. This is also the case with the Ibrahimy University Research and Community Service Institute, which so far still uses attendance manually by affixing each employee's signature on the attendance sheet, which will later be recapitulated by the secretary to be used as part of the calculation in granting blessings to employees to submit to the treasurer of the pesantren. Barokah, as meant in the previous explanation, is a special designation or term used for salaries or honorariums in Islamic boarding schools. The attendance recapitulation and calculation of employee blessings in this institution still leave many problems; among them is the level of understanding of the rules for giving blessings and understanding of the formulas applied in Ms. Excel, which is used for the administration of barokah submissions. In fact, it is not uncommon to find many corrections from verifiers regarding the proposed nominal barokah. One of the causes is an error in applying the formula to adjust the existing rules. The problems faced, as explained earlier, also have an impact on the length of the process of making administrative files for filing barokah, which causes the disbursement of barokah to be late. One of the causes is an error in applying the formula according to existing rules. The problems encountered, as explained earlier, also impact the length of the process of making administrative files for filing barokah, which causes the disbursement of barokah to be late. One of the causes is an error in applying the formula according to existing rules. The problems faced, as explained earlier, also have an impact on the length of the process of making administrative files for filing barokah, which causes the disbursement of barokah to be late.

Over time, the existence of information technology can be used to make it easier to obtain information, making it easier for stakeholders to make policies [9]. Much research related to attendance and payroll has been carried out with various models and tools used, including what has been done by Panji Nurul Iksan et al. entitled Design of Employee Presence and Payroll Administration Systems at Annisa Cibinong Kindergarten. This research discusses processing employee attendance and payroll data that was previously done manually, switching to a computerized system. The system built in this research is still centered on certain parties who can record employee attendance to application systems, especially desktop-based systems that can only be accessed from certain computers [3]. The next related research is entitled Presence and Payroll Information System for Employees of PT. Incubea Creative Indonesia, conducted by Revy Erlangga et al., produces an information system that can help collect attendance data, calculate employee salaries, and prepare employee reports. The system developed in this study is desktop-based, so employees must use a computer specifically for recording employee absences [10]. Ahmad Fahri conducted other research titled Design and Development of Payroll Applications and Employee Presence at PT. Pusaka Bunda, this research was conducted to facilitate the processing of employee attendance data, and so does the payroll. This research still leaves problems; namely, the processes carried out by the system are entirely carried out by the admin so that everything related to absences and payroll is carried out centrally by the admin [11]. Subsequent research was conducted by Musdalifa et al., with the title Presence System Integrated with the Payroll Process. This study explained attendance using fingerprints and determining employee salaries every month by entering data through the payroll form so that this system can make it easier to manage attendance data and employee payroll. However, there has been no explanation regarding the fingerprint system integration model with the payroll system [5]. Another study on a similar topic, titled IoT Presence System Integrated with the Payroll System, conducted by Ido Eka Wiranata et al., discusses using Radio Frequency Identification (RFID) and NodeMCU as an IoT platform for employee attendance processes. This system can facilitate monitoring and grouping employee attendance based on time [8].

Based on the literature review described above, several studies on developing attendance and payroll information systems have been carried out using various models and tools with their respective advantages and disadvantages. The results of the literature review described above, in general, it can be concluded that two types of attendance models are carried out. First, the employees carry out the attendance process; the second is carried out by officers who manage payroll through the forms provided in the built system. The attendance process is centralized to one officer, resulting in the system being run depending on only certain officers. In addition to problems from a user point of view, from the literature presented, there are also deficiencies in the use of tools, such as the weaknesses in using RFID. The disadvantages of using this device include a layer of too-thick foil, which can block radio signals, and threats to data privacy because RFID tags also store data that can be read using any smart reader. RFID is not recommended for frequent use because it easily damages smart cards. So, you have to replace it with a new card, and procuring this tool requires a fairly high cost [12]. Using a fingerprint as an authentication tool also has weaknesses, including when the condition of the finger is damp and the reading process does not match the data or form of the fingerprint stored in the database. It is also possible to use

an image or a person's fingerprint for authentication, so it is still possible for errors to occur in reading. Fingerprints require regular maintenance [13, 14]. In addition, the use of shared fingerprints for the attendance process is currently still worrying because it still has the potential to become a medium for transmitting the COVID-19 virus [15, 16].

Based on the results of the current situation analysis at the institution and observations of the research that has been carried out, the author tries to design an attendance system that is integrated with employee payroll by optimizing the Quick Response Code (QR Code) and Geolocation for the effectiveness and accuracy of attendance and payroll data, as well as as a solution to problems faced by institutions, especially office buildings that are scattered in various places and office hours that are regulated by multi shifts. The use of QR codes was chosen because its use is not evenly distributed, including in educational institutions [17]. The advantage of the system built is that the employee attendance process can not only be carried out at one particular location but can be carried out at several location points that have been carried out based on a set radius so that even though presence can be done via a personal device, it still cannot be done if it exceeds the specified location radius. Apart from taking attendance independently, the features provided for employees are also available for permits, viewing attendance history, and viewing the salary history earned. Meanwhile, the output generated for applying for disbursement of salaries to the treasurer is a recap of employee attendance every month, detailed details of employee salaries, cash flow, financial recap, and cover letters. In addition, printed output envelopes for each employee are also provided. In addition to the several features provided by the system that have covered the need to apply for disbursement of salaries to the treasurer, this system can also save expenses because it does not require a lot of procurement of tools.

