

Development of desktop-based information system on waste management bank

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Abstract. This paper discusses about computerized system design that can handle the entire process of data collection of garbage, customers and transactions, computerized account creation, and the automatic reporting system. The method used in this study is collecting data through interviews to garbage bank employee and observing the flow of waste processing to be creative recycling products, systematically and accurately describing facts and characteristics from the object of research. The structured methods were also used to determine the system approach, the method of system development, the tools or tools drawing system, perform system analyzes that run and design the proposed system. The result of this research is the development of an integrated and computerized desktop information system-based for the waste bank management business. The result is to help the owner of the garbage bank to manage the garbage bank business and facilitate everyone involved in it to obtain the information they need related to the price of selling and purchasing these garbage bins. System design is an advanced stage of an ongoing system analysis. And as a reference in updating or improving the performance of existing systems, system design is required.

1. Introduction

Garbage or refuse is part of the object that is seen is not used, not used, disliked, or should be discarded in such a way so as not to interfere with survival and one of the efficient ways to carry out waste management is through 3R system [1]. Solid waste management and waste collection are one of the most important challenges in urban areas throughout the world [2].

The biggest contribution of waste is plastic. Plastic pollution may be defined as the accumulation of plastic products in the environment that may affect human life as well as wildlife. Plastic is composed of various chemical elements and it does not degrade naturally even after its usage. The solution to tackle this problem lies in following 3R namely reduce, reuse and recycle [3].

Solid waste management is the overall activities and actions of managing waste from the final disposal. The whole activity starts from waste collection, carrying the solid waste out, and the final solid waste disposal. This aims at reducing the risks for our health, environment and the aesthetics of an area [4].

The other impacts of unmanaged waste based on Thakker and Narayanamoorthi are land pollution, spread of diseases, also it creates unhygienic conditions for people, and ugliness to that place [5]. Thus, one of the ways to overcome these problems is through improving the values of garbage. By



doing that improvisation, people will see this as an opportunity to collect the garbage to be then sold to the garbage recycle centre [6].

Waste bank, as a business, is owned by people who consider waste as a valuable economic commodity and savings, has instruments that involving community in waste [7], Before designing and implementing the waste of management system, the sustainability assessment must be done, but specially must be considered their impact on the environment [8].

In order to succeed in managing waste management policy, we should first know the characteristics of solid waste. From the research conducted in University of Lagos, 75% of the total amount of solid waste in University of Lagos can be potentially recycled [8].

There is a system which can give us a warning if the garbage is out of capacity or clarify the status from every kind of garbage such as domestic solid waste, paper, glass, and plastic. Microcontroller ARM and ultrasonic sensor are the systems that are automatically connected with ThingSpeak, which can save the data to be used as materials for the upcoming analysis [9].

Solving the garbage problems that are accumulated in the same place is similar to Suryawanshi et al (2018) which explained that the problem in waste management is the capacity of excess garbage in the trash before the cleaning schedule arrived [10]. Therefore, a warning system is required by providing warning signals to the city's web server for cleaning garbage cans based on garbage capacity in garbage cans, as well as systems that can provide information to the city's web that garbage has been cleaned, and the whole process is integrated with RFID and Facilitation of IOT [11].

Thus, this research was conducted to show the design of computerized system that can handle the whole process of garbage data collection, customers and transactions, computerized account creation, and automatic reporting system. By using data collection methods through interviews with garbage banks employee and waste measurements to be creative recycled products. This journal used sought and collected journals and lithography related to this study and used the structured method to determine the system approach to be used, the determination of the development method, the determination of the system drawing tools, perform the analysis of the running system and collect the proposed system. The establishment of an integrated and computerized desktop-based information system for waste bank management. So, it can help the owner of the garbage bank to manage the garbage bank business and facilitate everyone involved in it to obtain the information they need related to the selling and buying price of garbage in this garbage bank. Compared to previous research, this research discusses how to overcome the existing waste problem by taking into account the value of the waste, as well as the ease in transacting and knowing the information related to the garbage that has been collected. This is different from previous research which focuses more on waste management in 3R ways, or the use of a system that only focuses on the notification of waste capacity in the trash.

