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Design of an Information System for Management of Organic Waste Bins As a Processor for Fertilizing Compost for Family Medicinal Plants

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ABSTRACT

During global climate change and the threat of environmental pollution, society is increasingly aware of the crucial role played by nature conservation and waste management. One of the big challenges in this context is waste management, especially organic waste. This research uses a method with a qualitative research approach. Qualitative data collection techniques were carried out using interviews and observations to explore the problems faced. The approach used in this research is experimental research. The data collected is managed to create a design for a website-based information system that is used to provide various information and guidelines for managing organic waste bins. This website was designed with the aim of deepening understanding of the problems faced by the community regarding organic waste management and the use of organic waste bins. The research results provide an overview of the design of an information system that can be used for various activities related to managing organic waste bins. This website was designed with the aim of deepening understanding of the problems faced by the community regarding organic waste management and the use of organic waste bins. It is hoped that these results can be translated into a system that can provide significant support for organic waste management in the community so that the impact can be felt directly in the community with a healthier and more comfortable environment.

Keywords: Organic Fertilizer, Organic Waste Bin, Information System

Introduction

The level of understanding of the importance of the environment and poverty has increased rapidly throughout the world. During global climate change and the threat of environmental pollution, society is increasingly aware of the crucial role played by nature conservation and waste management. One of the big challenges in this context is waste management, especially organic waste. Organic waste, such as food waste, leaves, and plant litter, is an important component in the formation of natural fertilizers that can support sustainable agriculture. However, unfortunately, a lot of organic waste still ends up in landfills, which does not reduce the global waste problem and is detrimental to the environment. The phenomenon that occurs in society is increasing awareness of the importance of the environment and desires. Waste from household waste has potential if it is processed into fertilizer. Household waste such as vegetables contains a lot of liquid, so it will break down or decompose more quickly. Making this fertilizer will reduce waste in the environment [1].

Technological advances certainly also have an influence in this field, with the aim of technology to make human work easier. Supported by increasing people concerned about environmental issues, including waste management. During the determination of the status of emergency waste disposal, the Governor also asked the residents of Bandung City and its surroundings to carry out independent waste management. Most governments generally seek macroeconomic goals with the overarching expectation of positively impacting the population [2]. This trash can could be one answer to the waste problem. Apart from being able to manage organic

waste into fertilizer, this also affects the amount of waste produced, where in a village where a survey was conducted, organic waste dominates up to 70.5%, while inorganic constitutes 29.5% of housing [3]. However, there is still a lot of organic waste that is not processed effectively, so the organic waste ends up in landfills or is wasted. Therefore, innovation is needed in managing organic waste. Garbage is one of the negative impacts in community environments, as well as remote environments or village. Even though the government and agencies environment, providing rubbish bins but public awareness in disposing of waste not in place [4].

This approach not only helps in minimizing adverse environmental effects but also offers positive impacts. positive benefits in the form of compost fertilizer for agriculture. Therefore, it is proposed to design this organic waste bin which is targeted as a compost fertilizer processor to fertilize family medicinal plants, especially for the community, especially housewives who grow family medicines both around campus and in the wider community. This Organic Trash Can uses electricity and a dynamo to rotate 4 blades to crush organic waste and is also provided with a small drawer as a place to store the compost. Compost fertilizer is fertilizer that comes from the decomposition of organic material by microorganisms. Organic compost fertilizer is an environmentally friendly fertilizer that has various benefits such as: increasing soil fertility, as a stabilizer for soil aggregates, a source of nutrients for soil and plants and can increase land productivity in the long term [5]. This organic trash can also uses cinnamon and activated carbon for odor removal and antibacterial properties. Cinnamon and activated carbon are materials that need to be replaced within 2-3 months of using the trash can.

