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E-COMMERCE REQUIREMENT ANALYSIS AND DESIGN WITH FOGG BEHAVIOR MODEL (FBM)

Fauziah Ahmad[1*], Syafiyana Elysha Asmadi[2], and Norjansalika Janom[3]

[1,2,3]Faculty of Computer and Mathematical Sciences.Universiti Teknologi MARA (UiTM), 40450 Shah Alam, Selangor*

[1*]fauziaha@uitm.edu.my, [2]syafiyanae@gmail.com, [3]norjansalika@uitm.edu.my

ABSTRACT

E-commerce platforms often struggle to convert user visits into meaningful actions, and this paper explores how the Fogg Behavior Model (FBM) can be used to design a more effective e-commerce (EC) platform. FBM focuses on three key factors that influence user behavior: motivation, ability, and triggers. It offers a structured framework for designing systems that not only meet functional needs but also enhance user engagement and actions. The Web Development Life Cycle (WDLC) method was employed to develop an EC platform for Carro Empire, a small business enterprise that wanted to improve its EC platform to attract and expand its existing business. During the analysis and design stage of the WDLC methodology, FBM elements were incorporated as part of the EC development. It involved stakeholder interviews, thematic analysis, and content mapping of user needs to FBM elements during the analysis and was translated into user/stakeholder requirements and design. Motivation was addressed through features like 3D product views, customer reviews, and urgency cues; ability was enhanced via simplified navigation, search filters, and integrated payment options; and triggers were implemented through contextual prompts and real-time notifications. System models, including use case diagrams and UI mockups, were developed and validated by the business owner. A working prototype was developed, and positive feedback was received from the business owner, showing that FBM helps create a more user-friendly and persuasive online shopping experience. This study helps to contribute to the field of persuasive system design by demonstrating how behavioral models can be practically applied in system development. For future work, the study recommends conducting user testing, such as surveys or A/B testing, to measure how FBM-based features impact customer behavior and improve the system further. The integration of advanced technologies such as WebGL for interactive 3D models is also recommended to further enhance user engagement.

Keywords: *Design, E-Commerce, Fogg Behavior Model, Persuasive and System Requirements.*

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1. Introduction

Today, e-commerce has evolved from a competitive advantage into a fundamental necessity for retail businesses. The rapid advancement of internet technologies and increased consumer expectations have transformed how products are searched, evaluated, and purchased. Consumers nowadays want convenience, personalization, and instant access, which are lacking in the traditional brick-and-mortar business. As a result, e-commerce platforms have

become essential and important for businesses, especially retailers, not only to expand their market reach but also to remain relevant in an increasingly digital-first economy.

For retail businesses to survive and thrive, especially small and medium enterprises (SMEs), the implementation of digital transformation is compulsory. The COVID-19 pandemic further drove this need, without which a business cannot survive. In this context, e-commerce is not merely a sales channel. It is a strategy that enables retailers to adapt to changing market dynamics, reduce operational costs, and engage with customers beyond geographical boundaries (Qian, 2025) (Aziz et. al, 2024).

However, launching an e-commerce platform is not solely about digitizing transactions. Customer retention — the ability to keep customers returning — is a critical success factor. Studies have shown that retaining existing customers is significantly more cost-effective than acquiring new ones (ibid). To achieve this, businesses must understand and respond to customer behavior, which includes motivations, preferences, and decision-making patterns. A good e-commerce system must therefore be designed to incorporate customer behavioral insights, thereby ensuring successful customer retention in the business.

Incorporating behavioral models into the design and requirement gathering process of an e-commerce system allows the platform to not only function efficiently but also influence and sustain user engagement. This paper explores how the Fogg Behavior Model (FBM) — a framework that explains behavior through the convergence of motivation, ability, and triggers — can be applied as a foundation for gathering requirements and designing persuasive e-commerce systems, with a focus on the retail automotive accessories sector, Carro Empire.

Carro Empire is a small business based in Selangor, Malaysia, that sells car accessories for both general car owners and modification fans. Established in 2019, the business began operations online through Facebook and later expanded to Shopee and TikTok Shop to reach a wider audience. In 2022, Carro Empire opened its first physical store to support local customers and manage inventory. Despite this expansion, the business remains highly dependent on third-party e-commerce platforms. To improve customer service and long-term sustainability, Carro Empire aims to gain more control over its digital presence, particularly in supporting customers before and after purchases. As a stakeholder of this study, Carro Empire helps us to apply theoretical models in a real-world business context, gaining practical insights into user behaviors and system requirement elicitation. In return, this study provided Carro Empire access to a more persuasive and user-centered e-commerce platform design (a prototype version).

