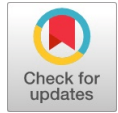


Waste Pickup Information System Design (SIASAH)



Melda Agnes Manuhutu, Lulu Jola Uktolseja, Tagor Manurung, Jalmijn Tindage, Abraham Manuhutu

Abstract: *The large number of waste problems in Sorong City is a never-ending homework, a challenge in regional development even though Sorong City is one of the most advanced cities in the Land of Papua. The aim of this research is to design a Waste Pickup Management Information System (SIASAH) at the Housing and Residential Area Office. In this study, implementing the MD5 algorithm as a data security algorithm in the SIASAH system database. This system was built using bootstrap as a framework, PHP as the programming language and MySQL as the database system. The system development method used is the Rapid Application Development (RAD) method. The Web-Based SIASAH system can help the community and related industries in waste management which has been one of the toughest problems in Sorong City. This system will also assist officials to obtain information regarding illegal waste disposal in Sorong City and to pick it up them immediately.*

Keywords: Waste Pickup, Information System, SIASAH.

Abbreviations:

- RAD: Rapid Application Development
- XP: Extreme Programming
- MD5: Message-Digest Algorithm 5
- UML: Unified Modeling Language
- TPS: Transaction Processing System

I. INTRODUCTION

Waste is the residue of human daily activities and/or natural processes in solid form, and specific waste is waste which due to its nature, concentration and/or volume requires special management [1]. The more the population increases, the more waste will be generated. In 2016 the amount of waste generation in Indonesia reached 65,200,000 tons per year with a population of 261,115,456 people. Indonesia's population projections show that the population continues to grow and will certainly increase the amount of waste generation [2]. Waste always arises as a complicated problem

in a society that lacks sensitivity to the environment [3]. Waste piled up is very disturbing residents in the vicinity. Apart from causing air pollution, waste causes disease outbreaks, causes natural disasters such as floods and landslides so that waste can be detrimental [4].

Waste is a problem faced by all countries in the world, not only in developed countries but also in developing countries like Indonesia. Waste problems are found in almost all regions in Indonesia, one of them is Sorong City. Waste is one of the sources of problems that until now are still being attempted to be resolved. The problem of handling waste in the city is one of the government's special concerns through related parties including the Housing and Settlement Area Office, and other fields.

The City Housing and Settlement Area Service as the agency that handles cleanliness issues in the City has conducted socialization to the public through the mass media, distributing brochures and bulletin boards at certain points in the City area, collaborating with third parties Pegadaian, Bank Papua, Bank Perindo and community associations, also holding a waste bank as an effort to deal with environmental cleanliness, especially waste problems. The Ministry of Environment and Forestry (KLHK) awarded Sorong City as the dirtiest city for the medium city category [5], of course this is a big responsibility for the government, especially the City in looking for various alternative steps related to waste management.

In Sorong City, the accumulation of waste has a very clear impact as seen from the condition of the city which is quite prone to flooding. The source of the existing waste is not only from housing waste but also partly from business actors in the City. The business unit is one of the goals of economic development [6]. Business units provide business opportunities for business actors in the regions [7]. Business actors do not only focus on managing business products, but also manage business revenues, and business actors need to see the volume of waste generated from the managed business units [6]. In the business community, both small and large scale, it certainly provides an increase in the volume of waste exceeding the amount of housing waste every day, thus the City Housing and Settlement Area Service requires special handling to handle the waste produced by business actors.

Efforts that have been made by the Housing and Settlement Area Office in the form of providing temporary waste disposal sites (TPS) at several points in the city have not been utilized properly by the community, especially business actors. It always comes with many reasons, one of them is that the temporary TPS points are far from the location of the business unit, business actors have difficulty handling existing waste [8]. This shows that all parties, both the government community and all existing elements, have not

Manuscript received on 29 April 2023 | First Revised Manuscript received on 02 February 2025 | Second Revised Manuscript received on 21 March 2025 | Manuscript Accepted on 15 April 2025 | Manuscript published on 30 April 2025.