2. Method

The method used in this journal was descriptive and structured method. Descriptive method aims at describing facts and characteristics systematically and accurately from the object under study, and collecting data and information related to this research. While structured method purposes at determining the system approach, determine the method of system development that will be used after the system is complete, determine the tools or tool drawing system that is Flowmap and Data Flow Diagram, describes the flow of data in the system that is running and design recommendations (See Figure 1).

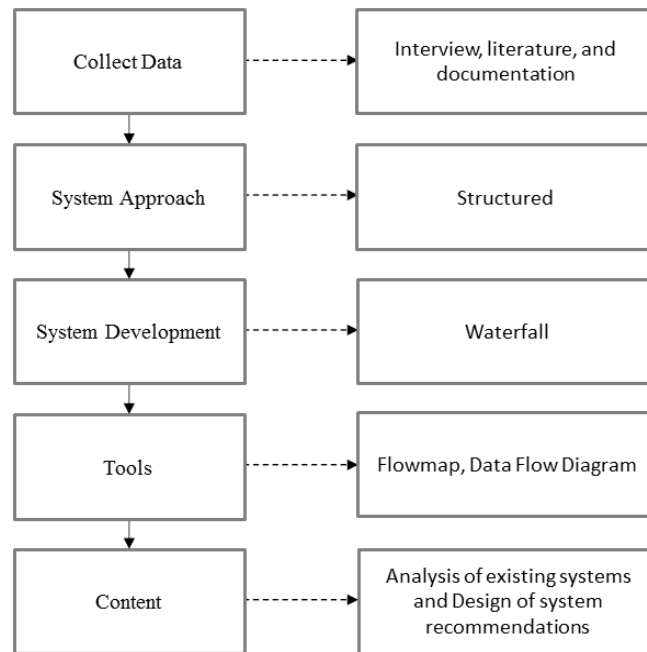


Figure 1. Research scheme.

System development method using in development of this desktop-based information system is Waterfall model. This model aims at getting better quality of information system. Furthermore, this method is also useful for finding errors in the system and which errors that need to be fixed. Waterfall method generally consists of the following steps: Requirement, System Design, Coding and Testing, Implementation Program, and Maintenance (See Figure 2).

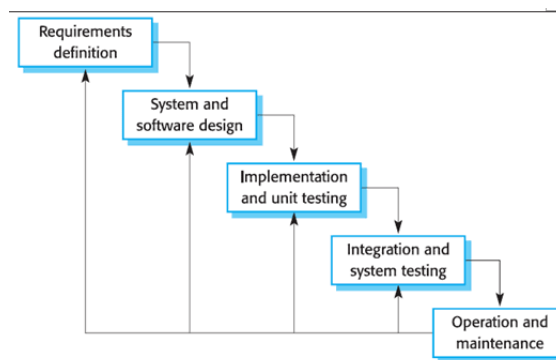


Figure 2. Waterfall method.

3. Results and Discussion

3.1. An overview of the design and manufacture of the Waste Bank Information System

Flowmap is a tool used for the steps and sequence of a program. It usually consists of actors, processes and data streams in the form of incoming documents and outgoing documents (See Figure 3-4)

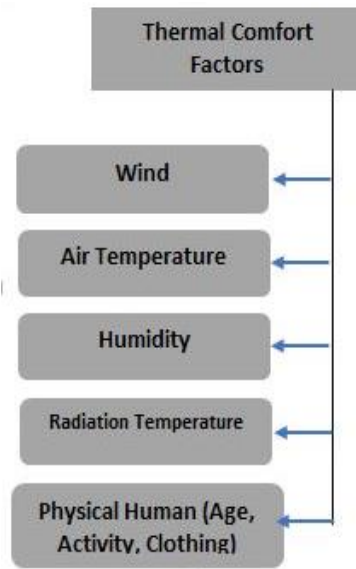


Figure 3. Recommendation waste purchase flowmap.

