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GreenKart - A Sustainable E-Commerce Platform

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Abstract

In this research paper we are solving how nowadays E-commerce platforms have transformed shopping convenience but have also affected the environment by contributing to carbon emissions, packaging waste, and energy-intensive logistics. Despite growing awareness of sustainability, users often lack visibility into the environmental impact of their purchases. This research presents the GreenKart, a sustainability-aware e-commerce platform designed to promote the eco-friendly decision-making. The platform is built using a scalable architecture with Node.js and React.js and includes a transparency dashboard for tracking environmental impact. In this way GreenKart bridges the gap between awareness and action by integrating sustainability into everyday online shopping.

Keywords: Sustainable E-commerce; Environmental Impact; Carbon Emissions; Packaging Waste

How to Cite This Article

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Introduction

E-commerce has rapidly transformed the way people shop, making it possible to browse and purchase products with just a few clicks in few seconds. While this convenience has greatly improved the user experience, it has also contributed to growing environmental concerns such as increased carbon emissions, excessive packaging waste, and energy-intensive logistics operations. As online shopping continues to expand more in future, these issues are becoming increasingly difficult to ignore and it becomes important to create sustainable options for the users.

At the same time, awareness of sustainability is slowly increasing among consumers. Many users express a preference for the eco-friendly products; however, their actual purchasing decisions are still largely influenced by the price and the convenience. One of the main reasons for this gap is the lack of clear and accessible information about the environmental impact of products. Most ecommerce platforms do not present this information in a way that is easy for users to understand or act upon.

Another important challenge is the lack of motivation. Even when the sustainable alternatives are available, users are rarely encouraged to choose them. There is limited feedback, minimal visibility into the impact of their decisions, and almost no benefits to promote eco-friendly behavior. As a result, good intentions often do not translate into real actions.

To address these challenges, this paper presents GreenKart, this is a sustainability-aware e-commerce framework designed to integrate environmental considerations directly into the shopping experience. The platform assigns a Green Score to each product based on the lifecycle assessment (LCA) metrics, including carbon footprint, energy and water usage, recyclability, packaging, and ethical sourcing. This provides users with a clearer understanding while shopping online about the environmental impact of their choices.

In addition, GreenKart incorporates a hybrid recommendation system that suggests more sustainable alternatives based on user preferences and behavior. A gamification layer is also introduced, allowing users to earn the points and the badges for making environmentally responsible decisions, thereby encouraging consistent sustainable behavior.

Overall, the goal of this work is not only to inform users but also to guide them toward more responsible purchasing decisions. By combining transparency, intelligent recommendations, and user incentives, the GreenKart aims to bridge the gap between environmental awareness and actual consumer behavior.

Methodology

The proposed system, GreenKart, is designed using a MERN stack architecture (MongoDB, Express.js, React.js, Node.js) to ensure scalability, flexibility, and efficient data processing. The system integrates the sustainability analysis into the e-commerce workflow to support the environmentally responsible decision-making.

Sustainability-related data of all the products is collected from multiple sources, including lifecycle assessment (LCA) databases, supplier APIs, and carbon intelligence platforms. This data is then processed through Node.js and Express.js-based RESTful APIs and stored in the MongoDB Atlas using structured and semi-structured schemas. Mongoose is used for efficient data modeling and interaction with the database.

Fig. 1. *GreenKart System Workflow*

A core component of the system is the Scoring Engine, the Scoring Engine calculates a Green Score for each product on a scale of 0 to 100. The score is computed using various different environmental parameters such as carbon footprint, energy consumption, recyclability, packaging, and ethical sourcing.After which Rule-based algorithms are applied, with the potential integration of machine learning models for improved accuracy over time.

The system also incorporates an Incentive Module that rewards users with the Green Points and the badges for making sustainable

choices. JWT-based authentication is used in the project which ensures secure user management, while real-time updates of the website can be supported using Socket.io.

The front-end interface is developed using React.js, provides a Transparency Dashboard which includes all the details of how a product is made and what all the resources have been used during manufacturing of the product and this dashboard visualizes sustainability metrics and user impact. Overall, the workflow involves data collection, score computation, user interaction, and reward allocation, which enables a seamless and eco-conscious shopping experience.

