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SECTION 05

PHASE 1: PROJECT PROPOSAL & DATABASE REQUIREMENT

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<LOW CARBON MONITORING AND MANAGEMENT SYSTEM>
<HUMAN COMPILERS>

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1.0 Introduction

Global warming has become a serious threat to the environment, society, and economy, which requires immediate action to lessen its impact. Recognizing the issue, Malaysia has initiated various sustainable solutions to address the environmental, social, and economic concerns. In this project, we are focusing on one of the initiatives which is the Low Carbon Cities Framework (LCCF). Evaluating and lowering the levels of carbon emissions is a vital part of this initiative in handling the issue.

Johor government has come to the front on this initiative by developing the Low Carbon Blueprint for Iskandar Malaysia 2025 with the goal of reducing carbon intensity by 58% by 2025 compared to the baseline of 2005. There are three key entities that play pivotal roles in achieving this target which are the Iskandar Malaysia Ecolife Challenge (IMELC) program, the Johor Education Department's (JPNJ) e-Lestari system, and the Iskandar Puteri City Council (MBIP). These initiatives work together with one common aim to increase public awareness, integrate sustainability into education, and gather data on energy-saving efforts that serve a variety of user groups to combat global warming.

2.0 Background Study

As part of Malaysia's commitment to the Low Carbon Cities Framework (LCCF) and in response to the urgent need for sustainable development, the Iskandar Puteri City Council (MBIP) is launching a significant initiative. MBIP was established as a significant stakeholder and was vital in promoting the Low Carbon Society (LCS), primarily through the Iskandar Puteri Low Carbon (IPRK) program. IPRK was established in 2019 to gather information on energy-saving initiatives in various community segments, such as factories, residential areas, schools, and higher education establishments. MBIP has demonstrated its dedication to sustainability through several projects, such as the Iskandar Puteri Low Carbon Calendar Competition. This competition had the goal of encouraging the community in order to minimise electricity and energy used, as well as manage waste.

The competition faced several challenges due to the unfriendly data entry process. It is not efficient to use Google Form as a platform to collect many data from users as it can cause confusion. The manual calculation and reporting of carbon reduction from the previous method is time-consuming and can lead to errors. With the limited data analysis capabilities and variety of user profiles, it is challenging to classify and distinguish them to the respective type of user. As a response to these challenges, MBIP aims to develop a new data collection and analysis platform, taking inspiration from the current e-Lestari system.

3.0 Problem Statement

- **Time-consuming and User-Unfriendly Data Entry Procedure**

  The current process of entering data into the system using Google Form was found to be too time-consuming. Moreover, the problem got more complex because people from different ethnicities with limited education experience using the Google Form platform had a laborious time trying to participate, which led to the need for MBIP to provide kiosks to help the community fill out the forms.

- **Manual Carbon Reduction Calculations and Reporting**

  The stakeholder was facing the challenges of calculating the carbon reduction manually. Relying on manual calculations is not only time-consuming but also can affect the actual carbon reduction achieved due to the high risk of human error. This manual approach will reduce the accuracy and reliability of the reported results. It is hard to identify the winner as they have to make a manual comparison of participants across different user groups.

- **Inefficient User Engagement**

  The existing dashboard lacks efficiency in engaging users, lowering the active participation of the users in carbon reduction and community activities. Developing a user-friendly dashboard is crucial to foster active involvement and contribution. An improved dashboard would promote user-friendly engagement, by making it user for users to actively participate in carbon reduction initiatives.

- **Language Accessibility**

  The application language limitation poses a barrier to inclusivity and hinders accessibility, particularly for individuals who primarily don't speak Bahasa Melayu. Operating mainly in Bahasa Melayu, with additional language options, is crucial to cater to individuals from diverse linguistic backgrounds. This approach will promote an ease of use to both individuals who speak Melayu or different languages, encouraging broader engagement in carbon reduction and environmental initiatives.

- **Inadequate Carbon Mapping System**

  The current carbon mapping system lacks the specific details and accuracy to understand the environmental impact of diverse activities especially in providing insights into carbon emissions.

