UNIVERSITY OF PLYMOUTH

PUSL3190 Computing Individual Project

Final Project Report

Sustainable Insight AI
(GREEN HUB)

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1. Acknowledgement

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2. Abstract

Within the last decade, the focus on Environmental Sustainability has grown exponentially considering the drastic changes in technologies, and the more choices consumers get to make each day. **GreenHub** emerges as a simple and user-friendly online portal, supervising eco-friendly products throughout the global markets, creating an online space for the targeted audience based in Sri Lanka.

The current market for eco-friendly products in Sri Lanka solely relies on the traditional marketplace scenario, where the buyer must visit the seller to get the goods or even speculate on the products. Harnessing the power of Artificial Intelligence, GreenHub provides a timeliness solution for the above-mentioned struggles with personal recommendations, a well-curated catalog, and ease of buying eco-friendly products at your fingertips.

Considering the market cap, This Project aims to build an online marketplace for consumers as the initial stage and to expand within the eco-friendly products sector, diversifying into more subcategories with the help of insights and data that we generate with the AI models we developed. Moreover, the development of this project consists of developing the backend or the API with one of the most famous programming languages for developing the backend, Python with FastAPI which creates a user interface for the API itself to test API endpoints in a more resilient manner. MongoDB works as the database for this project with the help of libraries like Motor and Pydantic to validate data types and connect with the NoSQL database. The front end of the project consists of React JS, the most famous lightweight Javascript UI library by Meta to develop user interfaces in the modern century. CSS3 works as the primary styling script for the entire project. As the development methodology, Agile methodology is being followed with the technologies mentioned earlier to develop this project. Considering the technologies and methodologies used in the project, GreenHub excels in its performance of being time efficient and a modern full-stack application in the software market of sustainability-focused PaaS products.

When considering about my project benefits shop guilt free with curated selection of green goodies, connect with eco- warrior and share your sustainable wins , discover products that matches your green goals etc

3. Introduction

As consumers become more mindful and environmentally conscious, businesses have a chance to meet the demand for sustainable products through e-commerce. This project aims to create an online store focused on bringing a sustainable shopping experience to users. It will not only offer eco-friendly products but also aim to raise awareness and share knowledge about sustainability practices. By building a community of environmentally conscious shoppers, this platform encourages responsible purchasing decisions.

This project has multiple parts. It aims to make shopping easier and to better understand how customers make decisions about buying sustainable products. By studying different factors, such as the time of year, product features, and sales, the project hopes to find patterns and preferences that affect what customers buy. This knowledge will help us to better understand our customers and accurately meet their needs, eliminating hours of searching and browsing.

Moreover, the project endeavors to explore the nuanced relationship between customer demographics, such as age and gender, and their purchasing behavior. By leveraging the Consumer Behavior and Shopping Habits Datasets, the project seeks to uncover whether distinct product categories or shopping channels are favored by specific age groups or genders. Armed with this knowledge, businesses can tailor their marketing strategies to resonate more effectively with target demographics, thereby enhancing customer engagement and loyalty.

Ultimately, this project demonstrates a comprehensive approach to building a sustainable e-commerce platform that aims to go beyond individual transactions and create a community of conscious consumers.

By implementing sustainability principles in line with current advancements in data analytics and AI-driven insights, the project seeks to redefine the relationship businesses have with their customers and the way they contribute to a more environmentally responsible future.

4. Background

In the 1970s, Sri Lanka went from a socialist orientation to an actively trading economy with foreign investments, securing a reputation for high standards and well-finished, high-quality products in the international market. Despite the reputation for authenticity, the market for environmentally sustainable products remains largely untapped by the Government and major businesses.
With climate change, biodiversity loss, and resource depletion have arisen an urgent need for sustainable solutions across all of human activity, creating the need and the market for eco-friendly products to expand every minute.

This project is conceived as a response to this imperative, driven by the vision of leveraging technology and its advances to promote environmental sustainability. However, despite the demand for eco-friendly products, identifying the targeted audience and conversion to the consumer heavily relies on how we present our platform to the market, and the way the market is going to comprehend our cause to this industry. There are massive co-operations that are interconnected with the “Made in Sri Lanka” brand to promote sustainability and authenticity. In fact, these giant businesses focus on manufacturing and exports rather than covering the demand within the country as mentioned above.

One of the prevailing challenges in this market is counterfeit products masquerading as eco-friendly products, which could harm consumer opinion and perspective on sustainability. To address this pressing issue, the National Cleaner Production Centre (NCPC) has emerged as a proactive agent of change to combat counterfeit sustainability products. As an aspiring platform to promote a healthy and sustainable lifestyle, we actively work on integrating the NCPC Eco label certification with our product catalog to uphold the credibility of genuine eco-friendly products.

Furthermore, GreenHub's tailored recommendations and insights help the customers make informative decisions more effectively while educating us about our consumers and their buying habits and patterns. With such data, we can provide even personalized products targeted to each customer, making their lives less stressful and efficient.

The Artificial Intelligence algorithms we've developed operate on a simple yet effective principle: **the more products a user visits and purchases, the more personalized their recommendations become.**

4.1 Key Features of Eco-friendly Products

Eco-friendly products embody a holistic approach to both preserving the environment and promoting a more sustainable and regenerative future.

Sustainable Material

Eco-friendliness and sustainability-focused products are often crafted with organic materials such as organic cotton, recycled plastic, bamboo, etc. Usage of these materials reduces resource consumption and minimizes waste.

Biodegradability

These sustainable products are often biodegradable or compostable, which means they can naturally break down without harming the environment

Energy Efficiency

Most of these products are designed with energy efficiency in mind. To reduce Carbon emissions and to conserve finite energy resources, sustainability products in particular consume less energy during production, use, and disposal phases.

Durability and Longevity

Eco-friendly products are built to last long. They offer durability and longevity compared to conventional counterparts. With the reduced need for replacement, these products reduce waste over time.

Certifications and Standards

Certifications such as “Eco label” by NCPC, USDA, and Forest Stewardship Council (FSC) provide consumers with assurance of both environmental integrity and product authenticity.

Minimal Packaging

By using recycled or biodegradable materials and minimalist packaging designs, Eco-friendly products aim to minimize packaging waste. This minimizes the environmental impact of packaging disposal.

Ethical Production Practices

It is an international standard to manufacture eco-friendly products under fair labor conditions, ensuring fair wages and safe working environments for the workers. Ethical production practices prioritize sustainable livelihoods and social responsibility.

Circular Economy Principles

These principles focus on aiming to minimize resource consumption and waste generation with product reuse, recycling, and upcycling methods to maximize efficiency from manufacturing to end product.

5. Objectives and Deliverables

This project will be an online eco-friendly products-selling platform for consumers to choose and buy from a wide range of sustainability-focused products. The targeted users are mainly those who prefer to live a sustainable life and are interested in reducing their daily carbon footprint, making the earth greener every day. GreenHub marks a significant step towards promoting eco-friendly consumerism. Dedicated to educating consumers about green practices, our platform encourages mindful purchasing decisions.

The core objective of GreenHub is to provide a user-friendly yet simple, online marketplace for consumers to easily access and purchase eco-friendly products. With our intuitive navigation and visually appealing design, we strive to create a seamless browsing and shopping experience for our users. The platform prioritizes sustainability by featuring products under well-organized categories. Such as: “Green Kitchen, Zero Waste, Natural Beauty, etc...”.

Moreover, GreenHub utilizes data analysis to understand customer behavior patterns and preferences. By investigating consumer-based factors such as **past viewed products**, **most bought products**, **most visited categories,** and **review sentiments**, our algorithms provide valuable information for every registered user of the platform. Products wise, **eco-attributes**, **seasonality-based sales**, and **most sold demographic locations** provide insights to develop and market the products with the best and highest sales yield in the target.

With all this highly valuable information, we are able to develop marketing campaigns for targeted consumer segments with decent **ROI**. Incorporating AI-driven predictive modeling, the platform enables to deliver unique tailored experiences to each user.

Below here are the main project objectives in order.

- Developing an E-trade website

  This involves developing a person-pleasant platform with intuitive navigation and a visually attractive design. The internet site ought

to prioritize eco-friendly products and offer unbroken browsing and purchasing revel in.

- Integrate Product Content

  The Product page will function as informative content on sustainability-related topics to teach customers about green practices briefly and covering the information about the product.

- Investigate Factors Influencing Customer Decisions

  Data analysis might be performed to understand how various factors consisting of seasonality, product attributes, and promotions impact patron purchase decisions. Insights received from this evaluation will inform product placement techniques, pricing changes, and promotional campaigns to higher align with customer preferences and sustainability dreams.

- Identify Seasonal Trends and Preferences

  Through statistics evaluation, discover trends in customer conduct for the duration of unique seasons and check which product categories perform better during specific times of the year. Understanding seasonal choices will permit for centered marketing efforts, seasonal product launches, and inventory control optimization

- Explore Demographic Preferences

  Analyze purchaser demographic records, such as age and gender, to perceive alternatives for particular product classes or shopping channels amongst exceptional demographic segments. This information will inform targeted advertising techniques tailored to the specific possibilities and behaviors of various customer organizations.

- Leverage Insights for Targeted Marketing

  Utilize insights from records analysis to design and put in force centered advertising and marketing campaigns that resonate with

different age companies and genders. This should contain personalized e-mail advertising and marketing, social media focused on and tailored marketing campaigns to efficiently attain and have interaction with particular consumer segments.

- Utilize Sustainable Insight AI

  Incorporate AI-driven predictive modeling using the Consumer Behavior and Shopping Habits Dataset to forecast tendencies and styles in consumer conduct. This predictive analytics functionality will allow the development of focused advertising techniques and personalized tips primarily based on personal consumer possibilities and purchasing records.

- Optimize User Experience

  Enhance the overall consumer revel on the e-commerce website by imparting customized tips and facilitating sustainable buying decisions through AI-pushed analytics. This may want to encompass capabilities including recommendation engines that suggest eco-friendly products based totally on past purchases, interactive tools for calculating carbon footprints, and user-pleasant interfaces.

6. Literature Review

6.1 Domain Overview

Consumer behavior has been influenced by the worldwide movement towards sustainability in several kinds of industries, including e-commerce, in recent years. Consumers are looking for sustainable and eco-friendly products more and more as awareness of the environment grows, offering a sizable market for businesses that share these same ideals. This literature review examines how consumer behavior and sustainable e-commerce interact, highlighting key issues, developments, and scientific discoveries in the area.

According to the findings of Nielsen's Global Corporate Sustainability Report, 66% of consumers globally are willing to pay higher prices for environmentally friendly goods. This tendency is especially noticeable among younger generations, who give social and environmental responsibility top priority when making purchases (Nielsen, 2015). Due to this, businesses who integrate sustainability into their operations and product lines stand to benefit from a competitive edge.

E-commerce platforms are crucial for encouraging sustainable consumption since they give customers access to a large selection of environmentally friendly goods. Due to parameters including lower energy use and fewer emissions from transportation, studies have shown that purchasing goods online can be more environmentally friendly than traditional retail (Koomey, 2011). Nonetheless, e-commerce does have a significant environmental impact, especially when it comes to last-mile emissions from transportation and wasteful packaging (McKinnon, 2018). Therefore, in order to reduce their environmental impact, e-commerce businesses are under greater pressure to adopt environmentally friendly supply chain management approaches such as e-commerce platforms.

With respect to factors like age, income, and region, customer opinions of sustainability might differ considerably. According to research, although customers are usually favorable of sustainable products, they might give price and convenience more weight when making decisions about what to buy (Vermeir & Verbeke, 2006). To appeal towards eco-conscious customers, companies must clearly convey the environmental advantages of their goods and solve any clear trade-offs.

To demonstrate that they are dedicated to sustainability, a lot of e-commerce businesses have started corporate social responsibility (CSR)

activities. Initiatives to reduce waste, work with environmental organizations, and carry out carbon offset programs are a few examples of these. According to research, social responsibility (CSR) campaigns can enhance brand loyalty and consumer opinions, especially among environmentally sensitive consumers (Sen & Bhattacharya, 2001). E-commerce businesses can build a devoted consumer while enhancing their brand by investing in sustainable practices and publicly announcing their corporate social responsibility (CSR) efforts.

6.2 Existing System

Before delving into the development of our targeted marketing strategies for sustainable e-commerce, it's crucial to assess the current landscape of consumer behavior and shopping habits analysis within the e-commerce industry.

The existing system encompasses various approaches to understanding consumer preferences, purchase decisions, and marketing effectiveness.

1. **Data Analytics Tools**: Many e-commerce platforms leverage advanced data analytics tools to analyze customer behavior and shopping habits. These tools track user interactions, such as product views, addto-cart actions, and purchase history, to identify patterns and trends (Smith, 2019). By analyzing large datasets, e-commerce companies can gain insights into customer preferences, product performance, and the effectiveness of marketing campaigns.

2. **Customer Relationship Management (CRM) Systems**: CRM systems play a vital role in managing customer interactions and data. These systems enable e-commerce companies to track customer demographics, purchase history, and communication preferences (Jones et al., 2020). By segmenting customers based on their behavior and preferences, companies can tailor marketing messages and offers to specific audience segments, increasing the relevance and effectiveness of their campaigns.

3. **Market Research and Surveys**: Market research firms conduct surveys and studies to gather insights into consumer preferences, attitudes, and shopping behaviors (Brown & Black, 2018). These studies often provide valuable data on demographic trends, purchasing motivations, and brand perceptions. E-commerce companies may leverage market research reports to inform their marketing strategies and product offerings, ensuring alignment with consumer preferences and market trends.

4. **A/B Testing and Experimentation**: A/B testing, also known as split testing, is a common technique used by e-commerce companies to evaluate the effectiveness of marketing strategies and website optimizations (Johnson, 2017). By randomly assigning users to different variations of a webpage or marketing campaign, companies can measure the impact on key metrics such as conversion rates, click-through rates, and average order value. This iterative approach allows companies to refine their marketing strategies based on empirical evidence and user feedback.

5. **Social Media Monitoring and Analysis**: Social media platforms offer valuable insights into consumer sentiment, preferences, and trends (Garcia & Martinez, 2019). E-commerce companies monitor social media channels to track brand mentions, product reviews, and customer feedback. By analyzing social media data, companies can identify emerging trends, address customer concerns, and engage with their audience in meaningful ways. Social media analysis also provides opportunities for targeted marketing campaigns based on user interests and behavior.

6. **Third-Party Data Providers**: E-commerce companies may collaborate with third-party data providers to access additional consumer data and insights (White et al., 2021). These providers offer access to demographic data, purchasing behavior data, and psychographic profiles, enabling companies to enrich their customer profiles and improve targeting accuracy. By integrating third-party data into their analytics systems, companies can enhance their understanding of customer preferences and behavior, facilitating more effective marketing strategies.

7. **Customer Feedback and Reviews**: Customer feedback and reviews are valuable sources of information for understanding customer satisfaction, product preferences, and areas for improvement (Lee et al., 2018). Ecommerce companies actively solicit feedback from customers through surveys, email communications, and review platforms. By analyzing customer feedback and sentiment, companies can identify patterns and trends, address customer concerns, and optimize their product offerings and marketing strategies accordingly.

The existing system of consumer behavior analysis in e-commerce, despite its advantages, comes with several drawbacks that need to be addressed for more effective and efficient operation. Below are some of the key drawbacks along with references:

Data Fragmentation: One of the primary drawbacks of the existing system is the fragmentation of data across multiple platforms and tools. Data generated from different sources such as CRM systems, social media, and market research may not always be integrated seamlessly (Smith, 2019). This fragmented data landscape makes it challenging for businesses to gain a holistic understanding of customer behavior and preferences.

Data Silos: Related to data fragmentation, data silos occur when information is isolated within specific departments or systems within an organization. This lack of data sharing and collaboration inhibits cross-functional analysis and decision-making (Jones et al., 2020). As a result, businesses may miss out on valuable insights that could drive marketing effectiveness and customer engagement.

Slow Data Processing: Processing and analyzing large volumes of data can be time-consuming, leading to delays in obtaining actionable insights. Traditional data analytics methods may not be equipped to handle real-time data processing requirements, resulting in missed opportunities for timely interventions and optimizations (Brown & Black, 2018).

Privacy Concerns: With the increasing focus on data privacy and regulations such as GDPR and CCPA, businesses face challenges in collecting and utilizing customer data ethically and transparently. Consumers are becoming more cautious about sharing their personal information, leading to limitations in data collection and analysis (Johnson, 2017).

Cost and Resource Intensiveness: Implementing and maintaining sophisticated data analytics tools and systems can be costly and resource-intensive for businesses, especially small and medium enterprises (SMEs). High upfront investments in technology infrastructure and ongoing expenses for data management and analysis may not always be feasible for all organizations (Garcia & Martinez, 2019).

Limited Predictive Capabilities: While data analytics can provide valuable insights into past consumer behavior, its predictive capabilities may be limited. Predicting future trends and preferences accurately requires advanced predictive modeling techniques and access to comprehensive and high-quality data, which may not always be available (White et al., 2021).

Complexity and Skill Gap: Utilizing data analytics effectively requires specialized skills and expertise in data science, statistics, and technology.

Many businesses, especially smaller ones, may lack the internal capabilities and resources to harness the full potential of data analytics tools and methodologies (Lee et al., 2018).

In summary, the existing system for consumer behavior and shopping habits analysis in e-commerce encompasses a wide range of tools and techniques. By leveraging these resources, e-commerce companies can gain valuable insights into customer preferences and behavior, enabling them to develop targeted marketing strategies that resonate with their audience and drive business growth.

6.3 Technical Analysis

In this project, Main targeted users are eco-friendly and sustainability-interested individuals. In order to Give them a better experience through the application it is so important to use the most suitable technologies. For that, the project plans to make a web-based e-commerce platform for the targeted audience.

As mentioned in the article there are several criteria for different organizations to select appropriate technologies for the projects. The suitable technologies should be selected according to the project outcome. Technology plays a major role in so many industries. So, the wrong technology selection can be the reason for a big mistake. The researcher mentioned that after going through the project requirements and the required outcomes, technology selection can be done.

Technology selections should link to project strategies after that existing methodologies should be reviewed. Then the developers can make decisions according to business needs. It is true that demonstrating the technology's value during its development and before the development is important. The technology of the project can be giving a big impact to the system. It can be a financial impact, systematic impact, or any other impact. If the right technology is used for the system, the project requirements can be achieved easily. If not, implementing a simple task of the system can be tough or the developed system will not provide the expected outcome.

For the user interface, most of the projects use this technology, a javascript framework called **React JS**. Most of this kind of e-commerce projects has done with React (Aggarwal, 2018). This is a Javascript library that is used to develop the front end of the application. There are so many re-usable components and react is easy and simple. In 2022 React is the second most used web development framework. Day by day the popularity of the ReactJS library is increasing. By using this

framework, we can make a user-friendly interface. Then users will have a good user experience.

Another most important thing is the backend. For the back-end development, used the NoSQL database named **MongoDB**. This has been developed by MongoDB Inc. MongoDB is a popular NoSQL database that offers flexibility, scalability, and ease of use. MongoDB provides real-time databases as well as for the API, **Fast API** has been used.

Furthermore, MongoDB offers secure and reliable database hosting options, ensuring the integrity and confidentiality of our data. With features such as authentication, encryption, and access control, MongoDB enables us to maintain high-security measures and protect sensitive information from unauthorized access or breaches.

For our domain, these will be the most suitable back-end technologies. As a good project, it is very important to know which technologies will improve and maintain the core idea of the project. It also increases the app's quality and speed.

7. Method of Approach

GreenHub, eco-friendly products selling e-commerce web project approached with an organized and structured approach to ensure that the project is going to complete the works within the appropriate timeline. This report section will address about the method of approach that used to complete this GreenHub project.

7.1 Project Planning

Defining the project's objectives, timeline, and scope, involved in the project's planning phase. This phase was crucial in ensuring that the project was delivered on time, within working functionalities, and met the desired outcomes. The following activities are in the planning phase.