*Correspondence Author(s)

Melda Agnes Manuhutu*, Lecture, Department of Information System, Victory Sorong, Sorong (Barat), Indonesia. Email ID: melda.a.manuhutu@gmail.com, ORCID ID: 0000-0003-0049-7064

Lulu Jola Uktolseja, Lecture, Department of English, Victory Sorong, Sorong (Barat), Indonesia. Email ID: lulujola39@gmail.com, ORCID ID: 0000-0002-8291-9066

Tagor Manurung, Vice Rector Department of Management, Victory Sorong, Sorong (Barat), Indonesia. Email ID: tagormanurung24031963@gmail.com

Jalmijn Tindage, Assistant Rector, Department of Management, Victory Sorong, Sorong (Barat), Indonesia. Email ID: jalmijn@unvicsorong.ac.id

Abraham Manuhutu, Lecture, Department of Electrical Engineering, Ambon State Polytechnic, Ambon (Maluku), Indonesia. Email ID: bram.manuhutu@gmail.com

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>



been able to deal with the city's waste problem. Then, the current situation shown that the government's handling of the waste problem was not yet optimal, both in terms of data collection, transportation and control of waste management as well as evaluating the availability of trash cans in a number of Business Units. In order to realize a city that is clean and free from flooding problems caused by waste, especially waste from business actors, it is necessary to design a Waste Management Information System (SIASAH) at the Housing and Settlement Area Office [9]. The information system is used in this research because the information system is the application of technology that can be used to support business and work processes in various fields, be it Education, Social, and Industrial Economy [10]

II. REVIEW OF LITERATURES

A. Related Works

Related research includes research entitled Development of a Data Management Information System for Ceria Purwokerto Waste Bank Savings, which was conducted by Riyanto and Kusumastuti in 2015. In this study researchers built an information system to process savings data at the Ceria Waste Bank using the Extreme Programming (XP) method. and in collecting data, researchers used interviews, observation and literature studies [11].

The second research entitled Web-Based Waste Bank Data Management Information System in Cianjur Regency was conducted by Widaningsih and Suheri in 2019. The information system which is the result of this research makes it easier for the sub-district to supervise and see the progress of the waste bank units in *Kelurahan* so that management between waste banks can be more integrated. The software engineering model used is waterfall. Making this information system uses the PHP programming language with code igniter framework and MYSQL database [12].

The third study entitled Design and Build of a Waste Bank Information System in Paguyangan Village was conducted by Afuan, et al in 2021. The aim of this research is to make it easier for officers and customers to process services at the waste bank. The methodology used in system development is the Waterfall method. Development of information systems using PHP as a programming language and MySql as a Database Management System. The result of this research is an information system that can be used in managing waste management transactions. The results of testing the system using Blackbox Testing and Mean Opinion Score (MOS) obtained all components in this system running well according to requirements [13].

The fourth study entitled Information System for Household Waste Management at the Grand Catania Citra Raya Tangerang Housing Complex was conducted by Jumiran and Fitri in 2021. One of the objectives of this study was to find out how to design a good and more useful household waste management information system for support positive activities especially for residents of Grand Catania. In accordance with the objectives of this study, this research is descriptive in nature, that is, the researcher intends to make a (descriptive) description of the situation and condition of the house by looking at the description of the household waste management system at Grand Catania Citra Raya Housing

Complex, RT. 001 RW. 004 Ciakar Village, Panongan District, Tangerang Regency, Banten Province. As the result of the system that has been developed, in fact it has produced real financial reports. it can be seen that the proposed waste management system provides real financial value to the residents of Grand Catania [14].