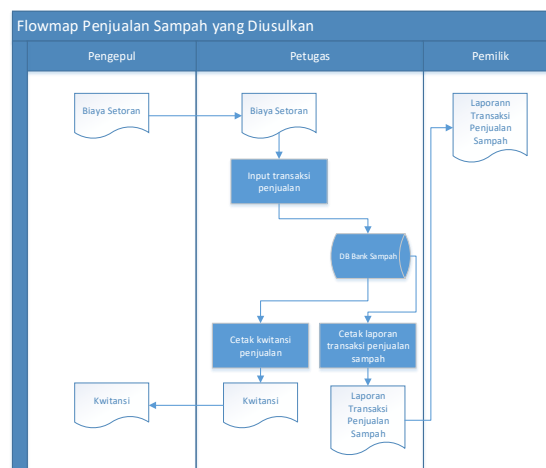


Figure 4. Recommendation solid sales flowmap.

Data Flow Diagram (DFD) maps out the flow of information for any process or system. It shows data inputs, outputs, storage points and the routes between each destination. (See Figure 5).

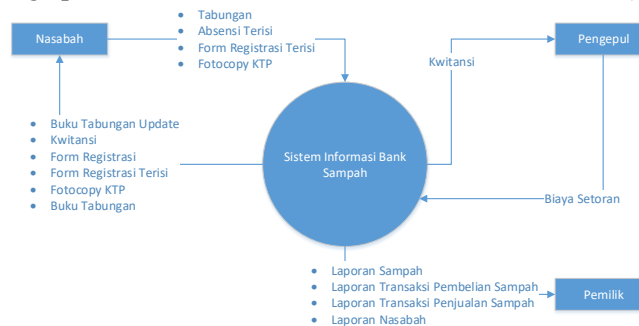


Figure 5. Data Flow Diagram (DFD) Level 0.

3.2. Implementation and Testing of the System

Once the garbage bank information system is built, the next step is to implement and test the system by first installing the garbage bank application, then sign in to the account. For those who are not registered yet, they can sign up for their account first. (See Figure 6).



Figure 6. Display login form and account.

If Login is successful, then go to the main menu view, which includes the account user name and his teammates (See Figure 7).



Figure 7. Display form menu.

If you want to be a waste bank customer, or see the status of each customer, then login to the customer forum and fill out each form listed on the customer forum (See Figure 8).

No	Kode Nasabah	Kode Rekening	Nama Nasabah	Alamat	Telepon	Status
1	N001	0123	Wahyu	Jl. Melati No.9	087828273012	Aktif
2	N002	2345	Salsa	Jl. Angrek No.10	089912793041	Aktif

Figure 8. Display customer form.

If you want to see the employees in the waste bank, then go to the forum employees. In this forum, you can see detailly the names of officers who work according to the part and phone number of each waste bank employees (See Figure 9).

No	Kode Petugas	Nama Petugas	Jenis Kelamin	Bagian	Telepon
1	P001	Fauzi	L	Pengelola Tabungan	089742937105
2	P002	Hergy	L	Pencatatan Administras...	087821309741
3	P003	Leonaldi	L	Pengelola Sampah	0877821603123
4	P004	Rina	P	Pencatatan Administras...	087761920739

Figure 9. Display officer form.

To get the information from the garbage collectors in this waste bank, you can see collector's forum, it will show the code, name, address, and contact of every collector in this waste bank (See Figure 10).