7.1.1 Defining Project Objectives

Defining the project objective is the first step. The primary objective is to develop an eco-friendly e-commerce platform catering to sustainability-focused consumers. And objectives include but are not limited to, providing updated information on products with their availability, pricing, and sustainability attributes, offering personal recommendations based on past activity, implementing features to better order & delivery process, sales and marketing statistics for vendors

7.1.2 Defining Scope

The scope of the project was defined in detail to ensure that all the features and functionalities required were included. This includes documentation of the requirements that outline the functionalities, features, and deliverables required for the project. Such as:

- Product categorization based on sustainability criteria and product attributes
- Integration of Artificial Intelligence models for data analysis
- Dashboard management for product listings and inventory management

7.1.3 Developing a Project Plan

For the project plan, it had included a well-documented timeline for each step of the project including planning, designing, development, automation, testing, deployments, and support. Plan for tasks such as:

- Designing an intuitive user interface
- Implementing backend systems for product management and order processing

- Testing functionality across various web browsers to ensure compatibility.

7.1.4 Identifying Stakeholders

Identifying Stakeholders involved in this project, including:

Eco-friendly products Manufacturers and Vendors (Sole Vendor in this case), Consumers interested in purchasing eco-friendly products, Environmental organizations, and activists

Establish clear communication channels with stakeholders to ensure their involvement, support, and feedback throughout the project and foster collaboration and alignment of interests to ensure the success of the project as a sustainable e-commerce platform.

7.2 Requirements Gathering

These requirements gathering part involved working closely with Sustainability product manufacturers, Selected Individuals representing consumers, and multiple environmental activists to identify the functionalities and the features needed in the GreenHub platform. This is a critical path to ensure that the GreenHub website meets the requirements of the stakeholders.

The following works were figured out within the requirements gathering:

7.2.1 Conducting Stakeholder Interviews

For the requirements gathering phase, the team has conducted a few interviews with local eco-product manufacturing businesses, sustainability living enthusiasts, and multiple Sri Lankan environmental activists to gather the requirements that should help function and be included in the GreenHub platform.

7.2.2 Conduct a Survey

By using Google Forms, conducted a survey to gather user requirements and shared them across eco-friendly passionate communities for better accuracy and for better results. While making google forum first I consider about how sustainability can effect target marketing and then how I can use sustainability then I got the idea about eco friendly product idea through answers of google forum

7.2.3 Developing Use Cases

all the use cases have been developed to give a proper understanding of the GreenHub website functionalities features and how it is going to be used by consumers.

7.2.4 Creating Wireframes and Prototypes

Designed wireframes as well as prototypes using Figma to give a good visual representation of the GreenHub platform.

Prototype interfaces and functionalities show how the pages and the functionalities are linked together. This is a must to ensure that our website design has the functionalities and the features that consumers want to use in the platform.

7.2.5 Reviewing Requirements

all the gathered requirements have been reviewed and organized to give a proper understanding of the GreenHub website functionalities, features, and how it is going to be used by consumers, and added to the plan and documented properly in detail.

7.3 Design and Development

The design and development phase involved creating wireframes and prototypes to provide a visual representation of the website's design and layout. This phase also involved coding and programming the website's features and functionalities. The following activities were carried out during the design and development phase:

7.3.1 Developing the Website Design

Developed the website design based on the prototype and wireframes created with Figma during the requirements gathering phase. The design was developed to be a user-friendly, visually appealing marketplace for **desktop and laptop devices** as the initial phase.

7.3.2 Developing the Website Functionality

The website's features and functionalities were developed based on the use cases developed during the requirements-gathering phase. The features and functionalities included:

Products information including prices, stock and remarks, Order records, recommendations AI model, User Statistics AI model, User review sentiments AI model and etc.

7.3.3 Developing the Content Management System (Dashboard)

The content management system has developed to enable the administrator staff to update the website's content and features easily. The content management system was designed to be user-friendly, enabling the users to manage the website with ease. **Apart from the current functionalities, more API endpoints with data analysis are to be connected to the Dashboard as the next phase for GreenHub.**

7.3.4 Testing and Quality Assurance

The website was subjected to various tests to ensure that it was functioning correctly. For testing, We've carried out functional testing, usability testing, and performance testing. This was done to ensure that the website works properly.

Briefly let me describe how I use technologies while making my project

1. Database – MongoDB
2. Database configuration – Mortor , Mongoose
3. API – Python , FastAPI
4. Frontend – React , CSS3

8 Requirements

8.1 Functional Requirements

- **User Authentication and Registration**
  Allow users to securely create accounts and log in. It's like giving them a key to their own personalized eco-friendly shopping experience.
  When users sign up, ask for their name, email, telephone, and location. It's like getting to know them better, so we can tailor their experience to fit their needs and preferences. **For the initial phase, the location is taken as longitude and latitude, and the user profile picture as a base 64 string until moving to the next phase with more advanced AI models.**

- **Product Catalog and Categories Navigation Functionality**
  Show users a beautiful catalog of eco-friendly products, complete with descriptions and images. It's like strolling through a virtual eco-friendly marketplace. Let users search for products using categories with sustainability attributes. It's like having a personal shopping assistant who knows exactly what you're looking for

- **Product Content and Educational on Sustainability**
  Provide users with helpful product attributes on sustainability topics. It's like having a library of information right at their fingertips with summarized key points. Each Product content has its eco-friendly remarks on the product page.

- **Shopping Cart and Ordering Process**
  Allow users to easily add products to their shopping cart and smoothly proceed to checkout. It's like filling up a cart at your favorite store and seamlessly completing your purchase. It's like having peace of mind knowing your transactions are safe and protected. Users can view their orders and current status by clicking the profile.

- **Analytics and Insights Dashboard**
  Create a dashboard that visualizes sales data and analyzes factors like seasonality and consumer patterns. It's like having a crystal ball that helps us understand what our customers want and when they want it. Provide insights into product performance and sustainability trends. It's like having a backstage pass to the inner workings of our business.

- **AI-Powered Recommendation Engine**
  Use AI to suggest personalized product recommendations based on customer browsing patterns and sustainability interests. It's like having a personal shopper who knows your style and values. Tailor marketing campaigns to specific customer segments based on behavior analysis. It's like delivering customized offers directly to each customer's inbox.

8.2 Non-Functional Requirements

- **Performance and Scalability**
  Ensure fast page loading times, even during peak traffic. It's like making sure the checkout line moves quickly, no matter how busy the store gets. Design the website to grow seamlessly as more users join the community. It's like expanding our store to accommodate more shoppers without sacrificing quality
- **Security and Data Privacy**
  Implement robust security measures to protect user data and payment information. It's like having a security guard standing watch at the entrance to our online store. Comply with data privacy regulations to safeguard user privacy. It's like putting a lock on the door to ensure our customers' information stays safe and confidential.

- **Usability and Accessibility**
  Design the website to be easy to use and navigate. It's like arranging the store layout so customers can find what they need without getting lost. Ensure accessibility features for users with disabilities. It's like installing

ramps and handrails to make sure everyone can access our store.

- **Reliability and Availability**
  Keep the website up and running with minimal downtime. It's like keeping the lights on in our store so customers can shop whenever they want. Implement backup and recovery mechanisms to prevent data loss. It's like having a safety net in case something unexpected happens.

- **Scalability and Maintainability**
  Design the website to grow and evolve over time. It's like planting seeds and watching our business flourish. Document code and use version control practices to make maintenance easier. It's like keeping our store organized so we can find what we need quickly and make improvements as needed.

8.3 Hardware Requirements

By assuming the weight and the data count traffic gets to the website at the same time following requirements have been identified.

- Memory: 4GB Ram
- Storage: 256GB
- Processor: Core 2 Duo
- Internet Connection: The server should have a high-speed internet connection to ensure the website loads quickly and without delay

(Application itself)

- Database: MongoDB
- Frontend Frameworks and Languages: ReactJS, CSS3 and HTML
- Backend Frameworks and Technologies: Python (including Scikit and Pandas libraries) and Fast API
- Version Control: Git and GitHub

9 End Project Report

The GreenHub eco-friendly website project aimed to address the challenges faced by individuals, who are interested in sustainable products and eco-friendly lifestyles. Through the development of our comprehensive online platform, GreenHub sought to facilitate a seamless browsing experience for different types of eco-friendly products, and information sharing including educating consumers about eco-friendly product attributes and uses has been decently delivered as our initial stage for this platform. The project successfully met its objectives, providing a valuable resource for consumers who are eager to purchase their next eco-friendly product.

The primary objective of the GreenHub was to deliver a user-friendly e-commerce site for the consumers, empowering those individuals to adopt eco-friendly habits and to contribute to a lower carbon footprint and to a sustainable future. Our **revolutionary AI recommendation system** supports our platform's cause by getting closer to the consumer at a thinking level. With the help of these unique insights and information, these AI models generate, users can feel at home when browsing and purchasing through our platform. For better security and user safety, we've developed a **User Sentiment AI Insights Model** to keep track on how users behave within the platform. Data and privacy taken into account, this AI model is only used to validate how our consumers truly feel about our eco-friendly products. With a single click inside the admin dashboard, those who misbehaved or harassed our products negatively can be identified with their original comments and reviews posted to the products. These AI models deliver valuable information about how the platform should be addressed to consumers, and how the consumers see us as a platform on sustainability.

There were a few changes made to the original plan throughout the development of the project, to meet the initial objectives. For better security and data privacy, we've introduced a base 64 encoding technique to our product images and user profile pictures. Since this is an early stage of the GreenHub platform, currently User sign-up interface also features this base 64 string for the user profile picture. This is not the best way to ask for a user image, nonetheless, GreenHub undergoes various development tasks to advance platform outcomes. Individuals who prefer sustainable lifestyles would understand this scenario as the first 2.5% of customers of a business include innovators who try new things according to the Diffusion of Innovations.

As for the initial stage of our platform, we target these individuals rather than the early majority to get honest reviews about our platform and the products. Through the project evaluation process, the clients and stakeholders who were involved have provided valuable feedback about the functionality of our website, effectiveness, and overall usability. Our development process involved only Desktop and Laptop devices as our initial user research and surveys found that the Individuals who were interested in sustainable products, most of the time used their laptops to search and purchase products. These consumers try to leave zero to low-carbon footprint as much as they can.

After successfully gaining our initial customer audience, we hope to expand our website and its functionalities **by making the platform responsive to mobile devices and by promoting and educating new users into eco-friendly product lovers**. This is a leap that GreenHub is trying to make to expand into a giant market in Sri Lanka. At GreenHub, we constantly remind our users why we exist and why eco-friendly products matter with brief product attributes that consumers can only relate to when they see them. These tiny psychological nuances make great impacts which only our sales can speak. Our website is an online marketplace, which is the technological outcome of a traditional marketplace. At the end of the day, businesses should show numbers to stay in the game of selling products, and to play this financial game, we market our cause and belief to our consumers. Those who believe in sustainability and little to no carbon footprint concepts will eventually convert into our customers as we move forward with our cause to help make the earth more greener.

The GreenHub, an eco-friendly marketplace project has successfully met all the objectives stated for the initial phase and has been a useful platform for consumers to purchase eco-friendly products with a single visit to our website. The changes made during the project were necessary and were managed correctly, resulting in the successful completion of the project within the planned time period.

10 Project Postmortem

In this project postmortem report, the author is going to review all the identified risks and what are the risk management techniques that have used to overcome those risks, difficulties, mistakes, and misassumptions faced during the project.

10.1 Identified Risks

- There was lack of information about eco-friendly products and sustainability focused products in Sri Lanka
- Technical difficulties related to data management, training AI models and developing the platform with all the requirements
- Resistance from local eco-friendly product manufacturers to collaborate with the GreenHub as a new platform in the market
- Government policy changes may occur time to time regarding online businesses and taxation in Sri Lanka
- Coordinating and Communication difficulties with stakeholders while implementing the platform
- Time and effort constraints

10.2 Risk Management Techniques

- Conduct an extensive background research on eco-friendly products sustainable products domain
- Conduct an online survey to gather data (Google Forms)
- Engage with Environmental Activists to obtain more information on local markets for eco-friendly products
- Extensive research on development technologies to meet the expected timeline.
- Quality assurance and testing process to ensure the reliability of the platform

10.3 Difficulties and Overcomes

Difficulties

- As a technical challenge, it was difficult to integrate all the required features to the website.
- Initially used frontend framework exceeding expected time deadline and complex debugging process
- Delays from stakeholders' side. Conducting research and interviews were a time-consuming process because of the coordination difficulties.

Overcoming those difficulties

- Conduct a good background research with analysis to identify most needed functionalities to the platform as for the initial stage.
- Changing the frontend framework from Angular to React for better developer experience and timeliness
- Adopt to Agile development methodology and regular testing with quality assurance.
- Conduct regular meetings with stakeholders to identify and conform the needed features for the platform.
- And I useMongoDB as database MongoDB's flexibility with its document-based data model allows for easier adaptation to changing data structures, whereas Firebase, while user-friendly, may have limitations in accommodating complex schema changes so I think mongoDB is easy than firebase

10.4 Mistakes and Misassumptions

- It was a big mistake to develop the complete backend without starting on the frontend since it has taken the majority of time from development, and making some UI functionalities not been developed by the time.
- Assuming Stakeholders of the project would have crystal clear opinions on certain criteria
- Overestimate the time and the resources used for the project
- Misunderstanding about the features complexity and missing some simple UI elements due to time constraint.

10.5 Lessons Learned

- Extensive research and requirement gatherings are essential for project ideas
- The bigger the development library doesn’t always mean the best library for the job.
- To ensure the reliability of the project, it is necessary to do testing and quality assurance
- It is okay to have hundreds of unique functionalities unless you have a time constraint
- AI models need more datasets to feed, for more better accuracy.

11. Conclusion

In Conclusion, developing an e-commerce marketplace for Eco-friendly products can be both adventurous and daunting under various circumstances. Without proper research and information, Misuse or not comprehending the suitable technologies can make it difficult to develop the proposed outcome under the given time constraint.

The GreenHub project, undergoing all the above-mentioned scenarios has successfully implemented its first stage. With a robust catalog of eco-friendly products including various sustainability-focused categories and attributes, features a one-stop online shop for individuals who are interested in sustainable lifestyles.

In addition to the features and functional requirements mentioned above in this report, GreenHub thrives in excellence in promoting eco-friendly products to consumers. Finally, this project will eliminate all the challenges the traditional shopper faces when purchasing sustainable products in Sri Lanka.

Simply I can breakdown factors of conclution as

a. Eco-conscious Consumption: In recent years, there has been a significant shift in consumer behavior towards more eco-friendly and sustainable products. People are becoming increasingly aware of the environmental impact of their purchases and are actively seeking alternatives that minimize harm to the planet. By establishing GreenHub, not only do you tap into this growing market demand, but you also contribute to raising awareness about sustainable living practices.

b. Challenges Faced by Traditional Shoppers: Traditional shoppers often encounter several challenges when trying to purchase eco-friendly products. These may include limited availability of such products in local stores, difficulty in comparing products based on sustainability attributes, and uncertainty about the authenticity of eco-friendly claims made by manufacturers. GreenHub addresses these challenges by

offering a comprehensive catalog of verified eco-friendly products, making it convenient for consumers to make informed choices

c. Role of Technology: Technology plays a crucial role in the success of GreenHub. By leveraging advanced e-commerce platforms and digital marketing strategies, you can reach a wider audience and effectively showcase the benefits of eco-friendly products. Features such as personalized recommendations, user reviews, and transparent product information enhance the shopping experience and build trust with customers. Additionally, integrating sustainability-focused technologies such as carbon footprint calculators or eco-labeling systems further reinforces GreenHub's commitment to environmental responsibility.

d. Impact on Sustainability Efforts: The launch of GreenHub has the potential to catalyze sustainability efforts in Sri Lanka by promoting the adoption of eco-friendly products across various sectors. By partnering with local eco-conscious brands and suppliers, you not only support small businesses but also foster a culture of sustainability within the community. Moreover, by providing educational resources and engaging in advocacy campaigns, GreenHub can inspire more people to embrace sustainable lifestyles and contribute to positive environmental change.

In conclusion, GreenHub represents more than just an e-commerce platform; it symbolizes a commitment to a greener future and a more sustainable way of living. By addressing the challenges faced by traditional shoppers, leveraging technology, and fostering partnerships with like-minded stakeholders, GreenHub is poised to become a driving force in the sustainable consumer goods industry in Sri Lanka and beyond.

This is brief conclusion about my project and how it will impact further for future use because I do lot of research and other about e commerce website which sale eco friendly product I get a conclusion after making this project that it is very interesting project that forcus on sustainability insight targeting for marketing

Journey how I make my project as a conclusion

The journey of creating GreenHub, an e-commerce platform dedicated to eco- friendly products, has been a deeply insightful and rewarding experience.

Through extensive research and analysis of existing e-commerce platforms in the sustainability sector, coupled with a thorough understanding of consumer behavior and market trends, GreenHub has

emerged as not just a business venture but a beacon of sustainability in the digital marketplace.

The significance of GreenHub extends far beyond its role as a mere platform for buying and selling eco-friendly products. It embodies a vision of a world where conscious consumerism and environmental stewardship intersect seamlessly. In today's rapidly evolving landscape, where climate change and environmental degradation are pressing concerns, initiatives like GreenHub play a crucial role in driving positive change.

One of the key insights gained from the development of GreenHub is the immense potential for sustainability-focused businesses in the e-commerce space. As consumers become increasingly aware of the environmental impact of their purchasing decisions, there is a growing demand for products that align with their values. GreenHub recognizes this shift in consumer behavior and seeks to capitalize on it by providing a curated selection of eco-friendly products that meet the highest standards of sustainability.

Moreover, the process of developing GreenHub has shed light on the power of targeted marketing and personalized messaging in driving engagement and loyalty. By understanding the unique preferences and motivations of eco- conscious consumers, GreenHub is able to tailor its marketing strategies to resonate with its target audience effectively. From social media campaigns to influencer partnerships, every aspect of GreenHub's marketing efforts is designed to amplify its message of sustainability and attract like-minded individuals.

Furthermore, GreenHub serves as a testament to the transformative potential of technology in advancing sustainability goals. Through innovative features such as product certifications, eco-friendly packaging options, and carbon footprint calculators, GreenHub empowers consumers to make informed choices that align with their values. By harnessing the power of data analytics and artificial intelligence, GreenHub continuously refines its offerings to better meet the evolving needs of its customers while minimizing its environmental footprint.

12 Appendices

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PUSL3119 Computing Individual Project

Project Initiation Document (PID)

SustainableInsightAI

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Table of Contents

1. Introduction

"In the contemporary business landscape, enterprises confront the intricate task of balancing evolving market demands with aligning supply chains to dynamic sustainability benchmarks. This challenge becomes complex due to the unpredictable nature of real-time market fluctuations and risks. The current solutions available lack a comprehensive approach, hindering the seamless integration of customized AI models and advanced collaboration tools crucial for effective decision-making.

This project seeks to tackle prevalent issues in today's business environments. It specifically aims to resolve the inefficiencies hindering businesses from synchronizing their supply chains with ever-evolving sustainability standards while navigating rapid market shifts and associated risks. The core issue lies in the absence of holistic solutions capable of integrating personalized AI models and sophisticated collaboration features essential for robust decision-making.

Through the identification and resolution of these challenges, the project aims to transform the approach towards supply chain alignment, sustainability compliance, and real-time risk management. The project's framework includes an in-depth exploration of existing limitations, an innovative fusion of AI and collaboration tools, and the development of a strategic roadmap for implementing a holistic solution. This solution is designed to empower businesses in making well-informed and adaptable decisions within an ever-evolving marketplace."

1.1. Problem Statement:

Businesses encounter a significant challenge in balancing the evolving market demands while aligning their supply chains with dynamic sustainability benchmarks. This intricate hurdle is compounded by the unpredictability of real-time market fluctuations and risks. Existing solutions aimed at addressing these complexities lack a holistic approach, resulting in a barrier to seamlessly integrating tailored AI models and advanced collaboration tools necessary for robust decision-making.