Results And Discussion

The proposed GreenKart system was evaluated using tested product datasets to analyze its effectiveness for the users in promoting sustainable choices. The Scoring Engine successfully generated meaningful Green Scores for all the products based on environmental parameters, which enables clear comparison between the products. The recommendation module effectively suggested eco-friendly alternatives without hindering the user experience. Additionally, the Incentive Module demonstrated potential in encouraging repeated sustainable purchases through reward-based engagement. The Transparency Dashboard provided users with clear and intuitive visual insights into their environmental impact, making it easier for them to understand how their purchasing decisions in e-commerce affect the sustainability. By presenting data in a simple and engaging manner, users were able to track their eco-friendly actions and the overall contribution more effectively.

Overall, the system demonstrated promising results in bridging the gap between sustainability awareness and actual purchasing behavior of the customers. It not only informed users but also encouraged them to make more responsible choices for the environment through visibility and engagement. These findings highlight the potential of GreenKart for real-world implementation, where such features can actively influence consumer behavior toward more sustainable practices.

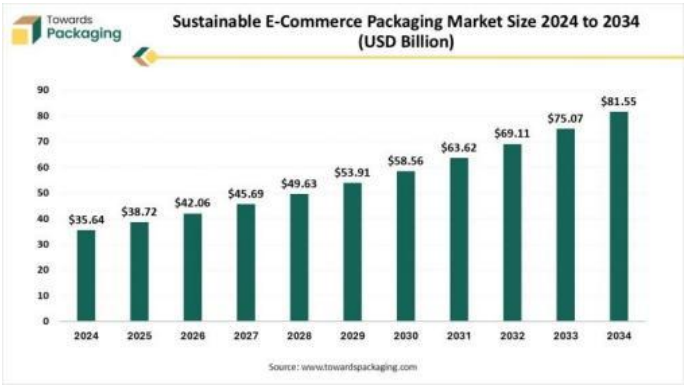

***Fig. 2**. Ecommerce Market Size*

Conclusion

This paper presented GreenKart, which is a sustainability-aware ecommerce platform designed to promote environmentally responsible purchasing behavior of the customers. By integrating a Green Score based on lifecycle assessment metrics, the system provides users with clear insights into the environmental impact of products. The inclusion of a recommendation system in the website and benefit-based gamification further encourages users to choose eco-friendly alternatives for them and thus helps to prevent the environment. The Transparency Dashboard enhances user awareness and provided a clearer view by visualizing individual sustainability impact. Overall, GreenKart successfully combines technology, data, and user engagement to bridge the gap between sustainability awareness and action. The proposed system demonstrates strong potential for real-world implementation and can contribute to more sustainable consumer practices.

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Conflict of Interest Statement

The authors declare that they have no known competing financial or personal interests that could have appeared to influence the work reported in this paper.

References

1. J. Nielsen. Sustainability in E-commerce: Trends and Challenges. *Journal of Cleaner Production*, 2020, 256, 120–135.
2. A. Kumar, R. Singh. Environmental Impact of Online Shopping Logistics. *International Journal of Sustainable Engineering*, 2021, 14, 210–225.
3. EcoInvent Database. Lifecycle Assessment Data for Environmental Analysis; EcoInvent Centre: Switzerland, 2022.
4. United States Life Cycle Inventory (US LCI) Database. National Renewable Energy Laboratory, 2021.
5. Climatiq API. Carbon Intelligence Platform for Emission Calculations. https://www.climatiq.io
6. MongoDB Inc. MongoDB Atlas Documentation. https://www.mongodb.com
7. Node.js Foundation. Node.js Documentation. https://nodejs.org
8. React Documentation. Meta Platforms, Inc. https://react.dev
9. R. Burke. Hybrid Recommender Systems: Survey and Experiments. *User Modeling and User-Adapted Interaction*, 2002, 12, 331–370.
10. S. Deterding et al. Gamification: Using Game Design Elements in Non-Gaming Contexts. *Proceedings of CHI Conference*, 2011, 2425–2428.