

PDCA Analysis on Management Administration Information Based on Android in Resik Becik Semarang

Vania Ayu Rachmadanti, Ratih Setyaningrum* and Dwi Nurul Izzhati

Industrial Engineering, Faculty of Engineering,

Dian Nuswantoro University

Semarang, Indonesia

vania.ayur@gmail.com, ratih.setyaningrum@dsn.dinus.ac.id, izzhati2@gmail.com

Abstract

One of the Waste Banks in Semarang is, "Resik Becik". It is located at Cokro Kembang Street Number 11 Krobokan Village, West Semarang. It was established on January 15th, 2012, as a Micro-medium enterprise that processes inorganic waste such as plastic and paper into goods that have high economic value. This final task research aims to determine the improvement of administration management of "Resik Becik" based on the plan-do-check-action cycle and also generate a design of administrative management information system at the waste bank from the results of continuous improvement analysis in plan-do-check-action. The results of this study are 1) Implementation of administrative management at "Resik Becik" Semarang based on PDCA method, in the planning cycle analyzing the cause of the problem by using seven tools. On Do cycle creates android-based apps as well as create questionnaires. On check cycle tests questionnaire variables using SPSS software and Action cycle publishes android-based applications. 2) The design of the administrative management information system at "Resik Becik" with an android-based application has the advantage to shorten the management process time at "Resik Becik". 3) Applications are made in a more modern way and take advantage of existing technological developments.

Keywords

Waste Banks, Continuous Improvement, Seven tools, Administration Management, and PDCA.

1. Introduction

Semarang City keeps having improvement in activity every year, this is directly rateable to the increase of waste production. The waste produced is around 1200 tons per day (DLH 2019). As the amount of waste increases, innovation is needed. One of the waste processing techniques in Semarang City is establishing a Waste Bank. According to the Unilever Indonesia Foundation, the Waste Bank is a collective dry waste processing system that motivates the community to play an active role in it (Saputro et al. 2005). Opened in 2012, the Resik Becik Waste Bank is also assisted by several partners in processing waste into goods that have a sale value. The Products generated from the waste collection are bags, wallets, mats, key rings, and others. The waste bank has increased its customers every year, until now there are approximately 592 customers. From the observations, the administrative process for the Waste Bank still uses the manual method. This also causes the error that often occurs in the process of recording customer names that is often repeated. In addition, when a customer deposits trash, the manager must look for the customer's savings book. This causes taking overtime to look for customer savings books. Because of this, the service process at "Resik Becik" has become ineffective. In previous research, a business process development design was carried out to reduce service process time (Estiningtyas 2020). Meanwhile, this research discusses the administrative management design and makes a special application that can be used for Waste Bank managers and customers. The PDCA method can help refinement in service quality at the Waste Bank. 4 steps will be taken starting from the problems that arise to analyzing how to deal with these problems. So, this study aims to determine the improvement in the administrative management of "Resik Becik" Waste Bank using the PDCA Method.

2. Methods

The Plan, Do, Check, Action method or known as the PDCA method is a process of solving problems with 4 stages in measuring the quality of activity and performance. The benefits of the PDCA method are as follows:

1. Make it easier to map the powers and responsibilities of an organizational unit.
2. Become a work pattern to improve a process or system in an organization.

3. Solve and control a problem using a sequential and systematic pattern.
4. Can shorten the workflow.
5. Eliminate waste in the workplace and increase productivity.

In the field of quality control, P-D-C-A is a process for solving and controlling problems in a sequential and systematic pattern. Here are the steps for carrying out the PDCA method:

1. Plan

The step aims to determine the targets or achieved targets in improving the process and the problems to be solved (Putra et al. 2018). The steps that need to be noticed include:

- a. Identifying services, expectations, customer satisfaction so that the results are by the provisions. Respondent demography in Semarang city, especially Krobokan residents.
- b. Description of the entire process to be carried out.
- c. Focusing on opportunities to improve quality.
- d. Laying goals and processes as needed so that the results are by the provisions.
- e. Referring to identify opportunities or ways for improvement.
- f. Finding the root of a problem.