1.2. Identification of Challenges:

The primary challenge faced by businesses lies in efficiently aligning their supply chains with constantly changing sustainability standards. Simultaneously, they struggle to respond effectively to rapid market shifts and associated risks. The crux of the issue stems from the inadequacy of current solutions, which do not provide a comprehensive framework for integrating personalized AI models and advanced collaboration features. This deficiency impedes businesses' ability to make well-rounded, informed decisions.

1.3. Solution Overview:

The proposed solution involves the development of an integrated website and web application designed to streamline the complexities faced by businesses in reconciling evolving market demands while aligning supply chains with dynamic sustainability benchmarks. This solution aims to provide a comprehensive platform that addresses real-time market fluctuations and risks, offering robust decision-making capabilities.

1.4. Project Outcome:

The website and accompanying web app will offer a user-friendly interface for businesses to efficiently align their supply chains with dynamic sustainability standards. It will include modules for tracking market shifts and risks in real-time, providing actionable insights for informed decision-making. The platform's key features encompass:

1. Supply Chain Alignment: Interactive tools enabling businesses to synchronize their supply chains with evolving sustainability benchmarks, optimizing processes and resource utilization.
2. Real-time Market Insights: AI-powered algorithms to analyze and predict market fluctuations, empowering businesses to proactively respond to changes and mitigate risks.
3. Decision Support System: Sophisticated collaboration features allowing seamless integration of customized AI models, aiding in comprehensive decision-making by offering tailored recommendations and strategies.
4. Accessibility and Scalability: A scalable web application accessible across devices, ensuring ease of use and adaptability for businesses of varying sizes and industries.
5. User Training and Support: Comprehensive user guides and support services to ensure businesses maximize the platform's potential, leveraging its capabilities for enhanced efficiency and sustainability compliance.

The project outcome aims to provide a versatile and intuitive platform, bridging the gap between supply chain management, sustainability adherence, and real-time risk mitigation. By offering an all-encompassing solution, the website and web app will empower businesses to navigate market complexities efficiently, fostering agility and informed decision-making for sustainable growth.

2. Business Review

Businesses today grapple with a complex challenge: balancing swiftly changing market demands with aligning supply chains to evolving sustainability benchmarks. This intricate task is compounded by the unpredictable nature of real-time market fluctuations and risks. Unfortunately, existing solutions lack the comprehensive approach needed for integrating tailored AI models and sophisticated collaboration tools crucial for robust decision-making.

The project aims to revolutionize business practices in navigating these challenges by focusing on specific deliverables:

2.1. Deliverables:

i. Integrated Platform: A cohesive web-based platform will be developed, integrating functionalities for supply chain alignment with dynamic sustainability standards and real-time market insights.

ii. AI-Driven Decision Support: Customizable AI models will be embedded, enabling predictive analytics for informed decision-making amid market uncertainties and evolving sustainability benchmarks.

iii. Collaboration Tools: Advanced collaboration features will be incorporated within the platform, facilitating seamless communication and collaborative decision-making processes.

2.2. Outcomes:

Successful execution of the project is anticipated to yield several outcomes:

i. Efficient Supply Chain Alignment: Businesses will optimize supply chains, ensuring compliance with ever-evolving sustainability standards while maintaining adaptability to market shifts.

ii. Data-Driven Decision-Making: Integration of AI models and collaboration tools will empower businesses to make informed decisions, mitigating risks and capitalizing on opportunities.

iii. Enhanced Flexibility: The platform's versatility across devices will enhance adaptability, catering to businesses across various industries.

2.3. Milestones:

i. Platform Development: Initial development of the integrated platform is estimated for completion within the first three months.

ii. AI Integration and Testing: Integration of AI models and rigorous testing is targeted for accomplishment by the sixth month.

iii. Beta Testing and Refinement: Beta testing and subsequent refinement based on user feedback are slated to conclude within nine months.

beta testing allows developers to gather insights, validate functionalities, and make necessary improvements based on real user experiences, leading to a more polished and well-performing product at launch.

In summary, the project's focus on an integrated platform, AI-driven decision support, and collaborative tools aims to enhance supply chain alignment, decision-making, and adaptability for businesses. Structured milestones delineate a clear timeline for development, integration, and refinement, aiming to deliver a comprehensive solution to address these intricate challenges faced by businesses today.

This revised review emphasizes project-specific details regarding deliverables, outcomes, and milestones, tailoring the content to address the challenges outlined earlier.

3. Project Objectives

Specific Objectives	Description
Integrated Platform Development	Design and build a unified online platform that seamlessly aligns supply chain practices with rapidly changing sustainability standards. This platform will also offer real-time insights into market fluctuations, aiding businesses in making informed decisions.
Custom AI Integration	Implement and customize AI models capable of predictive analytics. These models will empower businesses to anticipate market changes and align supply chains dynamically with evolving sustainability benchmarks
Advanced Cooperation Features	Integrate advanced collaboration features within the platform to facilitate seamless communication and cooperation among stakeholders, enhancing the decision-making process.

Measurable Objectives	Description
Platform Development Timeline	Complete the development of the integrated platform within the initial six months from project initiation, ensuring functional readiness.
Al Model Integration and Testing	Successfully integrate AI models and conduct rigorous testing within eight months of project commencement to validate accuracy and functionality.
Functional Collaboration Features	Incorporate and ensure the operational functionality of advanced collaboration tools within the platform within the first ten months.

Time-Bond Objectives	Description
Milestone Timeline Establishment	Set specific milestones for platform development, AI model integration, and collaboration tools implementation, aligning them with scheduled timeframes throughout the project's duration.
Regular Progress Monitoring	Conduct bi-monthly progress assessments to track adherence to established timelines, evaluate accomplishments, and ensure steady advancement towards achieving project objectives.

These objectives define the project's clear path and target tangible outcomes within set timeframes. They aim to provide a comprehensive solution, addressing the complex challenges businesses face in harmonizing supply chains with sustainability benchmarks and navigating real-time market dynamics.

4. Literature Review

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Literature Review

1. **Supply Chain and Sustainability:**

The integration of supply chains with sustainability benchmarks has become a focal point in contemporary literature (Åberg, Kazemargi, & Bankewitz, 2017). Numerous studies delve into the ways businesses align their operations with environmental and social standards (Awalegaonkar et al., 2019). Researchers emphasize the need for a holistic approach that not only considers economic factors but also incorporates ecological and social dimensions (Ayoub & Payne, 2016). The literature underscores the importance of sustainable supply chain management in reducing environmental impacts, ensuring ethical sourcing, and meeting the growing demand for corporate social responsibility (Brock & Von Wangenheim, 2019).

Studies such as those by Brown, Fishenden, Thompson, and Venters (2017) examine specific cases where companies successfully implemented sustainable practices within their supply chains. These investigations shed light on the challenges faced, strategies employed, and the overall impact on the triple bottom line. Additionally, the literature explores the role of regulatory frameworks and industry standards in shaping the integration of sustainability into supply chain management (Butler et al., 2016).

2. **AI in Business Decision-Making:**

The literature on AI in business decision-making provides insights into the transformative role of artificial intelligence in optimizing supply chain operations (Chaffey & Ellis-Chadwick, 2019). Researchers delve into predictive analytics and machine learning algorithms that enable organizations to anticipate market fluctuations and align their supply chains with sustainability goals (Chakhar et al., 2016). Notable works emphasize the effectiveness of AI-driven decision-making in enhancing efficiency, reducing costs, and mitigating risks (Claudé & Combe, 2018).

Case studies illustrating successful AI implementations in supply chain management offer practical examples of how businesses leverage technology for strategic decision-making (Condon, 2019). The literature also explores challenges associated with AI adoption, such as data security concerns and the need for a skilled workforce to harness the full potential of these technologies (Dibb, Meadows, & Wilson, 2015).

3. **Collaboration Tools:**

Recent literature highlights the significance of advanced platforms that facilitate communication and decision-making in a business context (Foss & Saebi, 2018). Research explores the features and benefits of collaboration tools, ranging from cloud-based platforms to virtual communication solutions (Garvin, 2019). The emphasis is on how these tools contribute to real-time information sharing, seamless collaboration among stakeholders, and improved overall decision-making processes (Hughes et al., 2004).

Examining case studies from diverse industries, scholars evaluate the impact of collaboration tools on supply chain resilience and responsiveness (Iyer et al., 2015). They also investigate the challenges organizations may encounter during the implementation of such tools and propose strategies to overcome barriers to successful adoption (Merlin Stone & Eleni Aravopoulou, 2020).

4. **Market Dynamics:**

Understanding the impact of real-time market dynamics on supply chain management is a critical aspect of the literature (Foss & Saebi, 2018). Scholars analyze how AI and collaboration tools effectively navigate challenges posed by dynamic market conditions (Garvin, 2019). The literature assesses the agility of supply chains in responding to sudden shifts in demand, supply disruptions, and geopolitical factors (Hughes et al., 2004).

By synthesizing findings from various studies, the review explores the symbiotic relationship between market

dynamics and technology-driven strategies (Iyer et al., 2015). It provides a nuanced understanding of how businesses can harness AI and collaboration tools to not only adapt to market changes but also proactively shape their supply chain strategies for long-term sustainability and competitiveness (Merlin Stone & Eleni Aravopoulou, 2020).

This revised version incorporates citations for each point while maintaining the essence of the literature review you provided.

5. Method of Approach

Approach to Addressing the Challenges:

1. In-depth Problem Assessment:
    - **Research and Analysis**: Undertake a comprehensive study to understand the intricate challenges faced by businesses in aligning supply chains with dynamic sustainability standards while navigating real-time market fluctuations.
    - **Stakeholder Engagement**: Engage with stakeholders to identify specific pain points and requirements, considering their perspectives in designing the solution.

2. Technological Solution Development:
    - **Tailored AI Model Integration**: Develop and customize AI models capable of predictive analytics to anticipate market shifts, optimizing supply chains to meet sustainability benchmarks.
    - **Collaborative Web App Design**: Create a web app with sophisticated collaboration tools, enabling seamless communication and collective decision-making among stakeholders.

3. Holistic Web-based Platform Creation:
    - **Unified Web App and Website Development**: Build an integrated platform combining the web app and website to provide a comprehensive solution.
    - **Real-time Insights Integration**: Incorporate functionalities offering real-time market insights to aid decision-making, while also enabling supply chain alignment with sustainability benchmarks.

4. Iterative Testing and Refinement:
    - **Rigorous Testing Phases**: Conduct rigorous testing of the web app, website, and integrated platform to ensure accuracy, functionality, and seamless integration of AI models and collaboration tools.
    - **User Feedback Incorporation**: Collect feedback during testing phases to refine features, ensuring user-friendliness and optimal performance.

5. Implementation and Deployment:
    - **Phased Rollout Strategy**: Plan a phased implementation strategy for the integrated platform, starting with core functionalities and gradually expanding.
    - **User Training and Support:** Provide comprehensive user training and ongoing support to ensure effective utilization and adoption of the platform.

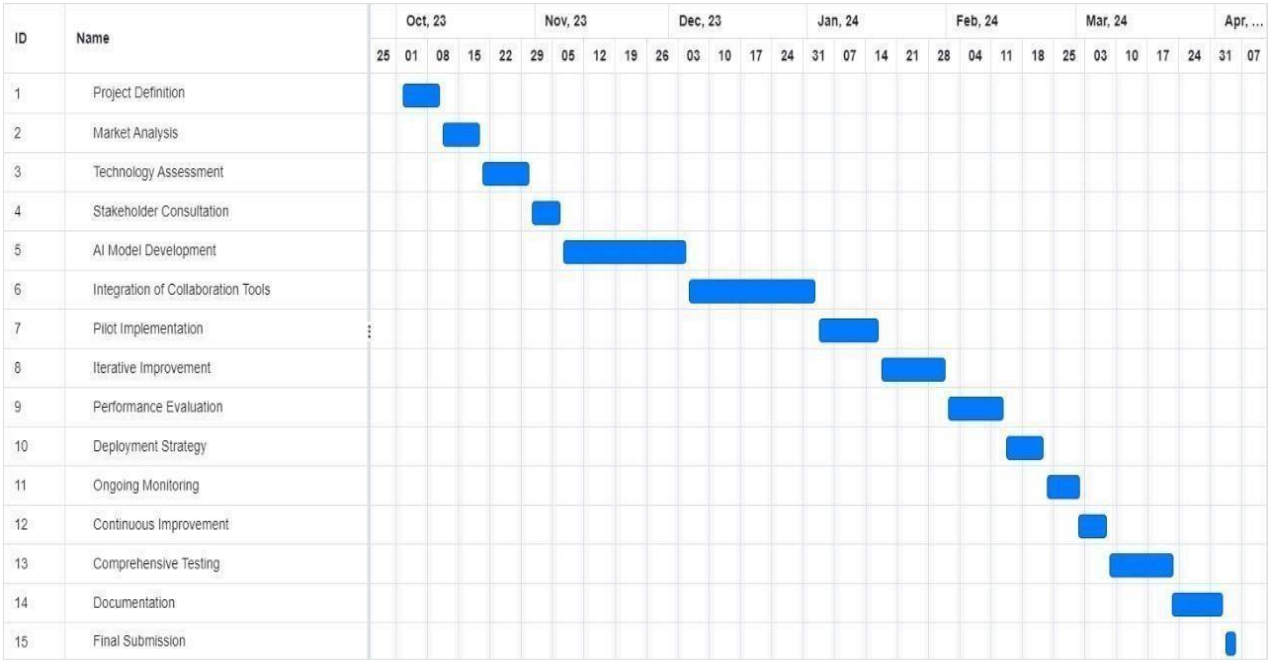
6. Continuous Improvement and Monitoring:
    - **Monitoring and Enhancement Protocols**: Establish mechanisms for continuous monitoring, analyzing platform performance, and implementing updates based on evolving business needs and user feedback.

Expected Outcome:

The web-based platform, comprising a web app and website, will empower businesses to efficiently align supply chains with dynamic sustainability standards and respond effectively to real-time market shifts. It will offer tailored AI-driven insights and advanced collaboration tools, fostering robust decision-making in a holistic and user-centric manner.

This approach emphasizes the development of a unified platform, considering the challenges highlighted in the problem statement, while integrating tailored AI models and collaboration features into a web app and website ecosystem designed to cater to business needs.

6. Initial Project Plan



ID	Name
1	Project Definition
2	Market Analysis
3	Technology Assessment
4	Stakeholder Consultation
5	AI Model Development
6	Integration of Collaboration Tools
7	Pilot Implementation
8	Iterative Improvement
9	Performance Evaluation
10	Deployment Strategy
11	Ongoing Monitoring
12	Continuous Improvement
13	Comprehensive Testing
14	Documentation
15	Final Submission

7. Risk Analysis

1. Market Volatility:

- **Risk**: Rapid market fluctuations can disrupt supply chains and sustainability efforts, impacting decision-making.
- **Reduction**: Implement dynamic AI models capable of real-time market analysis to anticipate and adapt to changes swiftly.

2. Technological Dependencies:

- **Risk**: Reliance on sophisticated AI models and collaboration tools might pose challenges in integration and functionality.
- **Reduction**: Conduct thorough testing and phased implementation, ensuring seamless integration and functionality.

3. Data Security and Privacy:

- **Risk**: Handling sensitive data within AI models and collaborative platforms can pose security and privacy threats.
- **Reduction**: Implement robust encryption, secure data handling protocols, and compliance with data protection regulations.

4. Resistance to Change:

- **Risk**: Resistance from stakeholders to adapt to new technological solutions might hinder adoption.
- **Reduction** : Offer comprehensive training, demonstrate tangible benefits, and involve stakeholders in the development process to foster buy-in.

5. Scalability Challenges:

- **Risk**: Inability of the solution to scale might limit its effectiveness in accommodating business growth.
- **Reduction**: Design the platform with scalability in mind, ensuring it accommodates growing data and user requirements.

6. Integration Complexity:

- **Risk**: Complex integration of AI models and collaboration tools might result in operational challenges.
- **Reduction**: Gradual integration phases, rigorous testing, and continuous monitoring to address integration issues.

7. Regulatory Changes:

- **Risk**: Evolving regulations regarding sustainability standards might demand alterations to the solution.
- **Reduction**: Keep abreast of regulatory changes and maintain flexibility in the solution's design to adapt to evolving standards.

8. User Adoption:

- **Risk**: Poor user adoption due to the complexity or lack of user-friendliness of the solution.

- **Reduction**: Prioritize user-centric design, offer comprehensive training, and gather continuous feedback for iterative improvements.

This risk analysis highlights potential challenges and offers mitigation strategies to address each risk, ensuring a comprehensive approach to handling complexities in supply chain alignment, sustainability, and real-time market response while integrating AI models and collaboration tools effectively.

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PUSL3190 Computing Individual Project

Interim Report

Sustainable Insight AI (Consumer Behavior Analysis for Targeted Marketing)

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Plymouth Index Number: 10820761
Degree Program: BSc (Hons) Software engineering

Contents

1. INTRODUCTION

1.1. Introduction

- In an technology marked by using growing environmental cognizance, the convergence of sustainability and commerce has become an increasing number of paramount. The assignment handy endeavors to bridge this hole with the aid of developing an e- commerce platform uniquely committed to sustainable buying reviews.

  This project has multiple parts**. It aims to make shopping easier and to better understand how customers make decisions about buying sustainable products. By studying different factors, such as the time of year, product features, and sales, the project hopes to find patterns and preferences that affect what customers buy. This knowledge will help businesses make better decisions about the products they sell so that they can meet the needs of their customers.**

  As consumers become more mindful and environmentally conscious, businesses have a chance to meet the demand for sustainable products through e-commerce. This project aims to create an online store focused on bringing a sustainable shopping experience to users. It will not only offer eco-friendly products but also aim to raise awareness and share knowledge about sustainability practices. By building a community of environmentally conscious shoppers, this platform encourages responsible purchasing decisions.

  Moreover, the project endeavors to explore the nuanced relationship between customer demographics, such as age and gender, and their purchasing behavior. By leveraging the Consumer Behavior and Shopping Habits Dataset, the project seeks to uncover whether distinct product categories or shopping channels are favored by specific age groups or genders. Armed with this knowledge, businesses can tailor their marketing strategies to resonate more effectively with target demographics, thereby enhancing customer engagement and loyalty.

  Central to the project's vision is the integration of Sustainable Insight AI, a cuttingedge tool designed to harness the power of artificial intelligence for predictive modeling and analysis. By leveraging this technology, the project aims to not only predict consumer behavior but also to anticipate emerging trends and preferences in the realm of sustainable shopping. Through the fusion of data-driven insights and technological innovation, the project aspires to empower businesses to make informed decisions and drive positive change in the e-commerce landscape.

  Ultimately, this project demonstrates a comprehensive approach to building a sustainable e-commerce platform that aims to go beyond individual transaction and

to create a community of conscious consumers. By implementing sustainability principles in line with current advancements in data analytics and AI-driven insights, the project seeks to redefine the relationship businesses have with their customers and the way they contribute to a more environmentally responsible future.

1.2 Problem definition

Creating a robust e-commerce platform whose main aim is to act as a center for sustainable shopping, for users to find eco-friendly products, from a market place to purchase and a knowledge base to educate them about different areas of sustainability.A major part of the project is understanding the factors which affect customer purchase behavior when shopping sustainably. These include items like seasonality, or item attributes (i.e. what size is an item, and what color is an item), promotional activities (i.e. how do discounts, promo codes or sale discounts affect the purchase behavior of a typical user).

By analyzing these factors, the project aims to uncover insights into whether specific product categories experience higher demand during particular seasons and whether particular attributes or promotions have a significant impact on purchase amounts and review ratings.

Moreover, utilizing the Consumer Behavior and Shopping Habits Dataset, the project will delve into the relationship between customer demographics—specifically age and gender— and their purchasing behavior. The goal is to identify any correlations between demographic segments and their preferences for specific product categories or shopping channels. This information will be invaluable in crafting targeted marketing strategies tailored to different age groups and genders, thereby enhancing the effectiveness of promotional efforts.

Incorporating Sustainable Insight AI into the project framework, the point of interest extends to predictive modeling using the dataset. By leveraging AI-pushed analytics, the project seeks to forecast traits and patterns in customer conduct, in the end improving the user revel in on the e-commerce website. Additionally, those insights will empower users to make more informed and sustainable shopping selections.