4.0 Proposed Solutions

In response to the identified challenges with the time-consuming and user-unfriendly data entry procedure, we propose a solution that combines an intuitive digital interface with localized support. Recognizing the complexities faced by people from diverse ethnicities and varying education levels, we aim to simplify the process and eliminate the need for physical kiosks.

Firstly, we recommend transitioning from the current Google Form platform to a dedicated, user-friendly interface designed specifically for carbon data entry. This new platform will be crafted with simplicity in mind, featuring clear instructions and straightforward navigation. To address language barriers and limited education experience, the system will incorporate visual cues, tooltips, and guidance pop-ups at each step, ensuring an inclusive and accessible experience for users.

Moreover, to further enhance accessibility, the system will provide optional support features. These may include audio instructions available in multiple languages, making the platform more accommodating for individuals with varying language backgrounds. By addressing the specific challenges faced by the community, our solution aims to empower users to participate in carbon reduction initiatives without the need for physical assistance, fostering a sense of inclusivity and efficiency in the data entry process.

4.1. Feasibility Study

4.1.1. Technical Feasibility

First and foremost, the system architecture will be developed using a microservices approach, ensuring modularity, scalability, and ease of maintenance. This choice facilitates the integration of cutting-edge technologies and allows for future enhancements without compromising system integrity.

Automation, a key focus, involves implementing machine learning algorithms in Python for rapid and precise carbon reduction calculations. This not only accelerates progress tracking but also contributes to the efficiency of carbon management. User engagement is enhanced through an intuitive interface using React or Vue.js, fostering active participation in carbon reduction and community initiatives.

Language accessibility is prioritized by operating primarily in Bahasa Melayu while offering additional language options. Security measures include encryption protocols, OAuth for user authentication, and regular security audits. Integration with existing environmental monitoring platforms is facilitated through APIs and webhooks, ensuring interoperability.

Scalability and performance are achieved via cloud-based infrastructure, leveraging AWS, Azure, or Google Cloud, with load balancing and database sharding for optimal performance. Rigorous testing, including UI and backend tests, ensures system reliability through tools like Selenium and JUnit. A robust maintenance plan, incorporating DevOps practices, guarantees continuous improvement through automated deployment and regular updates. This streamlined approach ensures the technical feasibility of a reliable, scalable, and user-friendly enhanced carbon mapping system.

4.1.2. Operational Feasibility

Operational feasibility, a pivotal consideration in evaluating proposed enhancements to the carbon mapping system, involves a thorough examination of key operational factors. The allocation of resources, encompassing human capital, technology, and financial investments, is scrutinized to ensure alignment with project objectives. Integration with existing processes is prioritized to minimize disruptions and facilitate a seamless transition while identifying and addressing training needs is critical for effective user adaptation.

Change management strategies, incorporating clear communication and stakeholder involvement, play a vital role in mitigating resistance and fostering a positive reception of the new system. Scalability analysis ensures the system's readiness to accommodate growth in data volume, users, and features, contributing to its long-term effectiveness. Maintenance and support protocols are carefully considered to uphold ongoing system performance.

Legal compliance, the cultivation of strong vendor relationships, robust data security measures, and a comprehensive operational impact analysis round out the operational feasibility assessment. This meticulous evaluation ensures that the proposed enhancements align seamlessly with operational realities, thereby enhancing the organization's overall efficiency and effectiveness.

4.1.3. Economical Feasibility

Economic feasibility is one of the crucial aspects to look into when making a project proposal. Using a cost-benefit analysis (CBA) will produce a profitable index to determine whether it is a good investment by considering the project's inputs and outcomes (Robinson, 1993).