2. Do

The step is a continuation of the identification results from the previous problem. In this step, it is required to carry out a compiled plan and check the implementation process on a small scale (Trial). In addition, the implementation of the problem-solving steps is also monitoring of the ongoing process.

3. Check

At this step, two things need to be noticed, including checking and evaluating. This monitors the successful completion of a problem formulation. Evaluation requires checking the process that is carried out as expected. The techniques used are observation and survey. If you find deficiencies, it is necessary to have an improvement plan for further implementation. If successful, the repairs can be carried out and made into enforced routines.

4. Action

At this step, it is a follow-up of previous results by making the necessary improvements. It can also mean reviewing the entire stage and modifying a process to improve on previous ones. Following up also means standardizing changes, such as considering areas to be defined, revising process improvements, and communicating to all staff. In addition, it is necessary to monitor change by measuring and controlling the process regularly at this step.

4. Data Collection

Table 1 below shows the pricelist of waste, collected from Bank Sampah Resik Becik (2020).

Table 1. List price waste

List price	
variable	Price (Rp)
PAPER (Kg)	
Marga	500
Tabloid	800
Cartoon paper	1.000
HVS/Book	1.250
Newspaper	4.000
PLASTIC (Kg)	
Toys	300
Packing plastic Mix	800
Packing plastic spesial	1.500
Plastic/bucket	1.500
Bottle	1.500
Pipe	2.500
Glass	1.500
LOGAM (Pcs)	
Cans	800
Iron	2.000
Aluminum Pan	7000

Source : Bank Sampah Resik Becik(2020)

4. Results and Discussion

4.1. Plan

At this step, the authors also plan to make a special application aimed at making it easier for managers to find customer names and enter customer data. As well as making it easier for customers to check and control savings books from anywhere. The plan for making the application is also made to understand the needs of consumers so that they get results that belong to the criteria and desires. The plan of administrative management at the Resik Becik Waste Bank is that the Waste Bank customers already have a savings book that they carry themselves, this is done to prove that the customer is saving at the Resik Becik Garbage Bank. In the initial step, the customer comes to deposit waste and brings a savings book. Then the manager will weigh and count the waste brought by the customer. The manager will record in a daily book, and he will enter data in a special application made to make it easier for managers and customers to control savings. And also he records it in the savings book as proof of the transaction.

4.2. Do

In the process of doing (Do), this research is creating an Android-based application according to the existing savings book at the Resik Becik Waste Bank and to create a questionnaire of application usage satisfaction based on usability, user interface, and user experience. Also, data analysis on the characteristics of respondents was carried out which could be input to clarify the research data. This is also made to make it easier to plan applications to suit what the user wants. The following is a list of application usage satisfaction questionnaire questions:

Table 2. List of questionnaire questions

Questionnaire Questions			
Usability			
Variable	Attribute	Statement	Information
Effective	Function	Easy to operate	P1
		Speed up the processing time	P2
Efficient	Care	Easy to care for product (right in the data update)	P3
Easy to remember	Display	Easy to use repeatedly	P4
<i>Error</i>	Complaint	Minimizing errors/errors on the product	P5
Satisfaction	Interest	Users are interested or not in the application	P6
User Interface Dan User Experience			
Variable	Attribute	Statement	Information
Ease of User	<i>Learnability</i>	Product usage is learned quickly	P7
	Satisfaction	Interesting product	P8
Quality of Information	Information Be accurate	The right information on the user	P9
	Relevant Information	Relevant information to users	P10
Value	Product Features	Products provide services well	P11
	Product Features	Products meet consumer wants and needs	P12
<i>Attractive</i>	Feeling User	The user is happy when using the product	P13
	Accuracy Product	Products can function with good	P14
<i>Task Success</i>	Pleasure	Products made for speed up needs	P15
	Efficiency and Effectivity	Products made as practical as possible	P16

After determining the variables and attributes on the questionnaire. The next step is determining the number of sample respondents being taken. In this study, the authors used the Slovin approach based on population size (N) and error value (e). The following is a design of the information system used in the form of an android-based application that can be accessed by the management and also customers of Resik Becik Waste Bank Semarang shown in Figure 1, Figure 2, and Figure 3.