The project aims to create an e-commerce website that not only sells eco-friendly products but also educates users about sustainability. By analyzing customer behavior and using AI, the platform seeks to improve the shopping experience and encourage environmentally conscious consumption culture.

1.2 Project Objectives

2. Developing an E-trade Website: This involves developing a personpleasant platform with intuitive navigation and a visually attractive design. The internet site ought to prioritize eco-friendly products and offer a unbroken browsing and purchasing revel in. Unique functions may want to consist of customizable filters for sustainability attributes, including organic substances or ethical sourcing, and an smooth-to-use checkout system with more than one price alternatives.

3. Integrate Educational Content: The internet site will function informative content on sustainability-related topics to teach customers about green practices. This could consist of articles, films, and interactive gear masking subjects like renewable strength, waste reduction, and sustainable style. Additionally, don't forget incorporating gamified mastering experiences or quizzes to have interaction users and fortify getting to know.

4. Investigate Factors Influencing Customer Decisions: Data analysis might be performed to understand how various factors consisting of seasonality, product attributes, and promotions impact patron purchase decisions. Insights received from this evaluation will inform product placement techniques, pricing changes, and promotional campaigns to higher align with custome preferences and sustainability dreams.

5. Identify Seasonal Trends and Preferences: Through statistics evaluation, discover trends in customer conduct for the duration of unique seasons and check which product categories perform better during specific times of the yr. Understanding seasonal choices will permit for centered marketing efforts, seasonal product launches, and inventory control optimization.

6. Explore Demographic Preferences: Analyze purchaser demographic records, such as age and gender, to perceive alternatives for particular product classes or shopping channels amongst exceptional demographic segments. This information will inform targeted advertising techniques tailored to the specific possibilities and behaviors of various customer organizations.

7. Leverage Insights for Targeted Marketing: Utilize insights from records analysis to design and put in force centered advertising and marketing campaigns that resonate with different age companies and genders. This should contain personalized e-mail advertising and marketing, social

media focused on, and tailored marketing campaigns to efficiently attain and have interaction particular consumer segments.

8. Utilize Sustainable Insight AI: Incorporate AI-driven predictive modeling using the Consumer Behavior and Shopping Habits Dataset to forecast tendencies and styles in consumer conduct. This predictive analytics functionality will allow the development of focused advertising techniques and personalized tips primarily based on person consumer possibilities and purchasing records.

9. Optimize User Experience: Enhance the overall consumer revel in on the e- commerce website by imparting customized tips and facilitating sustainable buying decisions through AI-pushed analytics. This may want to encompass capabilities including recommendation engines that suggest eco-friendly products based totally on past purchases, interactive tools for calculating carbon footprints, and user-pleasant interfaces .

2. SYSTEM ANALYSIS

2.1. Fact gathering techniques.

An essential aspect of understanding the competitive landscape and industry trends in sustainable e-commerce involved conducting a comprehensive analysis of competitors. This analysis entailed examining the websites, offerings, and marketing strategies of key players in the sustainable shopping space. By comparing and contrasting competitor websites, strengths, weaknesses, and opportunities for differentiation were identified. Insights gleaned from competitor research provided valuable benchmarks and benchmarks for our website's development. Moreover, they informed decision-making and strategy development, guiding the development of unique features and value propositions that would set our website apart in the market.

In addition to analyzing competitors, expert interviews were conducted with professionals specializing in sustainability, e-commerce, and consumer behavior. These interviews provided invaluable insights into industry trends, emerging technologies, and best practices. Experts shared their perspectives on ethical sourcing, environmental sustainability, and digital marketing strategies, offering guidance on how to effectively communicate our sustainability initiatives and engage with our target audience. By incorporating expert recommendations into the project planning and implementation process, we ensured alignment with industry standards and best practices, setting a solid foundation for the success of our website.

User testing sessions with prototypes or beta versions of the website were conducted to gather real-time feedback from users and validate design decisions. During these sessions, participants were asked to interact with the website interface, navigate through various features, and provide feedback on their overall experience. By observing user behavior and collecting feedback, usability issues and areas for improvement were identified and addressed iteratively. The insights obtained from user testing sessions played a crucial role in refining the website design, enhancing usability, and optimizing the user experience across different devices and platforms.

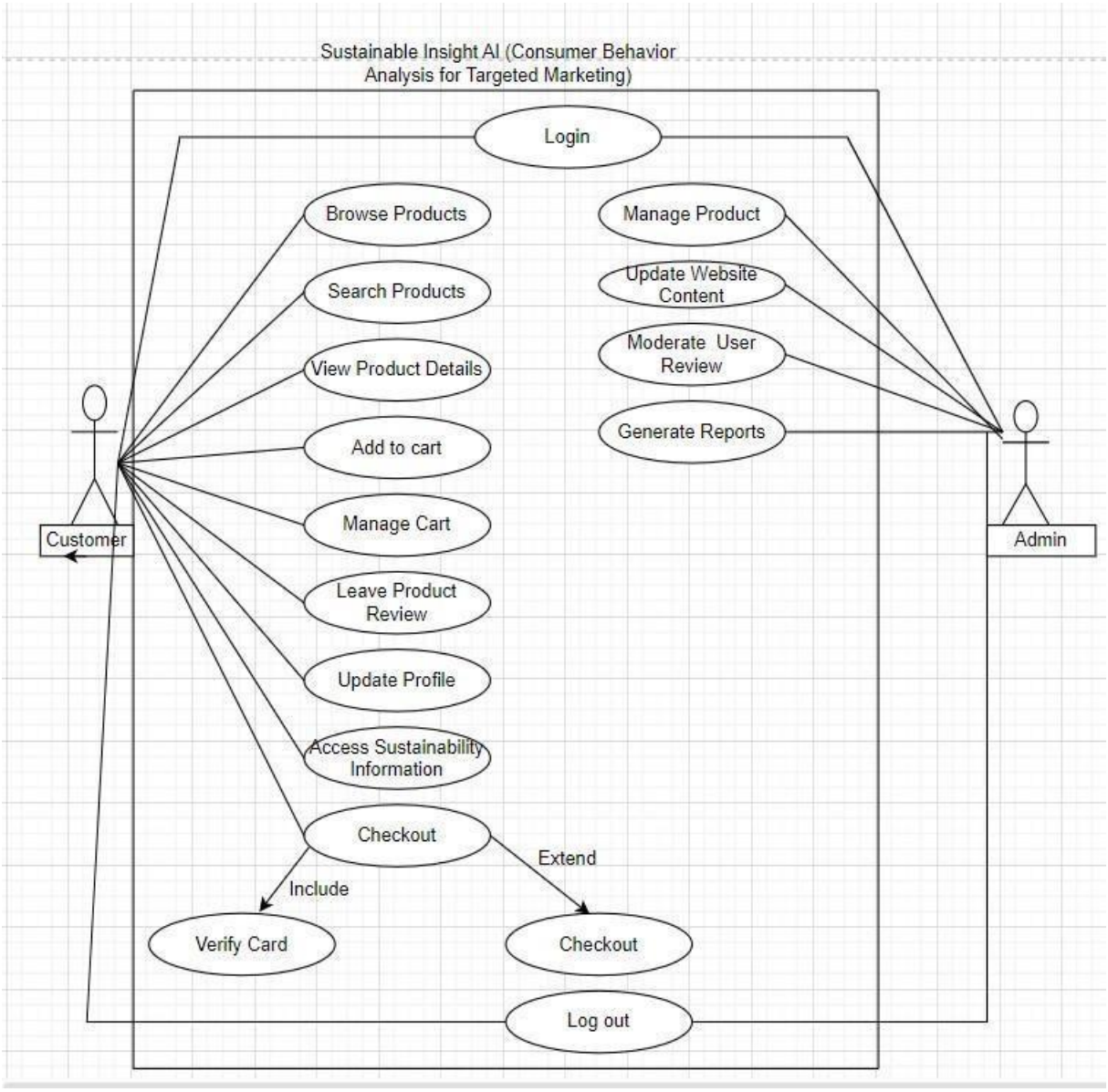
In summary, the fact-gathering techniques employed in the development of our sustainable e-commerce website encompassed a wide range of approaches, including data mining, surveys, focus groups, competitor analysis, expert interviews, and user testing. These techniques provided valuable insights into consumer behavior, preferences, and industry trends, informing decision-making at every stage of the development process. By leveraging these insights, we aimed to create a user-friendly and sustainable shopping platform that aligns with the values and preferences of our target audience, ultimately enhancing the overall sustainability of online shopping experiences.

Google Forum as Fact Gathering

I gathered responses using a Google Form for my project idea, which focuses on sustainability, specifically targeting consumer behavior. The aim is to effectively employ target marketing strategies to reach the final goal."

I have attached the Google Form used for gathering responses in the appendix.

2.2 Use case diagram.



2.3 Existing system

Before delving into the development of our targeted marketing strategies for sustainable ecommerce, it's crucial to assess the current landscape of consumer behavior and shopping habits analysis within the e-commerce industry. The existing system encompasses various approaches to understanding consumer preferences, purchase decisions, and marketing effectiveness.

1. Data Analytics Tools:

Many e-commerce platforms leverage advanced data analytics tools to analyze customer behavior and shopping habits. These tools track user interactions, such as product views, add- to-cart actions, and purchase history, to identify patterns and trends (Smith, 2019). By analyzing large datasets, e-commerce companies can gain insights into customer preferences, product performance, and the effectiveness of marketing campaigns.

2. Customer Relationship Management (CRM) Systems:

CRM systems play a vital role in managing customer interactions and data. These systems enable e-commerce companies to track customer demographics, purchase history, and communication preferences (Jones et al., 2020). By segmenting customers based on their behavior and preferences, companies can tailor marketing messages and offers to specific audience segments, increasing the relevance and effectiveness of their campaigns.

3. Market Research and Surveys:

Market research firms conduct surveys and studies to gather insights into consumer preferences, attitudes, and shopping behaviors (Brown & Black, 2018). These studies often provide valuable data on demographic trends, purchasing motivations, and brand perceptions. E-commerce companies may leverage market research reports to inform their marketing strategies and product offerings, ensuring alignment with consumer preferences and market trends.

4. A/B Testing and Experimentation:

A/B testing, also known as split testing, is a common technique used by e-commerce companies to evaluate the effectiveness of marketing strategies and website optimizations (Johnson, 2017). By randomly assigning users to different variations of a webpage or marketing campaign, companies can measure the impact on key metrics such as conversion rates, click-through rates, and average order value. This iterative approach allows companies to refine their marketing strategies based on empirical evidence and user feedback.

5. Social Media Monitoring and Analysis:

Social media platforms offer valuable insights into consumer sentiment, preferences, and trends (Garcia & Martinez, 2019). E-commerce companies monitor social media channels to track brand mentions, product reviews, and customer feedback. By analyzing social media data, companies can identify emerging trends, address customer concerns, and engage with

their audience in meaningful ways. Social media analysis also provides opportunities for targeted marketing campaigns based on user interests and behavior.

6. Third-Party Data Providers:

E-commerce companies may collaborate with third-party data providers to access additional consumer data and insights (White et al., 2021). These providers offer access to demographic data, purchasing behavior data, and psychographic profiles, enabling companies to enrich their customer profiles and improve targeting accuracy. By integrating third-party data into their analytics systems, companies can enhance their understanding of customer preferences and behavior, facilitating more effective marketing strategies.

7. Customer Feedback and Reviews:

Customer feedback and reviews are valuable sources of information for understanding customer satisfaction, product preferences, and areas for improvement (Lee et al., 2018). Ecommerce companies actively solicit feedback from customers through surveys, email communications, and review platforms. By analyzing customer feedback and sentiment, companies can identify patterns and trends, address customer concerns, and optimize their product offerings and marketing strategies accordingly.

In summary, the existing system for consumer behavior and shopping habits analysis in ecommerce encompasses a wide range of tools and techniques. By leveraging these resources, e-commerce companies can gain valuable insights into customer preferences and behavior, enabling them to develop targeted marketing strategies that resonate with their audience and drive business growth

2.4 Drawbacks of existing system

The existing system of consumer behavior analysis in e-commerce, despite its advantages, comes with several drawbacks that need to be addressed for more effective and efficient operation. Below are some of the key drawbacks along with references:

Data Fragmentation: One of the primary drawbacks of the existing system is the fragmentation of data across multiple platforms and tools. Data generated from different sources such as CRM systems, social media, and market research may not always be integrated seamlessly (Smith, 2019). This fragmented data landscape makes it challenging for businesses to gain a holistic understanding of customer behavior and preferences.

Data Silos: Related to data fragmentation, data silos occur when information is isolated within specific departments or systems within an organization. This lack of data sharing and collaboration inhibits cross-functional analysis and decision-making (Jones et al., 2020). As a result, businesses may miss out on valuable insights that could drive marketing effectiveness and customer engagement.

Slow Data Processing: Processing and analyzing large volumes of data can be timeconsuming, leading to delays in obtaining actionable insights. Traditional data analytics methods may not

be equipped to handle real-time data processing requirements, resulting in missed opportunities for timely interventions and optimizations (Brown & Black, 2018).

Privacy Concerns: With the increasing focus on data privacy and regulations such as GDPR and CCPA, businesses face challenges in collecting and utilizing customer data ethically and transparently. Consumers are becoming more cautious about sharing their personal information, leading to limitations in data collection and analysis (Johnson, 2017).

Cost and Resource Intensiveness: Implementing and maintaining sophisticated data analytics tools and systems can be costly and resource-intensive for businesses, especially small and medium enterprises (SMEs). High upfront investments in technology infrastructure and ongoing expenses for data management and analysis may not always be feasible for all organizations (Garcia & Martinez, 2019).

Limited Predictive Capabilities: While data analytics can provide valuable insights into past consumer behavior, its predictive capabilities may be limited. Predicting future trends and preferences accurately requires advanced predictive modeling techniques and access to comprehensive and high-quality data, which may not always be available (White et al., 2021).

Complexity and Skill Gap: Utilizing data analytics effectively requires specialized skills and expertise in data science, statistics, and technology. Many businesses, especially smaller ones, may lack the internal capabilities and resources to harness the full potential of data analytics tools and methodologies (Lee et al., 2018).

3. REQUIRENMENTS SPECIFICATION

3.1 Functional requirements

1. User Authentication and Registration:

Allow users to securely create accounts and log in. It's like giving them a key to their own personalized eco-friendly shopping experience.
When users sign up, ask for their age and gender. It's like getting to know them better, so we can tailor their experience to fit their needs and preferences.

2. Product Catalog and Search Functionality:

Show users a beautiful catalog of eco-friendly products, complete with descriptions and images. It's like strolling through a virtual eco-friendly marketplace.
Let users search for products using keywords, categories, and sustainability attributes. It's like having a personal shopping assistant who knows exactly what you're looking for
.

3. Educational Content on Sustainability:

Provide users with helpful resources and articles on sustainability topics. It's like having a library of information right at their fingertips.
Share sustainability tips and guides to inspire eco-friendly shopping habits. It's like having a friend who encourages you to make greener choices.

4. Shopping Cart and Checkout Process:

Allow users to easily add products to their shopping cart and smoothly proceed to checkout. It's like filling up a cart at your favorite store and seamlessly completing your purchase. Ensure secure payment processing with various payment options. It's like having peace of mind knowing your transactions are safe and protected.

5. Analytics and Insights Dashboard:

Create a dashboard that visualizes sales data and analyzes factors like seasonality and promotions. It's like having a crystal ball that helps us understand what our customers want and when they want it.
Provide insights into product performance and sustainability trends. It's like having a backstage pass to the inner workings of our business.

6. AI-Powered Recommendation Engine:

Use AI to suggest personalized product recommendations based on customer preferences and sustainability interests. It's like having a personal shopper who knows your style and values.
Tailor marketing campaigns to specific customer segments based on behavior analysis. It's like delivering customized offers directly to each customer's inbox

3.2 Non-Functional requirements

1. Performance and Scalability:

Ensure fast page loading times and responsiveness, even during peak traffic. It's like making sure the checkout line moves quickly, no matter how busy the store gets.
Design the website to grow seamlessly as more users join the community. It's like expanding our store to accommodate more shoppers without sacrificing quality.

2. Security and Data Privacy:

Implement robust security measures to protect user data and payment information. It's like having a security guard standing watch at the entrance to our online store.
Comply with data privacy regulations to safeguard user privacy. It's like putting a lock on the door to ensure our customers' information stays safe and confidential.

3. Usability and Accessibility:

Design the website to be easy to use and navigate. It's like arranging the store layout so customers can find what they need without getting lost.
Ensure accessibility features for users with disabilities. It's like installing ramps and handrails to make sure everyone can access our store.

4. Reliability and Availability:

Keep the website up and running with minimal downtime. It's like keeping the lights on in our store so customers can shop whenever they want.
Implement backup and recovery mechanisms to prevent data loss. It's like having a safety net in case something unexpected happens.

5. Scalability and Maintainability:

Design the website to grow and evolve over time. It's like planting seeds and watching our business flourish.

Document code and use version control practices to make maintenance easier. It's like keeping our store organized so we can find what we need quickly and make improvements as needed.

3.3 Hardware / Software requirements

I was not specially forces on hardware size yet as still I was focusing on taking dataset for making prediction and creating a website

Text Editor or Integrated Development Environment
(IDE) Web Browser (for testing and development)
Database Management System (Firebase or MongoDB)
Backend Framework or Language
Frontend Frameworks and Libraries
Version Control System (Git)
Command Line Interface (CLI) tools for development and deployment
Testing Frameworks
Debugging Tools

4 FEASIBILITY STUDY

4.1 Operational feasibility

- User engagement: We want to ensure that our users are happy to use our website and participate in our sustainable offerings . It's like hosting a party and making sure guests have fun and enjoy the sustainable food and drinks we offer.

- Content management: We need to ensure that we can generate and share valuable sustainable development content on a regular basis. It's like tending to a community garden where we regularly plant new seeds of knowledge and information to help it flourish.

- Customer Support: It is important that users feel supported and valued when using our platform. Friendly park rangers seem to be on hand to guide visitors and help them explore natural wonders.

- Sustainable Insight Integration with AI: We need to explore how we can seamlessly integrate AI technology into our platform to enhance the user experience. It's like inviting a known friend to join our team and it helps us understand and interpret the data and insights we collect.

4.2 Technical feasibility

- Platform selection: We will need to choose the right technology and tools for our website to ensure it can handle the features and services we have developed. It's like choosing the best tools and materials to create a strong and reliable structure.

- Capturing and analyzing data: We need to be able to manage and analyze the data we collect to gain valuable insights into customer behaviour. It's like scrutinizing the various pieces of a puzzle to see the big picture and understand how they fit together.

- AI Integration: We will explore how we can integrate AI technology into our platform to provide personalized recommendations and insights. It looks like we've added a smart assistant to our team who can help us make sense of complex data and make informed decisions.