2. Literature Review

The Fogg Behavior Model (FBM), developed by B.J. Fogg in 2009, is a psychological framework designed to explain how human behaviors can be influenced through technology. The model emphasizes that a behavior will occur only when three elements— motivation, ability, and a trigger — happen at the same moment. If any of these components is absent or insufficient, the behaviors will not happen (Fogg, 2009). Originally conceived for persuasive technology design, FBM has since been widely adopted in digital system development, particularly in domains where user engagement and decision-making are critical, such as e-commerce (Lin, 2023; Rahil, 2023).

In the information systems domain, FBM serves as a good tool for requirement elicitation and system design (Behavior Design Lab, nd; Li et al., 2023). The FBM is useful in the analysis and design of persuasive technologies. It provides a structured approach through which user behavior can be analysed and influenced, thus enabling developers to align system features with behavioral drivers, ensuring that the E-commerce platform not only meets functional requirements but also influences user actions effectively (Oinas-Kukkonen &

Harjumaa, 2008; Mehta, 2019), such as completing a purchase or signing up for a service. This behavior-centric approach is especially valuable in e-commerce, where user motivation, ease of use, and timely prompts directly impact conversion rates.The three FBM elements (motivation, ability, triggers) can be directly translated into system requirements for an e-commerce platform (Toledo et al., 2018).

- Motivation is influenced by emotional design, trust signals, urgency cues, and social proof. Features such as 3D product views, customer reviews, and limited-time offers enhance motivation by reducing uncertainty and increasing perceived value (Zimmermann et al., 2022; Roethke et al., 2020).
- Ability element highlights the user's capacity to perform actions with minimal effort. Simplified navigation, intuitive interfaces, and seamless checkout processes improve the ability by reducing friction. Examples include search filters, auto-filled forms, and integrated payment options (Dong et al., 2023; Li et al., 2022)
- Triggers are cues that prompt users to act. In digital systems, triggers include call-to-action buttons, pop-up reminders, and onboarding tooltips. Effective triggers are context-sensitive and aligned with the user's current motivation and ability (Fogg, 2009; Dong et al., 2023).

To implement FBM in system development, especially in e-commerce, behavioral insights can be integrated into the requirement analysis phase (Mehta, 2019. This involves identifying user needs, mapping user journeys, and designing wireframes that embed FBM principles (Shah, 2025).

3. Theoretical and Conceptual Framework

This study adopts a structured approach to system development by integrating the Web Development Life Cycle (WDLC) (Sarkar, 2018) with the Fogg Behavior Model (FBM) to guide the design of a persuasive e-commerce platform for Carro Empire, a retail business specializing in automotive accessories.

Research Design

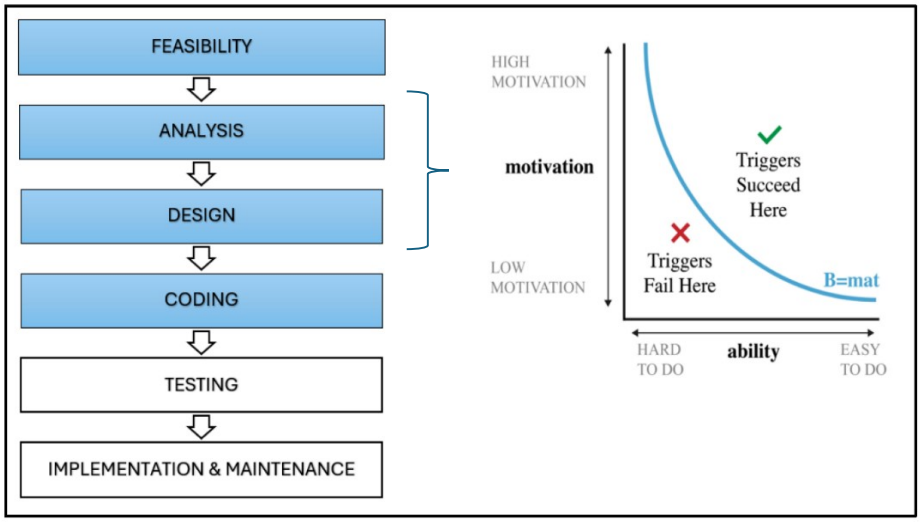

Figure 1. Adapted Web Development lifecycle phases with Fogg Behavior Model (Source: Sarkar, 2018; He et al., 2019)

This study follows a four-phase adaptation of the WDLC: Feasibility, Analysis, Design, and Coding.