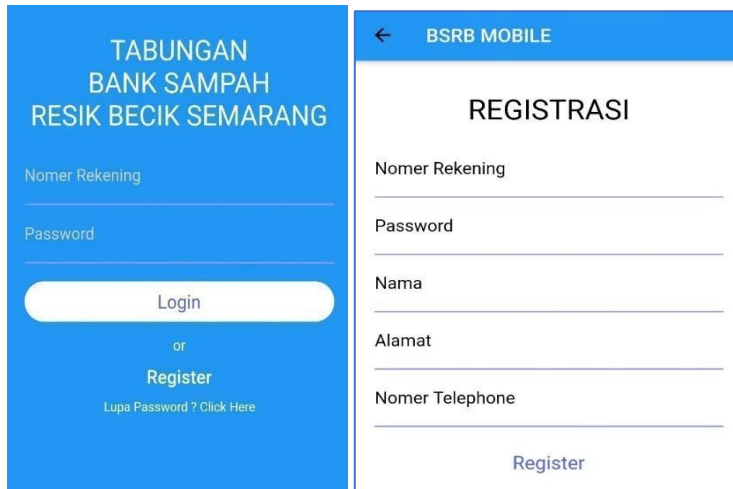


Figure 1. Initial display and registration of the BSRBmobile application

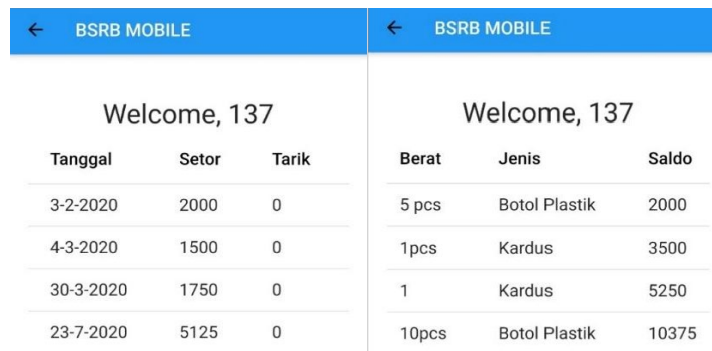


Figure 2. BSRBmobile display for customers

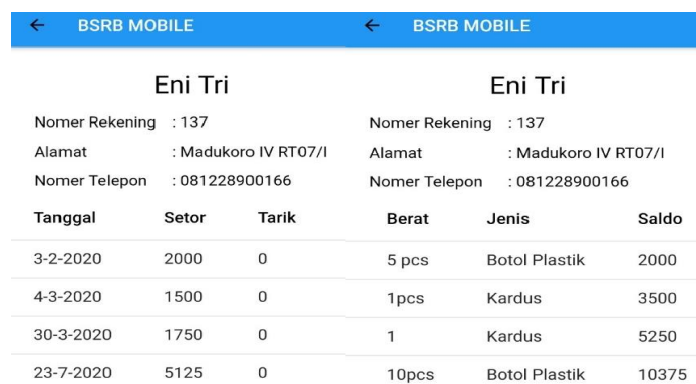


Figure 3. BSRBmobile display for admin

4.3. Evaluation

In this step (Check), this study tested the results of the questionnaire using several tests on the SPSS software. This study uses a closed questionnaire to determine the level of satisfaction of respondents or customers of the Resik Becik Waste Bank in using the BSRBmobile application. The following are the scores and levels of importance of the questionnaire:

Table 3. Importance score table

Score	Assessment	Information
1	Strongly Disagree	STS
2	Disagree	TS
3	Agree	S
4	Strongly agree	SS

From the results of the questionnaire, a summary of the answers from the respondents was obtained:

Table 4. Results of user satisfaction questionnaire

<i>Usability</i>					
Question	SS	S	TS	STS	Amount of data
P1	31	59	2		92
P2	29	61	2		92
P3	22	67	3		92
P4	35	54	3		92
P5	7	30	10	10	92
P6	35	43	14		92
<i>User Interface dan User Experience</i>					
Question	SS	S	TS	STS	Amount of data
P7	33	56	3		92
P8	32	52	7	1	92
P9	39	48	4	1	92
P10	33	57	2	1	92
P11	32	58	2	1	92
P12	34	56	2	1	92
P13	31	58	3		92
P14	31	57	4		92
P15	41	48	3		92
P16	59	37	2		92

