

## GameSphere BD – Voucher Selling Application

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### Abstract

The exponential expansion of online gaming has highlighted major issues in gaming e-commerce, particularly in-game transactions and the lack of user-centric features. The GameSphere BD program creates an eye catching e-commerce software for gamers that prioritizes security, usability, and trust to address these concerns. The study uses an iterative development methodology, thorough testing, and validation to create a safe platform that lets gamers buy game vouchers with confidence using intuitive interfaces and fortified payment gateways. Improved user interfaces, safe transactions, and loyalty programs boost user confidence, according to key results. The discussion emphasizes this platform's potential to revolutionize gaming e-commerce and suggests future improvements.

## 1. Introduction

GameSphere BD, a personalized game management system, simplifies and secures game voucher code sales online. The goal is to revolutionize gaming voucher sales by addressing common customer issues. Current methods typically lack security, product information, and user-friendly interfaces. GameSphere BD aims to improve Bangladeshi gamers' experiences by creating a secure and easy platform for buying game codes.

The current situation makes buying game vouchers secure and easy difficult for gamers. GameSphere BD is an iteratively built platform that focuses on a user-centered design which will address these difficulties with a secure payment gateway, user-friendly interfaces, loyalty programs, wish-list management, and organized reviews. This program prioritizes security, improves user interfaces, and adds features for players to effortlessly and confidently access game codes, assuring a seamless and satisfying transaction experience. The fundamental idea behind it is to address the shortcomings that are now present by delivering a platform that is more secure, user-friendly, and that improves gaming experiences while also fostering trust in online commerce.

A vibrant gaming e-commerce community is ensured by the project's constant optimization, which is achieved by the continuous evolution of the project through user feedback and data analysis. When it comes to streamlining transactions, increasing user engagement through incentives, simplifying wish-list administration, and ensuring transparency through user feedback, GameSphere BD is a comprehensive solution that stands out. Ultimately, the objective is to facilitate the transformation of the gaming e-commerce sector into a safe and user-focused environment, hence boosting the level of trust and convenience for gamers in Bangladesh.

GameSphere BD strives to become a leading solution in code sale management by employing a customized strategy that prioritizes security, usability, and improved functionality. This initiative aims to transform the buying process for gamers by offering a safe and easy-to-use platform, enhancing both transaction security and customer happiness while purchasing game codes.

## 2. Related Work

This section provides an overview of the domain background of the GameSphere BD application, as well as the management system itself. Additionally, the results of the comparative study are presented and discussed.

### 2.1 Domain Background

GameSphere BD is a mobile application designed with Flutter that allows users to purchase game vouchers. It provides a seamless experience on various platforms. The dart backend validates requests, modifies voucher availability, and guarantees safe data retrieval. Essentially, a Firebase Firestore Database is used to hold information about vouchers. An administrative web application, developed in React Js, allows authorized admin to efficiently manage the inventory by adding, amending, and modifying the availability of vouchers, products. The voucher system of GameSphere BD is powered by an integrated tech environment, which ensures its robustness and efficiency.

### 2.2 Game Management System

A game management system is a software solution designed to efficiently coordinate and oversee several facets of gaming [4]. These systems are essential framework that firms utilise to organise their processes and operations in a methodical manner. It has a vital function in improving corporate efficiency by simplifying procedures and guaranteeing intended results. Through the implementation of an appropriate management system and strict adherence to pertinent standards, organisations can enhance their performance while also incorporating secure and environmentally friendly methods. Consequently, this highlights the business's capacity to fulfil consumer requirements, thereby promoting stronger partnerships. Efficient management systems prioritise the management of risks, the improvement of performance, the promotion of transparency, and the cultivation of a culture that consistently strives for betterment. Meeting the criteria for such systems corresponds to client expectations for excellence and dependability in business [1].

The efficacy of a management system is contingent upon the implementation of well-organized and optimised procedures that regulate and improve activities. It achieves systematic and continuous organisational improvement by the implementation of explicit regulations, responsibilities, and procedures. These systems are essential for supporting an organization's dedication to ongoing enhancement in operational procedures, which is vital for long-term efficiency and sustainability [2].

### 2.3 Comparative Analysis

Table 1 displays a comprehensive comparison of three established gaming e-commerce applications namely Lunashop, Raven Claws E-shop, and Segam[5] alongside our suggested solution. This analysis identifies crucial elements such as platform compatibility, customer management, wishlist features, loyalty programmes, payment processing, reporting capabilities, and instant code delivery. These factors allow for a thorough assessment of the existing situation and guide the creation of our innovative solution.

**Table 1:** Comparison between systems

Feature	Lunashop	Raven Claws E-shop	Segam	GameSphere BD
Registration	Manual register	Web-app	Web/Mobile app	Mobile App
Login	NA	Available	Available	Available
Manage Profile	NA	Yes	Available	Available
Manage Cart	NA	Available	Available	Available
Wish-list	NA	NA	Available	Available
Orders	Manual	NA	YES	YES
Loyalty Point	NA	NA	NA	Yes
Payment	Manual	Limited Option	Various Option	Various Option
Code Delivery	Manual	Takes Time	Instant	Instant Popup
Review	NA	NA	Available	Rating & Review
Report	NA	NA	NA	Generate Report and Exportable
Bulk Order	Manual	NA	NA	Available

Among Lunashop, Raven Claws E-shop, Segam, and GameSphere BD, GameSphere BD stands out as the superior platform. GameSphere BD offers a comprehensive mobile app-based solution, unlike Lunashop's manual registration, Raven Claws E-shop's restricted options, and Segam's partial feature availability. The platform provides a variety of user-friendly functionalities such as cart management, wish-lists, and a review system. It stands out by offering a distinctive loyalty point program and different payment choices. In addition, GameSphere BD distinguishes itself from other platforms by offering rapid code distribution, as opposed to manual or delayed delivery. This guarantees a smooth and convenient experience for consumers in the gaming e-commerce industry.

