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## **The Effect of Implementing Android Based Information System on Waste Management**

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doi: 10.51505/ijebmr.2022.6712

URL: <http://dx.doi.org/10.51505/ijebmr.2022.6712>

### **Abstract**

Waste transaction management at the Srayan Makarya waste bank is still done manually and to increase the time efficiency of transaction data reporting, researchers design and build an android-based application and test it comparatively in terms of time to see if it can improve the time efficiency of the transaction data reporting process. Researchers also evaluate the application in terms of efficiency, effectiveness and usability of the business processes that occur in the organization. And the results of the comparative test found that there was a significant time difference from the previous 8.8928 minutes to 4.2197 in the transaction data reporting process. And the results of the benefit test also obtained an efficiency value of 93.5%, effectiveness of 96.3% and usability of 92.6%.

**Keywords:** waste management, information system, android, efficiency, effectivity, usability

### **1. Introduction**

Waste management is one of the problems that often occurs in developing countries such as Indonesia. The buildup of food waste is a significant problem with air pollution (Kim, Pal, & Kim, 2009). And the impact of this pollution, especially on volatile organic compounds (VOC), can cause contamination to the environment and threaten human health (Cui, Zhang, Zhang, Lu, & Xie, 2022). Therefore, controlling waste is important to create a healthier and cleaner environment based on 3 principles, "reduce", "reuse", and "recycle". (Das, et al., 2019). In waste management, it takes the role of the community to jointly be responsible for providing effective solutions in reducing waste pollution through good waste management (Viljoen, Schenck, Volschenk, Blaauw, & Grobler, 2021) The Srayan Makarya Purwokerto Waste Bank is a waste bank that was established in 2016 to manage waste originating from the surrounding community. Recording and documentation of waste management activities is still done manually so it takes a long time to input funds to data presentation. To improve the effectiveness of business processes in this organization, researchers developed applications that are useful in increasing the speed of process execution and displaying the results of data execution transparently (Bicevskis & Bicevska, 2015). Several studies have shown that information technology has an important role in assisting organizations in providing data and information, as well as improving efficiency and

performance in general (Al-Mamary, Shamsuddin, & Aziati, 2015) (Eva & Katerina, 2013). Therefore, the researcher believes that by designing and building a waste management information system application at the Srayan Makarya Waste Bank, it will increase the efficiency of reporting waste bank transaction data. In order to increase efficiency, one way that can be done is by utilizing an Android-based application (Safitri, Pasaribu, Simamora, & Lubis, 2019). Efficiency discussed in this study is about resource time spent by users to ensure the level and completeness of objectives that can be displayed in seconds or minutes (Singun, 2017). Documentation of transactions carried out manually causes the length of reporting recapitulation and the lack of integration of data also causes delays in documenting reports. In addition, errors in documentation also lead to inaccurate reports. Therefore, data integration through android-based applications can be a solution for all problems related to the completeness, accuracy, convenience, efficiency, simplicity, and suitability of transaction reporting (Kosadi, Ginting, & Merliana, 2021). Based on the above understanding, how quickly can an Android-based application on a waste management system have an impact on the efficiency of reporting data transactions? Through direct measurement in the form of the reporting process time of each waste bank customer transaction made by the user, it is expected to provide a significant time difference in the data transaction reporting process.

## **2. Method**

The conceptual framework discussed in this article is an analysis of the impact of implementing an information system application to improve the efficiency of the transaction reporting process to customers so that it is more effective and efficient.

The researcher argues that through the implementation of an android-based application on the waste management system at Srayan Makarya, it can increase the efficiency of transaction data reporting time. By using a comparative research design, which measures the processing time of transaction data reporting either manually or by application, the data collected can be used to test the researcher's hypothesis using the paired sample t test method. The method used to test the researcher's hypothesis is to use a comparative test of time per minute data samples obtained through transactions that occur in one week. And from a sample of 36 data taken for one week consisting of data before using the application and data after using the application on the same transaction object. The method of taking samples is done by convenience sampling. Researchers also tested the efficiency, effectiveness and usability of the android-based application using a questionnaire distributed to 36 respondents who made transactions using an android-based waste bank management information system application. These three variables are taken from the ISO 25022 standard which defines the quality of software products, models, quality characteristics and related metrics that are used to evaluate and determine the quality of software products (Blackwell, 2018).