Various business entities leverage the advancement of information technology to enhance the business landscape via information systems in virtually every routine business activity, impacting nearly all segments of global society [6]. Businesses are transitioning from traditional systems to incorporate digital online sales systems [7]. This product was created to support regulations from the Ministry of Health to make it easier for people to make compost for family medicinal plants that they plant in their yards, bearing in mind that the fertilizer used for medicinal plants must be organic fertilizer such as compost and manure [8]. Web services very vulnerable and subject to change constant. Therefore, they are offers new challenges for software engineering [9]. In an increasingly digitally connected world, accessing information has become easier than ever. Information refers to processed data that has been transformed to offer advantages and significance to the recipient [10]. The internet has opened the door to a world of knowledge and provided instant access to information from all corners of the globe. An information system is a collection of sub-systems in an organization that are interconnected to achieve a certain goal [11]. No longer limited by nature or time constraints, we can explore the world of information quickly and efficiently. The excellence of accounting information systems involves diverse aspects, such as integration, flexibility, accessibility, formalization, and media richness [12]. With these products, trash including barcodes can be used to navigate websites that provide information on waste management and purchasing materials which is cinnamon and activated carbon. Information is a collection of data processed to make it meaningful and useful to the client [8]. This initiative aims to help communities manage organic waste and make organic compost. In addition to product innovation, including organic waste trash with barcodes, users can also easy access information through the website and make online purchases. This step will facilitate simple and efficient remote transactions for users.

Method

This research uses a method with a qualitative research approach. Qualitative data collection techniques were carried out using interviews and observations to explore the problems faced. The approach used in this research is experimental research, which aims to find out the consequences

of giving a behavior intentionally by the researcher [13]. Meanwhile, qualitative research has a descriptive nature and tends to use analysis. Process and meaning are more emphasized in this type of research with a theoretical basis which is used as a guide so that the focus of the research is in accordance with the facts in the field. Qualitative data is data in non-numerical form [14].

The use of interviews allows researchers to hear directly from the community's experiences and views regarding organic waste management and the best methods for managing it, and its impact on daily life. Interviews allow people to talk about their feelings, difficulties and hopes regarding this innovation. Observation is also a relevant method because by directly observing Organic Waste Bin management methods in the field, researchers can collect data regarding daily practices, challenges that may arise, and their impact on the environment. The data collected is managed to create a website-based information system design that is used to provide various information and guidelines for managing organic waste bins. This website was designed with the aim of deepening understanding of the problems faced by the community regarding organic waste management and the use of organic waste bins.

Results and Discussion

A. Product

This product is the basis for this research, where we will create an information system so that the performance of this organic waste bin product can function well and provide wider benefits. An effort to provide innovative solutions in organic waste management, by developing a unique product by integrating activated carbon and cinnamon layers in the Organic Waste Bin. This product has a great impact in answering the challenges of organic waste management and acts as a compost processor that will fertilize family medicinal plants.

1. Product Foto

The product foto that can be seen in the following Figure 1.



Figure 1. Product Foto

This product is an innovative compost bin that maximizes the composting process while maintaining a clean and odor-free environment. With a stand height of approximately thirty centimeters, this product is a comfortable height for daily use. The height of the trash can is also sufficient to store organic waste. The 23 cm diameter is large enough to store a lot of organic waste. The dynamo is located outside to facilitate routine checking and maintenance, which is a wise move to ensure smooth and efficient operation. Combining activated charcoal and cinnamon in a filter

bag is a great way to reduce unwanted odors during composting. Activated charcoal absorbs unwanted odors, and cinnamon creates a pleasant aroma.

Trash can stands are used to reduce vibration, ensure product stability, and have a clean, contemporary appearance. Moving the dynamo to the outside is also a smart choice to reduce the noise produced during the composting process. This makes the product more environmentally friendly and provides greater user comfort.

2. Tools and Materials Requirement

The tools and materials used in making the product are as follows:

Table 1. Tools and Materials

No.	Name of Materials
1	Rubbish bin
2	Blade
3	Packaging (40x30x32 cm)
4	Miyako Dynamo
5	Filter Bag (12 x 20 cm)
6	AC Cable (3 Kabel)
7	Switch
8	Glue
9	Weld
10	Rubber
11	Scrupt

3. Manufacturing Process

The steps in making the product Organic Trash Can Made from Activated Carbon Lined with Cinnamon as a Compost Fertilizer Processor for Fertilizing Family Medicinal Plants are explained as follows:

- First, cut the saw blade to make the blade. Then, cut stainless steel for the blade holder and fit the bin.
- Next, the mechanical components are carefully assembled to ensure that they function properly. Connecting the dynamo to the AC cable, connecting it to the switch, and attaching it to the stand are all part of this process.
- The dynamo must be adjusted to the blade and gas tube rubber so that the machine functions properly. For stability, the knife holder must also be attached to the waste bin with a rubber gas tube.
- Cinnamon and activated carbon filters are made and cut according to design to reduce odors from composting. This filter is then installed as a lid on the trash can.