### 3. Methodology/Framework

The Software Development Lifecycle (SDLC) guides project development, particularly in an iterative paradigm (refer Fig. 1). Software engineering uses an iterative paradigm to build and improve software systems. This strategy uses a cycle-based development structure to add or improve features based on feedback and demand [3].

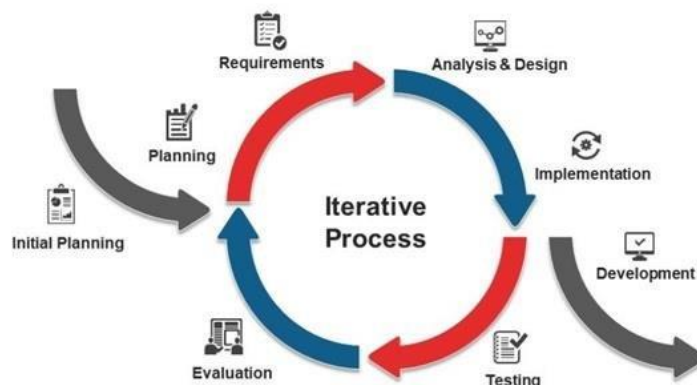


Fig. 1 Iterative Model

#### 3.1 Requirements collection

Entails the collection and documentation of the requirements and desires of the client/user. Specifies the objectives, capabilities, limitations, and objectives of the software.

#### 3.2 Analysis

Examines collected criteria to ensure they are comprehensive, coherent, and achievable. Assesses and determines the necessary specifications, limitations, and potential hazards of the system.

#### 3.3 Planning

Formulates the structure and blueprint of the software by utilising analysed requirements. Converts requirements into technical specifications and delineates system components.

#### 3.4 Implementation

Translates design specifications into a functional software system. Developing code, incorporating components, and constructing the system.

#### 3.5 Testing

Entails the development of test cases and strategies to verify the software's compliance with specified requirements. Performs a range of tests including unit tests, integration tests, system tests, and user acceptance tests.

#### 3.6 Review

Assesses the software based on predetermined criteria and needs. Detects inconsistencies, glitches, or opportunities for enhancement.

#### 3.7 Deployment

Entails providing access to the software for its designated users. The programme has been released, installed, and is now operational.

### 3.8 Maintenance

Resolves faults, rectifies flaws, and upgrades the programme to ensure its seamless functionality. Provides frequent updates, enhancements, and assistance to address changing requirements.

### 3.9 System Development Workflow

Table 2 displays the sequential process of system development for the proposed system. Every phase of the project development process includes certain assignments and outputs that must be produced. In addition, the production was completed within the specified timeframe.

**Table 2** System development workflow.

Phase	Activity	Work Product	Tool
Initial Planning	Brainstorm ideas.	-	-
Planning	Existing problems of current system and proposal and discussion, schedule timeline and task for the project	Gantt Chart	Excel Sheets
Requirements	Interview session and document gathering	URD	-
Analysis and Design	Design UML diagram, architecture, system database and interfaces and 2 iterations of database	SRS and SDD	Visual Paradigm and Luchidchart
Implementation	Create database, develop system module and database	Twelve modules and system database integration	Visual Studio Code, Flutter, Firebase
Two implementation, testing, and evaluation cycles			
Testing and	System testing, alpha testing, and evaluation	Test cases and test report	-
Evaluation	Upload system to live server and deliver the system	-	Live server

## 4. Result and Discussion

This chapter provides a comprehensive explanation of the study and design of the proposed system. Section 4.1 covers the analysis of system requirements, which includes the examination of user, functional, and non-functional needs. The use case diagram of the proposed system is described in Section 4.2, while the domain class diagram will be discussed in Section 4.3. Section 4.4 presents the user interface of the proposed system.

### 4.1 System Requirement Analysis

This section will show and discuss user requirements, functional requirements, and non-functional requirements. The system requirement analysis focuses on identifying and defining the precise functionalities that will be incorporated into the proposed system. Table 3 displays the user requirements for the proposed system.

**Table 3** User Requirements of the proposed system

User	Requirement
Customer	Able to register, log in, change account details, add items to cart, add items to wish-list the purchase, view orders and get the code delivered upon successful payment.
Seller	Able to register, log in, change account details, add new product, and manage stock.

Table 4 displays the operational criteria that the proposed system must meet.