2. RESEARCH METHOD

The research method used in developing this system is the classical linear sequential model, namely the waterfall method [18]. This method is carried out sequentially from each stage. Thus, the system development process can be carried out regularly and can be carried out properly [19, 20]. The stages of the method used in developing the system in this study include Communication, Planning, Modeling, Construction, and Deployment. Figure 1 [21] shows an overview of these stages.

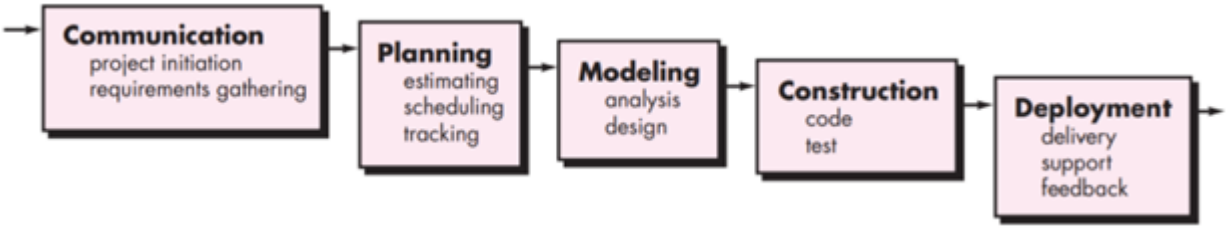


Figure 1. Waterfall method [22]

The communication stage is carried out when there is an idea to develop the system, carried out by coordinating with policyholders to gather information regarding current attendance and payroll procedures so that the problems encountered so far can be defined, as well as explaining the features that will be developed in the system. Furthermore, the planning stage is carried out to plan system development, including division of tasks, risk management, resource requirements, products to be produced, schedules, and work tracking. At the Modeling stage, it is carried out to design business processes, databases, application architectures, interface designs, and those translated into programming languages [23]. The construction stage is carried out to translate the design results that have been carried out at the modeling stage into a programming language. Then, system testing is conducted to test whether the system is running properly following the modeling and whether existing rules or errors are still found in programming. So, if an error is found, it is returned for repairs. The next stage is deployment. This stage is the stage of distributing applications to be implemented in institutions. The application of the system at this institution is expected to solve problems that have been faced so far and receive feedback from users regarding the use of the new system.

3. RESULT AND ANALYSIS

This study found that the process carried out in attendance and payroll at the institution was semi-computerized, causing delays in applying for blessings, which resulted in longer disbursement times. The Umana' attendance process (the term for employees at the institution) is carried out by signing the attendance sheet, which is then recapitulated at the end of the month to be entered into Ms. Excel to calculate the blessings of each employee based on existing rules. The results of the research conducted found that the

process of recording and calculating the blessing often results in errors in the calculation, resulting in an impact on the nominal that is not following what it should be, and also has an impact on the length of the process of disbursing the blessing. This research produces solutions to overcome the problems that have occurred so far so that attendance and payroll processes become more effective and efficient. The results of system analysis and design related to business processes developed regarding attendance and payroll can be explained as follows:

3.1. Identification of System Requirements

The results of the analysis of system requirements from research conducted in outline found the need for an easier attendance process and determining umana' salaries. The system requirements will be grouped into two accesses. First, the need for umana' who can take attendance independently, apply for permits, and see the history of absences and the salary that has been received. Second, the process requirements for officers who can fully access the system, the features provided for officers include setting master data to support attendance and determination of barokah, verification of presence and submission of attendance umana', financial circulation, determination of barokah, and making letters introduction [24]. An overview of the system requirements translated into the proposed system can be seen in Figure 2.