The fifth study entitled Savings Management Information System at the Rafflesia Waste Bank Using the Waterfall Method was conducted by Brilian and Rohman in 2022. In this study, designing and building a waste bank management information system using the waterfall method was oriented towards the needs of the Reflesia waste bank. The stages of the research were carried out starting with the analysis of system requirements, designing the system, implementing, testing the system up to maintenance. The results of this study provide convenience to admins and customers in management and business processes at the Raflesia waste bank [15].

Based on research that has been done before, the difference with the research that is currently being carried out is that the current research focuses on Waste Management Information Systems with the concept of designing a website-based Information System that can be used as a technological solution using bootstrap as a framework and PHP as a programming language and MySQL as database system. The system development method used is the Rapid Application Development (RAD) method. The aim of this research is to design a Waste Collection Management Information System (SIASAH) at the Housing and Residential Area Office. In this study, implementing the MD5 algorithm as a data security algorithm in the SIASAH system database.

B. Definition of Terms

i. Information System

Information systems as a set of organizations that exist when implemented will provide information for decision makers and to control the organization. An information system is a set of organizations that provide information to control organizations in which there are interactions between people, processes, data and technology [16].

ii. MD5 Algorithm

In cryptography [17], MD5 (Message-Digest Algorithm 5) is a widely used cryptographic hash function with a 128-bit hash value [18]. MD5 is used variously in security applications [19]. How MD5 Works The steps for creating a message digest are outlined [20]:

- Addition of padding bits.
- Added the length value of the original message.
- Initialize the MD buffer.
- Message processing in blocks of 512 bits.

III. METHODS

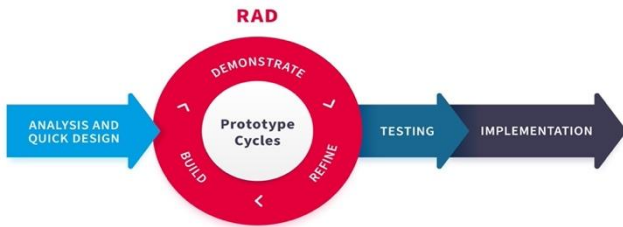
A. Objects and Locations of Research

This research was carried out at the Department of Housing and Settlement Areas located in Sorong City, Indonesia. The object of this study is the waste data collection process which is still done manually without utilizing an information system technology.



B. System Design Method

Rapid Application Development (RAD) is a software development method used to describe the software development process. In this study, the Rapid Application Development method was used because it is more flexible with the concept that developers can carry out the redesign process at the same time.



[Fig.1: Model Rapid Application Development (RAD)]

Figure 1 shows the system development process with the RAD method, which shows the 4 main processes in the RAD method. The stages of the RAD system development method applied to this study are as follows:

i. Analysis and Quick Design

Determining RAD project requirements begins with determining project requirements. Intensive communication was carried out with the Department of Housing and Settlement Areas using the interview method to identify problems in order to get an overview of the existing problems and also the information needed in future system development.

ii. Prototype Cycles

The next step is to create a prototype. The researcher makes a prototype of the application that the client wants. Equipped with various functions. The sole purpose is to ensure that the prototypes created meet the client's requirements. However, this procedure can be repeated several times. Researchers also test and provide feedback. This process allows the team to study potential bugs. This helps reduce errors and correct errors. At this stage, the research team has the capital to create an application that is easy to use, has few bugs, and has a good design. At this stage, researchers have determined all the necessary requirements both functionally and non-functionally, hardware and software specifications to support the formation of the system, and work scheduling planning. At this stage the process of creating a system schema is also carried out using the Balsamic Mockup 3 application, modeling the Unified Modeling Language (UML) system using the Rational Rose application, and designing databases using MySQL.

iii. Testing

The system design process was completed in the previous stage. At this stage is to test the system, and integrate. Researchers use tools and frameworks that support RAD to speed up the testing process. Furthermore, this process will be repeated because researchers continue to consider client feedback, be it features, functions, interfaces, all aspects of the system being designed. The stages of testing this system use blackbox testing.

iv. Implementation

The system implementation stage is the last step in software development. At this stage, the researcher implemented the SIASAH system that had been designed. System implementation is carried out at the Housing and Settlement Area Office as the location of the research object.