1. Feasibility Phase: Preliminary interviews were conducted with the business owner and a customer to identify operational challenges and digital gaps. This phase also included a literature review and benchmarking of existing e-commerce platforms to establish a theoretical and practical foundation.
2. Analysis Phase: Requirements were gathered through stakeholder interviews and analysed using a content-based mapping technique aligned with FBM. Keywords from literature were categorized under FBM's three elements— Motivation, Ability, and Trigger —to ensure that both functional and non-functional requirements support persuasive user behavior.
3. Design Phase: System models, including use case diagrams, activity diagrams, and user interface mockups, were developed. The UI was designed to incorporate FBM principles, such as 3D product views (to enhance motivation and ability) and contextual prompts (to serve as triggers). Stakeholder feedback was used to validate the design.
4. Coding Phase: A functional prototype was developed using tools such as Visual Studio Code, Figma, and XAMPP. The prototype integrates features mapped to FBM elements and was validated by the business owner to ensure alignment with operational needs and user expectations.

FBM in the Web Development Life Cycle

FBM was embedded throughout the methodology to guide requirement elicitation and system behavior design, such as:

- Motivation: Features like product reviews, urgency cues, and immersive visuals were prioritized.
- Ability: Simplified navigation, clear product information, and seamless checkout processes were emphasized.
- Triggers: Timely call-to-action buttons and reminder prompts were strategically placed to encourage user action.

Based on the identified features, design and development were carried out.

4. Findings and Discussion

The findings are structured around three key phases: analysis, design, and development.

Requirement Analysis and FBM Mapping

Stakeholder interviews were conducted with the business owner of Carro Empire and a returning customer. The responses were analysed using a content-based thematic approach, where keywords were mapped to the three FBM elements: Motivation, Ability, and Trigger.

- Motivation: Users expressed the need for features that build trust and urgency, such as 3D product views, customer reviews, discount vouchers, and countdown timers. These elements enhance emotional engagement and perceived value.
- Ability: The most dominant theme, which emphasizes the need for ease of use, easy navigation, and simplified processes. Features such as product filters, search functionality, simplified checkout, and integrated payment options were prioritized.
- Trigger: Users emphasized the importance of timely prompts and confirmations, including order updates, stock alerts, and promotional notifications.

Table 1. Analysis Of Interview with Business Owner Using FBM Keywords

Analysis	Theme	FBM
Filtering by category, car model, and price is helpful because it makes it easy to find products.	Ease of use, Simplicity of navigation	Ability
Searching by name or keyword is essential.	Ease of use, Quick access to info, Simplicity of navigation	Ability
Wants product categories like steering wheels and gear shifters. It would look neat and easy to look for products	Ease of use, Product organization	Ability
Wants a section to display discounted items.	Ease of use, Simplicity of navigation, Quick access to info	Ability
Stakeholder wants the product images and descriptions as well as 3D product viewing, as it would help customers better understand the product.	Product confidence, Visual assistance, Product Assurance	Motivation
Customer would be required to login into their account to complete their order, but the registration and login process should be very quick, easy, simple and intuitive.	User Interface Design, Ease of use, Simplicity of ordering	Ability
Customer would be required to register for an account to complete their order, but the registration and login process should be very quick, simple and intuitive.	User Interface Design, Ease of use, Simplicity of ordering	Ability
Customers should be able to save items in the cart for later.	Shopping Flexibility	Ability
The stock alert feature is helpful because it creates pressure to buy.	Scarcity/Urgency	Motivation
Shipping costs and total costs should be visible before checkout.	Auto-calculated pricing, Price transparency	Ability
Wants to offer vouchers at checkout so that the product feels worth buying at a lower price	Perceived value	Motivation
Prefers using FPX for online payments.	Simplicity of ordering, Integrated payment options	Ability
Customers should get a receipt and summary by email.	Order confirmation prompt	Trigger
Customers should track the order status in their account.	Ease of use, Order history access	Ability
Saving multiple shipping addresses would help.	Simplicity of ordering, Ease of use	Ability
Customers should be able to change passwords and update their accounts easily.	Account Control	Ability
Supports customer reviews for feedback and guidance to other buyers.	Product confidence, social proof	Motivation