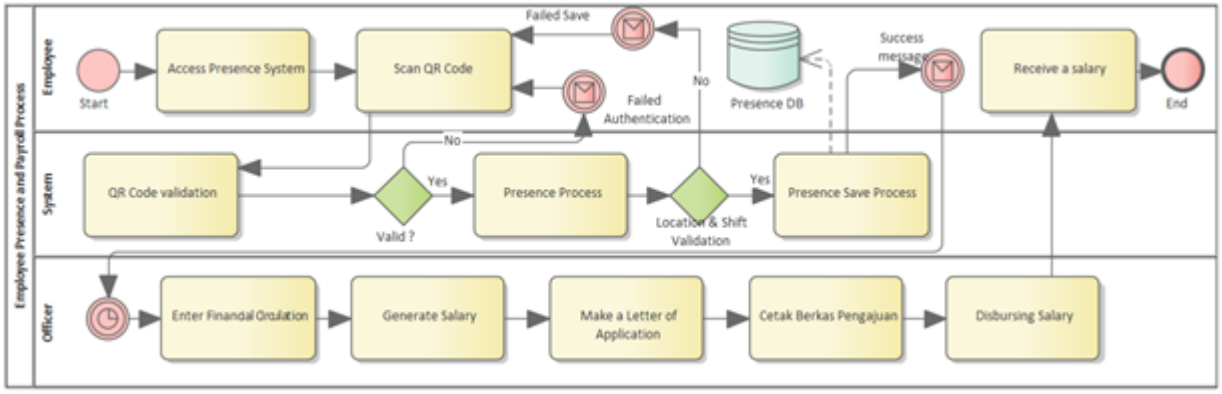


Figure 2. Design of umana' presence and payroll process

3.2. System Design

System design in this study, the authors use Unified Modelling Language (UML) as object-oriented software development, Some of the diagrams contained in the UML are used in designing the software developed by the author.

1. Use Case Diagram

Use case diagram in this study describes the behavior or activities that can be carried out by the two actors as mentioned earlier, namely umana' and officers. The main activity of the umana' actor is being able to take attendance independently by using the QR Code that has been printed on the card. Apart from that umana' can also access the history of blessings received, permit requests, and profile settings. Officer actors or institutional admins are given full access to the system to regulate the process of activating the academic year and period, verifying permits, managing financial circulation, determining the amount of blessings, making cover letters, and setting master menus that support the determination of the umana blessing on the system This. An overview of the use case diagram of this system can be seen in Figure 3.

Figure 3. Use case diagram

2. Sequence Diagram

Modeling using this diagram aims to describe schematic scenarios where the execution is carried out based on a time sequence. In general, the sequence diagram that is built describes the details of the stages when executing the process carried out by the system in a coherent manner. The sequence diagram of the processes that run in the system can be explained as shown in Figure 4.

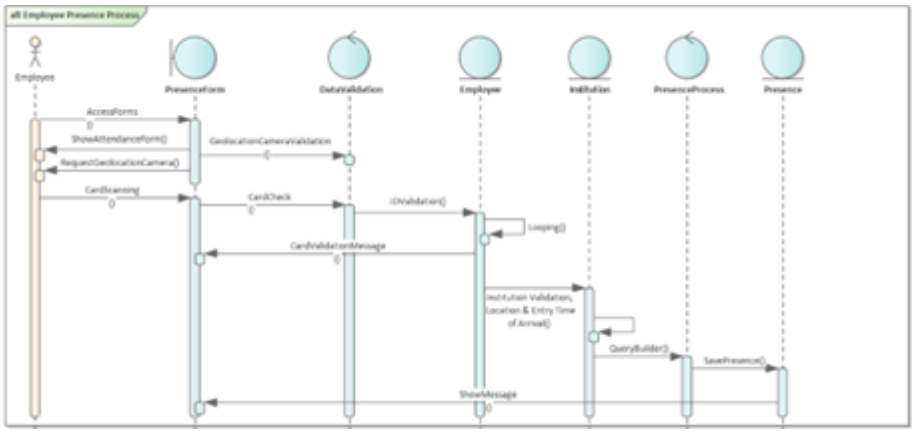


Figure 4. Presence attendance sequence diagram

In Figure 4 above, you can see the process that umana' carried out during attendance. The process that is carried out is to access the presence form, and then the system will ask to activate the location and the camera to scan the QR Code. If it is active, then umana' can scan the QR Code to continue the attendance process. Furthermore, the system will check the data scanned by the QR Code to match it with the data contained in the database. The data checking is carried out in stages, starting from checking the umana data, followed by checking the identity of the institution, location, and time of attendance. After the data checking process is completed, it is continued by processing the data storage into the database, displaying a message to umana's presence that was carried out successfully or not. Meanwhile, the sequence diagram for determining barokah can be seen in Figure 5.

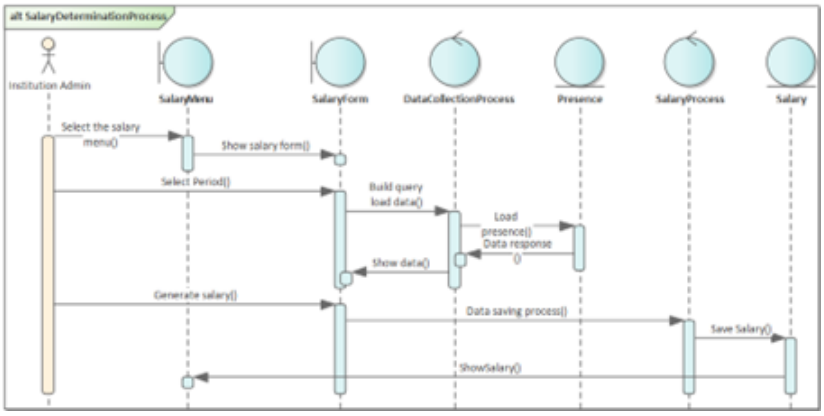


Figure 5. Sequence diagram for determining barokah

Sequence diagram Figure 5 above explains the stages of the process of determining the blessings that exist in the built system. The process is carried out by the officer accessing the barokah menu, which then displays the baroque data, which is ready to be determined based on attendance data for the full month and other supporting data. If you have entered at the end of the month, a button appears to determine the barokah in one month. After saving, it is processed into the database, and then the data that has been stored is displayed.