C. Software Design Needs Analysis

In designing and building SIASAH, there are several software requirements as described in the following table:

Table-I: Software Requirements

No.	Software	Versi
1	Operation System	Windows 8,10,11
2	XAMPP Panel	8.2.4
3	Sublime Text	3
4	Balsamic Mockup	3

The following is an explanation of the design in the SIASAH system as follows:

i. Software Design

The design of the Waste Pickup Information System at the Housing and Settlement Area Service aims to assist business actors and also the government in organizing the existence of waste so that there is no excessive accumulation in the Waste Disposal Site (TPS).

ii. Process Design

Figure 2 below explains the admin flowchart of the system designed in this study. Where it is illustrated that the admin carries out the login process by entering the username and password, then the data is verified if the data is incorrect then the program will return to displaying the form for filling in the username and password, if the data entered by the admin is correct it will display the admin form where the admin can process user data, data public info, waste receipt data, and can reply to comments from website visitors then the data is processed and stored in the SIASAH database, after processing the data, the admin can log out of the system.

The flow of using this system can be explained in the flowchart as follows:



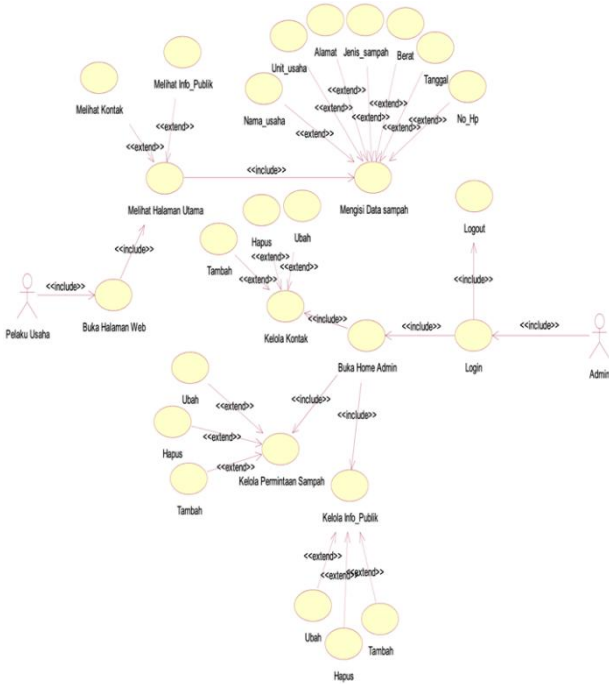
[Fig.2: SIASAH Flowchart]



iii. Unified Modeling Language (UML)

- Use case Siasah System Diagram

Figure 3 below explains the use case of the SIASAH Information System, there are two actors who use the system, namely business actors and system admins. Fill in the waste data to the Department. Then the admin can log into the system, in the admin page form, the admin can process all the data.



[Fig.3: Use case Diagram System SIASAH]

Figure 3 shows the user case diagram used in the study. There are 2 (two) actors, namely the system admin and business actors as well as several use case including system login use case, use case Manage public info, use case Manage waste requests, use case Manage contacts, and others.

IV. RESULTS AND DISSCUSION

A. Implementation

```

1 <?php
2 $dbUser = 'localhost';
3 $dbHost = 'root';
4 $dbPass = '';
5 $dbName = 'db_siasah';
6
7 $db = mysqli_connect($dbUser, $dbHost, $dbPass, $dbName);
8 ?>
    
```

Program Code 1. Connection to the SIASAH System Database

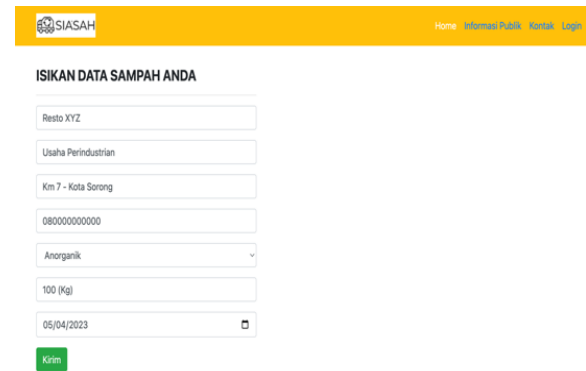
Program code 1 shows the database connection program code on the SIASAH system. There is a database username, database hostname, database name and database password.