Analysis	Theme	FBM
Real-time dashboard, track reports	Efficient admin tools/Admin efficiency & Ease of use	Ability
Real-time sales and order history on the admin dashboard would be useful.	Ease of use, Efficient admin tools / Admin efficiency	Ability
Exporting reports to Excel or PDF would be helpful.	Efficient admin tools/Admin efficiency	Ability
Wants banners or featured products on the homepage to attract attention.	Visual promotion	Trigger
Admin should be able to set start and end dates for promotions.	Efficient admin tools / Admin efficiency	Ability
Countdown timers on promos to encourage faster purchases.	Scarcity/Urgency	Motivation
Wants the system to send order, payment, and shipping notifications.	Order confirmation prompt, Email/SMS order updates	Trigger
Prefers to edit product details directly within the product list to save time and avoid opening new pages.	Ease of use / Admin efficiency	Ability
Wants the system to show a confirmation prompt before deleting to prevent accidental removals.	Order confirmation prompt	Trigger
Prefers to be able to update orders to maintain full control over order processing.	Admin efficiency	Ability
Customers would be required to login into their account to complete their order, but the registration and login process should be very quick, easy, simple and intuitive.	User Interface Design, Ease of use, Simplicity of ordering	Ability

Table 2. Analysis of interview with Customer using FBM keywords

Analysis	Theme	FBM
Prefers filters by car model, customer ratings, real images, and product comparison.	Quick access to info & Decision Support	Ability
Agrees that filters by category, price, and popularity help.	Ease of use, Simplicity of navigation, Quick access to info	Ability
Prefers both descriptions and images for clarity.	Product Clarity, Decision support	Ability
Customers always read and check product details, reviews and pictures to understand the product; message the seller when unclear.	Product confidence	Motivation
Prefers physical store for touch/feel, but online is more practical.	Product confidence	Motivation
Feels confident buying online only with reviews and clear details.	Product confidence	Motivation
Finds 3D product view helpful in making decisions.	Product confidence, visual assistance, and persuasive content	Motivation

Analysis	Theme	FBM
Prefers creating an account to track order history.	Order history access	Ability
Add to cart first to compare and think before paying. Sometimes uses the "buy now" button	Shopping Flexibility	Ability
Would use loyalty programs or promo codes so that the product could be bought at a lower price, which would be worth more.	Perceived value	Motivation
Wants to see the total cost, including shipping, before payment.	Auto-calculated pricing/ Price transparency	Ability
Always look for discount codes before buying.	Perceived value	Motivation
Prefers using FPX for online payments.	Simplicity of ordering, Integrated payment options	Ability
Real-time order updates are important.	Timely reminders	Trigger
Prefers email notifications, not WhatsApp, to avoid clutter.	Email/SMS order updates	Trigger
Wants to view order history in the account.	Order history access	Ability
Wants to save delivery info for faster checkout.	Checkout Efficiency	Ability
Wants the option to change password and update info.	Account Control	Ability
Wants to save multiple shipping addresses.	Simplicity of ordering, Ease of use	Ability
Wants the product's wish list feature.	Shopping flexibility	Ability
Wants an FAQ section to find answers faster.	Quick access to info	Ability
Wants to receive updates on promotions and sales.	Engagement Triggers	Trigger

Table 1 and Table 2 summarize the content based mapping analysis. Based on the analysis, functional requirements were identified from the owner and customer, covering features such as:

- Product browsing (filters, categories, search)
- Product detail viewing (3D viewer, reviews)
- Account management (registration, login, order history)
- Checkout and payment (voucher support, FPX integration)
- Admin tools (dashboard, product and order management)

Additionally, non-functional requirements were also defined to ensure system security, usability, and reliability. These included secure login, friendly and persuasive UI design, and confirmation prompts for critical actions. The requirements were translated into a set of use cases for both customer and admin interactions.