3. Class Diagram

Class Diagram is used to model the classes contained in the system being built as well as the attributes needed in the system. From the class diagram, as shown in Figure 6, it can be illustrated the relationship between classes and what operations are carried out to manage the presence and determination process of umana' along with other processes related to the process of granting blessings.

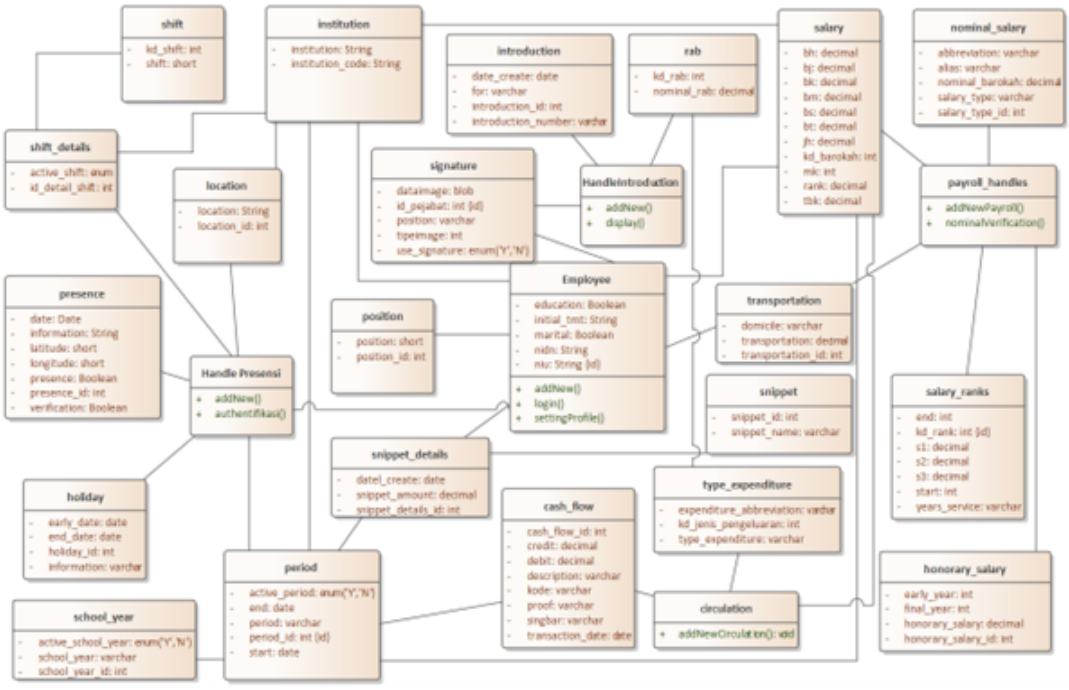


Figure 6. Class diagram

4. Implementation

After completing the system modeling and design stage, it continues with implementation using a programming language, the programming language chosen is web-based, so that the system built can be accessed from various places. The results of the implementation using the selected programming language can be seen in Figure 7.

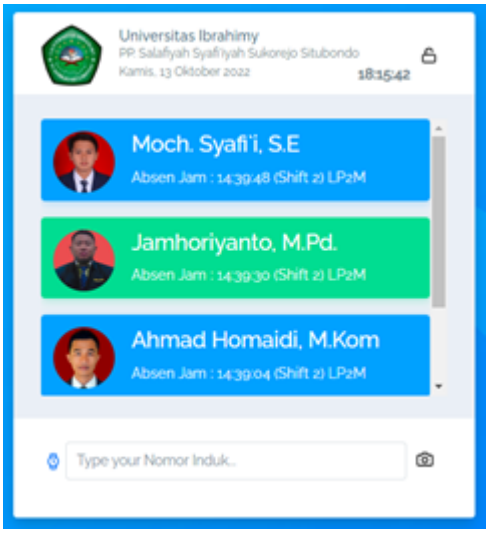


Figure 7. Initial display

Figure 7 above is the initial view of the application being built, which contains a list of umana' data that has taken attendance attendance. There is also a textbox for reading barcodes for those taking attendance via an office computer. The presence process is carried out using a card that can be printed from the system via the umana' menu, which contains a photo and an encrypted QR Code in the hope that the information contained in the QR Code can only be read by this system. An example of an employee card generated by the system can be seen in Figure 8.