B. System Design

System design is designed to find out the data, processes, and flows that exist in the system to be created. This system design uses, Flowchart, Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD).

1. Flowchart

A flowchart is a graphic depiction of the steps and sequence of procedures in a program. Flowcharts function to explain or describe each process that occurs in the program. This will make

it easier for programmers to explain the progress of the software development they are working on [15].

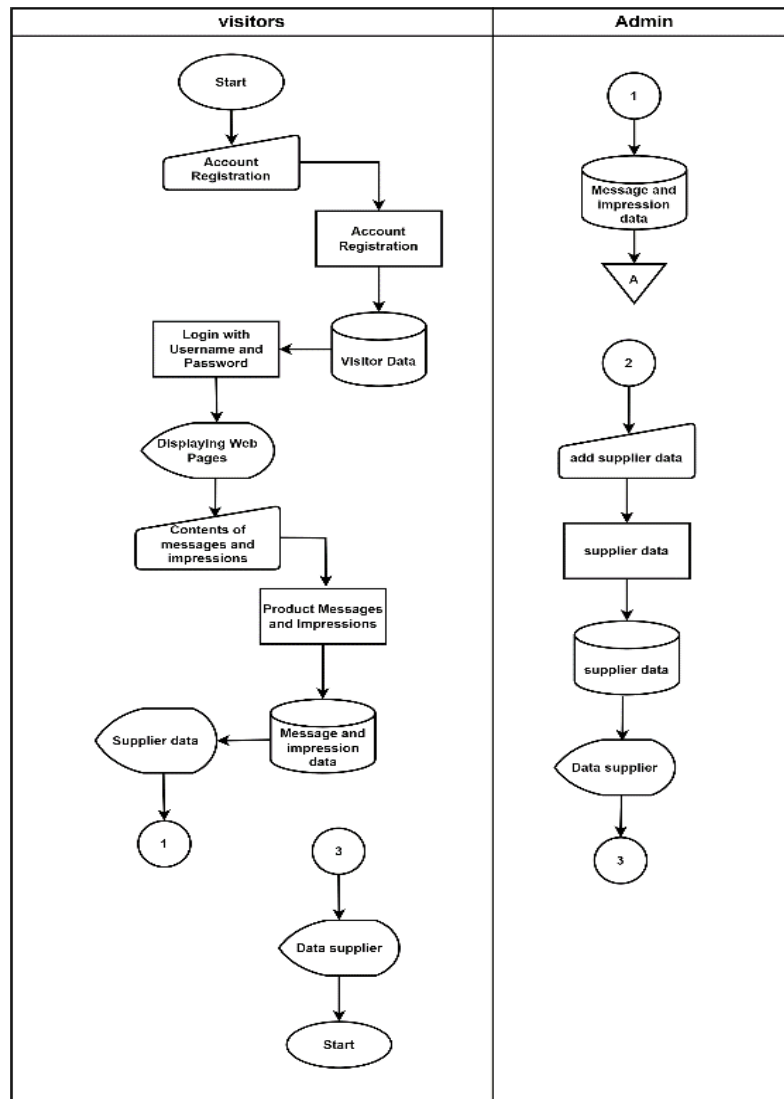


Figure 2. Flowchart

Figure 2 shows the application flowchart of products that have been created with access rights for 2 of them, namely visitors and admin. Visitors can see detailed information about products as well as information on purchasing charcoal and cinnamon, then the admin can add or update data about suppliers.

2. Diagram Konteks

A context diagram is a diagram that consists of processes and describes the scope of a system. Context diagrams explain the relationships between entities related to the system [16]. In the context diagram there are entities that carry out activities of providing data and receiving data [17].