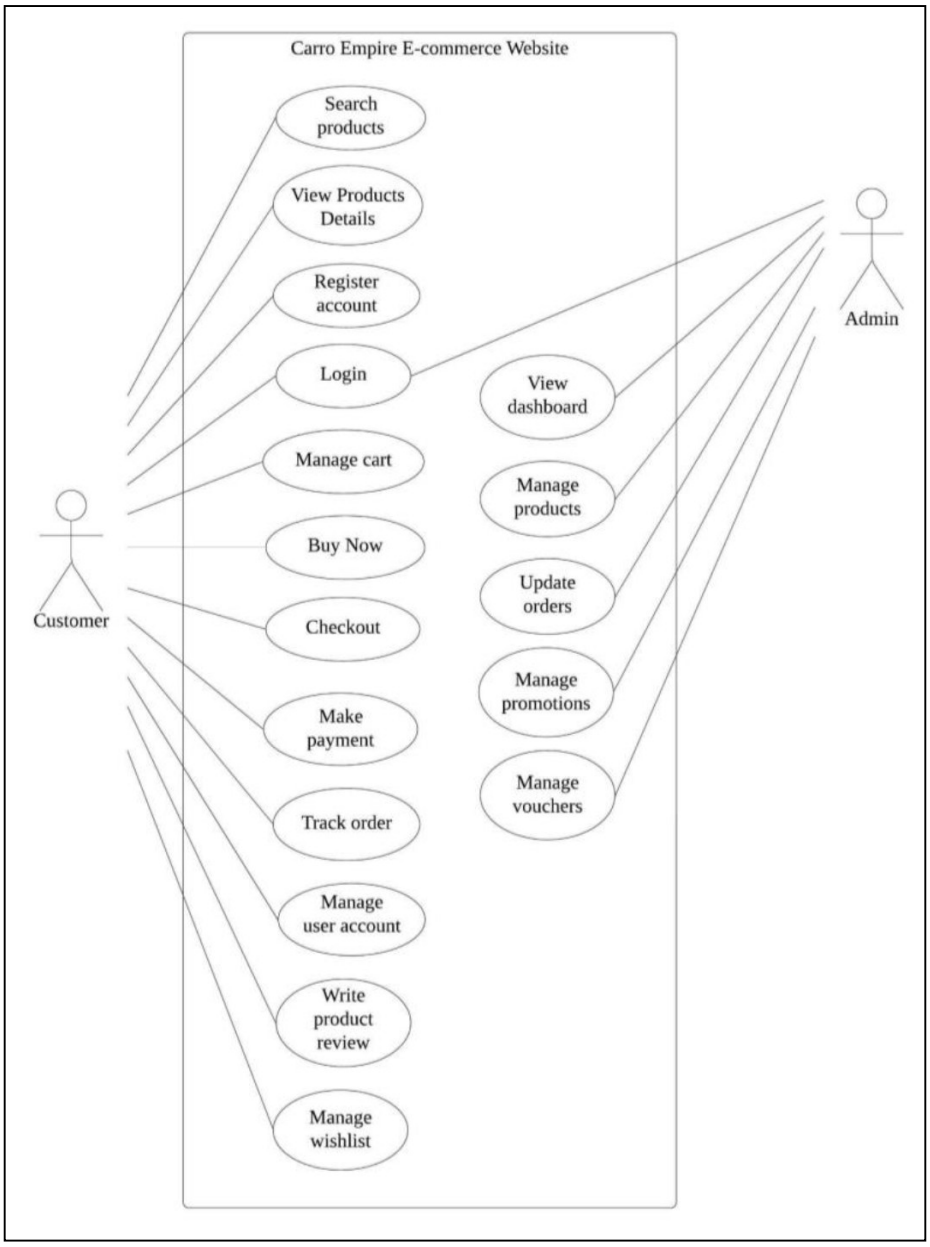

Figure 2. Use Case Diagram

Design

Based on the identified features, wireframes and mockups were created with Figma to illustrate essential pages and workflows, facilitating early validation of layout, content arrangement, and feature accessibility. A user interface design verification session was conducted with Carro Empire's business owner at the end of the design phase. Both the customer and admin interface designs were provided for assessment during this session. This verification aimed to confirm that the visual layout, navigation flow, and proposed functionality effectively represented the previously acquired business requirements. A formal verification document was completed and signed by the stakeholder, affirming that the design aligned with his expectations and highlighting any aspects necessitating improvement. Proceeding from this, the development of the EC was carried out.

Prototype Development and Validation

A functional prototype was developed based on the identified requirements and validated by the business owner. The system includes admin pages such as the dashboard (Figure 3), and pages for managing products (Figure 4), orders (Figure 5), promotions (Figure 6), and vouchers (Figure 7),

Also included are the customer-facing interfaces (Figure 8) with specifically designed 3D product views (Figure 9), a wish list, and real-time order tracking (Figure 10). as shown in the following figures.