Data Validity and Reliability Test

The validity test was carried out by comparing the r-count of the SPSS results to the r-table with a significant level of 5%. If the r-table is smaller than the r-count, then the questionnaire questions are declared valid [3]. Here is how to determine the value of the r-table (Degree of Freedom):

$$\text{Df (Degree of Freedom): } N - 2 = 92 - 2 = 90$$

Based on the existing r-table list, the r-table value at the 5% significance level for $n = 90$ is 0.205. Then the data reliability test was carried out through the Cronbach alpha statistical test and the questionnaire question variable was said to be reliable if the value of Cronbach alpha was greater than 0.6[4].

Table 5. The validity test result of the questionnaire (usability)

Question	Mean	Nilai Corrected Item – Total Correlation	r-table	Criteria
P1	3,32	0,551	0,205	VALID
P2	3,27	0,589	0,205	VALID
P3	3,16	0,643	0,205	VALID
P4	3,35	0,558	0,205	VALID
P5	2,37	0,205	0,205	VALID
P6	3,22	0,520	0,205	VALID

The reliability test results of the consumer satisfaction questionnaire with usability can be seen in the Reliability The statistic table section is as follows in Figure 4:

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.733	.796	7

Figure 4. Usability test results

The same is true for the user interface and user experience. The following is the result of testing the validity of the customer satisfaction questionnaire data for the Resik Becik Waste Bank savings application for the user interface and user experiences:

Table 5. User interface and user experience validity test results

Question	Mean	Corrected Item Value – Total Correlation	r-table	Criteria
P1	3,32	0,742	0,205	VALID
P2	3,24	0,547	0,205	VALID
P3	3,36	0,716	0,205	VALID
P4	3,29	0,647	0,205	VALID
P5	3,33	0,628	0,205	VALID
P6	3,34	0,779	0,205	VALID
P7	3,26	0,739	0,205	VALID
P8	3,27	0,587	0,205	VALID
P9	3,41	0,652	0,205	VALID
P10	3,55	0,648	0,205	VALID

For the reliability test results of the customer satisfaction questionnaire for the user interface and user experience, it can be seen in the Reliability Statistic table section as follows in Figure 5:

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.769	.914	11

Figure 5. Reliability test results (user interface and user experience)

LINIER REGRESSION TEST

To determine the level of influence between usability with the User Interface and User Experience is to use the linear regression method. The following are the results of the linear regression test based on the following table:

Table 7. Linear regression test results

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8,260	2,606		3,170	,002
	Usability	1,344	,139	,715	9,697	,000

a. Dependent Variable: UI_UX

Table 7 shows the coefficient value of the regression equation. In this study, the linear regression equation used is:

$$Y = a + bX$$

Which:

Y = User Interface dan User Experience

X = Usability

The obtained Regression Equation: $Y = 8,260 + 1,344 X$

The regression equation coefficient means that the constant variable of Unstandardized Coefficients, where the value is 8,260, means that if there is no usability (zero), the consistent value of UI and UX is 8,260.

The regression coefficient variable, the value obtained is 1.344, which means that every 1 percent addition to usability, will increase the UI and UX by 1.344.

HYPOTHESIS TESTING (UJI T)

The following is the formulation of the hypothesis, the null hypothesis test (H0), and the alternative hypothesis (H1):

H0: $b_1 = 0$, There is no significant effect between usability on the user interface and user experience.

H1: $b_1 \neq 0$, There is a significant influence between usability on the user interface and user experience.

Meanwhile, the error value used is 0.5. So, the value of t count is compared with the t table with the following provisions:

If the $t\text{-count} \geq t\text{-table}$, then H0 is rejected and H1 is accepted. If $t\text{-count} < t\text{-table}$, then H0 is accepted and H1 is rejected. Here are the results of the hypothesis on testing:

Table 8. Hypothesis test results

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8,260	2,606		3,170	,002
	Usability	1,344	,139	,715	9,697	,000

a. Dependent Variable: UI_UX

It can be seen in the table, the t-count on usability is 9,697. At Df (Degree of Freedom) = $N - 2 = 92 - 2 = 90$, then the r table is 0.205. Then it can be concluded that t-count \geq t table ($9.697 > 0.205$). The criteria are as follows:

- a. If t counts \geq t table, then H_0 is rejected statistically which is significant, from the results of the t test, a significant value is less than 0.05, meaning that there is a strong influence between usability and the user interface and user experience.
- b. If t count $<$ t table then H_0 is accepted, which means that significantly there is no significant effect between usability and the user interface and user experience.