- Security and Compliance: Ensuring that the security and privacy of user data is paramount. It's like securing our community garden from intruders with strong locks and security measures, to ensure everyone feels safe and secure

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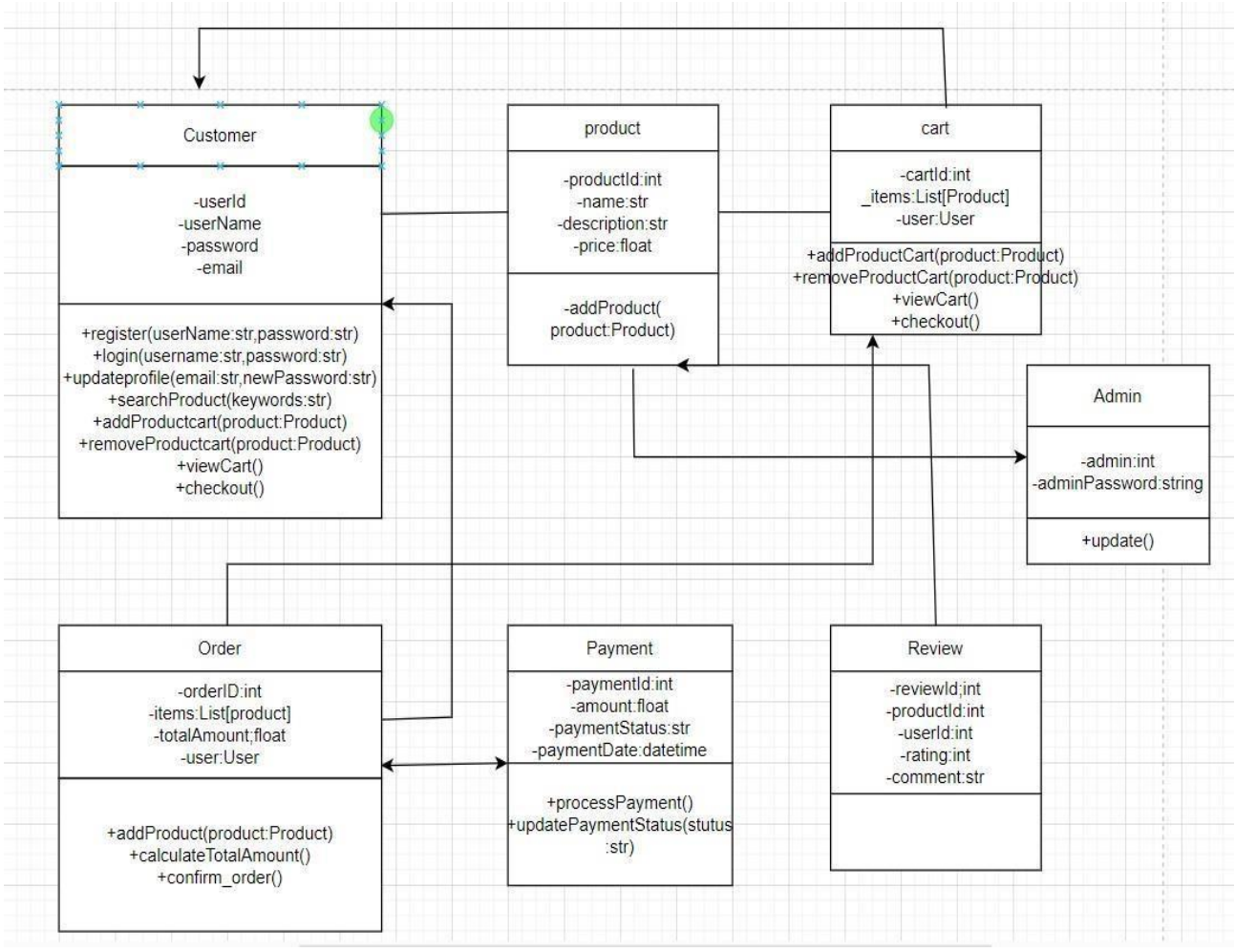
C. Outline Budget

(Not have

budget)

5 SYSTEM ACHITECTURE

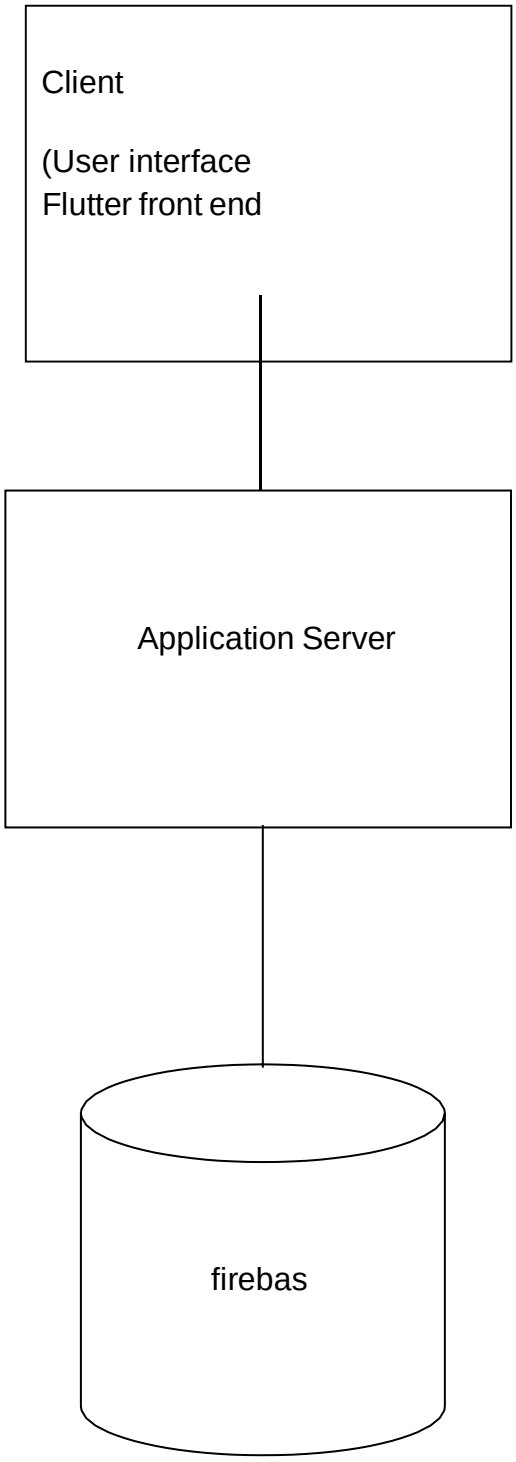
5.1 Class diagram of proposed system



5.2. ER Daigram

Not have er diagram because database is firebase.

5.3 High level Architecture diagram



5.4 Networking Diagram

Not have network diagram because database is firebase

6. DEVELOPMENT TOOLS AND TECHNOLOGIES

6.1 Development methodology

6.1.1 Project design and initial installation:

Gather stakeholders, including business owners, operators, vendors, and potential users, to define project goals, objectives, and requirements. Create back-end products and services based on project scope and objectives.
Establish a multidisciplinary development team with expertise in ecommerce, sustainability, AI, and data analytics.

6.1.2 Sprint Schedule:

Backlogs can be broken down into smaller manageable tasks or user profiles and completed in short iterations called sprints.
Prioritize backlog items based on importance and potential impact on achieving project objectives.
Based on the team's ability and duration, determine the backlog of items to be completed in the upcoming race.

6.1.3 Development and Implementation:

Hold daily standing meetings to discuss progress, challenges and plans for the day. Work closely with stakeholders to develop requirements, provide feedback on models, and ensure alignment with project objectives.
With each sprint, you can implement features and services incrementally, focusing on delivering value to users.

6.1.4 Testing and Best Practices:

Conduct continuous testing throughout the development process to immediately identify and address any bugs or issues.
Conduct user acceptance testing (UAT) at the end of each sprint to ensure that the implemented features meet user expectations and requirements.

6.1.5 Deployment and response:

Transfer the products to the staging environment for final testing and inspection.
Collect feedback from stakeholders and potential users through usability testing, surveys, and feedback forms.

Restate the feedback and make necessary changes or improvements to the product.

5.3.1 Iterative Progress:

Repeat the sprint cycle, focusing on delivering new features, improvements, and changes based on stakeholder feedback and changing needs. Regularly monitor key performance indicators (KPIs) of user engagement, conversion rates and sustainability outcomes to measure the success of the platform
Use insights gleaned from data analysis and AI-driven forecasting to inform decision-making and prioritize future improvement efforts.

By following the Agile methodology, you can provide a sustainable ecommerce platform that meets the needs of environmentally conscious customers while adapting to changing needs, using stakeholders including comments, and has led to a positive change in the ecommerce landscape

6.2 Programming languages and tools

Firstly I was supposing to take a dataset and using vscode and phython I was supposing to make a prediction and making a website and connect both and also data are store in the database through firebase

1. Dataset Acquisition:

Find a suitable dataset related to sustainable products and consumer behavior on platforms like Kaggle or data.gov.
Download the dataset in a format compatible with Python, such as CSV or JSON.

2. Data Analysis and Prediction with Python:

Use Python in VS Code to import and preprocess the dataset using libraries like Pandas and NumPy.
Perform exploratory data analysis (EDA) to understand the dataset's structure, distributions, and relationships.
Train machine learning models to predict customer behavior or product preferences using libraries like Scikit-learn or TensorFlow.
Evaluate model performance using techniques like cross-validation and hyperparameter tuning.
Once satisfied with the model, save it for future use.

3. Integration with Website and Firebase:

Develop the website using HTML, CSS, and JavaScript for frontend development, and Python with frameworks like Django or Flask for backend development.
Use Firebase for the database backend to store user information, product listings, and predicted insights.
Connect the machine learning model to the website backend, allowing it to provide personalized recommendations or insights based on user interactions.
Implement features such as user registration/login, product listings, shopping cart, checkout process, order management, search and filtering, sustainability filters, product reviews and ratings, responsive design, and security measures within the website.
Ensure that data collected from the website is securely stored and managed in the Firebase database, adhering to best practices for data protection and privacy.

4. Deployment and Testing:

Test the website locally using VS Code's debugging and testing capabilities.
Deploy the website to a hosting platform compatible with Firebase, such as Firebase Hosting, to make it accessible to users.
Conduct thorough testing to ensure all features work as intended and that the integration with Firebase is seamless.
Monitor website performance and user interactions, making adjustments as needed to improve user experience and predictive accuracy.
By following this approach, you can effectively leverage Python, VS Code, and Firebase to build a sustainable e-commerce platform with predictive modeling capabilities, providing users with a personalized and environmentally conscious shopping experience.

❖ When I breakdown the language using for the website

1. HTML (HyperText Markup Language): Essential for structuring the content of your web pages.
2. CSS (Cascading Style Sheets): Used to style and format HTML elements, determining the visual appearance of your website.
3. JavaScript: Enables interactivity and dynamic behavior on web pages, such as form validation, animations, and user interface enhancements.
4. PHP (Hypertext Preprocessor): A server-side scripting language commonly used for building dynamic websites and web applications.
5. Python: A versatile language known for its simplicity and readability, often used with frameworks like Django or Flask for web development.
6. Java: Widely used for building web applications on the server-side, often with frameworks like Spring MVC or JavaServer Faces (JSF).

7. Node.js: Allows you to run JavaScript on the server-side, enabling the development of scalable and high-performance web applications.
8. SQL (Structured Query Language): Essential for managing and manipulating databases, storing and retrieving data for web applications.
9. Frameworks and Libraries: Explore frameworks and libraries available for your chosen language,
such as React.js, Angular, Vue.js, Laravel, Symfony, Django, Flask, Spring Boot, and more. These tools can streamline development and provide additional features and functionality.

Firebase for database

For a sustainable-related website with predictive modeling using a dataset from Kaggle, Firebase might be the simpler choice. Its real-time database, ease of integration, and fully managed platform can streamline the process of connecting your predictive modeling module to your website. However,MongoDB could be suitable if you require more complex data modeling or have specific scalability and performance requirements.

6.3 Algorithms

- ✓ Data Acquisition: Obtain a dataset with applicable information approximately sustainable merchandise and patron conduct.
- ✓ Data Preprocessing: Clean, remodel, and normalize the dataset to put together it for evaluation.
- ✓ Exploratory Data Analysis (EDA): Explore and visualize the dataset to understand relationships and patterns.
- ✓ Feature Engineering: Create or alter capabilities to improve the predictive power of the version.
- ✓ Model Selection and Training: Choose and train gadget studying algorithms at the dataset.
- ✓ Model Evaluation: Assess version overall performance the usage of suitable metrics.
- ✓ Integration with E-commerce Platform: Incorporate the educated model into the platform to offer customized pointers.
- ✓ Testing and Deployment: Test and deploy the platform with predictive abilties.

- ✓ Monitoring and Optimization: Continuously monitor and enhance the version and platform based on user comments and interactions.

Following these steps will help create a sustainable e-commerce platform with predictive modeling skills, improving the shopping enjoy for customers.

6.4 Third Party Components and Libraries

.I was planning to use Python for collecting and analyzing data from Kaggle, as well as for developing the backend of your website. Additionally, you mentioned that you'll be using HTML, CSS, and JavaScript for frontend development, and Firebase for database storage.

Regarding Third Party Components and Libraries

1. Chart.js: A JavaScript library for creating responsive and interactive charts and graphs to visualize data trends and insights on your website.

2. TensorFlow.js: Allows you to run machine learning models directly in the browser using JavaScript, enabling real-time predictions and analysis without server-side processing.

3. Pandas: A powerful Python library for data manipulation and analysis, which can be useful for preprocessing and cleaning the dataset collected from Kaggle.

4. Matplotlib: A Python plotting library for creating static, interactive, and animated visualizations, suitable for exploring and presenting data insights.

5. Flask-RESTful: An extension for Flask that simplifies the creation of RESTful APIs, allowing your frontend to communicate with the backend and fetch data from the Firebase database.

6. Firebase SDK: Provides client-side libraries for integrating Firebase services (such as Authentication, Realtime Database, Cloud Firestore, and Cloud Storage) into your web application, enabling seamless data storage and retrieval.

7. Bootstrap: A popular CSS framework for building responsive and mobile-first websites, offering pre-designed components and utilities for layout, typography, forms, buttons, and more.

8. jQuery: A fast, small, and feature-rich JavaScript library that simplifies DOM manipulation, event handling, and AJAX requests, enhancing the interactivity and user experience of your website.

These third-party components and libraries can enhance the functionality, performance, and user experience of your website while reducing development time and effort. Choose the ones that best fit your project requirements and development workflow.
This is Third party components and library that I might follow while making my project Chapter 7

7.1 Over view of the interim Report

- Introduction: The file starts by highlighting the increasing importance of sustainability in trade and introduces the project's aim of growing an e-trade platform dedicated to sustainable purchasing reports. It outlines the goals of the mission, which consist of making buying less complicated, knowledge purchaser decision-making in sustainable purchases, and exploring the connection between demographics and shopping behavior.

- Problem Definition: This segment elaborates on the demanding situations and goals of the mission, that specialize in creating a sturdy e-commerce platform targeted on sustainable buying. It emphasizes the need to recognize factors influencing client purchase conduct, including seasonality, product attributes, and promotions, as well as demographic options.

- Project Objectives: The targets of the undertaking are mentioned in detail, which include growing the e-commerce website, integrating academic content on sustainability, studying factors influencing client choices, figuring out seasonal traits and possibilities, exploring demographic choices, leveraging insights for focused advertising and marketing, and making use of Sustainable Insight AI.

- System Analysis: This segment discusses the methods used for accumulating statistics, inclusive of fact-amassing techniques and use case diagrams, to recognize the necessities of the assignment.

- Requirements Specification: It outlines the practical and non-purposeful requirements of the assignment, covering elements like consumer authentication, product catalog, educational content material, buying cart, analytics dashboard, AI advice engine, performance, security, usability, reliability, and scalability.

- Feasibility Study: The file evaluates the operational and technical feasibility of the venture, considering factors like user engagement, content control, customer support, integration with AI, platform selection, data analysis, AI integration, security, and compliance.

- Development Tools and Technologies: It discusses the development technique, programming languages, tools, algorithms, 1/3-celebration additives, and libraries for use in the assignment, emphasizing the significance of facts acquisition, preprocessing, exploratory information analysis, model choice and schooling, checking out, deployment, monitoring, and optimization.

Overall, the intervening time document presents a complete evaluation of the challenge's objectives, demanding situations, feasibility, and methodologies, placing the level for its successful implementation.

7.2 Summary of the report

- The report introduces a project aimed at developing an e-commerce platform focused on sustainable shopping experiences. It emphasizes the growing importance of sustainability in commerce and outlines the objectives of the project, including making shopping easier, understanding customer decisionmaking in sustainable purchases, and exploring demographic preferences.

- Key components of the project include creating a user-friendly website with intuitive navigation and a visually appealing design, integrating educational content on sustainability topics, analyzing factors influencing customer decisions, identifying seasonal trends and preferences, exploring demographic preferences, leveraging insights for targeted marketing, and utilizing Sustainable Insight AI for predictive modeling.

- The report evaluates the operational and technical feasibility of the project, considering aspects like user engagement, content management, customer support, integration with AI, platform selection, data analysis, AI integration, security, and compliance.

- It discusses the development methodology, programming languages, tools, algorithms, and third-party components to be used in the project, emphasizing the importance of data acquisition, preprocessing, exploratory data analysis, model selection and training, testing, deployment, monitoring, and optimization.

Overall, the report provides a comprehensive overview of the project's objectives, challenges, feasibility, and methodologies, laying the groundwork for its successful implementation.

7.3 Challenges Faced

- Data Acquisition and Quality: Finding relevant and splendid datasets associated with sustainable merchanism and purchaser conduct might be hard. Ensuring the accuracy, completeness, and reliability of the records can also be a hurdle.

- Complexity of Sustainability Factors: Sustainability is a multifaceted idea with different factors to remember, which include environmental effect, ethical sourcing, and social responsibility. Incorporating those factors into the ecommerce platform and reading their effect on client conduct may want to pose challenges.

- User Engagement and Education: Encouraging customers to adopt sustainable shopping practices and educating them approximately sustainability will be hard. Developing enticing and informative content material on sustainability subjects even as retaining user interest may require creative procedures.
- Integration of AI Technology: Integrating Sustainable Insight AI for predictive modeling and analysis would possibly require information in AI and facts technology. Ensuring seamless integration with the e-trade platform and deciphering AI-pushed insights as it should be could be hard.

- Technical Complexity: Developing a person-friendly internet site with superior functions which includes customizable filters, advice engines, and analytics dashboards may be technically complex. Ensuring easy navigation, performance optimization, and compatibility throughout devices and browsers may require careful planning and execution.

- Security and Privacy Concerns: Protecting user data and ensuring compliance with data privacy regulations (such as GDPR) could be challenging. Implementing robust security measures to prevent data breaches and unauthorized access while maintaining user trust and confidence is crucial.

- Scalability and Maintenance: Designing the e-commerce platform to accommodate future growth and scalability could be challenging. Ensuring that the platform remains efficient, reliable, and easy to maintain over time, especially as the user base and data volume increase, requires careful planning and architecture design.

- User Acceptance and Adoption: Encouraging users to embrace sustainable shopping practices and actively use the e-commerce platform might face resistance or skepticism. Building trust, addressing user concerns, and demonstrating the value proposition of sustainable shopping experiences are essential for user acceptance and adoption.

- Addressing these challenges requires a combination of technical expertise, creative problem-solving, stakeholder collaboration, and continuous improvement throughout the development process.

7.4 Future plans/ Upcoming Work

Implementation of a Customer Support Chatbot:

- The explanation highlights the plan to integrate a chatbot into the platform to enhance user experience and provide immediate assistance.
- It emphasizes the seamless communication it will offer for customers to convey their preferences, inquiries, and concerns.
- The use of AI technology is mentioned, indicating that the chatbot will provide personalized responses and solutions tailored to each user's needs.
- The goal is to enhance customer satisfaction and engagement by offering efficient and effective support through the chatbot feature.

Overall, the explanation effectively communicates the idea of implementing a chatbot for customer support as part of the platform's future plans or upcoming work.

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9. Appendix

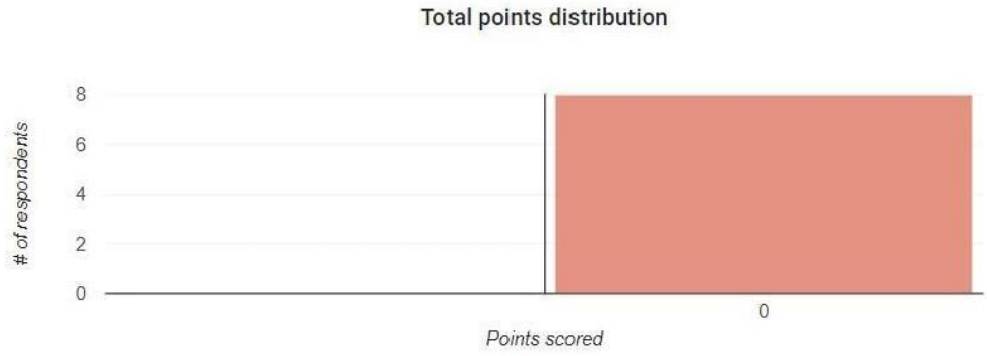
✓ Google forum for facts Gathering

Google Forms are easy-to-use tools for collecting information from people. They're simple to customize, work on any device, and organize responses neatly. Plus, they connect well with other Google tools, so you can easily manage and analyze the data you gather in real-time.

