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Effective Utilization of Web Based E-Office System in Payakumbuh High School of Technology

Neni Delfianis[1], Ilham Mubara[2], Amna[3*], Rini Budiarni[4], Noviarti[3]

[1,2,4]Department of Informatics, Sekolah Tinggi Teknologi Payakumbuh
[3]Department of Informatics, Faculty of Engineering, Universitas Gajah Putih
[5]Department of Civil, Faculty of Engineering, Sekolah Tinggi Teknologi Payakumbuh

[*]Corresponding author: amnaa98@hotmail.com

Abstract. *Correspondence has defined as a written communication medium between private agencies and government agencies. It become the main reference for all activities within an agency. Payakumbuh High School of Technology (STTP) is one of the private universities in Payakumbuh City which still uses a manual system in managing data related to correspondence as it is prone to error. Therefore, a web-based e-Office system was built using the SLDC Waterfall method. The performance of the e-Office system is tested using GTMetrix. To determine the level of effective usage of the e-Offuce system at STTP, a research was conducted using quantitative methods which were analyzed based on the Technology Acceptance Model (TAM). From the results of testing the performance of the e-Office system, it is obtained a grade "A", which states a "Very Good" performance. While the results of the research on the effectiveness of the e-Office system in STTP use obtained a value of 3.235, which can be interpreted that the system could be used "effectively" by users.*

Keywords: e-Office system, waterfall model, GTMetrix, TAM

1. Introduction

The development of technology and information in Indonesia is currently progressing rapidly. One of its utilization is Electronic Office (e-Office). E-Office has become one of the most common application systems that have been used in modern administration systems (Nasution et al., 2020). Electronic office (e-Office) is a system interconnected with administration, virtually centralizing the components of an organization where data, information and communication were made through telecommunications media. E-Office is the software utilized to regulate the work pattern that has been implemented or will be done by employees in an agency. Where the storage, processing, and control that already existed within an organization will be carried out electronically (Sari et al., 2018).

To develop systems like e-Office, one commonly used method is the waterfall model. The waterfall model is a Software Development model that is in an SDLC model. This model is also often referred to as the waterfall model which is defined as the classic life cycle that interpreted a clear goal and increases the probability of success (Whitman & Mattford, 2017). The name of this method is the "Linear Sequential Model" which describes a systematic and

sequential approach in Software Development, starting from the specification of user requirements and further through the stages of planning, modeling, construction, delivery of the system to users (deployment), and ends with support for the complete software produced (Fathoroni et al., 2020).

One of the common outputs of software developed using such models is a website. A website is a collection of pages that contain digital data information in the form of text, images, videos, animations, and also a combination of several of these variables provided via the internet which can later be accessed and viewed by people around the world (Syukri & Ambarita, 2016). Website pages are processed using a standard language, namely HTML (Hypertext Markup Language). This HTML script will be read and translated by a web browser so that it can be displayed in the form of information that will be read and translated by a web browser so thatit can be displayed in the form of information that will be seen by readers from all over the world (Abdulloh, 2018).

GTMetrix could be defined as a webpage used to analyze functionalities in a website, such as graphical internet speed which is a web performance hosting tool [11]. The advantage of GTMetrix is its stable analysis with a level of measurement consistency that corrects the values. GTMetrix also has a feature to assign grades along with their scores. Grades are graded qualitatively with the letters A, B, C, D, E, or F to give a score on the web page, while scores in GTMetrix are quantitively in numbers. GTMetrix will measure the rate of the website and display the results in detail. The final grades of GTMetrix are A to F. A grade means that the performance is excellent, while the F grade means that the performance is poor. To obtain an A grade, the score of the application tested must be above 90. The results of the GTMetrix analysis consisted of data regarding page load time, total page size, and total number of requests contained on a website (Suliman, 2018).