Assumptions	
Discount rate	10%
Sensitivity factor (Costs)	1.1
Sensitivity factor (Benefits)	0.9
Annual change in production costs	4%
Annual change in benefits	7%

Estimated Costs	
Hardware	RM 15000
Software	RM 15000
Training	RM 10000
Advertising	RM 5000 per year
Maintenance	RM 2500 per year

Estimated Benefits	
Increase Sales	RM 25000 per year
Savings	RM 30000 per year

Costs	Year 0	Year 1	Year 2	Year 3
Development Cost				
Hardware	16500			
Software	16500			
Training	11000			
Total Development Cost	44000			
Production Cost				
Advertising		5500	5720	5949
Maintenance		2750	2860	2974
Annual Production Cost		8250	8580	8923
Present Value		7500	7090	6704
Accumulated Cost		51500	58590	65294

Benefits	Year 0	Year 1	Year 2	Year 3
Increase Sales		22500	24075	25760
Cost Savings		27000	28890	30912
Annual Benefit		49500	52965	56672
Present Value		45000	43773	42578
Accumulated Benefit		45000	88773	131351
Gain/ Loss		(6500)	30183	66057
Profitable Index (PI)	1.50			

From the analysis above, we can conclude that it is a good investment since the Profitable Index (PI) value is 1.5, which is greater than one. This system is expected to gain around RM66057 after three years, even if we lose around RM6500 in the first year. Therefore, proceeding with this project is worth it.

5.0 Objectives

- **Accurate Carbon Mapping**

  Accurate Carbon is a key focus of our initiatives, as we strive to create a system capable of mapping the carbon footprint across various dimensions, including water usage, waste management, electricity consumption, and the utilization of recycled cooking oil. This approach will provide users with an efficient understanding of their environmental impact.

- **Automatic Carbon Reduction Calculations**

  The implementation of Automatic Carbon Reduction Calculations marks a significant advancement in our system. By updating to automated calculations, we enhance the accuracy and precision of carbon reduction tracking. Doing so, will enable the users to monitor and assess their progress in reducing carbon intensity with greater accuracy, achieving an accountable approach to sustainability.

- **User Engagement**

  User engagement is an important element of our strategy to promote active participation in reducing carbon emissions. To facilitate this, we are developing a user-friendly dashboard. This dashboard will empower users to actively contribute to the low carbon practices and events, resulting in a sense of ownership and self-responsibility for environmental protection.

- **Language Availability**

  Language availability is the core consideration in our plan to ensure inclusivity. While the platform will operate mainly in Bahasa Malayu, we are committed to providing users with a diverse range of language options. This commitment will reflect our dedication to creating a user-friendly experience for individuals of various ethnicities, promoting accessibility and usability for a wide variety of people.

6.0 Scope

6.1. Project Scope

The "Low Carbon Initiatives Community Monitoring System" is a project with ambitious goals to create a comprehensive platform for collecting and analyzing carbon emission data across diverse community groups. This project aims to enhance and reinvent existing systems by drawing inspiration from successful models such as the e-Lestari system used by the Johor Education Department and the Iskandar Malaysia Eco Life Challenge (IMELC).

The project's primary goal is to locate and address the problems identified in earlier initiatives to track and lower carbon emissions. The intended recipients of this project encompass the residents, commercial enterprises, and the departments and people of Majlis Bandaraya Iskandar Puteri (MBIP). The project seeks to generate a comprehensive and significant transformation in the community's carbon emissions strategy by directing its efforts towards these groups.

Identifying communities with high carbon dioxide emissions is one of the main difficulties this initiative attempts to address. By employing advanced data gathering and analysis techniques, the system will effectively delineate carbon footprints across diverse industries and demographic cohorts within the community. The mapping process holds significant importance as it provides essential insights that can guide the development of targeted initiatives and policies aimed at reducing carbon emissions.

An additional noteworthy component of the project involves the computation of decreases in the utilization of crucial resources such as electricity, water, and trash management, which encompasses the recycling of cooking oil. This comprehensive strategy guarantees that the system's focus extends beyond carbon emissions to encompass broader environmental sustainability objectives.

The inclusion of a user-friendly dashboard is an essential element of this endeavor. The primary objective of this initiative is to promote the practice of self-monitoring of carbon emissions within the community. The dashboard will exhibit real-time data and offer valuable insights and recommendations for mitigating carbon footprints. The interface is designed to be intuitive, facilitating comprehension and interaction with the data for people with diverse backgrounds.

In essence, the Low Carbon Initiatives Community Monitoring System is an all-encompassing endeavor that seeks to decrease carbon emissions at the community level substantially. By utilizing effective models and prioritizing user-friendly technologies, the initiative is positioned to establish a sustainable and ecologically conscious culture within its target areas.