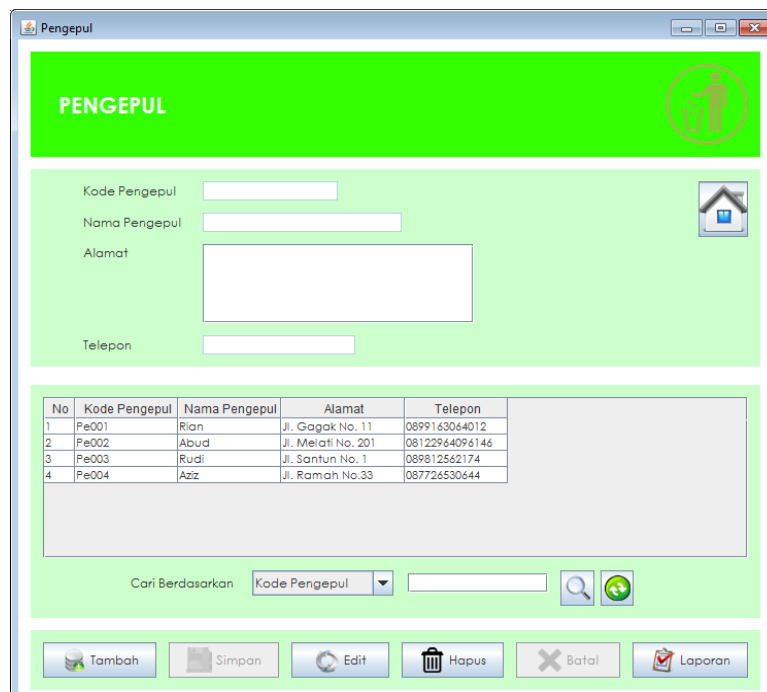


Figure 10. Display form collectors.

To obtain the information of the price of any garbage collected and sold as well as the grouping of the waste can be seen in the garbage forum (See Figure 11).

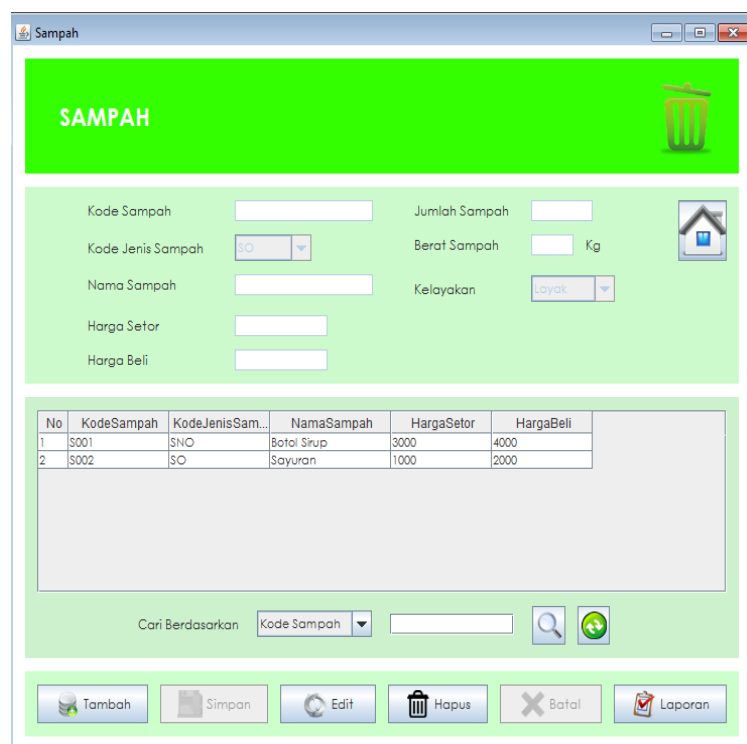


Figure 11. Display trash form.

Meanwhile, to see the amount of savings that have been owned in savings Bank Trash, you can see in the forum savings (See Figure 12).