Despite the availability of tools and systems that can enhance digital efficiency, some institutions still rely on manual processes. Sekolah Tinggi Teknologi Payakumbuh (STTP) is a technology school located in LLDIKTI Region X (ten) or Payakumbuh City. Currently, at STTP, the data management related to letters is still managed manually. This process takes a long time and causes errors such as damaged letters, missing, and others

Based on the above background, a web-based e-Office system was built to manage data related to correspondence in STTP. The system was constructed using the SDLC (System Development Life Cycle) with the Waterfall Model technique software development. The purpose of this study is to analyze the performance of a web-based e-Office system using the GTMetrix application and the level of effectiveness of its use in STTP. The research method used is a quantitative method based on the analysis of the TAM model.

2. Method

This study used quantitative methods. Quantitative methods collect, process, analyze, and present data objectively to solve a problem or test a hypothesis to solve the problem (Duli, 2017).

2.1 Research Variable

The TAM variable used in the study consisted of 4 variables, namely: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Behavioral Intention to Use (BI), and Actual

Usage (AU). Each TAM variable consists of 6 indicators. For more details, research variables and indicators could be seen in Table 1 (Saputra et al., 2017).

Table 1. Research Variables and Indicators.

No	Variable	Code	Indicator
1	Perceived Usefulness	Q1	Gives accurate results
		Q2	Answering the needs
		Q3	Control for work
		Q4	Make work easier
		Q5	Increase user productivity
		Q6	Important for work
2	Perceived Ease of Use	Q7	Easy to learn
		Q8	Ease of use
		Q9	Easy to understand
		Q10	Easy to remember
		Q11	Easy operation without a user manual
		Q12	Ease of access
3	Behavioral Intention to Use	Q13	Motivation to keep using
		Q14	Plan to keep utilizing in the future
		Q15	Motivate other users to use
		Q16	Initiative to provide input for use
		Q17	Love in use
		Q18	Desire to use independently
4	Actual Usage	Q19	Ethical use
		Q20	Compliance with procedures
		Q21	Usage satisfaction
		Q22	Convenience in use
		Q23	Understanding in use
		Q24	Delivering user satisfaction

The Likert scale is used to measure the research variables. The Likert scale, a psychometric scale commonly used in questionnaires, is the most widely used in collecting research data to conduct surveys (Taluke et al., 2019). The Likert scale used in this study has a 4-dimensional score which is stated in the table below (Joshi et al., 2015).

Table 2. Likert Scale Score

No	Answer	Code	Score
1	Strongly Disagree	SD	1
2	Disagree	D	2
3	Agree	A	3
4	Strongly Agree	SA	4

2.2 Data

The data sourced in this study were obtained through interviews and questionnaires. Interviews were conducted directly in question-and-answer sessions with employees who managed data related to correspondence at STTP, to detect the problems to be studied. While the questionnaire is a collection of questions related to the e-Office system at STTP, which addressed to system users.

2.3 *Population and Sample*

The population is defined as the research object or subject. The research subject is the place or location of the research conducted. While the sample is the part that provides a general description of the population (Riyanto et al., 2020). The total testimony in the study was 19 people consisting of employees and lecturers who were involved in managing correspondence data at STTP.

2.4 *Research Subject and Object*

The subjects in this study are employees and lecturers who are involved in managing data related to correspondence at STTP using the e-Office system. While the object to be studied is the web-based e-Office system at STTP.

2.5 *Research Implementation*

The stages of research implementation consist of several stages which are problem identification, research objectives, research scope, research benefits, collecting data, software development, research implementation, results and discussion, and conclusion and recommendation. The research data that has been collected is processed using quantitative methods and the TAM model.

2.6 *Software Development*

The e-Office system database is designed using four tables. It consists of a user table, disposition table, incoming mail table, and outgoing mail table. Each table composed of different field names, data types, and size.