## **3. Results**

The result of the development of the system is a mobile application using Android and has several display examples. One of the views is the menu display as below:



Figure 1. User Menu

In addition, there is also a display of report data, display of customer profiles, views to access the telephone and see contacts, views to access Instagram, views to view maps, and views to view waste bank products. Examples of these views can be accessed by customers as shown in the pictures below:

No	Nama	Tanggal	Debit	Kredit	Saldo
1	Iestari	2019-06-29	48000	0	48000
2	Iestari	2019-06-29	48000	0	96000
3	Iestari	2019-06-29	0	48000	48000
4	Iestari	2019-06-29	0	40000	8000

Figure 2. Customer Transaction Report

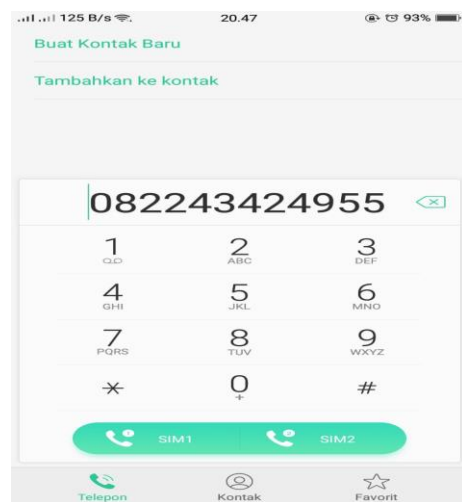


Figure 3. Contact and Phone List

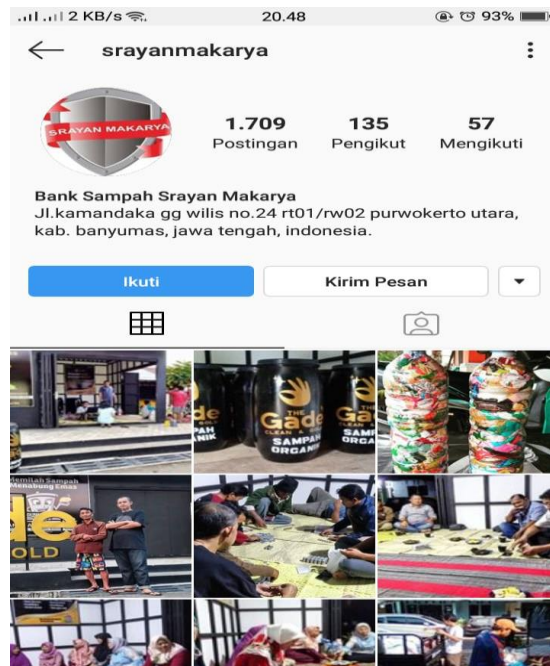


Figure 4. Instagram Page



Figure 5. Srayan Makaryan Waste Bank Location Page

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

using Android.App;
using Android.Content;
using Android.OS;
using Android.Runtime;
using Android.Views;
using Android.Widget;
using Newtonsoft.Json.Linq;
using Newtonsoft.Json;
using System.Net;
using Android.Webkit;

namespace skripsi3
{
    [Activity(Label = "trans")]
    public class trans : Activity
    {
        WebView webview;
        protected override void onCreate(Bundle savedInstanceState)
        {
            base.onCreate(savedInstanceState);
            setContentView(Resource.Layout.trans);
            string codeuser = Intent.GetStringExtra("sid");
            TextView txt = FindViewById<TextView>(Resource.Id.textView1);
            txt.Text = "http://xamarinpro-a1.com/sub-
            ekanti/index.php/Laporan_transaksi/index/" + codeuser;