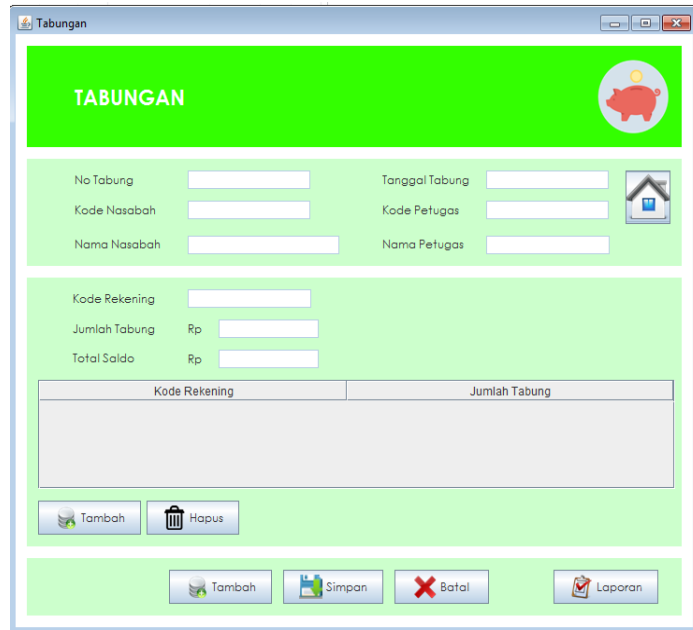


Figure 12. Display savings form.

To see the history of cash withdrawal, you can see in the cash withdrawal forum, here is the number of withdrawals that have been done. (See Figure 13).



Figure 13. Display of cash withdrawal form.

If you want to buy garbage from this waste bank, first do the registration in the forum of garbage purchase (See Figure 14).

PEMBELIAN SAMPAH

No. Beli: Tanggal Beli:

Kode Pengepul: Kode Petugas:

Nama Pengepul: Nama Petugas:

Jumlah Beli: Jumlah Sampah:

Kode Sampah: Harga Jual: Rp

Nama Sampah: Harga Beli: Rp

Kode Jenis Sampah: Kelayakan:

Jenis Sampah: Berat: Kg

Total Harga Beli: Rp

Kode ...	Nama Sampah	Jumlah ...	Kode Je...	Jenis Sa...	Jumlah ...	Harga J...	Harga Beli	Kelayakan	Berat	Total Ha...

Tambah Hapus

Tambah Simpan Batal Laporan

Figure 14. Display of purchase form.

For a garbage seller, if you want to see the garbage sale history that you have done or want to sell the garbage to a customer, it can be done through the garbage sale forum (See Figure 15).

PENJUALAN SAMPAH

No Penjualan: Tanggal Jual:

Kode Nasabah: Kode Petugas:

Nama Nasabah: Nama Petugas:

Jumlah Setor: Jumlah Sampah:

Kode Sampah: Harga Jual: Rp

Nama Sampah: Harga Beli: Rp

Kode Jenis Sampah: Kelayakan:

Jenis Sampah: Berat: Kg

Total Harga Setor: Rp

Kode ...	Nama Sampah	Jumlah ...	Kode Je...	Jenis Sa...	Jumlah ...	Harga J...	Harga Beli	Kelayakan	Berat	Total Ha...

Tambah Hapus

Tambah Simpan Batal Laporan

Figure 15. Display of garbage sales form.

Any report on the sell and purchase of garbage done in this garbage bank can be seen in the waste report menu described in detail. In this menu the total looks that would have been built (See Figure 16).

No	Kode Sampah	Kode Jenis	Nama Sampah	Harga Setor	Harga Beli
1	S001	SNO	Botol Sirup	3000	4000
2	S002	SO	Sayuran	1000	2000

Figure 16. Waste report view.

For customers who want to see total balance, they can see the Customer Report Menu. On this menu all reports of deposits and cash advance can be listed (See Figure 17).

No	Kode Nasabah	Nomor Rekening	Nama Nasabah	Alamat	Telepon	Status	Total Saldo
1	N001	0123	Wahyu	Jl. Melati No.9	087828273012	Aktif	850000
2	N002	2345	Salsa	Jl. Angrek No.10	089912793041	Aktif	200000

Figure 17. Display of customer report.

4. Conclusion

Based on the results of the development of desktop-based information systems for Waste Banks, it can be seen that the construction of this garbage bank information system can help out the management of waste banks, because the whole process that occurs in the Bank Trash can be done more quickly and efficiently, ranging from customers, transactions through report generation, minimizing data input errors and data corruption.

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