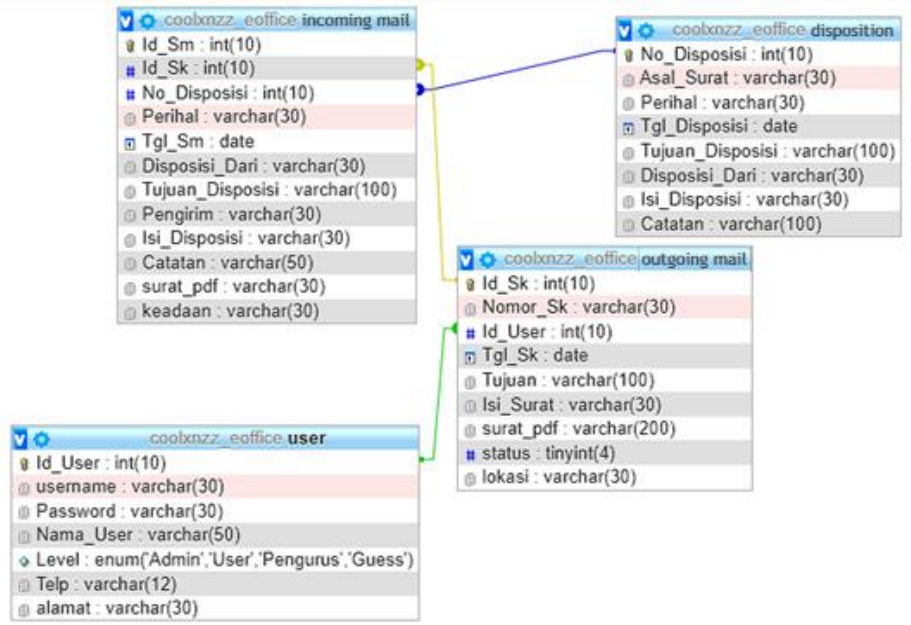

Figure 1. Database Relationship

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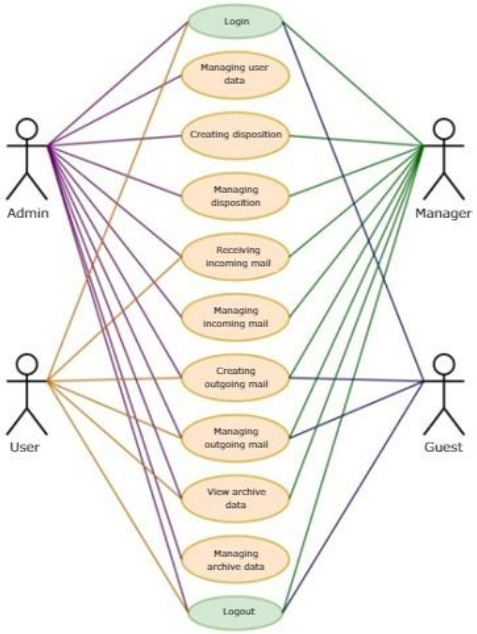

Figure 2. Usecase Diagram

Development is the process of developing and implementing an e-Office system design into an application. The interface of the e-Office system utilized a bootstrap framework to make it look better and more attractive. The e-Office system interface consists of several pages. It includes login page, dashboard, user data, add user data form, disposition, add disposition form, incoming mail, mail manager, add mail manager form, archive data, incoming mail archive, archive disposition letters manager, and archives.

3. Result and Discussion

3.1 Functionality Test of E-Office System

The testing stage is a process carried out to test a system to ensure the system is running well and according to the provisions. This stage is carried out on e-Office applications using black-box testing, which focuses on the login, logout, input, output, and several other primary functions contained in the system.