B. SIASAH System



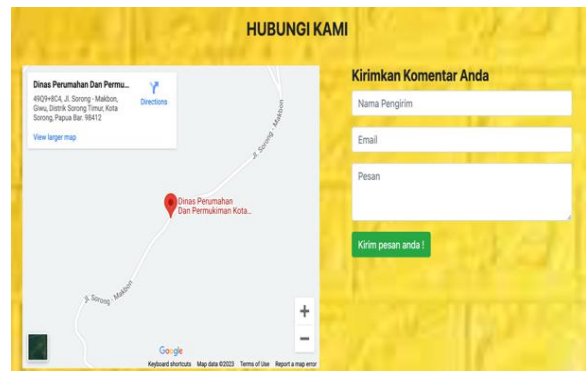
[Fig.4: The Main Page of the SIASAH System]

Figure 4 is the main page of the SIASAH system. When a user accesses this system, the main view of the system will be seen which displays menu information and vision and mission as well as the main tasks and functions of the related departments.



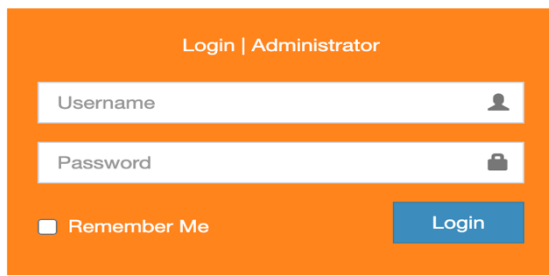
[Fig.5: Waste Data Input Page by Business Actors]

Figure 5 is the waste data input page filled in by business actors. The input data is then recorded on the system server database so that the admin can see the volume of waste inputted by the user and then based on this data the admin communicates with the division or section of the city waste transportation to go to the user's location area.



[Fig.6: Contact Menu Page]





[Fig.7: Admin Login Menu Page]

Figure 7 is the admin login menu page. the admin needs to input username and password data so that he can manage the SIAHAH system as a whole in system functions.

V. CONCLUSION

Based on the results of this study, it can be concluded that the Web-Based SIAHAH System can help the community and related industries in managing waste, which has been one of the thorniest problems in Sorong City. This system is equipped with the type of waste and also the address of the community or industry so that it can make it easier for the public to help report the accumulation of waste that is happening so that officers/trash man can provide assistance and conducting data collection. This system helps the community to reduce accumulation excess trash. SIAHAH will also helps the officers to due information related to the illegal waste disposal as well as making the pick up immediately.

ACKNOWLEDGMENT

Acknowledgments are conveyed by the author to all parties who have supported the implementation of this research.

DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been sponsored or funded by any organization or agency. The independence of this research is a crucial factor in affirming its impartiality, as it has been conducted without any external sway.
- **Ethical Approval and Consent to Participate:** The data provided in this article is exempt from the requirement for ethical approval or participant consent.
- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Authors Contributions:** The authorship of this article is contributed equally to all participating individuals.