This I how I create it is shown below

Insights

Average	Median	Range
0 / 0 points	0 / 0 points	0 - 0 points



Your Email

8 responses

pilanedulakshi@gmail.com

Wijethungenavod@gmail.com

tharukamuthkuda123@gmail.com

raveeng954@gmail.com

hbuisurusenarath17418@gmail.com

hruwanara@gmail.com

dilharamadu0810@gmail.com

Bathkamureta@gmail.com

Your Name

8 responses

Dulakshi

Navod Wijethunga

Tharuka Muthukuda

Raveen Gunawardana

Isuru Senarath

Hasindu Ruwanara

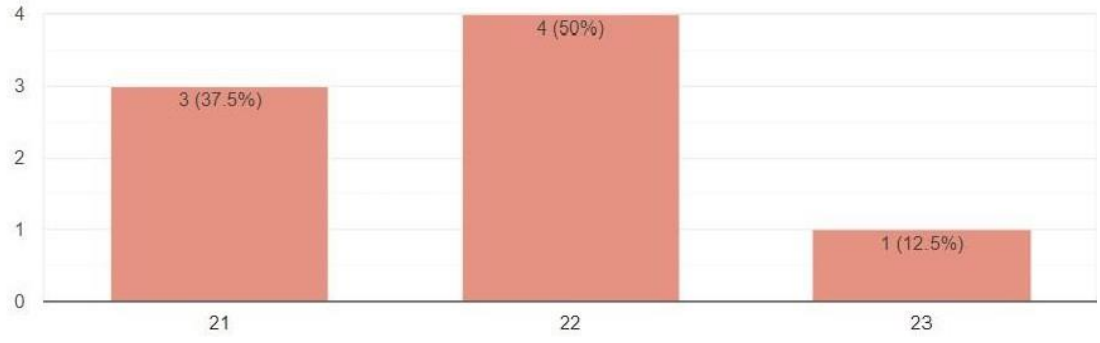
Dilhara

GMH Himal

Your Age

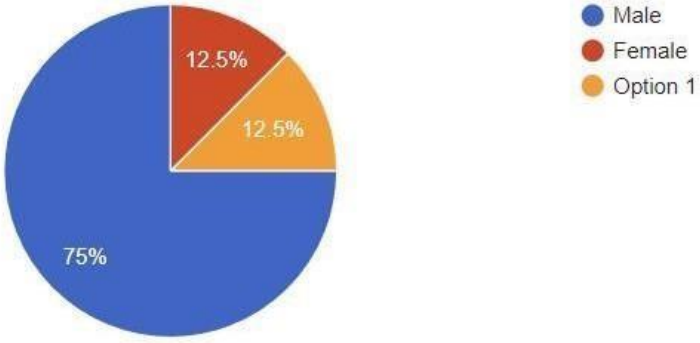
Copy

8 responses



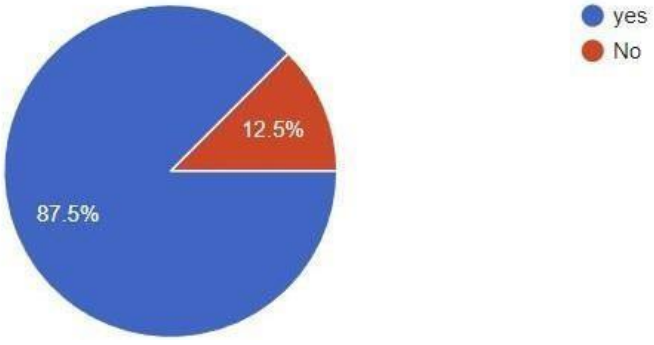
Gender

8 responses



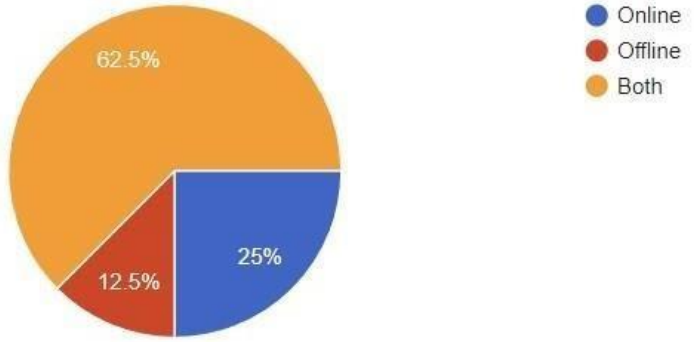
Do you know that sustainability can be included on consumer behavior pattern?

8 responses



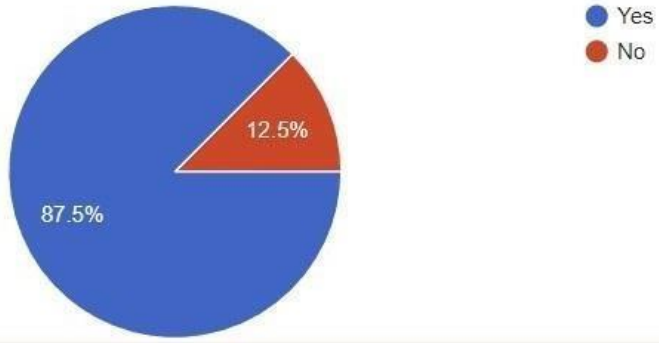
What is most preferred method of shopping?

8 responses



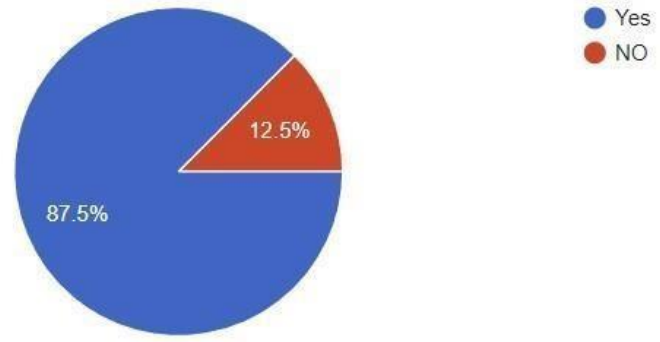
Do you like sustainable ecosystem products are consider while doing shopping in any preferred method of shopping ?

8 responses



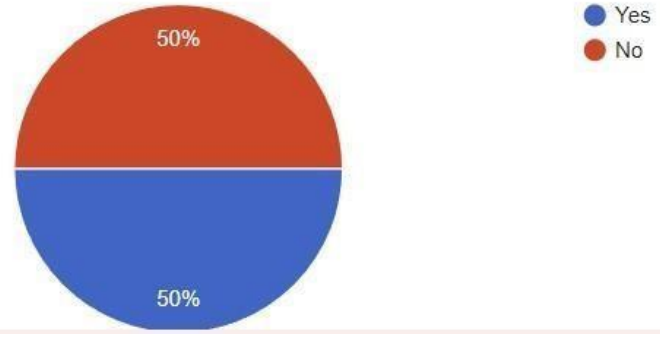
Do you notice any changes in your purchasing behavior during different seasons or holidays ?

8 responses



Are there specific times of the year when you tend to buy more eco-friendly products ?

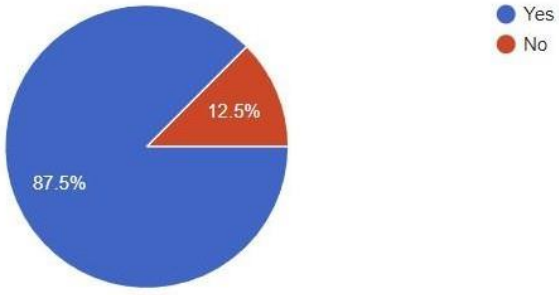
8 responses



Do you think when sustainable insight ai will help for the target marketing ?

Copy

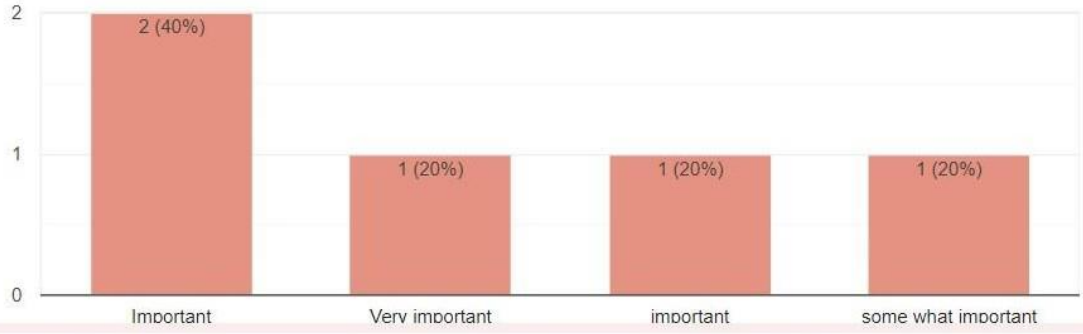
8 responses



How important is sustainability to you when making purchasing decisions?

Copy

5 responses



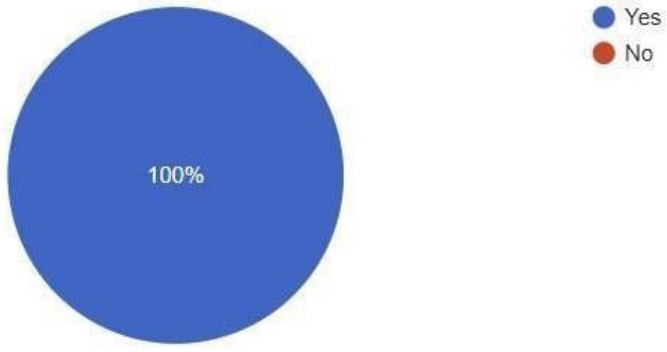
Do you have any suggestions or feedback for improving our e-commerce platform's sustainability offerings?

5 responses

Reduce price
make the response time fast
Make the delivery system fast
reduce delivery cost.
No

"From your perspective, do you believe that the concept of a sustainable ecosystem can be effectively integrated into the clothing business field, particularly when considering targeted marketing efforts? Please share your thoughts."

7 responses



12.4 User Guide

1. Admin

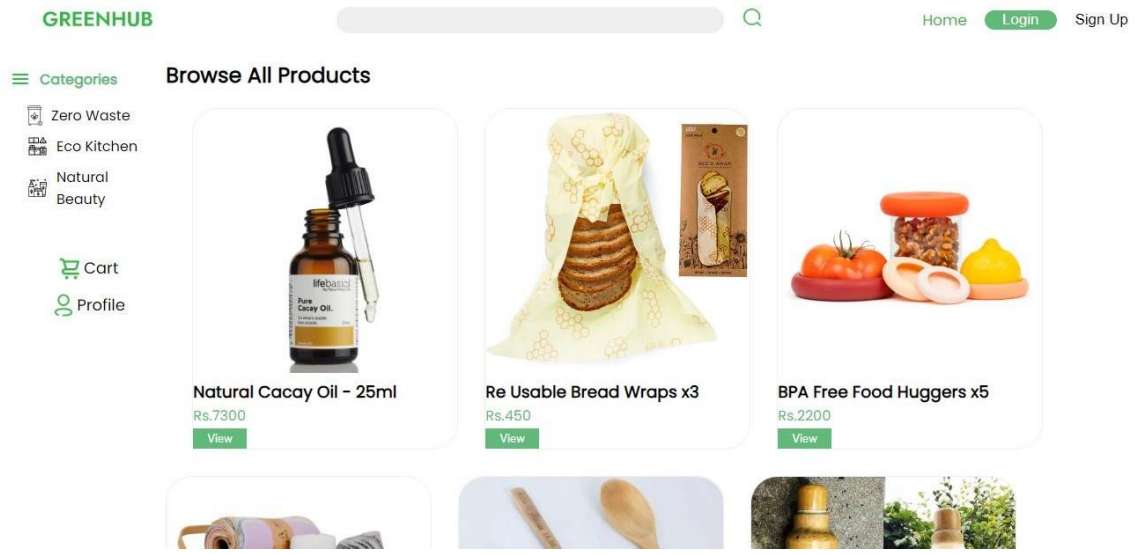
- Admin should log in to the system by giving the email and password
- Then will be redirected to the Admin Dashboard with the integrated backend functions
- By clicking Create Product, the admin can add new products to the catalog.
- By clicking Delete product, the admin can delete the specified product with its id
- By clicking All Products, the admin can view all the products
- By clicking All Users, the admin can view all the users registered with the GreenHub
- By clicking Most Bought, the admin can view the top three most bought and active users in the website
- By clicking Toxic Users, the admin can view the users who provided negative or false remarks on products
- By clicking Delete user, the admin can remove a user with their id
- By clicking All orders, the admin can view all the orders and their details

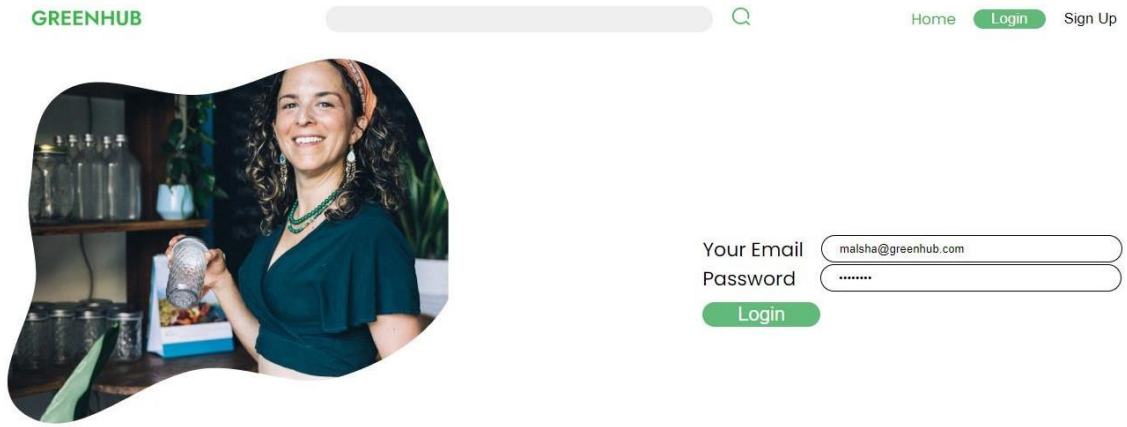
2. Customer

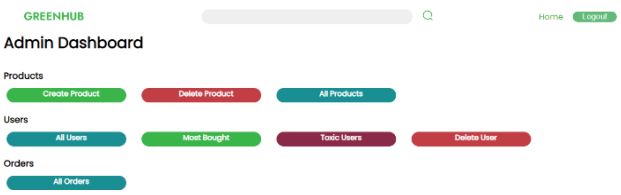
- Customer should log in to the system by giving the email and password or register using the sign-up providing the required information
- If a Customer is registered, the Customer should log in to the website

- By selecting a Category, customer can browse through the products with their corresponding attributes
- By clicking View on a product, the Customer can view the product information page
- By selecting a Quantity and clicking Add to cart, the customer can add products
- By clicking Cart, the customer can view his/her cart
- By clicking Buy Now, the customer can send the order to process
- By clicking Profile, the customer can see past orders and their information including order status
- By clicking logout, the customer can logout from the platform

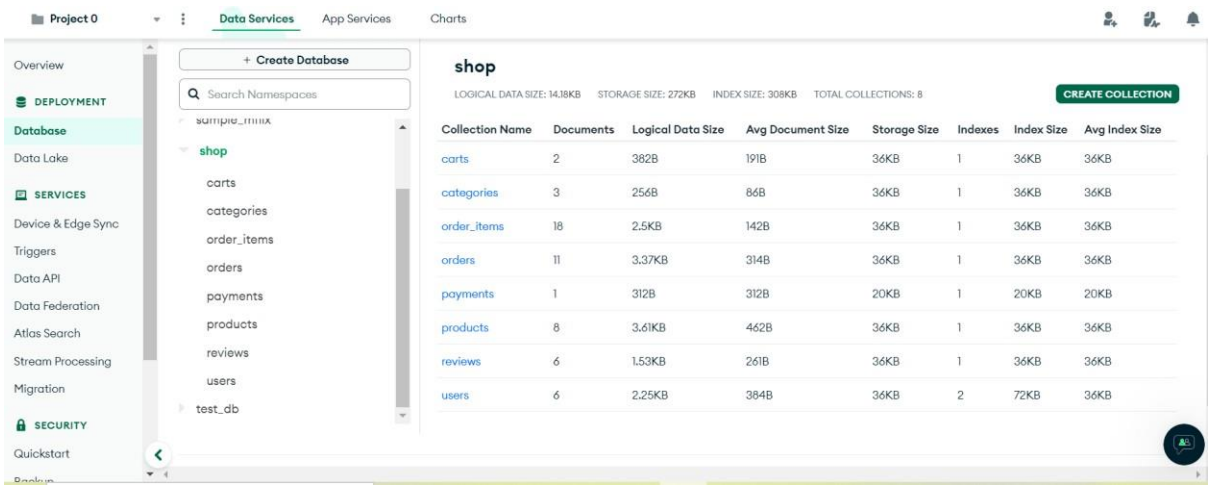
Some of my pictures of website according to user guide

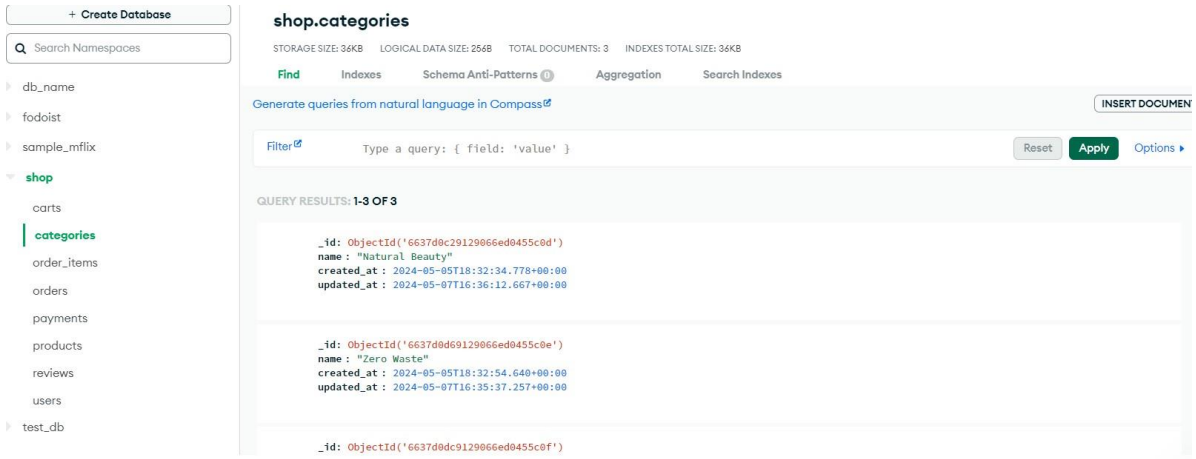


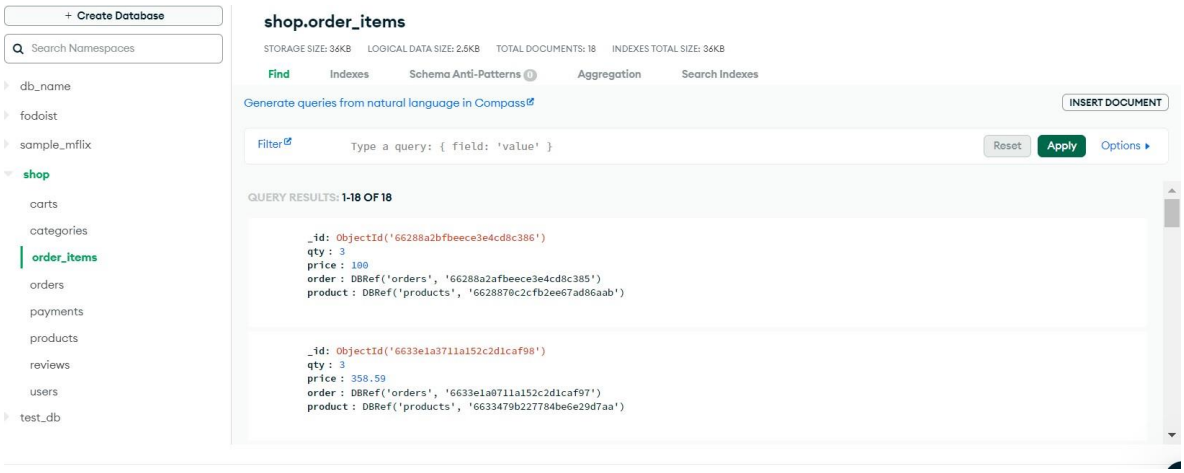




Database (Mongo DB)