Table 3. Functionality Test of e-Office System

No	Function Tested	Result
1	Multi-user login (admin, user, manager, guest)	Success
2	Access user data menu via the admin account	Success
3	Input user data via the admin account	Success
4	Edit user data via the admin account	Success
5	Delete user data via the admin account	Success
6	Access the disposition menu through admin, manager, and user accounts	Success
7	Input disposition data using admin, manager, and user accounts	Success
8	Delete disposition data through admin, manager, and user accounts	Success
9	Access the incoming mail menu through admin, manager, and user accounts	Success
10	Open incoming mail file	Success
11	Delete incoming mail data through admin, manager, and user accounts	Success
12	Access menu manage mail by admin	Success
13	Access the outgoing mail menu by multi-user	Success

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14	Input outgoing mail data by multiple users	Success
15	Delete outgoing mail data through admin, manager, and user accounts	Success
16	Access the archive data menu through admin, manager, and user accounts	Success
17	Access archives of incoming mail by admins, managers, and users	Success
18	Access archives of outgoing mail by admins, managers, and users	Success
19	Access to disposition data archives by admins, managers, and users	Success
20	Access mail archive data by admins, managers, and users	Success
21	Download letter file by multi-user	Success
22	Access history data through admin and manager accounts	Success

3.2 E-Office System Performance Test

The web-based e-Office system performance was tested using the GTMetrix application. The test is carried out by logging into the GTMetrix test page and writing a link to the application or system to be tested. The web-based e-Office system could be accessed via the following link: "http://eoffice.decordiyhomes.com".

Table 4. Likert Score Scale

No	Page	Grade	Result	
			Performance	Structure
1	Login	A	100%	98%
2	User data	A	98%	95%
3	Disposition	A	99%	95%
4	Incoming Mail	A	97%	94%
5	Manage Mail	A	99%	93%
6	Archive Data	A	99%	95%
7	Incoming Mail Archive	A	97%	94%
8	Outgoing Mail Archive	A	98%	95%
9	Disposition Archive	A	97%	95%

3.3 Questioner Result Test

The data from the questionnaire were processed using the Ms. application. Excel and tested using IBM SPSS Statistics 25 software. At this stage, the validity and reliability of the data are tested on research variables and indicators. Based on the results of testing the TAM variables and indicators used in the study, the results of the validity and reliability tests obtained as follows:

Table 5. Validity Test of Questionnaire Result

Variable	Code	Sig (2-tailed)	Description
Perceived Usefulness	Q1	0.000	Valid
	Q2	0.000	Valid
	Q3	0.000	Valid
	Q4	0.000	Valid
	Q5	0.000	Valid
	Q6	0.000	Valid
Perceived Ease of Use	Q7	0.000	Valid
	Q8	0.000	Valid
	Q9	0.000	Valid
	Q10	0.002	Valid
	Q11	0.000	Valid
	Q12	0.000	Valid
Behavioral Intention to Use	Q13	0.000	Valid
	Q14	0.000	Valid

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	Q15	0.001	Valid
	Q16	0.000	Valid
	Q17	0.000	Valid
	Q18	0.002	Valid
Actual Usage	Q19	0.001	Valid
	Q20	0.000	Valid
	Q21	0.000	Valid
	Q22	0.000	Valid
	Q23	0.000	Valid
	Q24	0.001	Valid

From the test result, it could be concluded that the validity of the variables and indicators on the TAM that all of the standards used are valid because the significant (2-tailed) test produces a value smaller than 0.05. Based on the results of the questionnaire test, a significant (2-tailed) value of 0.000 was found in the indicators shown in table 5. A significant (2-tailed) value of 0.001 was found in the Q16, Q19, and Q24 standards. While the significant value (2-tailed) of 0.002 was found in the Q10 and Q18 indicators.

Table 6. TAM Variable Reliability

Variable	Cronbach's Alpha	Description
Perceived Usefulness	0.932	Reliable
Perceived Ease of Use	0.892	Reliable
Behavioral Intention to Use	0.823	Reliable
Actual Usage	0.875	Reliable

Based on the TAM variable reliability result in Table 6, the Cronbach's Alpha value obtained > 0.70 can ensure that the answers from respondents to this research instrument are reliable. The highest reliability value is in the Perceived Usefulness variable, in the number of 0.932. Whereas the lowest reliability value is found in the Behavioral Intention to Use the variable in the number of 0.823.