REFERENCES

1. "Undang-Undang Republik Indonesia Nomor 18 Tahun 2008 Tentang Pengelolaan Sampah." <https://peraturan.bpk.go.id/Download/28462/UU%20Nomor%2018%20Tahun%202008.pdf>
2. Katalog, "Statistik Lingkungan Hidup Indonesia 2018 - Pengelolaan Sampah Di Indonesia (Badan Pusat Statistik)." https://unstats.un.org/unsd/envstats/Compendia/Indonesia_Statistik_Lingkungan_Hidup_2018.pdf

3. N. Luh Putu Juniartini Tim Fasilitator Lapangan SNVT PUPR, "Pengelolaan Sampah Dari Lingkup Terkecil dan Pemberdayaan Masyarakat sebagai Bentuk Tindakan Peduli Lingkungan." [Online]. Available: <https://ejournal.baliprov.go.id/index.php/jbmb/article/view/106>
4. D. Clasissa Aulia et al., "Peningkatan Pengetahuan dan Kesadaran Masyarakat tentang Pengelolaan Sampah dengan Pesan Jepang," *Jurnal Pengabdian Kesehatan Masyarakat (Pengmaskemas)*, vol. 1, no. 1, pp. 62-70, 2021, <https://core.ac.uk/download/484067367.pdf>
5. Irawati and A. Muhamad Faizal, "Faktor yang Berhubungan dengan Perilaku Masyarakat Membuang Sampah Rumah Tangga di Kanal Viktori Kota Sorong," *Jurnal Penelitian Kesehatan Suara Forikes*, vol. 12, no. 3, pp. 349-353, 2021. <https://forikes-ejournal.com/index.php/SF/article/view/sf12330>
6. F. A. Suwito and A. A. Tarigan, "Program Pengembangan Ekonomi Berbasis Pondok Pesantren," *Jurnal Inovasi Penelitian*, Accessed: Apr. 21, 2023. [Online]. Available: <https://www.neliti.com/publications/470165/program-pengembangan-ekonomi-berbasis-pondok-pesantren>
7. A. Halim, "Pengaruh Pertumbuhan Usaha Mikro, Kecil Dan Menengah Terhadap Pertumbuhan Ekonomi Kabupaten Mamuju," vol. 1, no. 2, 2020. DOI: <https://doi.org/10.57218/jueb.v2i2.604>
8. M. A. Manuhutu and A. Manuhutu, *Konsep Sistem Pendukung Keputusan*, 2020th ed. Development of Decision Support System in Determining Prospective Student Recipients of The Program Indonesia Pintar Using the Weighted Product Method, Kebumen: Intishar Publishing. <https://www.jatit.org/volumes/Vol101No21/2Vol101No21.pdf>
9. M. A. Manuhutu and L. J. Uktolseja, "Design and Implementation of Online Students' Complaint (Case Study of English Study Program at Victory University, Sorong)," 2018, [Online]. Available: DOI: <http://dx.doi.org/10.26438/ijcse/v6i1.228232>
10. L. Parabang, M. A. Manuhutu, A. Manuhutu, N. V. Leuwol, L. J. Uktolseja, and J. Tindage, "Development of 2D Animation-Based Folklore As Learning Media," *International Journal of Information System & Technology Akreditasi*, vol. 6, no. 4, pp. 584-589, 2022. <https://ijstech.org/ijstech/index.php/ijstech/article/view/275>
11. A. D. Riyanto and G. Kusumastuti, "Pembangunan Sistem Informasi Pengolahan Data Pada Tabungan Bank Sampah 'Ceria' Pembangunan Sistem Informasi Pengolahan Data Pada Tabungan Bank Sampah 'Ceria' Purwokerto," 2015. <https://download.garuda.kemdikbud.go.id/article.php?article=361472&val=7576&title=PEMBANGUNAN%20SISTEM%20INFORMASI%20PENGOLAHAN%20DATA%20PADA%20TABUNGAN%20BANK%20SAMPAH%20CERIA%20PURWOKERTO>
12. J. Homepage, S. Widaningsih, and A. Suheri, "IJCIT (Indonesian Journal on Computer and Information Technology) Sistem Informasi Pengelolaan Data Bank Sampah Berbasis Web di Kabupaten Cianjur," 2019. [Online]. Available: DOI: <http://dx.doi.org/10.31294/ijcit.v4i2.6489>
13. L. Afuan and N. Umayah, "Edumatic: Jurnal Pendidikan Informatika Rancang Bangun Sistem Informasi Bank Sampah di Desa Paguyangan," vol. 5, no. 1, 2021, DOI: <http://doi.org/10.29408/edumatic.v5i1.3171>
14. A. Fitri, "Sistem Informasi Pengelolaan Sampah Rumah Tangga Pada Perumahan Grand Catania Citra Raya Tangerang," vol. 9, no. 1, 2021. <https://ipsikom.unipem.ac.id/index.php/ipsikom/article/view/192/162>
15. R. Perdana Brilian and A. Rohman, "Sistem Informasi Manajemen Tabungan Pada Bank Sampah Raflesia Menggunakan Metode Waterfall," *Jurnal Bisnis, Manajemen, dan Informatika*, vol. 19, no. 3, 2022, <https://journal.unhas.ac.id/index.php/jbmi/article/view/25061>
16. P. S. Orangtua, W. Mahasiswa Berbasis Web, M. Agnes Manuhutu, and I. Surya Rajagukguk, "Perancangan Sistem Informasi Orangtua/Wali Mahasiswa Berbasis Web Pada Universitas Victory Sorong," 2020. DOI: <https://doi.org/10.54367/means.v7i1.1957>
17. y. kadri, "penerapan algoritma md5 sebagai pengaman akun pada aplikasi web emusrenbang kota binjai," *Jurnal Teknik Informatika Kaputama (JTik)*, vol. 4, no. 1, 2020. <https://download.garuda.kemdikbud.go.id/article.php?article=1293227&val=17377&title=PENERAPAN%20ALGORITMA%20MD5%20SEBAGAI%20PENGAMAN%20AKUN%20PADA%20APLIKASI%20WEB%20EMUSRENBANG%20KOTA%20BINJAI>
18. Tee, K., Nurjannah, R., Lee, D., & Kaburuan, E. R. (2019). Design of Waste Management Service System in Indonesia Based on Service Oriented Architecture (SOA): Go-Waste. In *International Journal of Recent Technology and Engineering (IJRTE)* (Vol. 8, Issue 3, pp.