            webview = FindViewById<WebView>(Resource.Id.webView1);
            webview.SetWebChromeClient(new WebChromeClient());
            webview.LoadUrl("http://xamarinpro-a1.com/sub-
            ekanti/index.php/Laporan_transaksi/index/" + codeuser);
            webview.Settings.BuiltInZoomControls = true;
            webview.Settings.JavaScriptEnabled = true;
            webview.Settings.AllowFileAccessFromFileURLs = true;
            webview.Settings.AllowContentAccess = true;
            webview.Settings.DatabaseEnabled = true;
            webview.Settings.AllowUniversalAccessFromFileURLs = true;
            webview.SetWebViewClient(new WebViewClient());
        }
    }
}
```

Figure 5. Source Code of Android Application for Transaction Report

From the use of the Information System Application above, we obtained the results of evaluation and testing of research hypotheses.

**Test of Normality**

Table 1. Normality Test Result

		Before	After
N		36	36
Normal Parameters <sup>a,b</sup>	Mean	8.8928	4,2197
	Std. Deviation	.85563	,64490
Most Extreme Differences	Absolute	,143	,127
	Positive	,143	,127
	Negative	-,072	-,123
Test Statistic		,143	,127
Asymp. Sig.(2-tailed)		,062 <sup>c</sup>	,154 <sup>c</sup>

Based on the normality test the results obtained as in table 1 are Asymp. Sig. value before using the Android Based Waste Bank Information System (0.062) and After using the Android Based Waste Bank Information System (0.154). And thus it can be concluded that the data are normally distributed because the significance value (Asymp. Sig.) Is greater than  $\alpha$  (0.05).

**Test of Hypothesis**

H<sub>0</sub>: There is no significant difference when reporting waste bank transaction data before and after using an android-based waste bank information system.

H<sub>1</sub>: There are significant differences when reporting waste bank transaction data before and after using an Android-based waste bank information system.

Table 2. Paired Sample T-Test

	Paired Differences		Std. Error	95% Confidence Interval of the Difference		t	df	Sig.(2-tailed)
	Mean	Std. Deviation		Lower	Upper			
Pair 1								
Before	4,673036	1,16956	,19493	4,27733	5,06878	23,973	35	,000
After								

Based on table 2 it can be concluded that H<sub>1</sub> is accepted because the value of Sig. (2-tailed) is less than 0.05. So it can be said that this Android-Based Waste Bank Information System can report waste bank transaction data quickly.

Table 3. Paired Sample Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before	8,8928	36	,85563	,14261
	After	4,2197	36	,64490	,10748

In table 3 explains that there are differences in the time of reporting waste bank transaction data before and after using the Android-Based Waste Bank Information System, the result is before using the system takes 8,8928 minutes, whereas after using the system takes 4.2197 minutes.

Before concluding efficiency, effectivity, and usability for the use of the application of the Waste Bank information system, it is necessary to test the validity and reliability test.

**Validity Test**

Validity test is used to check the suitability of the questionnaire to obtain data from respondents.

Table 4. Validity Test

		Correlations									
		q1	q2	q3	q4	q5	q6	q7	q8	q9	Total
q1	Pearson Correlation	1	,358*	,479**	,272	,345*	,179	,228	,513**	,522**	,693**
	Sig. (2-tailed)		,032	,003	,108	,039	,296	,182	,001	,001	,000
	N	36	36	36	36	36	36	36	36	36	36
q2	Pearson Correlation	,358*	1	,186	,526**	,186	,511**	,200	,205	,866**	,736**
	Sig. (2-tailed)	,032		,278	,001	,278	,001	,242	,230	,000	,000
	N	36	36	36	36	36	36	36	36	36	36
q3	Pearson Correlation	,479**	,186	1	,213	,037	-,013	,303	,309	,331*	,509**
	Sig. (2-tailed)	,003	,278		,213	,831	,938	,072	,067	,048	,002
	N	36	36	36	36	36	36	36	36	36	36
q4	Pearson Correlation	,272	,526**	,213	1	,360*	,608**	,382*	-,069	,298	,626**
	Sig. (2-tailed)	,108	,001	,213		,031	,000	,021	,691	,077	,000
	N	36	36	36	36	36	36	36	36	36	36
q5	Pearson Correlation	,345*	,186	,037	,360*	1	,350*	,186	,182	,227	,509**
	Sig. (2-tailed)	,039	,278	,831	,031		,037	,278	,287	,184	,002
	N	36	36	36	36	36	36	36	36	36	36
q6	Pearson Correlation	,179	,511**	-,013	,608**	,350*	1	,275	,014	,386*	,590**
	Sig. (2-tailed)	,296	,001	,938	,000	,037		,104	,935	,020	,000
	N	36	36	36	36	36	36	36	36	36	36
q7	Pearson Correlation	,228	,200	,303	,382*	,186	,275	1	,451**	,255	,587**
	Sig. (2-tailed)	,182	,242	,072	,021	,278	,104		,006	,134	,000
	N	36	36	36	36	36	36	36	36	36	36
q8	Pearson Correlation	,513**	,205	,309	-,069	,182	,014	,451**	1	,366*	,537**
	Sig. (2-tailed)	,001	,230	,067	,691	,287	,935	,006		,028	,001
	N	36	36	36	36	36	36	36	36	36	36
q9	Pearson Correlation	,522**	,866**	,331*	,298	,227	,386*	,255	,366*	1	,781**
	Sig. (2-tailed)	,001	,000	,048	,077	,184	,020	,134	,028		,000
	N	36	36	36	36	36	36	36	36	36	36
Total	Pearson Correlation	,693**	,736**	,509**	,626**	,509**	,590**	,587**	,537**	,781**	1
	Sig. (2-tailed)	,000	,000	,002	,000	,002	,000	,000	,001	,000	
	N	36	36	36	36	36	36	36	36	36	36

\*. Correlation is significant at the 0.05 level (2-tailed).  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).