3.4 Analysis of the Effectiveness of Using the E-Office System

The effectiveness of using the e-Office system was analyzed through a questionnaire that has been distributed to system users. In evaluating the effectiveness level of the system, an interval scale is used to categorize the studied objects. In this study, the number formed consists of 4 scale scales, where the highest value is 4, and the lowest value is 1. Based on the interval scale obtained, the assessment criteria could be determined as the following (Hanggono et al., 2021):

Table 7. TAM Variable Reliability

No	Interval Class	Description
1	3.26 – 4.00	Very Effective
2	2.51 – 3.25	Effective
3	1.76 – 2.50	Ineffective
4	1.00 – 1.75	Very Ineffective

The following are the results of the effectiveness of the use of the e-Office system, which is described based on the TAM variable.

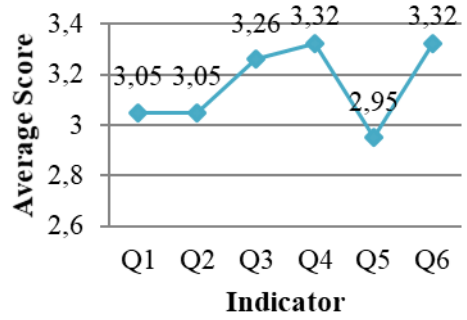

Figure 3. Perceived Usefulness Variable Test

Based on the graph, it can be concluded that the highest results in the PU variable were in indicators Q4 and Q6 with a value of 3.32. While the lowest result is found in the Q5 indicators, which is 2.95.

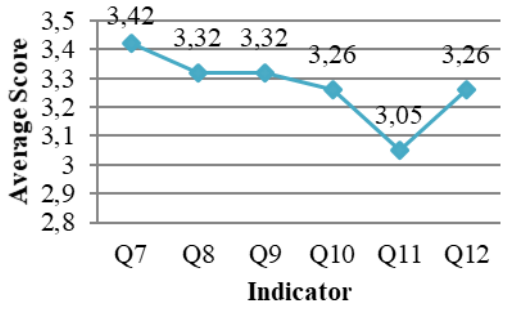

Figure 4. Perceived Ease of Use Variable Test

Based on the graph, it can be concluded that the highest result in the PEOU variable is found in the Q7 indicator with a value of 3.42. While the lowest result is found in the Q11 indicator, which is 3.05.

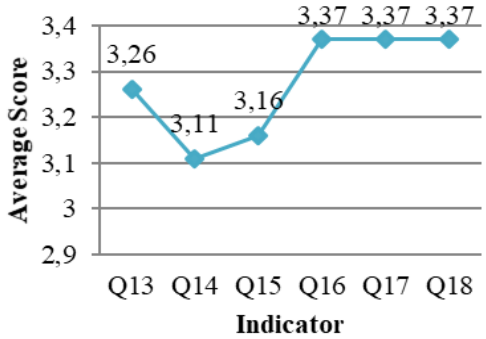

Figure 5. Behavioral Intention to Use Variable Test

Based on the graph in Figure 5, it can be concluded that the highest results in the BI variable are in indicators Q16, Q17, and Q18 with a value of 3.37. The lowest is in the Q14 indicator, which is 3.11.

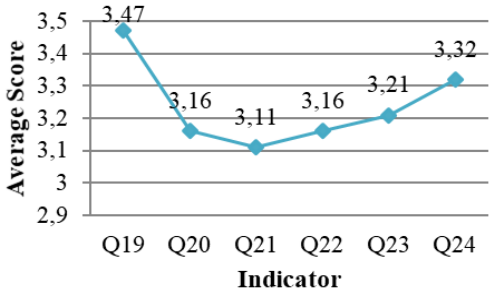

Figure 6. Actual Usage Variable Test

Based on the adjacent graph, it can be concluded that the highest result in the Actual Usage variable is found in indicator Q19 with a value of 3.47. Meanwhile, the lowest result in the Actual Usage variable is found in indicator Q21, which is 3.11.