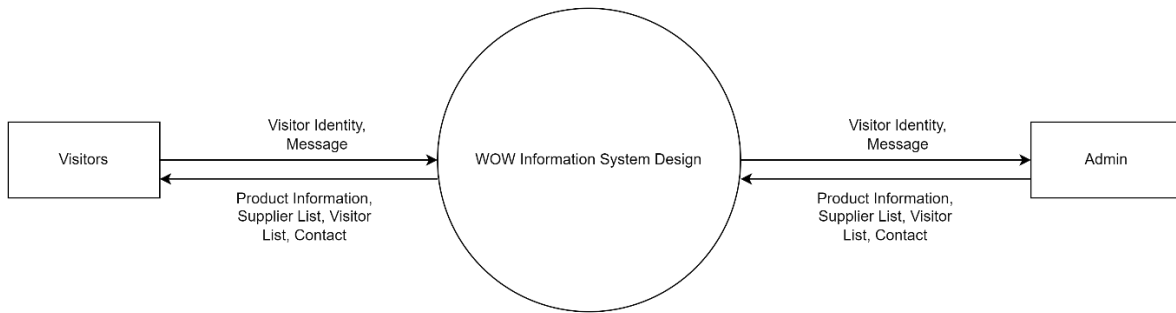


Figure 3. Context Diagram

The context diagram explains the entire flow of the website being created, where there are visitors and admins who send data information to each other. The admin provides the information needed by visitors

3. Data Flow Diagram (DFD)

Data flow diagrams are tools used to describe systems completely and clearly, both existing systems and existing systems in plan [18]. Data Flow Diagram is a technique that describes the components of a system and the flow of data on these components. Components of a system and the flow - the flow of data on these components origin, destination and storage of data.

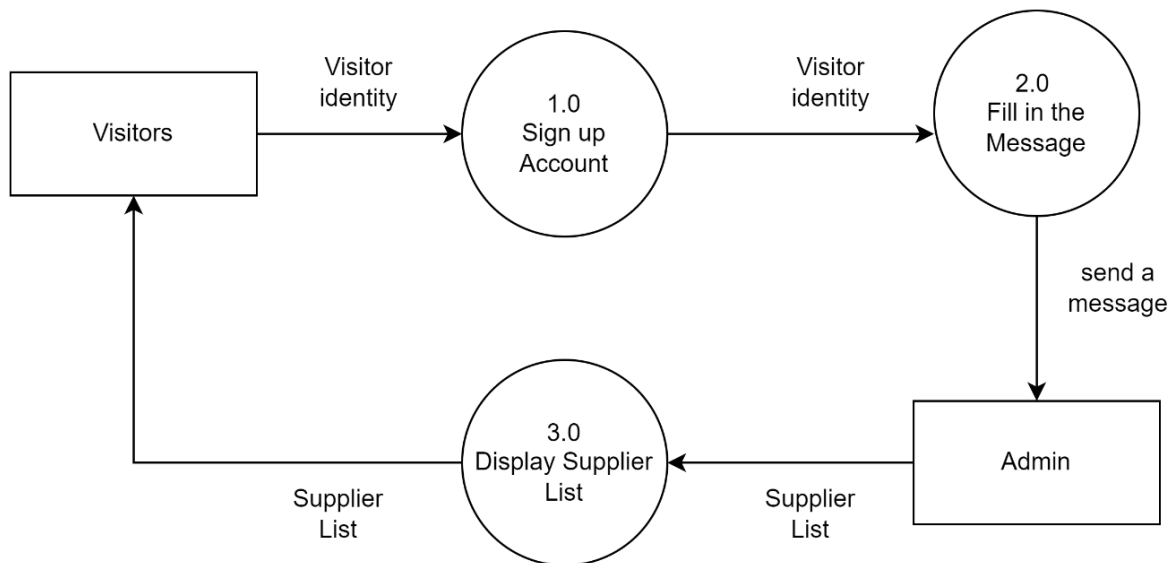


Figure 4. Data Flow Diagram

The Data Flow Diagram explains the flow of visitors registering and being able to fill in messages as criticism and suggestions for products. The admin will display information about product information and lists needed by visitors.

4. Entity Relationship Diagram (ERD)

Entity Relationship Diagram are relationships between tables and other tables that are related by several fields or records contained in the database. Entity Relational Diagrams contain components of entity sets and relationship sets, each of which is equipped with attributes that represent all the facts[19].