- 5257–5261). DOI: <https://doi.org/10.35940/ijrte.c5909.098319>
19. Ishak, F. D., Romli, F. I., Harmin, M. Y., & Rafie, A. S. M. (2020). Design Requirements for New Food Delivery and Waste Collection System Onboard Commercial Transport Aircraft. In International Journal of Innovative Technology and Exploring Engineering (Vol. 9, Issue 3, pp. 2207–2212). DOI: <https://doi.org/10.35940/ijtee.c8966.019320>
20. Tejasri, C. (2019). Smart Waste Management System using IBM Watson Services. In International Journal of Engineering and Advanced Technology (Vol. 9, Issue 1s6, pp. 161–163). DOI: <https://doi.org/10.35940/ijeat.a1032.1291s619>

AUTHOR'S PROFILE



Melda Agnes Manuhutu, is the lecturer of Information System Study Program at Victory University, Sorong. She finished both her bachelor and master degrees in Satya Wacana Christian University, Salatiga. She passionate in the software making to help and even change the manual system

that has not efficient yet.



Lulu Jola Uktolseja, is the lecturer of English Study Program at Victory University, Sorong. She is an active volunteer in several social works that help things about education. She is also active in giving her thought about the importance of electronic application in teaching

English process.



Tagor Manurung, is the Vice Rector at Victory University, Sorong. His education background is economic management. He is active to contribute in software management to help the work process.



Jalmjin Tindage, is the Assistant Rector who worked as the management study program. Her works are explaining a lot about the management stuff.



Abraham Manuhutu, is the lecture at Ambon State Polytechnic. His education background is electrical engineering. He is active to contribute in software management to help the work process.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)/ journal and/or the editor(s). The Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP) and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.