**Table 4:** *Functional requirements of the proposed system*

Modules	Requirements
Registration	The system allows customers and seller to register an account.
Login	The system should enable customer and seller to access the system upon valid verification check.
Product Listings	Show a full inventory of the items or services that are now accessible.
Cart Management	Allows user to manage items in their cart like increase, decrease, quantity, delete an item from cart, add multiple item in cart etc.
Orders	The system keeps track all the orders purchased by each user in their profile so that they can anytime view the invoice of the orders and retrieve their voucher code or rate an item. Admin can see all orders of the system
Loyalty and Reward Program	Allocate points to user's account in based on their purchases amount.
Wishlist Functionality	Offer users to add, organize, and retrieve selected products for future reference or purchase
Product Review and Rating System	Facilitate the ability for users to provide feedback and assign ratings to items they have acquired.
Secure Payment Processing	Provide a variety of safe payment methods, such as credit card, debit card, bank payment, Mobile Wallet.
Licensed Code Delivery	Ensure the safe distribution of licensed codes or digital items to consumers when they make a purchase.
Bulk Orders	System allows customer to submit bulk order request if they need large amount of quantity and discounted price or special request.
Report	Produce reports on sales and display data in a comprehensible manner, such as charts, graphs, or tables, to facilitate analysis.

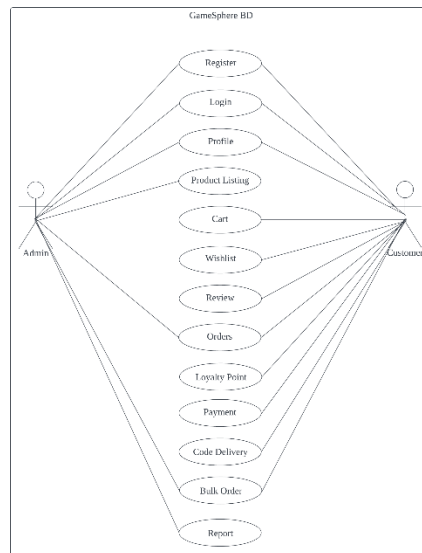
Table 5 presents the non-functional needs of the proposed system.

**Table 5** *Non-functional requirements of the proposed system*

Modules	Requirements
Security	Access to the system is restricted to those who input the correct login and password and the password must consist of eight characters and include both letters and numbers.
Operational	The system should possess the capability to operate effectively on all web browsers.
Performance	The customer logs into the system and carries out the ordering procedure.

## 4.2 Use Case Diagram

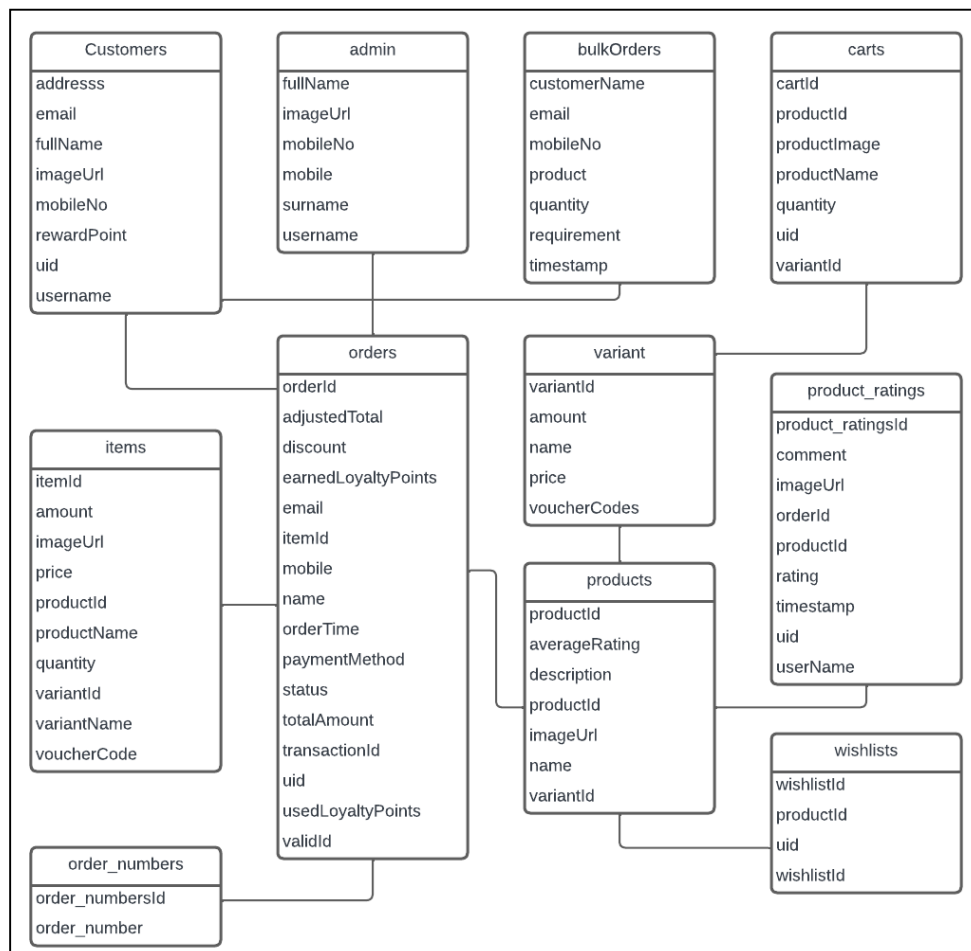
Figure 2 depicts the use case diagram for GameSphere BD game management system. The use case demonstrates ten primary functions or modules of the proposed system: registration, login, change account details, product listing, loyalty point, wish-list, review, payment, code delivery, and report. The system involves two actors: customer and seller (admin). The customer possesses the ability to access eight of the modules whereas the seller is limited to 4 modules. Association lines represent the connections between actors and use cases.