The QR Code on the card is encrypted as a form of security so that not just anyone knows the information on the card. Meanwhile, attendance using the QR Code can be done via each umana' mobile device by clicking on the camera icon next to the textbox, and the display after clicking appears, as shown in Figure 9.

Figure 8. Example of an employee card

Figure 9. Scan QR code

Figure 9, as above, is a display for Scanning the QR Code via a mobile device to make attendance independently using a card printed from the system. The results of the encrypted QR Code scan are validated by the system to be read and authenticated as valid or not, and also to check the location and shift according to the data in the system. After being declared valid and legible within the specified location radius, the data is stored in the database and will appear on the operator's page, as shown in Figure 10.

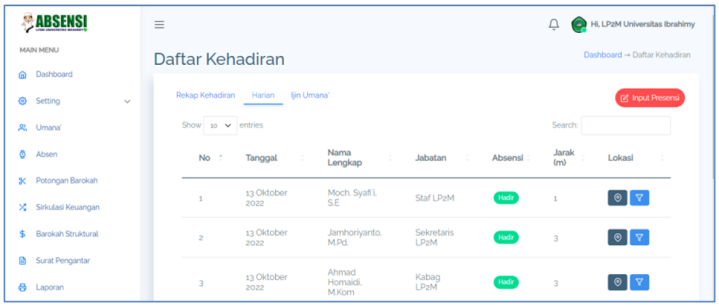


Figure 10. Display of umana' daily attendance list

The attendance list, as shown in Figure 10, contains information related to the attendees, including date, name, attendance status, distance, and attendance location. Thus, the manager can check the location where umana' makes attendance by clicking on the maps icon in the column on the right and can also filter attendance by clicking on the filter icon so that a display is appeared, as shown in Figure 11.

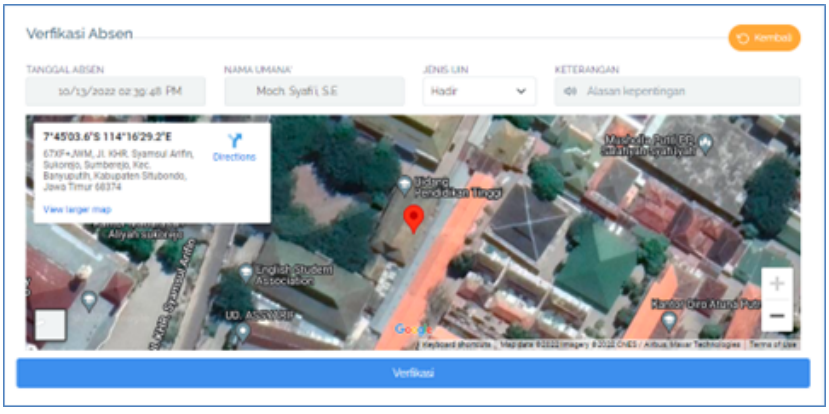


Figure 11. Appearance of presence verification page

Figure 11, as above, is used to verify attendance if it is still needed, so that attendance by umana' is truly valid and following the actual situation. This verification process is used to determine whether present, permit, sick, duty, or alpha by looking at the location points displayed on the map as shown above. The permit application process can be carried out through the page designated for umana' by accessing the absence menu, which displays a permit form as shown in Figure 12.

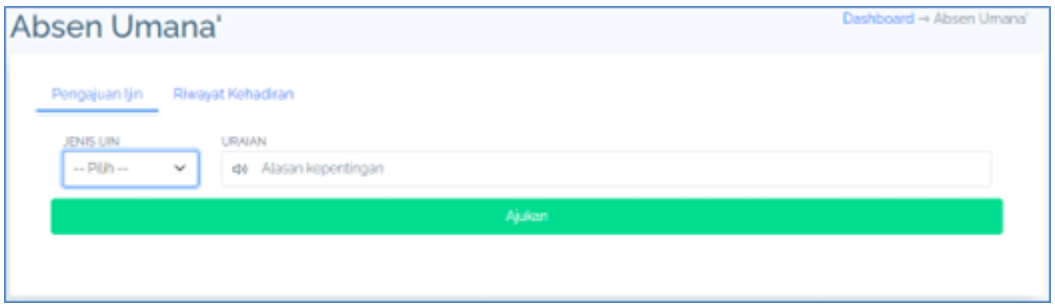


Figure 12. Display of the umana' permit form

The permit process is carried out by selecting the type of permit, either in the form of permission, illness, or duty, and including the reason in the description column, then clicking the submit button. The permission data sent later will also enter the officer's page for verification and approval so that it is recorded in attendance. Presence data carried out by umana' will then become part of the monthly barokah calculation. Figure 13 below is the determination of the amount of umana' blessing based on attendance data.