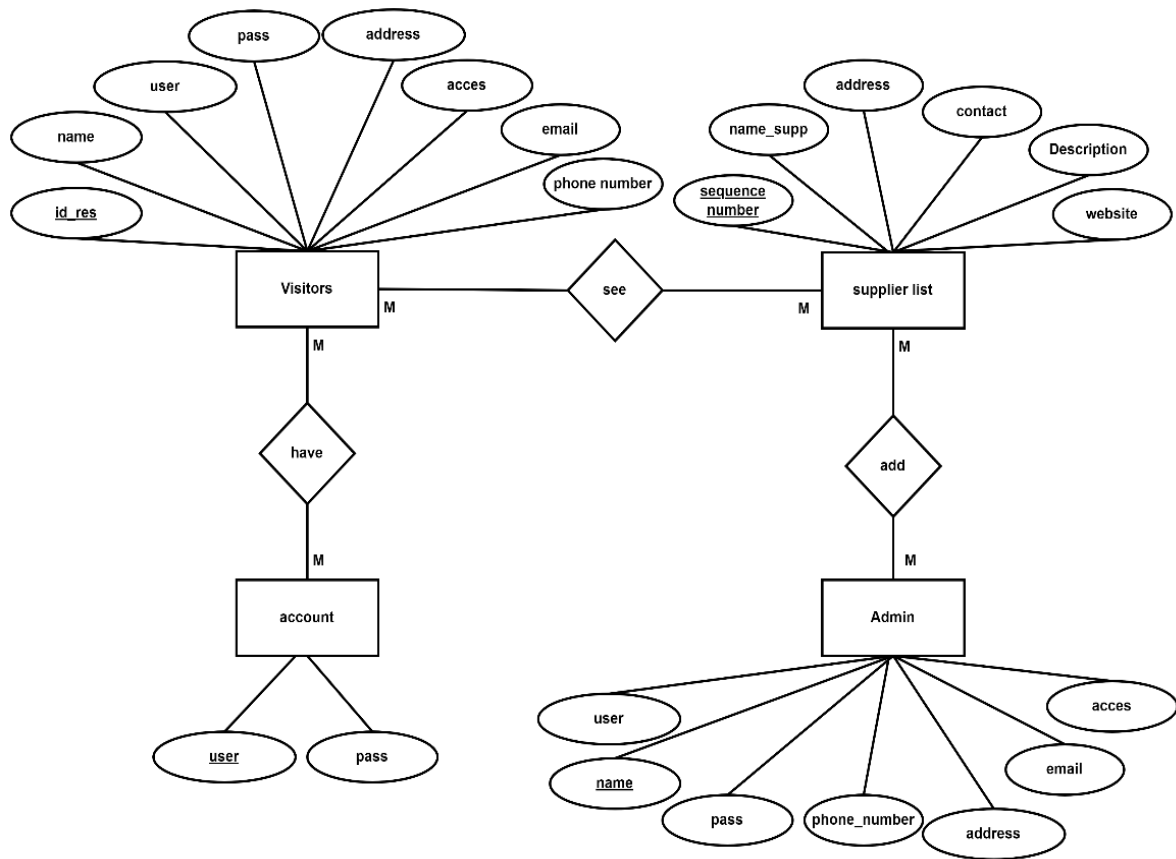


Figure 5. ERD

5. Program Menu Structure

The program menu structure is divided into 2 parts, namely admin and visitor. The main menu of the program consists of logging in as a team profile, product identity, product care, product usage, testimonials, activities, visitor list, supplier list and account information.