**Fig. 2** Use case Diagram of the GameSphere BD application.

### 4.3 Non-SQL Database Diagram

Figure 3 depicts the Non-SQL Database Diagram that shows the proposed system's 11 collections namely Customers, admin, bulkOrders, products, variant, product\_ratings, orders, items, carts, wishlists, and order\_numbers.



**Fig. 3** Non-SQL Database Diagram

Table 5 describes gamesphere\_bd database entities and characteristics. Several collections in the database represent GameSphere BD's gaming e-commerce system collections. The following table lists these collection, and their properties.

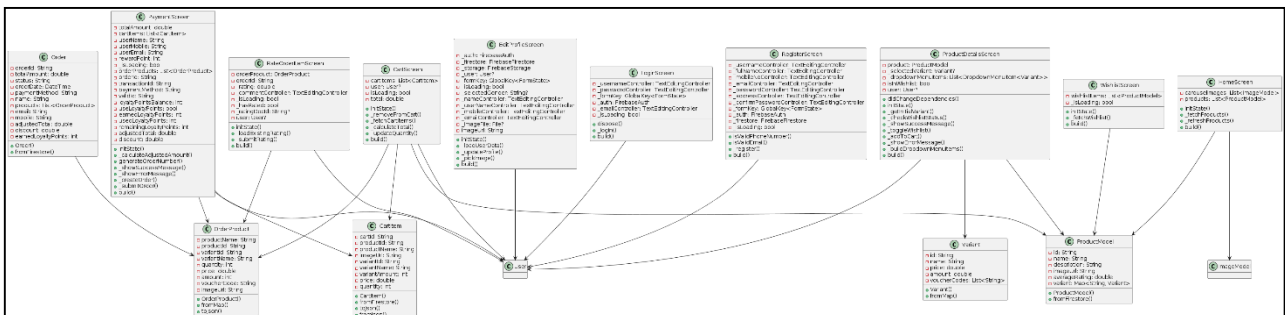
**Table 5** Data Documentation and Fields

Table	Attributes
Customers	address, email, fullName, imageUrl, mobileNo, rewardPoint, uid, username, gender, address
admin	fullName, imageUrl, mobileNo, surname
products	productId, description, imageUrl, name, variantId, ratingCount, averageRating,
carts	cartId, productId, productImage, productName, quantity, uid, variantId
variant	variantId, name, price, voucherCodes
items	itemId, amount, imageUrl, price, productId, productName, quantity, variantId, variantName, voucherCode
orders	orderId, adjustedTotal, discount, earnedLoyaltyPoints, email, itemId, mobile, name, orderTime, paymentMethod, status, totalAmount, transactionId, uid, usedLoyaltyPoints, validId
order_numbers	order_numberId, order_no
bulkOrders	customerName, email, mobileNo, product, quantity, requirement, timestamp
wishlists	productId, uid, wishlistId
product_ratings	product_ratingId, comment, imageUrl, orderId, productId, rating, timestamp, userName

This database schema supports a comprehensive ecommerce system, featuring tables to manage customer details such as addresses, emails, and loyalty points in the “Customers” table, product information including descriptions, images, and variants in the “Products” and “Variant” tables, order specifics like totals, payments, and statuses in the “Orders” table, alongside functionalities for managing carts, wish-lists, product ratings, and administrative user profiles, facilitating efficient tracking and interaction management throughout the platform.

### 4.4 Class Diagram

An essential component of software engineering competencies, a class diagram is a UML diagram that shows the classes in a system and their relationships [8]. Class diagrams, which display a system's classes, characteristics, methods, and relationships between objects, are essential for outlining the structure of a system. This facilitates the visualization of a software application's architecture, which helps engineers comprehend and use the system more easily [9]. Fig.04 shows class diagram of the GameSphere BD application.



**Fig.4** Class Diagram of the System

The class diagram for GameSphere BD offers a comprehensive depiction of the system's architecture, presenting the key classes, their attributes, methods, and relationships. This diagram serves as a vital tool for ensuring that

every aspect of the system's structure is precisely defined and comprehended by the development team, aiding in effective implementation and maintenance of the platform.

## 4.5 Implementation

The execution of GameSphere BD involves the practical achievement of the project's design and goals, transforming abstract ideas into a working and user-friendly mobile application. This section offers a thorough and detailed explanation of the technological procedures and methods used in the development of GameSphere BD. The project's theoretical framework is realized by providing a comprehensive explanation of the system architecture, front-end and back-end development, database design, and integration of security protocols. An iterative development process is employed, guaranteeing ongoing improvement and adjustment based on user feedback and testing. Each chapter in this section explores several aspects of the implementation process, such as the selection of technology, development processes, and the encountered problems. This comprehensive presentation highlights the meticulous attention to detail and careful strategic planning that form the foundation for the successful implementation of GameSphere BD.

### 4.5.1 Registration and Login

The Registration and Login subsystem is an essential element of GameSphere BD, guaranteeing secure and efficient access for both users and administrators. This section details the execution of user authentication and authorization procedures, which are essential for safeguarding user data and upholding the integrity of the application. Essential components consist of the establishment of user profiles, verification procedures, and the safe retention of login information. It also allows users to reset their password through a verification process that is handled by google firebase authentication. Fig 5 shows the interfaces of login, registration and reset password.