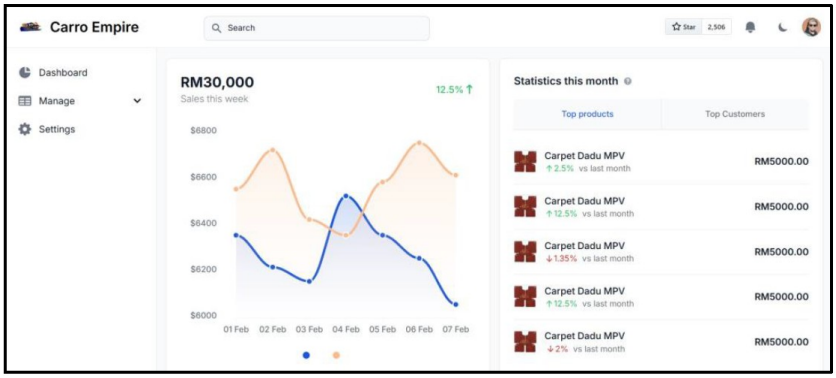

Figure 3. Admin Dashboard

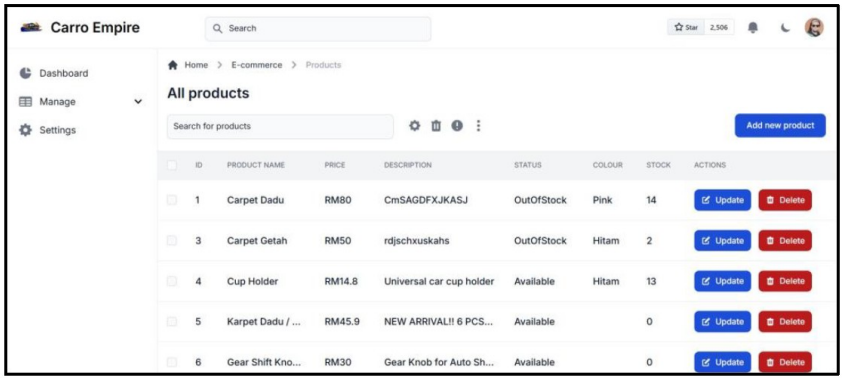

Figure 4. Product Management page

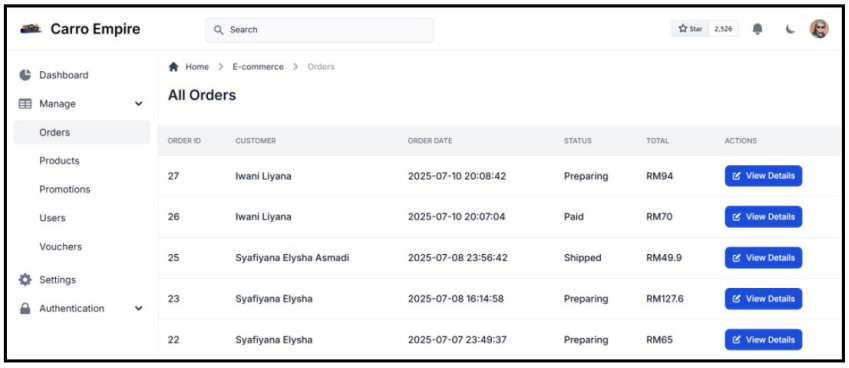

Figure 5. Order Management page

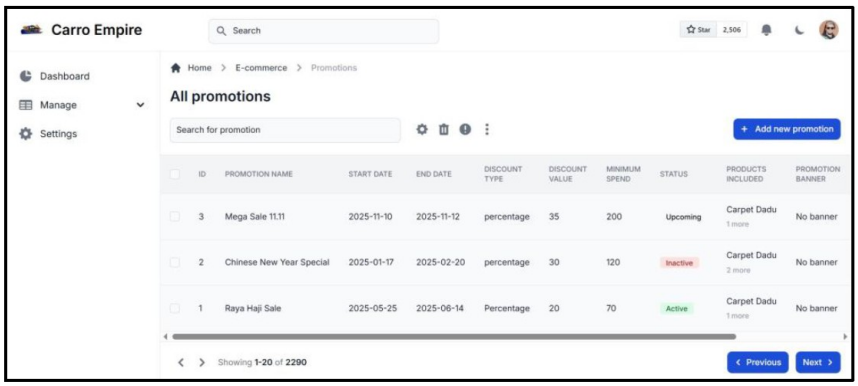