Table 8. Result Recapitulation of Effectiveness of Utilizing the e-Office System

Code	Variable and Indicator	Result	Description
1. Perceived Usefulness (PU)			
Q1	Provide accurate results	3.05	Effective
Q2	Answering the needs	3.05	Effective
Q3	Control for work	3.26	Very effective
Q4	Simplified the work	3.32	Very effective
Q5	Increase user productivity	2.95	Effective
Q6	Important for work	3.32	Very effective
Total PU Variable		18.95	
Average score (X1) = 18.95 / 6		3.16	Effective
2. Perceived Ease of Use (PEOU)			
Q7	Easy to learn	3.42	Very effective
Q8	Ease of use	3.32	Very effective
Q9	Easy to understand	3.32	Very effective
Q10	Easy to remember	3.26	Very effective
Q11	Easy operation without a user manual	3.05	Effective
Q12	Ease of access	3.26	Very effective
Total PEOU Variable		19.63	
Average score (X2) = 19.63 / 6		3.27	Very effective
3. Behavioral Intention to Use (BI)			
Q13	Advocated to keep using	3.26	Very effective
Q14	Plans to keep using the future	3.11	Effective
Q15	Recommend other users to use	3.16	Effective
Q16	Willing to provide feedback for use	3.37	Very effective
Q17	Favor to use	3.37	Very effective
Q18	Suitable for independent use	3.37	Very effective
Total BI Variable		19.64	
Average score (X3) = 19.64 / 6		3.27	Very effective
4. Actual Usage (AU)			
Q19	Transparency in use	3.47	Very effective
Q20	Compliance with procedures	3.16	Effective
Q21	Satisfaction in use	3.11	Effective
Q22	Convenience in use	3.16	Effective
Q23	Understand how to use	3.21	Effective
Q24	Delivering user satisfaction	3.32	Very effective
Total AU Variable		19.43	
Average score (X3) = 19.43 / 6		3.24	Effective

Based on Table 7, the average score of the Perceived Usefulness variable is 3.16, the Perceived Ease of Use variable is 3.27, Behavioral Intention to Use is 3.27, and the Actual Usage variable is 3.24.

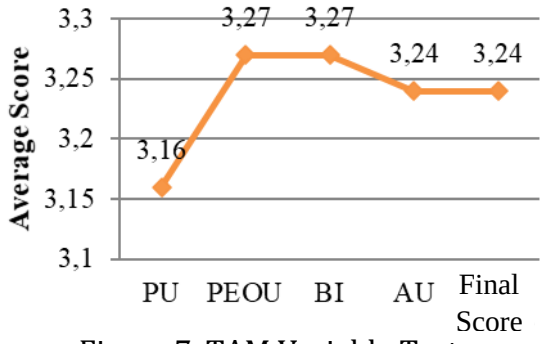

Figure 7. TAM Variable Test

Based on the total average score of the TAM variable, the final score is 3.24. The score obtained in the final score is in the interval 2.51 – 3.25, which means that the e-Office system can be used "effectively" by users

4. Conclusion and Suggestion

4.1 Conclusion

Based on the research result and discussion, it can be concluded:

a) From the e-Office system test using GTMetrix application, it is obtained grade "A" mark for all pages tested. The marks indicate that the result performance of e-Office system is "excellent".
b) The result of the study on the effectiveness of web-based e-Office systems at the Payakumbuh High School of Technology obtained a value of 3.235. This value is in the interval 2.51 – 3.25, so it can be concluded that the e-Office system can be used "Effectively" by its users.

4.2 Suggestion

Based on the results of the research that has been done, several suggestions are given as follows:

a) It is hoped that in the future, there will be further development of the e-Office system regarding incoming mail notifications and mail location history to provide more convenience for the user.
b) In the implementation of the e-Office system at STTP, it is necessary to guide the system creator or developer to the user so that the system can be utilized optimally.

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