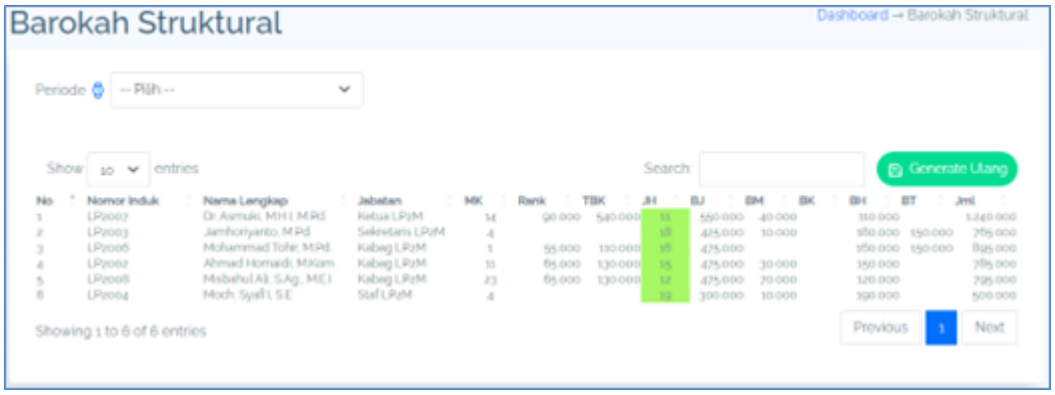


Figure 13. Display of umana' barokah determination

Determining the amount of blessings, as shown in Figure 13 above, can be done by clicking the "Structural Baraka" menu in the menu navigation, selecting a period, and then the system can display a list of data as shown in Figure 13. The data presented in Figure 13 is temporary data that has been calculated automatically from the system based on the number of attendances and determining the nominal amount of other barokah, which includes workload allowances, positions, years of service, family allowances, and honorary blessings, which of course follow the rules and calculations that have been set. If from the data presented here are still errors or changes, for example, umana' who was not married in the previous month then did not get a family allowance barokah, but it turns out that the following month the status has changed to married, so you have to update the data in the amana' data section so that the system can read that the umana' is entitled to get family allowances. After the nominal amount presented is deemed appropriate, data storage can be carried out for applying for blessings by clicking the "Generate" button. The button will appear when it enters the last day of each month and changes with the "Regenerate" button until the disbursement period is completed or entered into cash. This button is provided if it is still possible to change the nominal amount caused by corrections from related parties so that it can easily change the data that has been stored. Financial management and office spending can be done through the "Financial Circulation" menu, which is available to record entry and exit of office finances. The only source of office finance is the disbursement of funds obtained from the foundation's treasurer, which are used for giving blessings and routine office expenses. Thus, the form on the income tab on the circulation menu is only used to record the receipt of these funds. Furthermore, the administration of applying

for financial disbursement can be done by making an introduction, which is provided through the ”Introduction Letter” menu, which contains the amount of the monthly fund request along with the umana barokah, which has been stored in the process of determining the previous barokah. So in the application form provided, the nominal data of the umana’ barokah have been accumulated and added to the need for funds for administration and other routine expenditures. The display of the form provided for determining requests for financial disbursement can be seen in Figure 14.

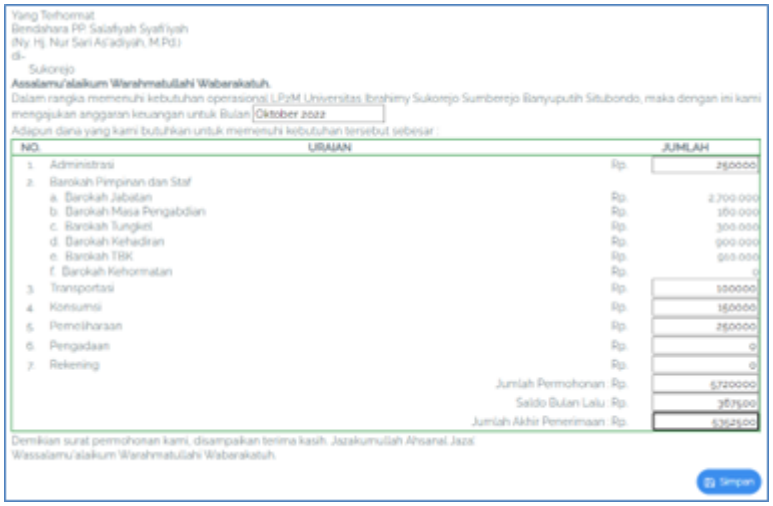
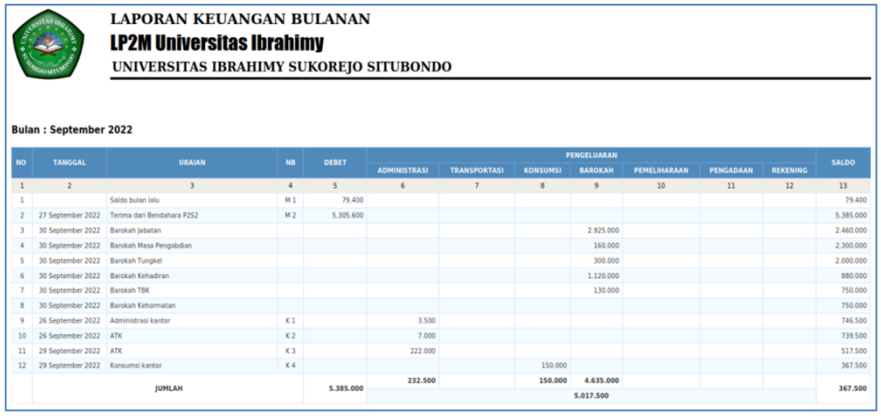