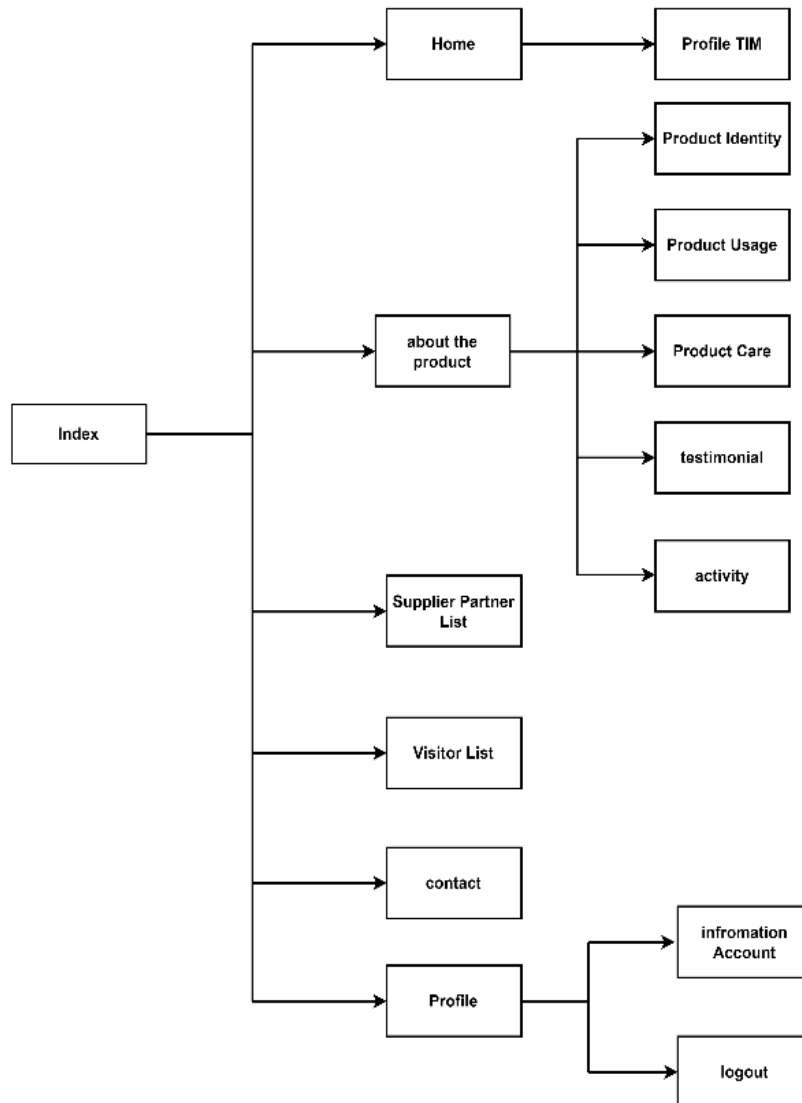


Figure 6. Program Structure Menu

6. Program Display

Figure 8 shows the initial appearance of the website when not logged in, there are 3 menu sections, namely homepage, login and contact.



Figure 7. Homepage View

Figure 8 shows the login page application mockup used to log into the application based on the access rights of each account. Each user has different roles and access rights. The roles are visitor and admin.