Figure 6: Promotion Management page

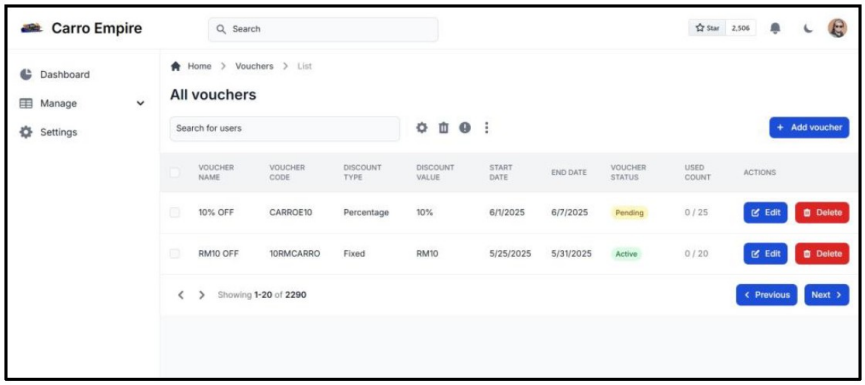

Figure 7: Voucher Management page

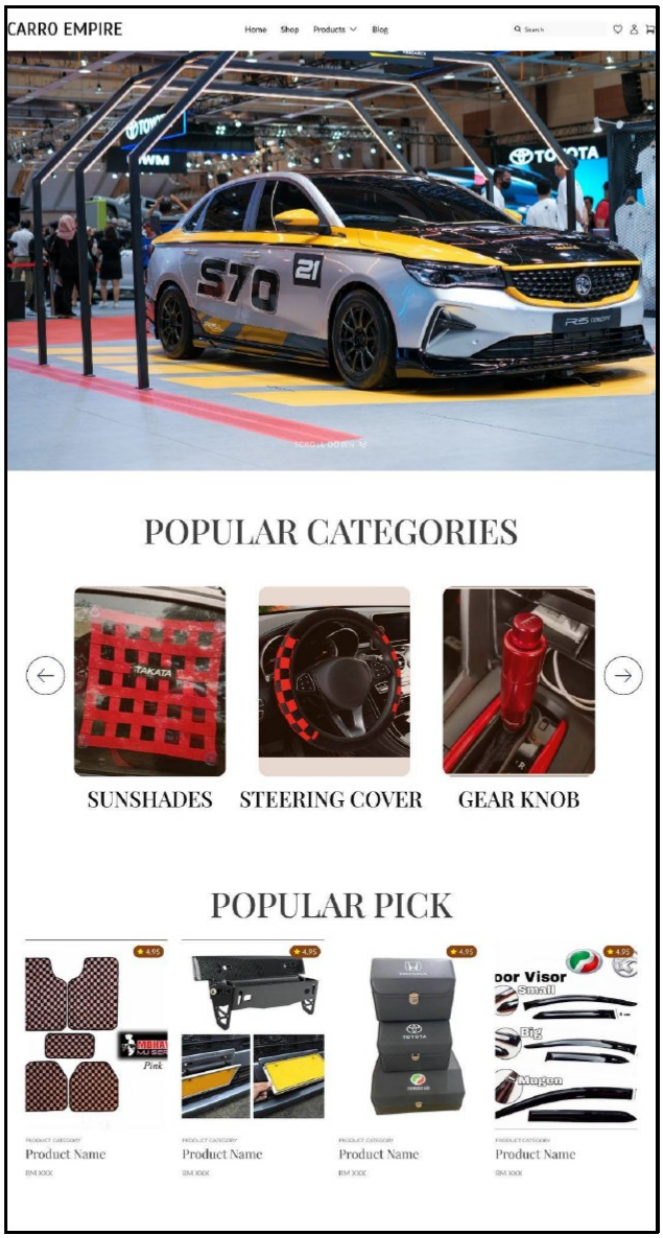

Figure 8. Main User Interface

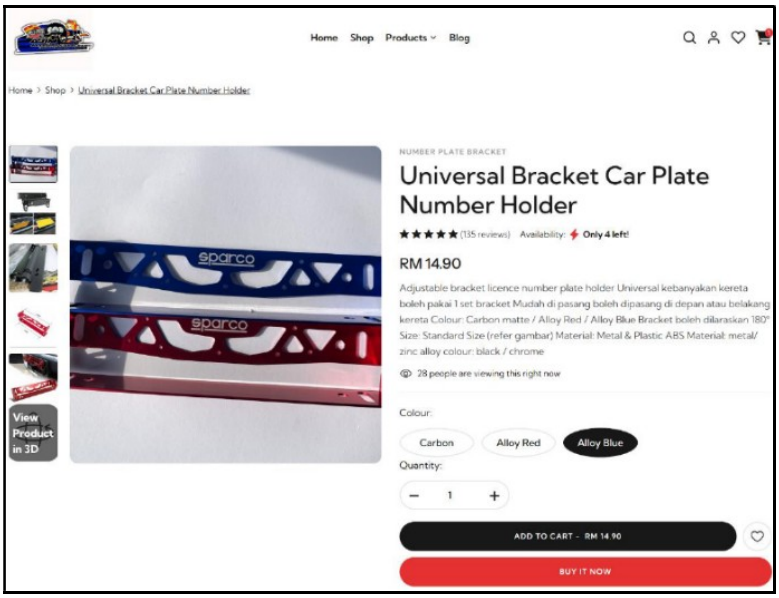

Figure 9. 3-D Product View (rotatable on mouse-over)