Figure 14. Display of the financial application form

As for routine office expenditures, data can be recorded through the expenditure tab found on the circulation menu, and entry and exit of office finances can be seen on the data list tab on the same menu as income and expenses. The menu displays the nominal balance from disbursing barokah umana’ and routine office expenditures. An overview of the display list of data from financial circulation can be seen in Figure 15 below.

Figure 15. Display of Financial Circulation Data List

Output generated from the system that can be printed include a letter of request for financial disbursement, a member card with a QR Code printed on it, a summary of attendance, details of the umana blessing, cash, a financial recap and an envelope that can be viewed via the ”Report” menu except for member cards that can be printed via the umana’ menu. Broadly speaking, the resulting output is the result of the processes contained in the system, namely attendance and financial circulation. The report output generated later become the basis for submitting financial disbursements so that the officer handling financial matters becomes lighter because they do not have to recapitulate attendance manually and do not need to enter the recap results as calculation material because the needs related to submitting financial disbursements have been accommodated in this system. An example of the output produced by this system can be seen in Figure 16.



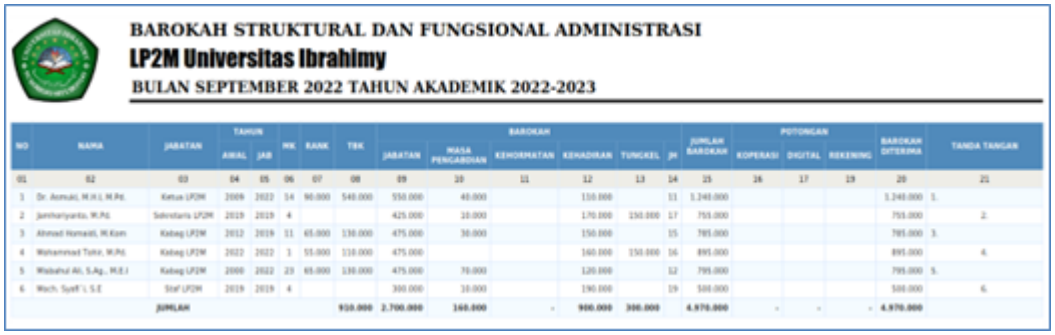
LAPORAN KEUANGAN BULANAN
LP2M Universitas Ibrahimy
UNIVERSITAS IBRAHIMY SUKOREJO SITUBONDO

Bulan : September 2022

NO	TANGGAL	URAIAN	NB	DEBET	PENGELUARAN							SALDO
					ADMINISTRASI	TRANSPORTASI	KONSUMSI	BAROKAH	PEMELIHARAAN	PENGADAAN	REKENING	
1	2	3	4	5	6	7	8	9	10	11	12	13
1		Saldo bulan lalu	M 1	79.400								79.400
2	27 September 2022	Terima dari Bendahara PJS2	M 2	5.305.600								5.385.000
3	30 September 2022	Barokah Jabatan						2.925.000				2.460.000
4	30 September 2022	Barokah Masa Pengabdian						160.000				2.300.000
5	30 September 2022	Barokah Tungkel						300.000				2.000.000
6	30 September 2022	Barokah Kehadiran						1.120.000				880.000
7	30 September 2022	Barokah TBK						130.000				750.000
8	30 September 2022	Barokah Kehormatan										750.000
9	26 September 2022	Administrasi kantor	K 1		3.500							746.500
10	26 September 2022	ATK	K 2		7.000							739.500
11	29 September 2022	ATK	K 3		222.000							517.500
12	29 September 2022	Konsumsi kantor	K 4				150.000					367.500
		JUMLAH		5.385.000	232.500		150.000	4.635.000				367.500
					5.017.500							

Figure 16. Monthly financial report

Figure 16, as above, is an example of a financial report generated from the system. The report contains information on financial income, balances, cash dates, descriptions, and financial expenditures of various types so that financial circulation can be grouped by type. The output of the umana' barokah report can be seen in Figure 17.