6.2. System Boundaries

The establishment of a thorough framework for system boundaries is important for the successful implementation of the "Low Carbon Initiatives Community Monitoring System" in order to guarantee clarity and efficacy. The following system boundaries are proposed, organised according to various elements of the subject matter. The following system boundaries are proposed, organised based on several characteristics of the project:

1. Geographical Boundaries:

- **Target Area:** Focuses on the regions within Majlis Bandaraya Iskandar Puteri (MBIP).
- **Communities:** Includes residential areas, commercial enterprises, and public spaces within MBIP.

2. Stakeholder Boundaries:

- **Primary Users:** Residents, businesses, and officials within MBIP.
- **Secondary Users:** Environmental researchers, policy makers, and external communities.

3. Data Collection and Analysis:

- **Sources of Data:** Energy consumption, water usage, waste management, and transportation data within MBIP.
- **Data types:** Quantitative (e.g., kWh, liters, kilograms) and qualitative data (e.g., recycling practices).

4. Carbon Footprint Mapping:

- **Industry and Demographic Focus:** Different sectors and demographic cohorts within MBIP.
- **Emission Sources:** Electricity, transportation, waste, and water usage.

5. Resource Utilization:

- **Scope of Resources:** Electricity, water, and waste management, including cooking oil recycling.
- **Reduction Goals:** Target decreases in usage based on baseline measurements.

6. Technology and Interface:

- **Dashboard Design:** User-friendly for diverse backgrounds.
- **Functionality:** Real-time data, analysis features, carbon footprint reduction recommendations.

7. Environmental Sustainability Goals:

- **Broader Objectives:** Beyond carbon emissions, including water conservation and waste reduction.
- **Community Engagement:** Involvement in sustainable practices.

8. Policy and Regulation:

- **Compliance:** Adherence to environmental regulations.
- **Policy Development:** Data-driven insights for policy creation.

9. Monitoring and Evaluation:

- **Success Metrics:** Criteria for evaluating reductions in emissions and resource use.
- **Feedback Mechanisms:** Systems for user feedback and system adaptation.

10. Scalability and Replication:

- **Potential Expansion:** Considerations for expansion beyond MBIP.
- **Replication Models:** Guidelines for adopting similar initiatives.

6.3. User View

6.3.1. Technical admin

System will not be successful without the technical admin as they will play crucial roles in ensuring the functionality, security, and efficiency of the Low Carbon Monitoring system.

In our system, technical admin will have the authority to manage user data and ensure the security and accuracy where they have the access to the database system. Technical admin can analyze reports for the detail as well as follow the real-time updates on data trends. Apart from that, there will be features as a communication link between the technical admin and the end user for notification systems to send updates and announcements and also for any queries from the user.

6.3.2. Participants

Participants are the main stakeholders that will use this system. Therefore, it is important to approach the participants and get their feedback regarding the current system.

The main feature that is required in our system is a dashboard overview which will allow the participants to keep on monitoring their contributions and progress. Next, this system is designed as a user-friendly view and provides guidance for the participants on how to enter data and explanation on metrics so the participants can update their monthly data and we can ensure the accurate tracking for low carbon.

6.3.3. MBIP

MBIP is one of the government agencies that will take responsibility for achieving the initiatives which is raising awareness about the importance of low carbon emissions across diverse user groups.

As MBIP is part of the government, they have access to view the insight of overall participation and engagement from the community. Since this system is designed for competition, MBIP will be able to validate and ensure the accuracy of final competition entries. In addition, MBIP also has the same view as technical admin which they also can communicate directly with the participants because this system will provide the platform to send official announcements. Next, MBIP enables feedback regarding overall performance from the community.