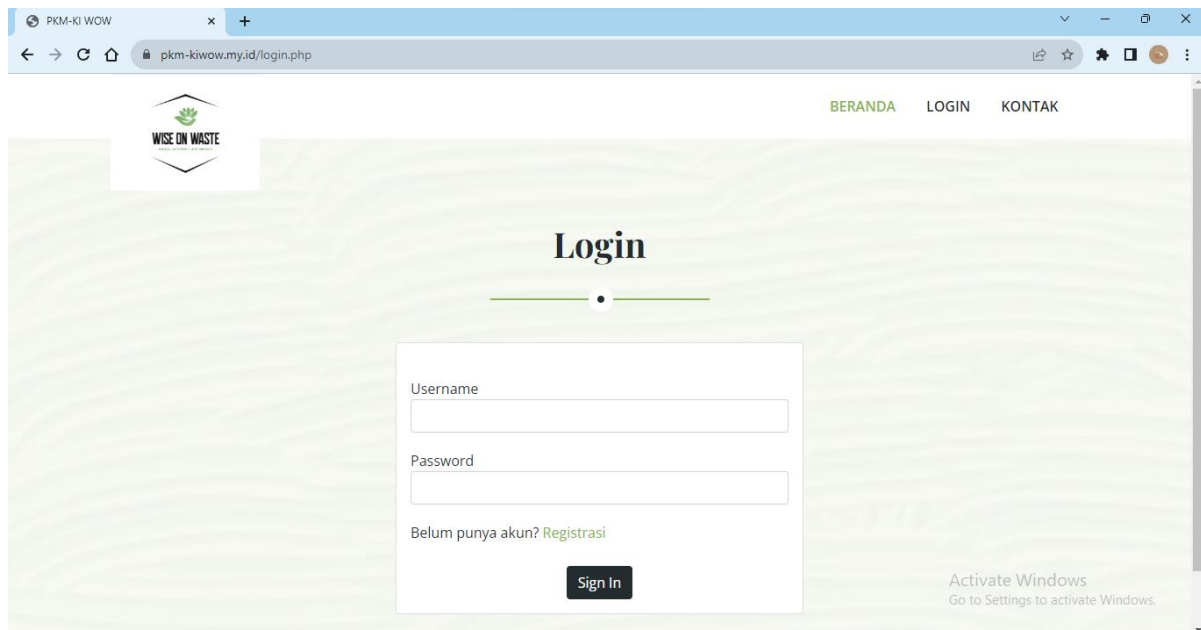


Figure 8. login view

Figure 9 shows related product information with product explanations, product designs. procedures for use and maintenance procedures are also available so that visitors can see the information clearly.



Figure 9. View About Product

Figure 10 shows the Product Care inside. This is the step where the system will display information about the care and maintenance of the product to the user.



Figure 10. Product Maintenance Display

Figure 11 shows the procedures for using the product, there is information that provides product usage for visitors so that visitors are not confused about the product to be used.



Figure 11. Product Usage Display

Figure 12 displays product testimonials from users, and visitors fill in the message column in the contact section then it will appear in the testimonials section as user impressions and messages.

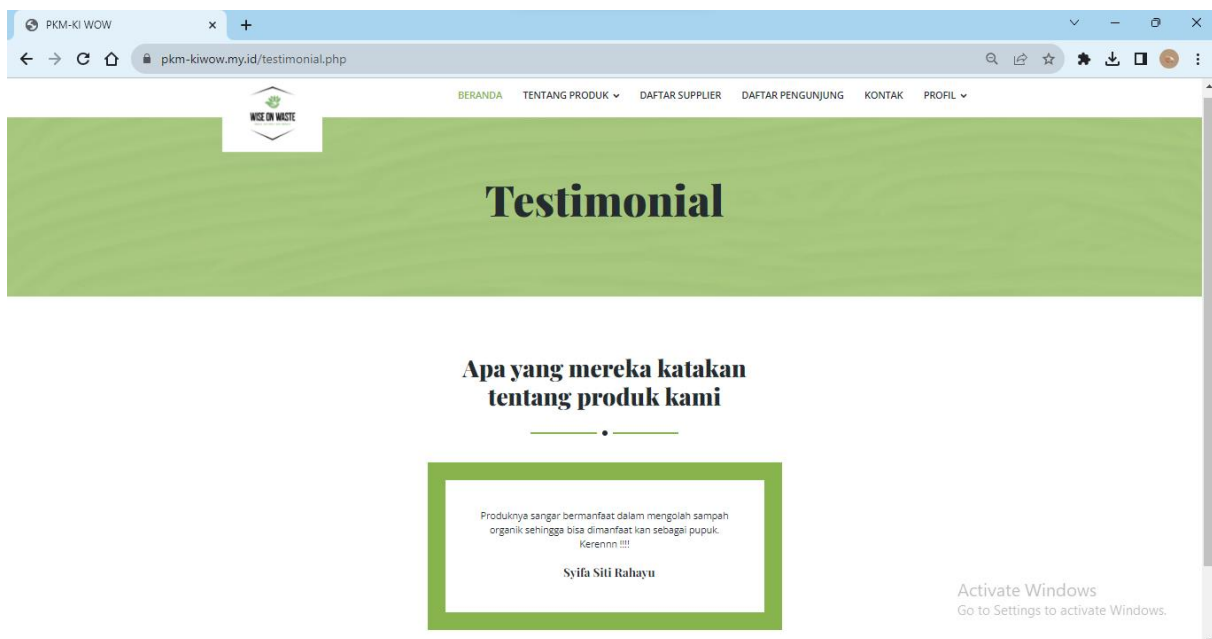


Figure 12. Testimonial View

Figure 13 shows the supplier list table that visitors can see as a reference for purchasing materials in which complete data is available.