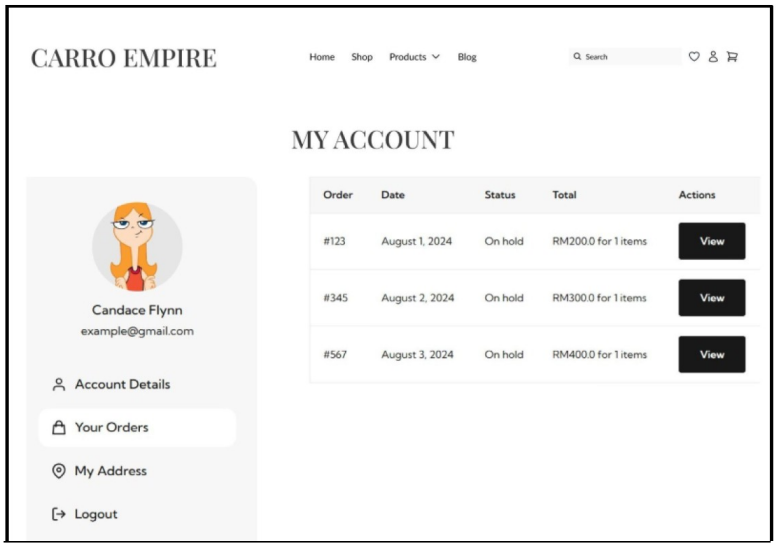

Figure 10 (a). Order Summary

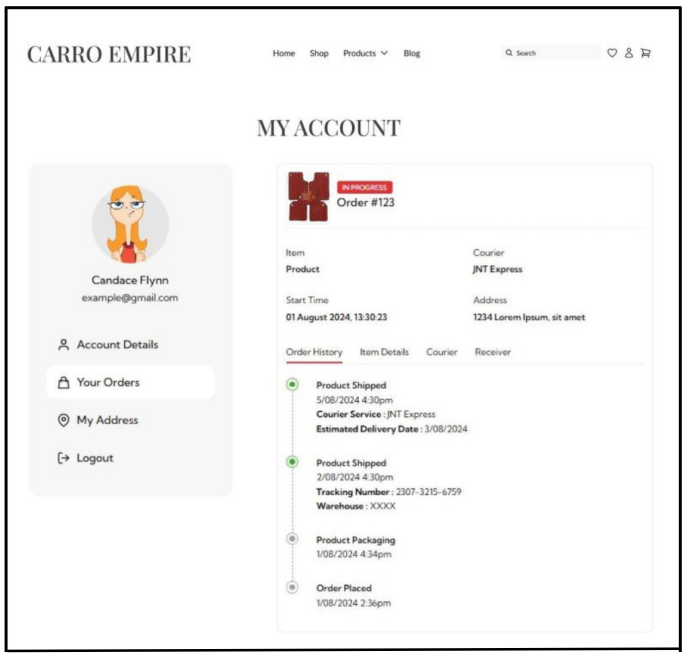

Figure 10 (b): Order Tracking

The prototype was positively received, with minor feedback incorporated into the final iteration. The validation with the stakeholders confirmed that the system met both business and user expectations.

The findings show that using the Fogg Behavior Model (FBM) in designing an e-commerce website can help to improve user experience and engagement, as the users and stakeholders anticipated. By focusing on motivation, ability, and triggers, the system was able to include features that make it easier and more attractive for users to browse and buy products. For example, 3D product views and customer reviews helped users feel more confident to make a purchase, while simple navigation and payment options made the process smoother. Real-time notifications and prompts also encouraged users to take action at the right time. The feedback from the business owner was positive, showing that the system fulfils the expectations. This approach is useful especially for small businesses that want to build their own e-commerce platform and reduce dependence on third-party apps.

5. Recommendation and Conclusion

The E-commerce website will help to strengthen Carro Empire's online presence by utilising the FBM and innovative capabilities such as 3D product viewing. This EC development, however, could not be validated with the existing customers due to the implementation and operational restrictions. Therefore, further user testing and behavioral analysis are recommended to be carried out to evaluate the influence of motivation, capability, and trigger on user decision-making. Instruments such as surveys, heatmaps, or A/B testing may be utilised to assess efficacy and enhance the persuasive components of the website. Besides that, this EC development also established a basis for future technology development or integration, such as the use of interactive 3D models that are supported by technologies such as WebGL or Three.js.

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Author Contribution

While the findings originated from the author's 2 projects, the journal paper is conceptualized, synthesized, framed and written by author 1. Author 3 provided ideas and guidance for authors 1 and 2 in the conduct of the project and paper.

Conflict of Interest

The authors have no conflicts of interest to declare.

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