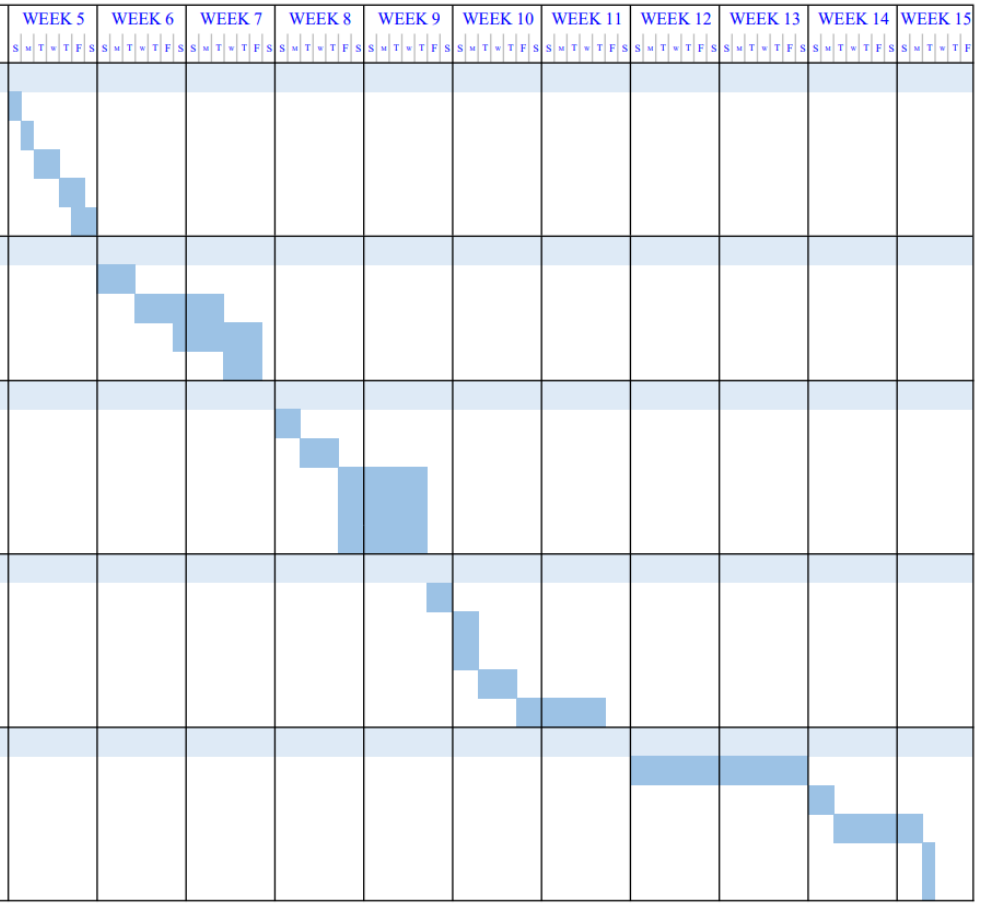
7.0 Project Planning

7.1. Human Resource

7.2. Work Breakdown Structure (WBS)

7.3. Gantt Chart

ID	Task Name	Start Date	End Date	Duration
1	Project Proposal and Planning			
	Establish a Team & Distribute The Roles of Each Member	5/11/2023	5/11/2023	1 day
	Define the Problems	6/11/2023	6/11/2023	1 day
	Define the Scopes, Purposes & Objectives	7/11/2023	8/11/2023	2 days
	Brainstorming & Analyse Data	9/11/2023	10/11/2023	2 days
	Plan the Process	11/11/2023	12/11/2023	2 days
2	Requirement Gathering			
	Identify Data Collection & Analysis	13/11/2023	15/11/2023	3 days
	Interview Stakeholders	16/11/2023	22/11/2023	1 week
	Conduct Interactive & Unobstrusive Method	19/11/2023	25/11/2023	1 week
	Determine Data Sources	23/11/2023	25/11/2023	3 days
3	Data Mapping & Analysis			
	Develop Software Modules for Carbon Calculation	27/11/2023	28/11/2023	2 days
	Calculate Carbon Emission	29/11/2023	1/12/2023	3 days
	Create a Module for Potential Carbon Reduction	2/12/2023	8/12/2023	1 week
	Identify User Actions of Carbon Reduction	2/12/2023	8/12/2023	1 week
	Get Feedback	2/12/2023	8/12/2023	1 week
4	System Development			
	Design Data Collection Platform	9/12/2023	10/12/2023	2 days
	Develop a Clear Layout to Collect Data	11/12/2023	12/12/2023	2 days
	Create a Dashboard for Carbon Emissions	11/12/2023	12/12/2023	2 days
	User Interface (GUI)	13/12/2023	15/12/2023	3 days
	Make Sure to Work With Various Devices	16/12/2023	22/12/2023	1 week
5	Hi-Fidelity Mockup			
	Develop System Prototype	24/12/2023	7/1/2024	2 weeks
	Testing Function of Prototype	8/1/2024	9/1/2024	2 days
	User Feedback & Collaboration	10/1/2024	16/1/2024	1 week
	Debugging & Improvement	17/1/2024	17/1/2024	1 day
	Implement Program Coding & Final Report	17/1/2024	17/1/2024	1 day