From the validity test using SPSS above, it can be concluded that the nine questions raised are valid because of the sig. value below 0.05.

Table 5. Validity Test Summary Table

No Item	R count	R table	Sig.	Result
1	0,693	0,3291	0,000	Valid
2	0,736	0,3291	0,000	Valid
3	0,509	0,3291	0,002	Valid
4	0,626	0,3291	0,000	Valid
5	0,509	0,3291	0,002	Valid
6	0,590	0,3291	0,000	Valid
7	0,587	0,3291	0,000	Valid
8	0,537	0,3291	0,001	Valid
9	0,781	0,3291	0,000	Valid

**Reliability Test**

The reliability test is used to measure how consistent the questionnaire is used as a data collector so that the questionnaire can be relied upon.

Table 6. Case Processing Summary

		N	%
Cases	Valid	36	100,0
	Excluded <sup>a</sup>	0	,0
	Total	36	100,0

a. Listwise deletion based on all variables in the procedure

Table 7. Reliability Statistic Result

Cronbach's Alpha	N of items
,799	9

Based on the Reliability Statistics table, the Cronbach Alpha value of 0.799 is obtained with 9 items (questions). Because the Cronbach Alpha value is greater than 0.6, it can be concluded that the items (questions) can be accepted or reliable.

From the interpretation of the results of the recapitulation of data taken from the questionnaire can be seen in the benefits test summary table below:

Table 8. Recapitulation Result of variabel



Attribute	Criteria	P1	P2	P3	Average
Efficiency	S	80,60%	75%	75%	93,50%
	SS	13,80%	16,70%	19,40%	
	Total	94,40%	91,70%	94,40%	
Attribute	Criteria	P1	P2	P3	Average
Effectiveness	S	80,60%	75%	25%	93,50%
	SS	16,70%	19,40%	72,20%	
	Total	97,30%	94,40%	97,20%	
Attribute	Criteria	P1	P2	P3	Average
Usefulness	S	75%	77,70%	66,70%	93,50%
	SS	16,70%	16,70%	25%	
	Total	91,70%	94,40%	91,70%	

Notes:

S = Agree

SS = Very Agree

P1-P12= Questions 1 to 12 on the benefit test questionnaire

Based on the results of the table shows the value of the system benefit test taken from the questionnaire that has been answered by respondents and produces a benefit test of the Android-Based Waste Bank Information System can be seen that the efficiency of 93.50%, effectiveness of 96.30%, and usefulness of 92.60%. Based on the results of this large percentage, it can be concluded that the Android-Based Waste Bank Information System is efficient, effective, and usable for customers in obtaining information on transaction data.

#### 4. Discussion

Based on the results of research on Android-Based Waste Bank Information System in Srayan Makarya Purwokerto, it can be concluded that the researcher's hypothesis can be accepted because there is a significant time difference between before and after using the Android-Based Waste Bank Information System in Srayan Makarya Purwokerto, the results are before using the system takes 8.8928 minutes and after using the system only takes 4.2197 minutes. After using this system, the reporting waste bank transaction data is faster than before.

While in the benefit test there are results of using information system applications based on the percentage of statements from 36 respondents that the researchers chose, the percentage of efficiency is 93.50%, effectiveness is 96.30%, and usability is 92.60%. So that the Android-Based Waste Bank Information System at Srayan Makarya Purwokerto can have good effectiveness, efficiency, and usability in processing transaction data reporting.

Some of the limitations in this study are that there is still no awareness of the community in participating in utilizing an Android-based waste management application as a solution to waste pollution in their environment. Therefore, it is also necessary to develop this application to be more attractive, easy to use, and useful in providing additional income for its customers.

The direction of this research in the future will be better if the concept of developing this application can be adapted to the concept of gamification and the concept of customer relationship management, so that it can attract public interest to participate as customers in managing waste in the surrounding environment.

**Author Contributions:** Conceptualization, AW, N, ES; methodology, AW, ES; software, AA; validation, ES, N; formal analysis, AW, N; investigation, AW, N; resources, AW, ES; data curation, AW, N; writing—original draft preparation, AW, ES; writing—review and editing, AW, N; visualization, ES, AA; project administration, AW, ES; funding acquisition, AW, ES. All authors have read and agreed to the published version of the manuscript.

### **Acknowledgments**

The researcher would like to thank the many parties who were directly or indirectly involved in this research, especially from Srayan Makarya as the organization that manages the waste bank so that the application built by the researcher can be utilized and evaluated according to the needs that occur in the organization. In addition, the researchers also thank the International Journal of Economics, Business and Management Research for being willing to publish this article.

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