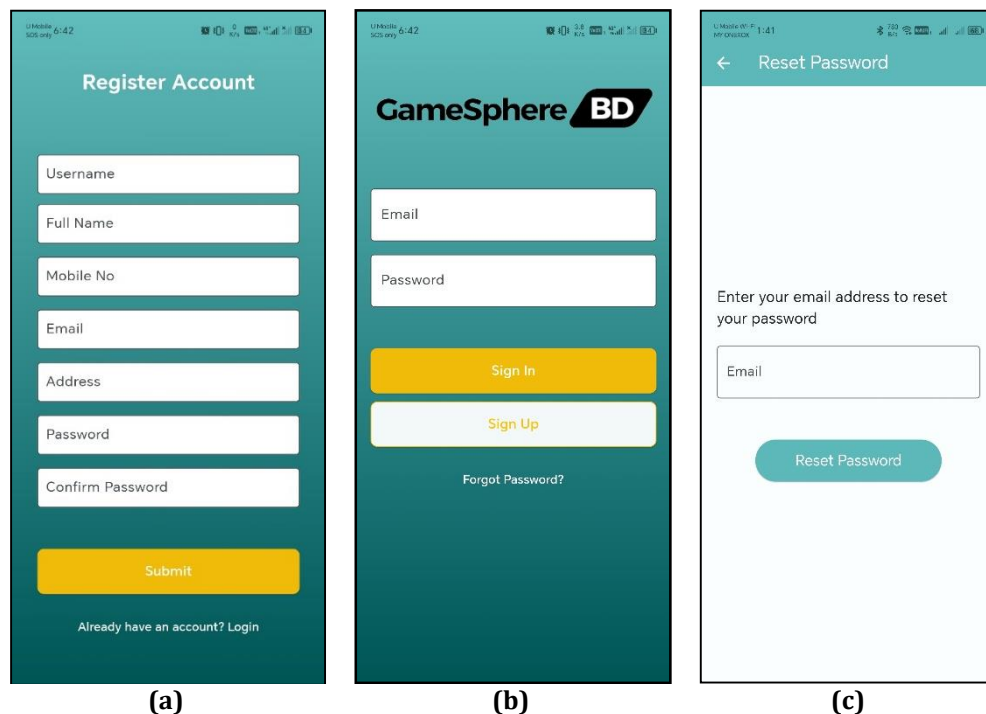


Fig.5 Register, Login and Reset Password

### 4.5.2 Customer's Home Interface

GameSphere BD opens to the Homepage without or with a login. It gives a comprehensive perspective and encourages feature exploration. Customer Homepage Interface shown in Fig.6(a). This interface displays popular products of the application. Customers can view full list of product tapping View All text button. It will display All product interface as shown in Fig.6(b).

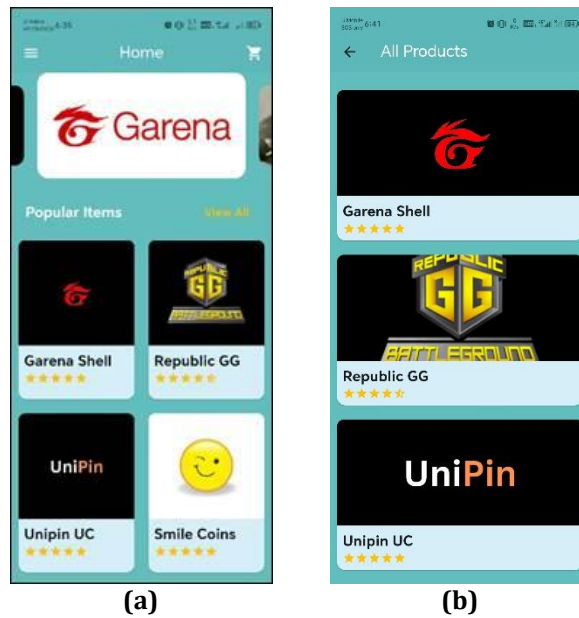


Fig.6 Home Interface and All Products Interface

### 4.5.3 Product Details

The Product Details Page in GameSphere BD provides vivid visuals and full information of product variants to help users make informed decisions. It has an Add to Wishlist button and a Return to back button for easy navigation as shown in Fig.7(a). Available variants of the product can be seen from the dropdown list of the variant field as in Fig.7(b). Product ratings and reviews are shown in a scrollable container, providing customers with vital information as shown in Fig.7(c). The Product Details Page is precisely designed to simplify browsing by providing detailed product details and convenient purchasing alternatives.