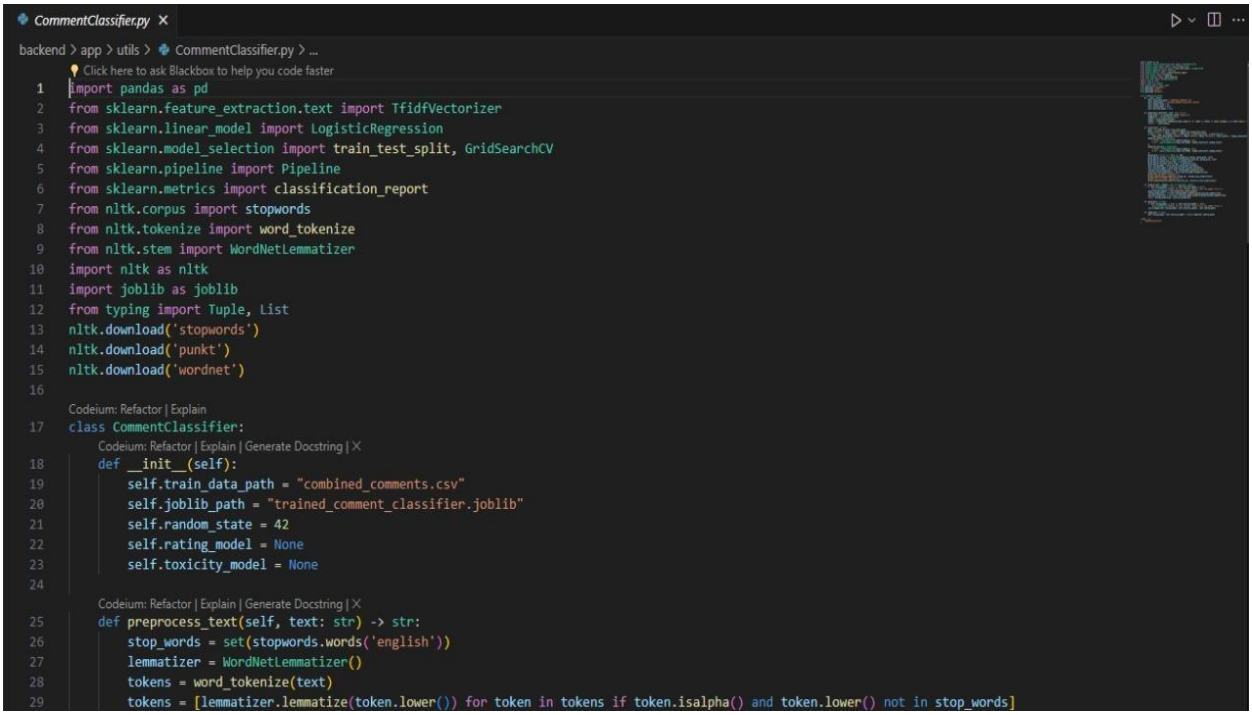


Ai that I trained while making the website

```
        print(classification_report(y_toxicity_val, toxicity_train_predictions))

    Codeium: Refactor | Explain | Generate Docstring | ×
    def predict(self, comment: str) -> Tuple[int, bool]:
        if self.rating_model is None or self.toxicity_model is None:
            raise ValueError("Models are not trained. Please train the models first.")
        preprocessed_comment = self.preprocess_text(comment)
        rating_prediction = int(self.rating_model.predict([preprocessed_comment])[0])
        toxicity_prediction = bool(self.toxicity_model.predict([preprocessed_comment])[0])
        return rating_prediction, toxicity_prediction

    Codeium: Refactor | Explain | Generate Docstring | ×
    def save(self) -> None:
        if self.rating_model is None or self.toxicity_model is None:
            raise ValueError("Models are not trained. Please train the models first.")
        joblib.dump((self.rating_model, self.toxicity_model), self.joblib_path)

    Codeium: Refactor | Explain | Generate Docstring | ×
    def load(self) -> None:
        self.rating_model, self.toxicity_model = joblib.load(self.joblib_path)

__all__ = [
    "CommentClassifier"
]
```

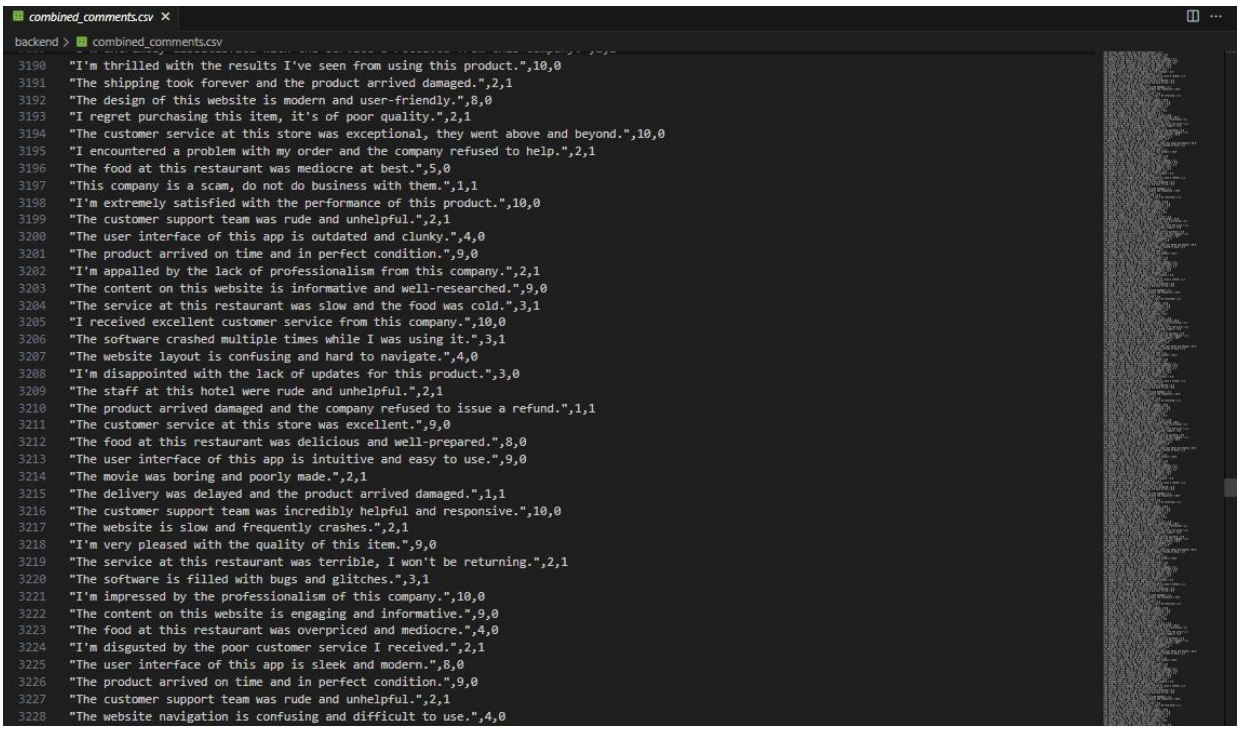
```
class CommentClassifier:
        return ' '.join(tokens)

    Codeium: Refactor | Explain | Generate Docstring | ×
    def train(self) -> None:
        data = pd.read_csv(self.train_data_path)
        data['comment'] = data['comment'].apply(self.preprocess_text)
        x_train, x_val, y_rating_train, y_rating_val, y_toxicity_train, y_toxicity_val = \
            train_test_split(data['comment'], data['rating'], data['toxicity'], test_size=0.2, random_state=self.random_state)
        pipeline_rating = Pipeline([
            ('tfidf', TfidfVectorizer(ngram_range=(1, 2))),
            ('clf', LogisticRegression(max_iter=1000, random_state=self.random_state))
        ])
        pipeline_toxicity = Pipeline([
            ('tfidf', TfidfVectorizer(ngram_range=(1, 2))),
            ('clf', LogisticRegression(max_iter=1000, random_state=self.random_state))
        ])
        param_grid = {'clf__C': [0.1, 1, 10]}
        grid_search_rating = GridSearchCV(pipeline_rating, param_grid, cv=5)
        grid_search_toxicity = GridSearchCV(pipeline_toxicity, param_grid, cv=5)
        grid_search_rating.fit(x_train, y_rating_train)
        grid_search_toxicity.fit(x_train, y_toxicity_train)
        self.rating_model = grid_search_rating.best_estimator_
        self.toxicity_model = grid_search_toxicity.best_estimator_
        rating_train_predictions = self.rating_model.predict(x_val)
        toxicity_train_predictions = self.toxicity_model.predict(x_val)
        print("Rating Model Evaluation:")
        print(classification_report(y_rating_val, rating_train_predictions))
        print("Toxicity Model Evaluation:")
        print(classification_report(y_toxicity_val, toxicity_train_predictions))

    Codeium: Refactor | Explain | Generate Docstring | ×
```

User Toxicity and Review Filter Classifier



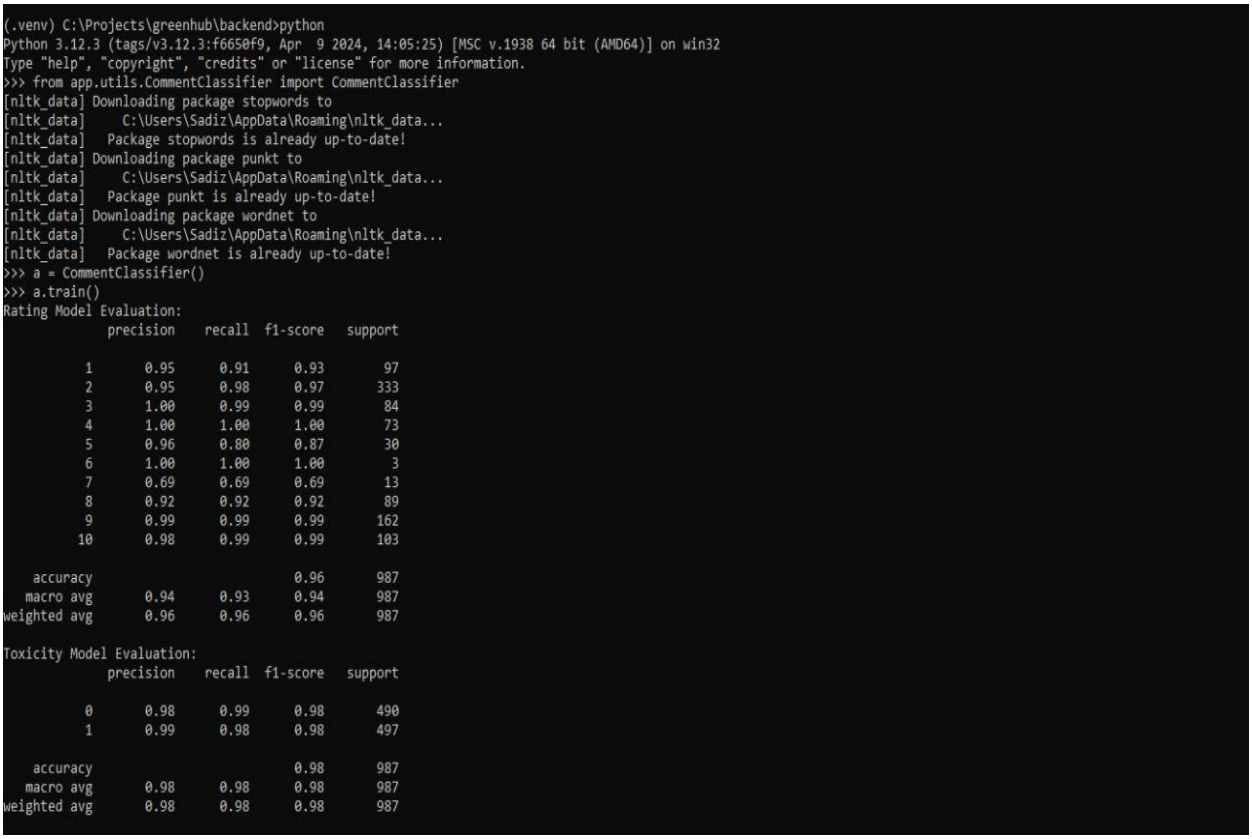
```python
import pandas as pd
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split, GridSearchCV
from sklearn.pipeline import Pipeline
from sklearn.metrics import classification_report
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
from nltk.stem import WordNetLemmatizer
import nltk as nltk
import joblib as joblib
from typing import Tuple, List
nltk.download('stopwords')
nltk.download('punkt')
nltk.download('wordnet')

class CommentClassifier:
    def __init__(self):
        self.train_data_path = "combined_comments.csv"
        self.joblib_path = "trained_comment_classifier.joblib"
        self.random_state = 42
        self.rating_model = None
        self.toxicity_model = None

    def preprocess_text(self, text: str) -> str:
        stop_words = set(stopwords.words('english'))
        lemmatizer = WordNetLemmatizer()
        tokens = word_tokenize(text)
        tokens = [lemmatizer.lemmatize(token.lower()) for token in tokens if token.isalpha() and token.lower() not in stop_words]
```

Trained dataset



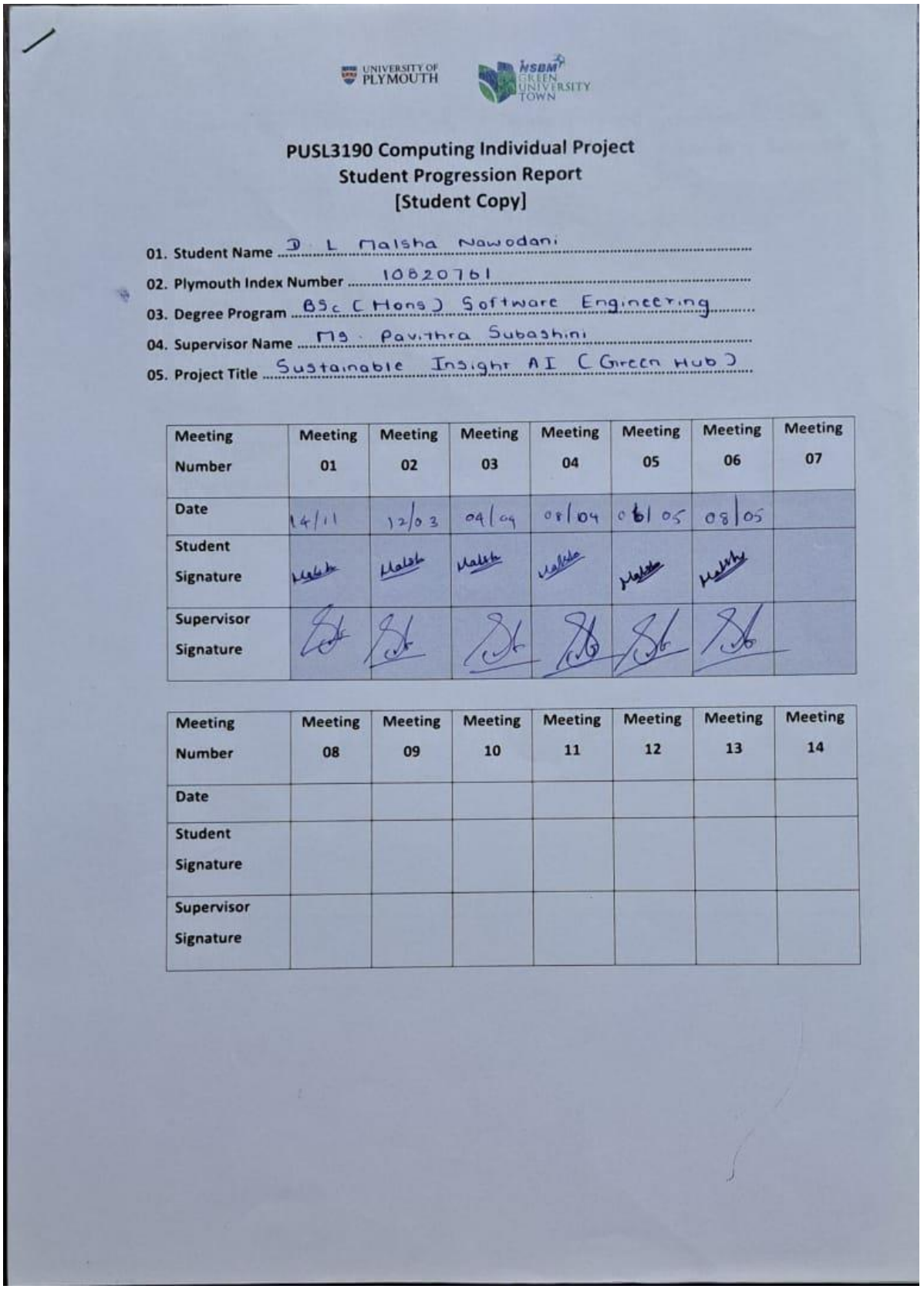
```
"I'm thrilled with the results I've seen from using this product.",10,0
"The shipping took forever and the product arrived damaged.",2,1
"The design of this website is modern and user-friendly.",8,0
"I regret purchasing this item, it's of poor quality.",2,1
"The customer service at this store was exceptional, they went above and beyond.",10,0
"I encountered a problem with my order and the company refused to help.",2,1
"The food at this restaurant was mediocre at best.",5,0
"This company is a scam, do not do business with them.",1,1
"I'm extremely satisfied with the performance of this product.",10,0
"The customer support team was rude and unhelpful.",2,1
"The user interface of this app is outdated and clunky.",4,0
"The product arrived on time and in perfect condition.",9,0
"I'm appalled by the lack of professionalism from this company.",2,1
"The content on this website is informative and well-researched.",9,0
"The service at this restaurant was slow and the food was cold.",3,1
"I received excellent customer service from this company.",10,0
"The software crashed multiple times while I was using it.",3,1
"The website layout is confusing and hard to navigate.",4,0
"I'm disappointed with the lack of updates for this product.",3,0
"The staff at this hotel were rude and unhelpful.",2,1
"The product arrived damaged and the company refused to issue a refund.",1,1
"The customer service at this store was excellent.",9,0
"The food at this restaurant was delicious and well-prepared.",8,0
"The user interface of this app is intuitive and easy to use.",9,0
"The movie was boring and poorly made.",2,1
"The delivery was delayed and the product arrived damaged.",1,1
"The customer support team was incredibly helpful and responsive.",10,0
"The website is slow and frequently crashes.",2,1
"I'm very pleased with the quality of this item.",9,0
"The service at this restaurant was terrible, I won't be returning.",2,1
"The software is filled with bugs and glitches.",3,1
"I'm impressed by the professionalism of this company.",10,0
"The content on this website is engaging and informative.",9,0
"The food at this restaurant was overpriced and mediocre.",4,0
"I'm disgusted by the poor customer service I received.",2,1
"The user interface of this app is sleek and modern.",8,0
"The product arrived on time and in perfect condition.",9,0
"The customer support team was rude and unhelpful.",2,1
"The website navigation is confusing and difficult to use.",4,0
```

AI model training workflow



```
(.venv) C:\Projects\greenhub\backend>python
Python 3.12.3 (tags/v3.12.3:f6650f9, Apr  9 2024, 14:05:25) [MSC v.1938 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> from app.utils.CommentClassifier import CommentClassifier
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\Sadiz\AppData\Roaming\nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\Sadiz\AppData\Roaming\nltk_data...
[nltk_data]   Package punkt is already up-to-date!
[nltk_data] Downloading package wordnet to
[nltk_data]     C:\Users\Sadiz\AppData\Roaming\nltk_data...
[nltk_data]   Package wordnet is already up-to-date!
>>> a = CommentClassifier()
>>> a.train()
Rating Model Evaluation:
              precision    recall  f1-score   support

           1       0.95      0.91      0.93        97
           2       0.95      0.98      0.97       333
           3       1.00      0.99      0.99        84
           4       1.00      1.00      1.00        73
           5       0.96      0.80      0.87        30
           6       1.00      1.00      1.00         3
           7       0.69      0.69      0.69        13
           8       0.92      0.92      0.92        89
           9       0.99      0.99      0.99       162
          10       0.98      0.99      0.99       103

    accuracy                           0.96       987
   macro avg       0.94      0.93      0.94       987
weighted avg       0.96      0.96      0.96       987

Toxicity Model Evaluation:
              precision    recall  f1-score   support

           0       0.98      0.99      0.98       490
           1       0.99      0.98      0.98       497

    accuracy                           0.98       987
   macro avg       0.98      0.98      0.98       987
weighted avg       0.98      0.98      0.98       987
```

12.5 Records of Supervisor Meetings



UNIVERSITY OF PLYMOUTH

NSBM GREEN UNIVERSITY TOWN

PUSL3190 Computing Individual Project
Student Progression Report
[Student Copy]

01. Student Name ..... D L Malsha Nawodani .....
02. Plymouth Index Number ..... 10820761 .....
03. Degree Program ..... BSc (Hons) Software Engineering .....
04. Supervisor Name ..... Ms. Pavithra Subashini .....
05. Project Title ..... Sustainable Insight AI (Green Hub) .....