BAROKAH STRUKTURAL DAN FUNGSIONAL ADMINISTRASI
LP2M Universitas Ibrahimy
BULAN SEPTEMBER 2022 TAHUN AKADEMIK 2022-2023

NO	NAMA	JABATAN	TAHUN		MK	RANK	TBK	BAROKAH						JUMLAH BAROKAH	POTONGAN			BAROKAH DITERIMA	TANDA TANGAN
			AWAL	JAB				JABATAN	MASA PENGABDIAN	KEHORMATAN	KEHADIRAN	TUNGKEL	JH		KOPERASI	DIGITAL	REKENING		
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	19	20	21
1	Dr. Asmuki, M.H.I, M.Pd.	Ketua LP2M	2009	2022	14	90.000	540.000	550.000	40.000		110.000		11	1.340.000				1.340.000	1.
2	Jamhariyanto, M.Pd.	Sekretaris LP2M	2019	2019	4			425.000	10.000		170.000	150.000	17	755.000				755.000	2.
3	Ahmad Homaidi, M.Kom	Kabag LP2M	2012	2019	11	65.000	130.000	475.000	30.000		150.000		15	785.000				785.000	3.
4	Mohammad Tohir, M.Pd.	Kabag LP2M	2022	2022	1	55.000	110.000	475.000			160.000	150.000	16	895.000				895.000	4.
5	Misbahul Ali, S.Ag., M.E.I	Kabag LP2M	2009	2022	23	65.000	130.000	475.000	70.000		120.000		12	795.000				795.000	5.
6	Moch. Syafi' i, S.E	Staf LP2M	2019	2019	4			300.000	10.000		190.000		19	500.000				500.000	6.
		JUMLAH					910.000	2.700.000	160.000	-	900.000	300.000		4.970.000	-	-	-	4.970.000	

Figure 17. Administrative structural and functional barokah report

The information shown in Figure 17 above contains information related to umana' barokah in the form of name, position, year of office, length of service, barokah rank, workload allowance, and barokah obtained by type and barokah deduction, as well as the final nominal of the barokah received by each umana '. The report's output, as shown in Figure 16, is obtained from the process of determining the barokah, which is carried out on the structural barokah menu.

5. System Testing

One of the goals of making an information system is to make human work more effective and efficient. Therefore, the system that is built must really be able to bring about a better change impact than before the new system existed. Based on this, a system test is needed to ensure the system's quality. System testing in this study focused on measuring system quality from the user's perspective. Therefore, the tests were conducted using the WebQual method [25, 26]. System testing using this method is carried out to measure four aspects, namely usability, information, and service interaction. This test was carried out on employees at LP2M Ibrahimy University by conducting a direct trial of using the system for $\pm$ 1 month, after which a 22-question questionnaire was given with a rating range from 1 to 5, and the calculation of the percentage of satisfaction from the test results was carried out using the following formula.

$$Prosentase = \frac{\Sigma \text{nilai aktual}}{\Sigma \text{ nila ideal}} \times 100 \quad (1)$$

From the results of the tests that have been carried out on employees, the percentage of results is 90%; with this, users are very satisfied with the system that has been built. The recapitulation of values from the test results can be presented in Table 1.

Table 1. Test Result

Aspect	Number of Questions	Score		
		Actual	Ideal	%
Usability	8	186	200	93
Information	7	267	300	89
Service Interaction	7	220	250	88
Total	22	673	750	90

Based on the results of the tests that have been carried out, it can be concluded that the system built can overcome the problems encountered so far and can also make the p User satisfaction with the system built is the basis for recommendations for continuous system use. However, apart from this satisfactory assessment, notes from users are that sometimes there are still difficulties in configuring the browser for location and camera access permissions and focusing the camera on scanning the QR Code.

4. CONCLUSION

The design of this information system produces software that makes it easier for employees to take attendance, and the payroll process becomes faster. The advantage of this system is that attendance can be carried out from different places that have been arranged and is not focused on one particular device because it can be accessed via each employee's smartphone but remains within a predetermined radius and shift time. Another advantage of this system is integration with employee payroll activities, which has not been discussed in previous studies. From the results of testing the use of this system, the majority of users stated that they were satisfied with the performance of the system that was built, so it is a positive point that the system can be well received because it can overcome the problems that have been experienced. This research is still limited to the attendance and salaries of structural employees, even though at the place where this research was conducted, some employees are also lecturers and their salaries are still regulated by the faculty. Therefore, further research is still needed regarding the attendance model for lecturers and their salaries by following the rules that apply to the institution. Apart from that, the development of the attendance system also needs to accommodate the latest technology to improve the system.

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6. DECLARATIONS

AUTHOR CONTIBUTION

This research was conducted by Ibrahimy University lecturers including one student named Nur Azizah. Jarot Dwi Prasetyo is responsible for collecting data, preliminary observations, and modeling business processes. Ahmad Homaidi is in charge of analyzing and designing the system with the assistance of Nur Azizah. Meanwhile, the implementation of the program was carried out by Lukman Fakih Lidimilah.

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COMPETING INTEREST

I have no representation under competing financial, public, and institutional interests.

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