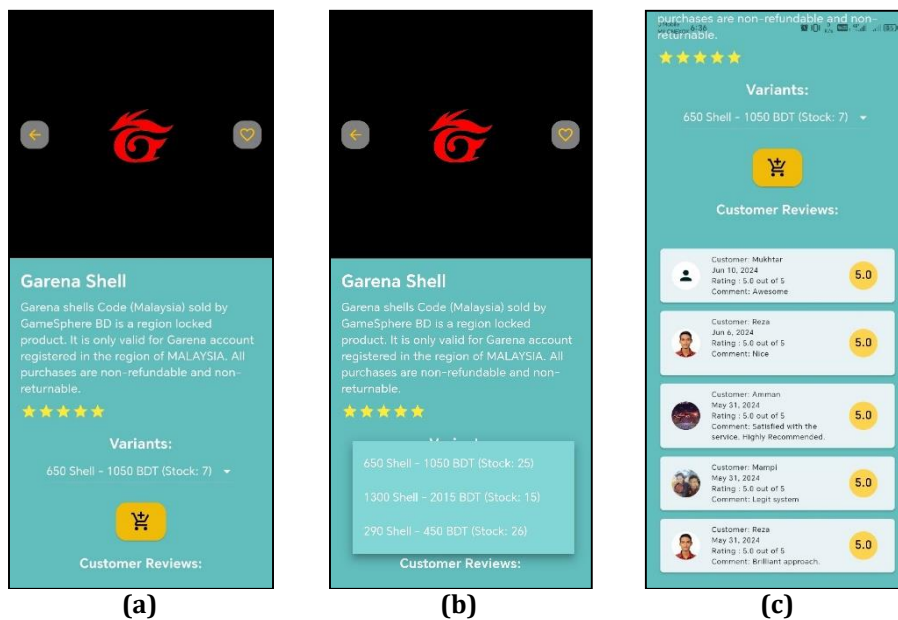


Fig.7 Product Details Interface

### 4.5.4 Wishlist Interface

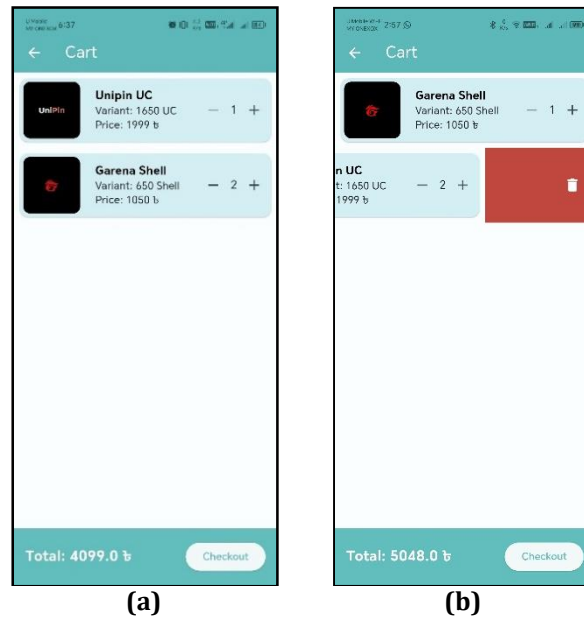
The Wishlist Page in GameSphere BD serves as a curated collection of products chosen by customers for future consideration or purchase. It showcases items based on users' browsing history, offering a simple way to monitor desired products. Typically presented in a grid or list format, the page displays product photos, names, and brief descriptions, allowing users to easily manage their selections by adding or removing items. This functionality provides customers with a convenient tool to gather and track products of interest, facilitating efficient evaluation and planning for future purchases.



**Fig.8** *Wishlist Interface*

#### 4.5.5 Cart Interface

Fig.7 depicts the cart interface in GameSphere BD that allows users to review and manage selected items for purchase. It displays a detailed list of merchandise with names, quantities, prices, and subtotals for each item. Users can adjust quantities, remove items, or proceed to checkout directly from this interface. It also shows the total cost of items providing a convenient overview for users to finalize their purchases.



**Fig.9** *Cart Interface*

#### 4.5.6 Payment Interface

The Payment Interface in GameSphere BD provides users with a clear summary of their purchase details before proceeding to payment. It includes information such as item quantities, prices, available and earned loyalty points, discounts, and the total amount due. This interface ensures transparency by outlining all expenses, including deductions, shipping fees, and taxes. It serves as a verification step for users to review their purchase thoroughly before completing the transaction, aiming to enhance confidence and trust in the buying process.