4.4. Action

In the follow-up process or action, the quality of the administrative process is improved by implementing an application at the Semarang Becik Resik Waste Bank. The following is a summary of the results of the data search and recording of the Waste Bank savings book after using the android application.

Table 9. Comparison of savings book search process time

Number.	Time Before Application (Manual)	Time After Android Application
1	155 second	64 second
2	186 second	44 second
3	122 second	68 second
4	135 second	48 second
5	118 second	39 second
6	124 second	48 second
7	92 second	52 second
8	132 second	36 second
Average	133 second	49 second

Table 10. The savings book search process

Number.	Time Before Application (Manual)	Time After Android Application
1	32 second	27 second
2	45 second	38 second
3	55 second	44 second
4	33 second	25 second
5	27 second	35 second
6	33 second	19 second
7	62 second	44 second
8	33 second	18 second
Average	40 second	31 second

Previous research on Noviandhi (2012) about user experience and Nafidah (2015) about customer satisfaction are used as references of this research. From the average results shown in Table 9 and Table 10, the savings book search process has decreased by 9 seconds from the previous time. This is because the barb-mobile application helps managers record in a passbook

5. Conclusion

The implementation of administrative management at Resik Becik Waste Bank Semarang based on the PDCA method is in the Plan step analyzing the causes of the problems using seven tools. For the Do step, make an android-based application and create a questionnaire. For the Check step, testing the questionnaire variables using SPSS software and the Action step is publishing an android-based application. The design of an administrative management information system has been implemented in the Resik Becik Garbage Bank with an Android-based application which has the advantage of shortening the processing time of the management at the Resik Becik Waste Bank, checking the passbook from anywhere and also the application helps minimize the occurrence of savings book

losses. The owner of the Resik Becik Waste Bank gave a positive response to the application. Because according to the owner, the application is carried out in a more modern way and takes advantage of existing technological developments.

References

- Estiningtyas, R. A., Analysis and design of business process system at Resik Becik waste bank based on information technology to reduce service operation time, *Thesis*, Faculty of Engineering, Dian Nuswantoro University, 2020.
- Nafidah, N., The influence of librarian performance on user satisfaction at the University of Indonesia library, *Thesis*, Faculty of Etiquette and Humanities, University of Islam Negeri Syarif Hidayatullah, 2015.
- Noviandhi, A., Comparison of the effect of the user experience on the site on brand image for goal-direct user and experiential users, *Thesis*, Faculty of Social and Political Science, University of Indonesia, 2012.
- Putra, M. F., Dwi, Darmawan, I., and Hedyanto, S. U., Analysis and design of network device performance monitoring system using SNMP with plan-do-check-act (PDCA) at PT. Len Industri (Persero), *e-Proceeding of Engineering*, vol. 5, pp. 7162, 2018.
- Saputro, Y. Eko., Kismartini., and Syarifudin., Community-based waste management through the waste bank, *Indonesian Journal of Conservation*, vol. 4, pp. 83-94, 2005.

Biographies

Vania Ayu Rachmadanti is a graduate of an Industrial Engineering student from the Engineering Faculty at the Dian Nuswantoro University.

Ratih Setyaningrum is a lecturer at the Industrial Engineering Department of UDINUS Semarang who is quite experienced in the fields of product development and design and ergonomics. Some of his works are designing products needed to support ergonomic MSME activities to make them more productive. Research funded by Ristekdikti in 2017 namely product development is the output of his dissertation so that he obtains a Doctorate in Industrial Engineering.

Dwi Nurul Izzhati is a lecturer at the Department of Industrial Engineering UDINUS Semarang. Who has been involved in the field of waste processing for various products. Besides that, it also concentrates on the expertise of quality management and business management. Research on appropriate technology for smoked fish.