Meeting Number	Meeting 01	Meeting 02	Meeting 03	Meeting 04	Meeting 05	Meeting 06	Meeting 07
Date	14/11	12/03	04/04	08/04	01/05	08/05	
Student Signature							
Supervisor Signature							

Meeting Number	Meeting 08	Meeting 09	Meeting 10	Meeting 11	Meeting 12	Meeting 13	Meeting 14
Date							
Student Signature							
Supervisor Signature							

Documentations	Proposal	PID	Interim 01	Interim 02	Research Abstract	Final Submission
Date	12/03	12/03	22/03			
Approved (Yes / No)	Request Modification	Request Modification	Yes			
Student Signature						
Supervisor Signature						

Other Comments (Supervisor Use Only)

UNIVERSITY OF PLYMOUTH

Final Year Project – Supervisory meeting minutes

Meeting No: 01

Date : 14.11.2023

Project Title : Sustainable Insight AI (Green Hub)

Name of the Student : D.L Naisha Nawodani

Students ID : 10820761

Name of the Supervisor : Ms. Pavithra Subashini

Items discussed:

- Discussing the project idea and the points that should be included in the project.

Items to be completed before the next supervisory meeting:

- Gothrough the research papers and coming to the conclusion will Greenhub site will helpfull for target Marketing as i was supposing to make my site with sustainable products selling point or selling website

Supervisor (Signature & Date)

Instructions to the supervisor: **Do not sign** if the above boxes are blank.

UNIVERSITY OF PLYMOUTH | NSBM GREEN UNIVERSITY TOWN

Final Year Project – Supervisory meeting minutes

Meeting No: 02

Date : 12 · 03 · 2024

Project Title : Sustainable Insight AI (Green Hub)

Name of the Student : D. L Malsha Nawodani

Students ID : 10820761

Name of the Supervisor : Ms Pavithra Subashini

Items discussed:

Cross check the interium report

Items to be completed before the next supervisory meeting:

Mention the places it should be correct
And inform to show the work that is completed in next supervisor Meeting

Supervisor (Signature & Date)

Instructions to the supervisor: **Do not sign** if the above boxes are blank.

UNIVERSITY OF PLYMOUTH | NSBM GREEN UNIVERSITY TOWN

Final Year Project – Supervisory meeting minutes

Meeting No: 03

Date : 04 · 01 · 2024

Project Title : Sustainabe Insight AI (Green Hub)

Name of the Student : D. L Malsha Nawodani

Students ID : 10820761

Name of the Supervisor : Ms. Pavithra Subashini

Items discussed:

- Discussed about changing the database firebase to Mogo DB Because while developing the database as firebase i get some unsolveble errors that i cannot fixed.
- Disscussed about how to use AI for my project as a chatbot or using views

Items to be completed before the next supervisory meeting:

- Informed that database can changed because the error that I get i cannot fixed it by my own.
- Informed about use best way to use AI to my project.

Supervisor (Signature & Date)

Instructions to the supervisor: **Do not sign** if the above boxes are blank.

UNIVERSITY OF PLYMOUTH | IISBM GREEN UNIVERSITY TOWN

Final Year Project – Supervisory meeting minutes

Meeting No: 04

Date : 05 · 04 · 2024

Project Title : Sustainable Insight AI (Green Hub)

Name of the Student : D. L Malsha Nawodani

Students ID : 10820761

Name of the Supervisor : Ms. Pavithra Subashini

Items discussed:

- disscussed about what are the type of AI i can apply to my project
- After creating the order page a message should be send to the Customer as order is out of to the courier disscuss it will i send that message as sms to mobile or a email.

Items to be completed before the next supervisory meeting:

- Inform to bring Test case that prove objectives

Supervisor (Signature & Date)

Instructions to the supervisor: **Do not sign** if the above boxes are blank.

UNIVERSITY OF PLYMOUTH

Final Year Project – Supervisory meeting minutes

Meeting No: 05

Date : 06 · 05 · 2024

Project Title : Sustainable Insight AI (Green Hub)

Name of the Student : D . L Malsha Nawodani

Students ID : 10820761

Name of the Supervisor : Ms . Pavithra Subashini

Items discussed:

Discussed with maam is it okay to use react istead of Angular because while making the project with angular I got lot of errors that I cannot fix

Items to be completed before the next supervisory meeting:

Asked to bring complete project to the next meeting to check it

Supervisor (Signature & Date)

Instructions to the supervisor: **Do not sign** if the above boxes are blank.

UNIVERSITY OF PLYMOUTH | NSBM GREEN UNIVERSITY TOWN

Final Year Project – Supervisory meeting minutes

Meeting No: 06

Date : 06 . 05 . 2021

Project Title : Sustainable Insight AI (Green Hub)

Name of the Student : D. L Maisha Nowodoni

Students ID : 10820761

Name of the Supervisor : Ms Pavithra Subashini

Items discussed:

The questions that came to me during the report were discussed in the meeting

Items to be completed before the next supervisory meeting:

Complete and show the final report with corrections

Supervisor (Signature & Date)

Instructions to the supervisor: **Do not sign** if the above boxes are blank.

12.6 Testing Report

Test Cas	Test T	Description	Pre Condition	Test Data	EXP Result	Post Con	Act Result	Stat
TS_GH_001	POSITIVE	Go to login page by clicking login Btn	Valid url, test data	click	succ. Redirect	able to see login	succ. Redirect	pass
TS_GH_002	POSITIVE	Enter Valid credentials	Valid url, test data	malsha@greenhub.com Greenhub	succ. Login	able to login to system	succ. Login	pass
TS_GH_003	NEGATIVE	Enter valid email, incorrect password	valid url, test data	malsha@greenhub.com passWrong	error alert	error alert	error alert	pass
TS_GH_004	NEGATIVE	Enter Invalid email, valid passwo	Valid url, test data	haha@greenhub.com passWrong	error alert	error alert	error alert	pass
TS_GH_005	POSITIVE	Register user with sign up	Valid url, test data	valid(fname, lname, email, telephone, password, location, img)	succ. Alert	succ. Alert	succ. Alert	pass
TS_GH_006	NEGATIVE	Register user with sign up	Valid url, test data	invalid (fname, lname), valid(email, telephone, password, location, img)	error Alert	error Alert	error Alert	pass
TS_GH_007	NEGATIVE	Register user with sign up	Valid url, test data	invalid (email), valid(fname, lname, telephone, password, location, img)	error Alert	error Alert	error Alert	pass
TS_GH_008	NEGATIVE	Register user with sign up	Valid url, test data	invalid (telephone), valid(fname, lname,email password, location, img)	error Alert	error Alert	error Alert	pass
TS_GH_009	NEGATIVE	Register user with sign up	Valid url, test data	invalid (password), valid(fname, lname,email telephone, location, img)	error Alert	error Alert	error Alert	pass
TS_GH_010	NEGATIVI	Register user with sign up	Valid url, test data	invalid (location), valid(fname, lname,email telephone, password, img)	error Alert	error Alert	error Alert	pass
TS_GH_011	NEGATIVI	Register user with sign up	Valid url, test data	invalid (img) valid(fname, lname,email telephone, password, location,)	error Alert	error Alert	error Alert	pass
TS_GH_012	POSITIVE	Go to category by clicking zero waste	valid url, test data	click	go to zero waste category	go to zero waste category	go to zero waste category	pass
TS_GH_013	POSITIVE	Go to category by clicking Eco Kitchen	valid url, test data	click	go to eco kitchen category	go to eco kitchen category	go to eco kitchen category	pass
TS_GH_014	POSITIVE	Go to category by clicking Natural beauty	valid url, test data	click	go to natural beauty category	go to natural beauty category	go to natural beauty category	pass
TS_GH_015	POSITIVE	Display cart by clicking cart	valid url, test data	click	display cart	display cart	display cart	pass
TS_GH_016	POSITIVE	Display profile by clicking cart	valid url, test data	click	display profile	display profile	display profile	pass
TS_GH_017	POSITIVE	display product info by clicking view	Valid url, test data	click	display product info	display product info	display product info	pass
TS_GH_018	POSITIVE	add to cart by clicking add to cart	Valid url, test data	quantity - 3, click	Succ. Alert	Succ. Alert	Succ. Alert	pass
TS_GH_019	NEGATIVE	add to cart by clicking add to cart	Valid url, test data	quantity - 0, click	Error Alert	Error Alert	Error Alert	pass
TS_GH_020	POSITIVE	enter keywords and search products by search btn	valid url, test data	"natural bottle"	listed product	listed product	no changes	fail
TS_GH_021	POSITIVE	create product with create product btn	valid url, test data	"category_id": "dd66bee9-edb9-4697-9efb-ad8b2d970e0a", "image": { "content": "base64", "filename": "str" }, "name": "forget", "price": 41.73, "qty_in_stock": 51, "remark": "Only blood start choose traditional exist. These worry card person people full. Door room professor around put.",	succ. Alert	succ. Alert	succ. Alert	pass
TS_GH_022	POSITIVE	Delete Product with Delete Product Btn	valid url, test data	"id": "663a79bb344eefe05b363d84",	succ. Alert	succ. Alert	succ. Alert	pass
TS_GH_023	POSITIVE	View all products with all products btn	valid url, test data	click	all products listed	all products listed	all products listed	pass

12.7 Interview Questions with Answers

(Some of question and answers)

Questions

Do you know that sustainability can be included on consumer behavior pattern?

- yes
- No

What is most preferred method of shopping?

- Online
- Offline
- Both

Do you like sustainable ecosystem products are consider while doing shopping in any preferred method of shopping ?

- Yes
- No

Do you notice any changes in your purchasing behavior during different seasons or holidays ?

- Yes
- NO

Are there specific times of the year when you tend to buy more eco-friendly products ?

- Yes
- No

Do you think when sustainable insight ai will help for the target marketing ?

- Yes
- No

Do you think when sustainable insight ai will help for the target marketing ?

- ◯ Yes
- ◯ No

How important is sustainability to you when making purchasing decisions?

Short answer text

Do you have any suggestions or feedback for improving our e-commerce platform's sustainability offerings?

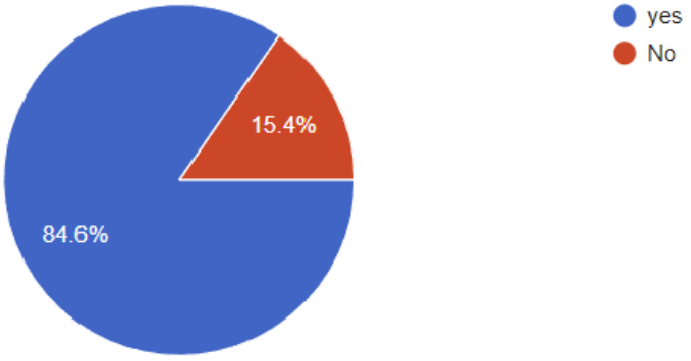
Long answer text

"From your perspective, do you believe that the concept of a sustainable ecosystem can be effectively integrated into the clothing business field, particularly when considering targeted marketing efforts? Please share your thoughts."

Answers

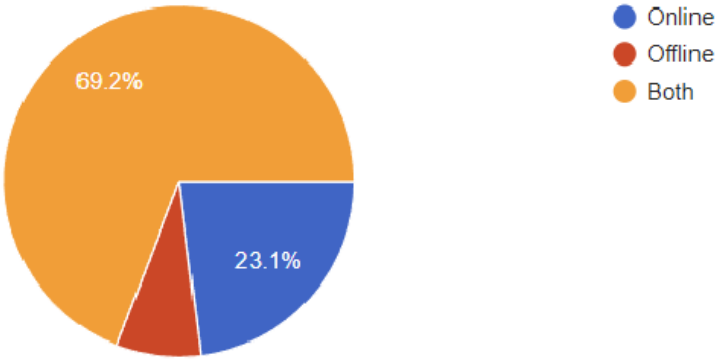
Do you know that sustainability can be included on consumer behavior pattern?

13 responses



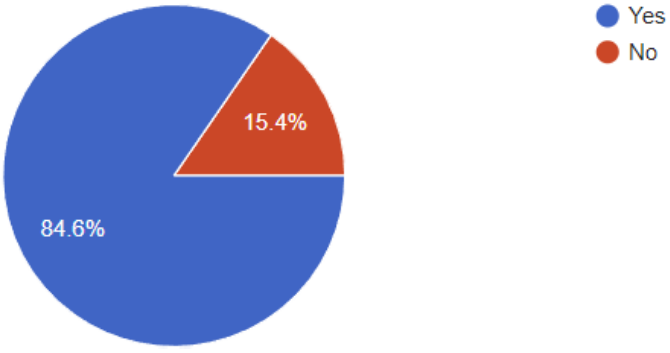
What is most preferred method of shopping?

13 responses



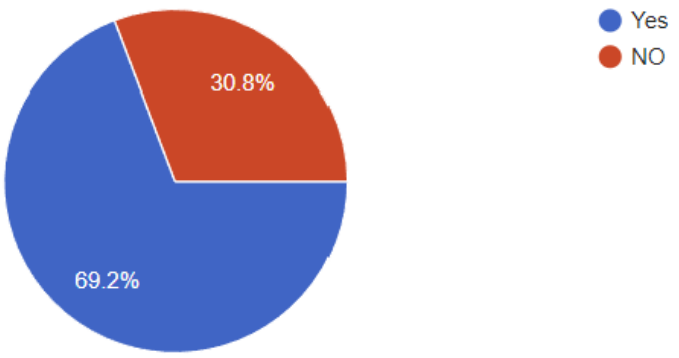
Do you like sustainable ecosystem products are consider while doing shopping in any preferred method of shopping ?

13 responses



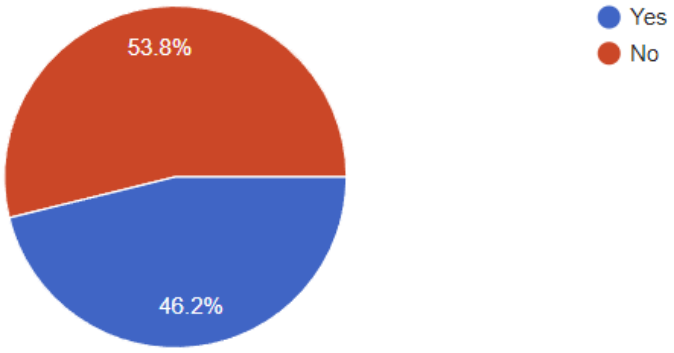
Do you notice any changes in your purchasing behavior during different seasons or holidays ?

13 responses



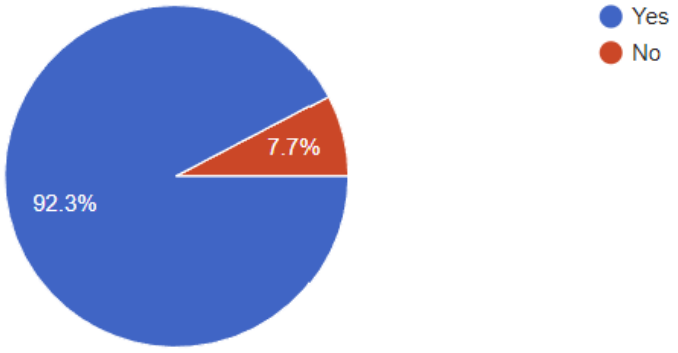
Are there specific times of the year when you tend to buy more eco-friendly products ?

13 responses



Do you think when sustainable insight ai will help for the target marketing ?

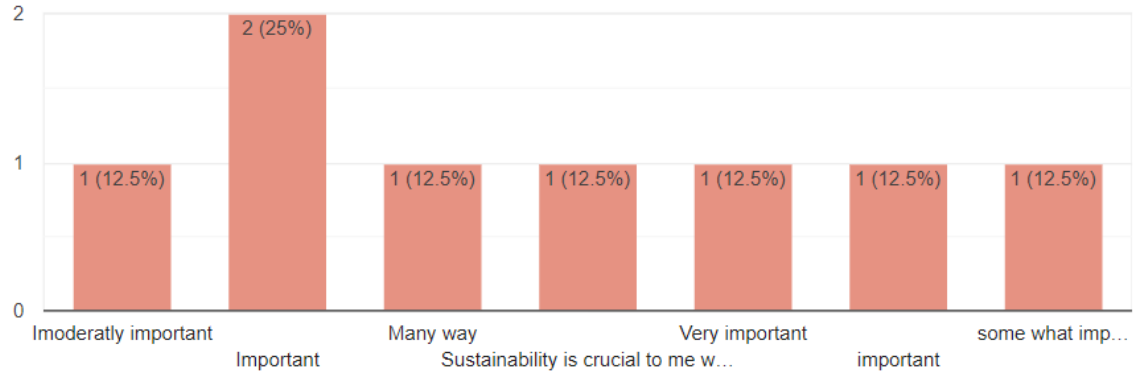
13 responses



How important is sustainability to you when making purchasing decisions?

Copy

8 responses



Do you have any suggestions or feedback for improving our e-commerce platform's sustainability offerings?

8 responses

No

Reduce price

make the response time fast

Make the delivery system fast

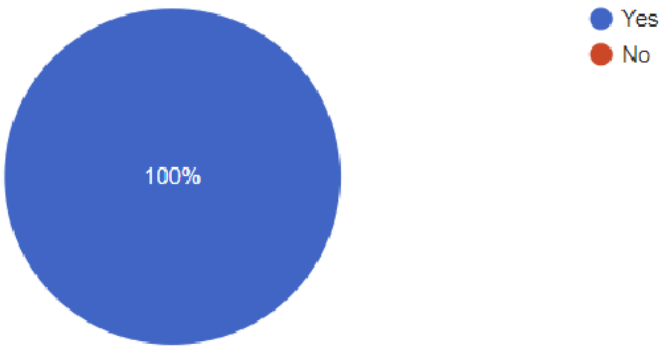
reduce delivery cost.

Minimize packaging waste and offer plastic-free packaging option

No idea

"From your perspective, do you believe that the concept of a sustainable ecosystem can be effectively integrated into the clothing business field, particularly when considering targeted marketing efforts? Please share your thoughts."

10 responses

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