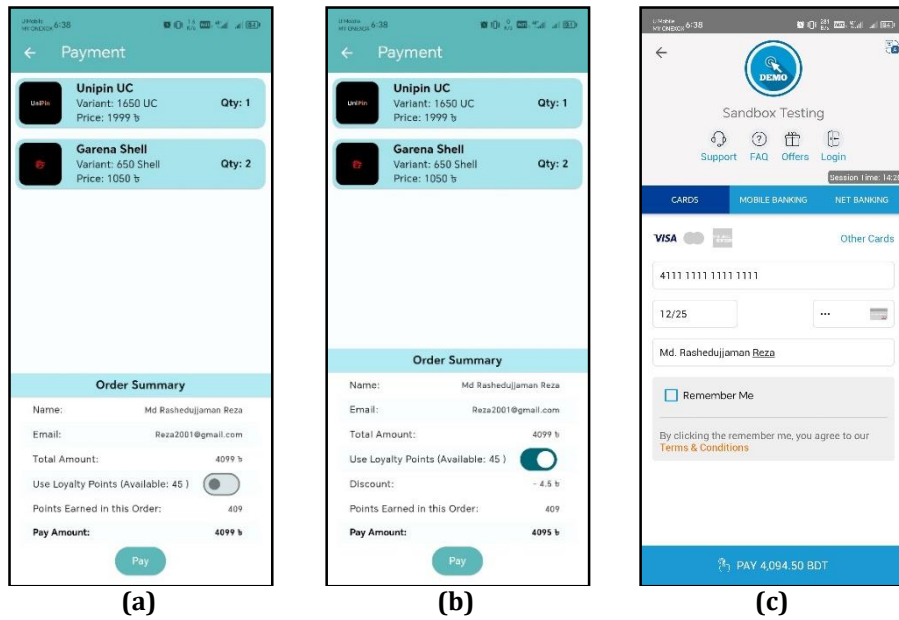


Fig.10 Payment Interface

### 4.5.7 Invoice Interface

The Invoice Interface in GameSphere BD displays a detailed summary of a customer’s purchase following a successful transaction. It includes information such as purchased items, quantities, prices, applied discounts, total amount paid, and the payment method used. Additionally, the Receipt Interface feature transaction-specific codes or identifiers for customer support purposes or future reference, confirming the completion of the transaction and providing customers with proof of purchase containing essential details. It also contains delivery voucher code. Once the QR icon is pressed it pops up the delivery code.

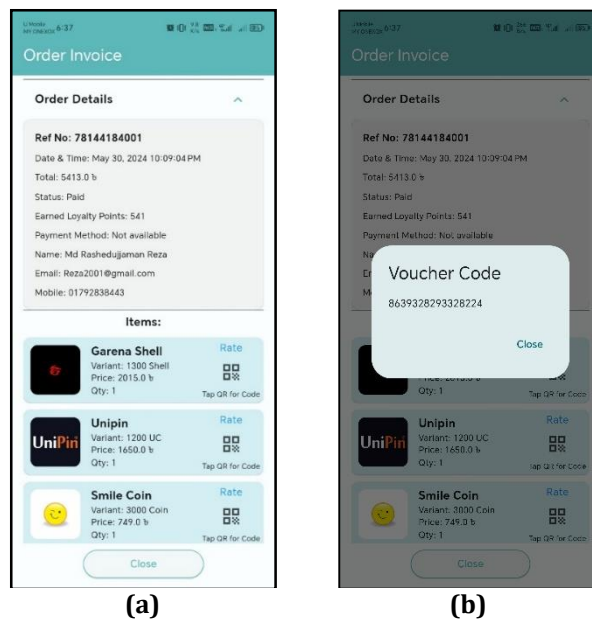
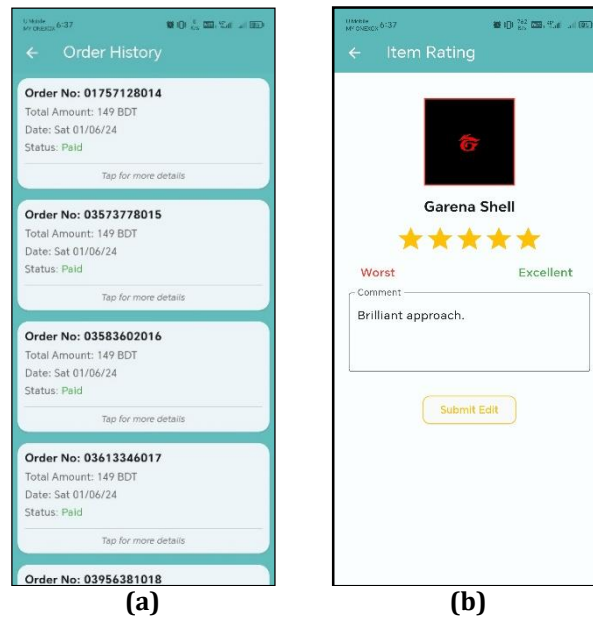


Fig.11 Invoice Interface

### 4.5.8 Order History and Product Rating

The Orders interface, also known as Purchase History in GameSphere BD, displays all customer transactions in chronological order. It details each transaction, including date, goods, quantities, prices, and total cost. Customers can trace their buying patterns, examine previous transactions, and check purchase data on this portal. Users can easily reorder goods and view transaction details by clicking “Details” to open the Order Details page.