8.0 Transaction Requirement

8.1. Data Entry

Enter the details for users

Enter the details for data type

Enter the details for information required for the data type

Enter the details for data consumption

Enter the details for survey of lifestyle for carbon footprint

Enter the details for declaration form

8.2. Data Update/ Delete

Update/ Delete the details of users

Update/ Delete the details for data type

Update/ Delete the details for information required for the data type

Update/ Delete the details of data consumption

Update/ Delete the details for survey of lifestyle for carbon footprint

Update/ Delete the details of declaration form

8.3. Data Queries

List details of user’s carbon footprint

List details of data consumption

List details of information required for the data type

List details of declaration form

List details of carbon emissions for each user

Display the carbon emissions among users

Display the mapping of carbon reduction

Identify the user with high carbon emission

List survey of lifestyle for carbon footprint

9.0 Benefit and Summary of the Proposed System

The proposed Carbon Monitoring and Management System is designed to reduce carbon emissions through a user-friendly interface, automated carbon reduction calculations, and standardized user categorization. This system focuses on improving the efficiency of the data collection and analysis process from diverse groups of users. This comprehensive approach seeks to overcome previous challenges while encouraging wider community engagement and awareness.

- **Benefit For Admin:**

  The efficiency of managing the collected data will increase. This is due to the automatic calculation generated by this system, resulting in a more accurate outcome. As a result, it will save a lot of time and reduce errors compared to the previous method, which relies on manual calculation and reporting. The auto-generated data also can make it more effective to compare carbon emissions and determine the user with the highest carbon emission value.

  As this system will separate the type of user, it can form a systematic user management. With the categorization of the user, it is easy to recognize and differentiate between the many user profiles. The same goes for the type of data needed because the admin can identify the crucial data for each category, including the number of days, prorate factor, usage value, and current charge. Even if all required data is the same for each category, with the new system, the admin will find it easier to track the data as it is more organized for each month.

- **Benefit For Users:**

  We will provide a user-friendly interface for data entry in this system, making it easier for users to enter the required information about their electricity, uses of water, waste, and recycled cooking oil consumption. As it is more appealing and easy to understand, users will save a lot of time using this system compared to using Google Forms, which might need clarification. At the same time, users will be more aware of their carbon footprints because self-monitoring dashboards are available.

10.0 Summary

In conclusion, phase 1 of our project has been the key to our planning process. We have learned how to begin and propose the project, and we also consider a few factors in deciding whether to pursue it or not. From the various challenges faced by our stakeholders, we identify a clear problem statement and provide the solutions and the objective of this system. We also proposed the feasibility study which focuses on technical, operational, and economical feasibility studies to determine the worthiness of proceeding with this project.

Then, we also defined the project scope, which defined both inclusions and exclusions to provide a clear picture of the project's objectives and deliverables. Simultaneously, we established system boundaries to outline the limits of the system. Both of these tasks will ultimately enhance the project's likelihood of success.

Meanwhile, we have done the project planning and scheduling to ensure that we finish this project within the required time. Delegating the role to human resources will give us a better understanding of our task. Next, using a Work-Breakdown Structure (WBS) makes understanding and carrying out our roles and responsibilities easier as it breaks down the whole project into smaller and more manageable tasks. On the other hand, the Gantt Chart will provide us with a clear vision of our task and the estimated time for us to finish it.

Therefore, all of these aspects are important in the project proposal to conduct the project more efficiently and organized without causing confusion later on.