Figure 13. Supplier List View

Figure 14 shows a list of visitors who have registered with the application so that if anyone registers it will appear on the list.



Figure 14. View Visitor List

Figure 15 shows information regarding contacts who can be contacted when there are questions or problems from users. where there is information related to social media, email and cellphone numbers.

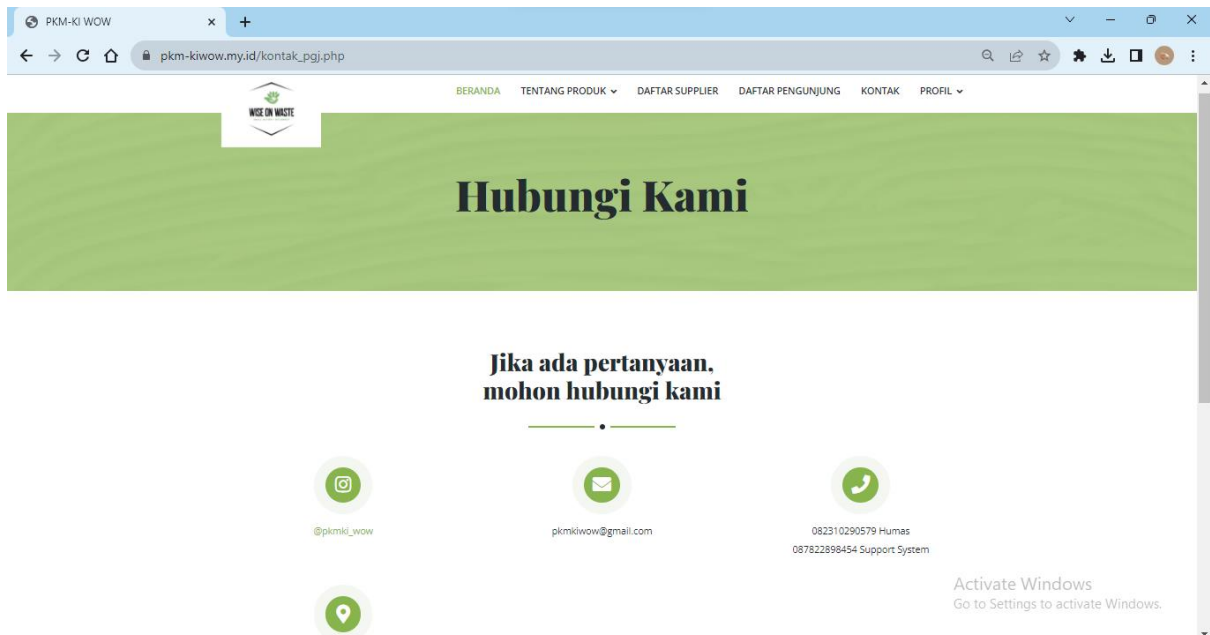


Figure 15. Contact View

7. Barcode

Figure 16 displays the products created are equipped with a barcode feature that is connected directly to the website. This is an innovative approach that is very useful for users. Thanks to the barcode installed on the product, users can easily access product information. If a user points a barcode (e.g. smartphone or special scanner) at a product barcode, the product information is immediately read and sent to the corresponding website. Enables users to access important product information such as technical information, user guides, maintenance instructions, and the latest product information or updates.



Figure 16. Website Barcodes

Conclusion

In short, this product offers an innovative and sustainable solution for organic waste management. The use of materials such as activated carbon and cinnamon coating helps reduce the impact of organic waste on the environment and creates high-value organic fertilizer for plants. Apart from reducing organic waste, it also produces organic fertilizer which can be used to fertilize household medicinal plants. Activated carbon helps improve the quality of compost, while cinnamon can provide antibacterial properties and a pleasant aroma. Designing a web application related to this product will provide a very useful way to promote the product, provide information and help users use the product. These studies may include tracking the growth of medicinal plants

in homes that utilize compost from their produce, examining the quality of the resulting compost, its impact on the environment, and other variables. Furthermore, research can be carried out in developing optimal formulas by trying various additional ingredients in the composting process.

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