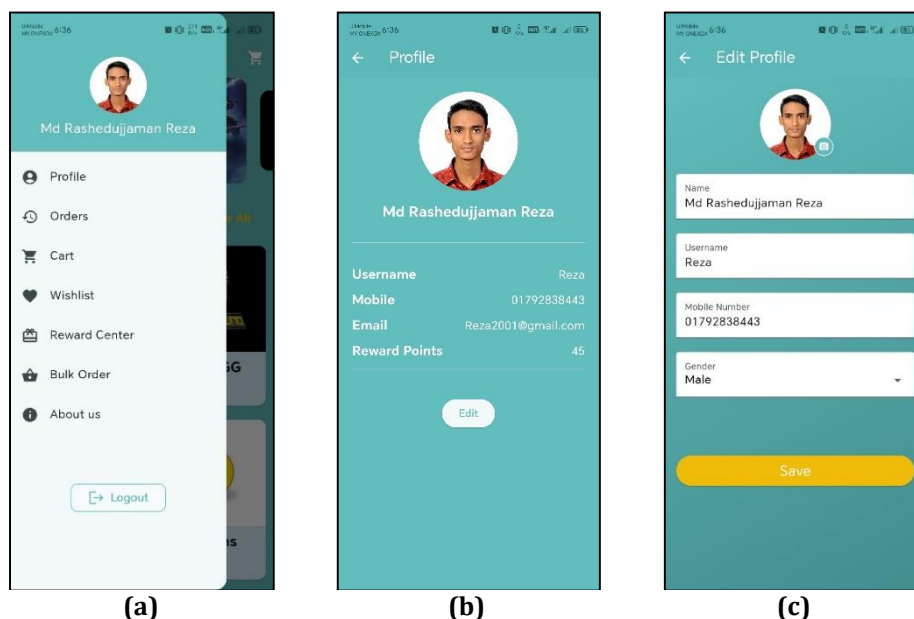


**Fig.12** Order History and Product Rating Interface

The Item Rating interface in the GameSphere BD app allows users to rate and review products, fostering transparency and trust within the platform. Users can assign a star rating from 1 to 5 and provide a written comment to express their feedback. This feedback is valuable for users making purchasing decisions. The “Submit Edit” button suggests that users can modify their existing reviews, promoting ongoing engagement and updated opinions

#### 4.5.9 Profile Management

Customers can manage and update their personal information on a consolidated platform with GameSphere BD’s Customer Profile Management Interface that can be navigated from the main menu drawer of the application in Fig.13(a). Fig.13(b) is a profile page that shows user personal information like full name, username, mobile no, email, reward points earned and picture. Important information, such as full name, username, gender, mobile no, and image can be simply changed by users as shown in Fig.13(c). Designed to assure correctness and relevance in account management, this interface shown in Fig.11 offers intuitive tools that make changing and preserving personal data easy.



**Fig. 13** Menu Drawer and Profile Interface

### 4.5.10 Admin Dashboard

The GameSphere BD admin dashboard interface features a Sales Dashboard that provides critical sales metrics, including the total number of orders and sales amount over the last 30 days, and highlights the top buyer during this period. The interface offers administrators a clear overview of key sales performance data. Fig.15 includes a bar chart depicting product sales trends and popularity, alongside a pie chart showing customer distribution by location, aiding in targeted marketing strategies to enhance business outreach.

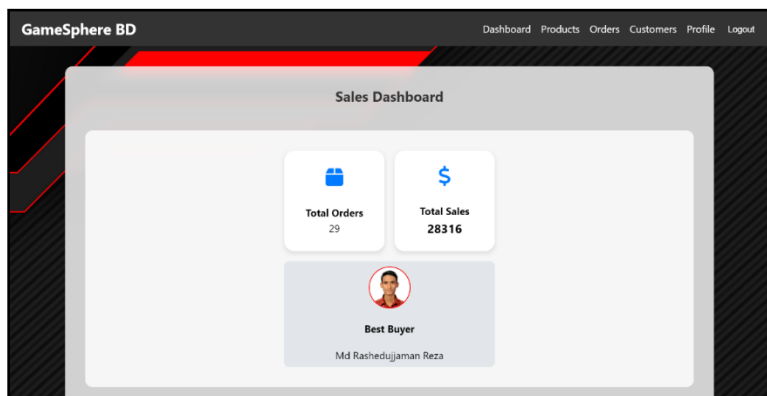


Fig.14 Admin Dashboard Front



Fig.15 Business Analysis Through Chart Representation

### 4.5.11 Products Management Interface

The Admin Product Listing interface in GameSphere BD provides administrators with a comprehensive overview of all listed products. Each product entry includes details such as the product image, name, current rating, available stock, and an Update button for making modifications. Additionally, administrators can easily add new products to the inventory using the “Add More Product” button.

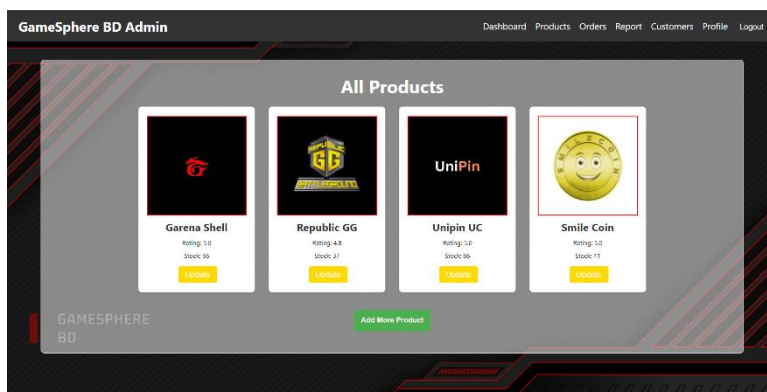
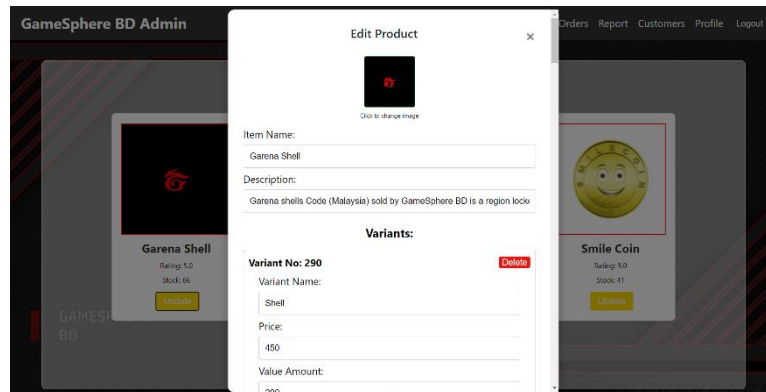


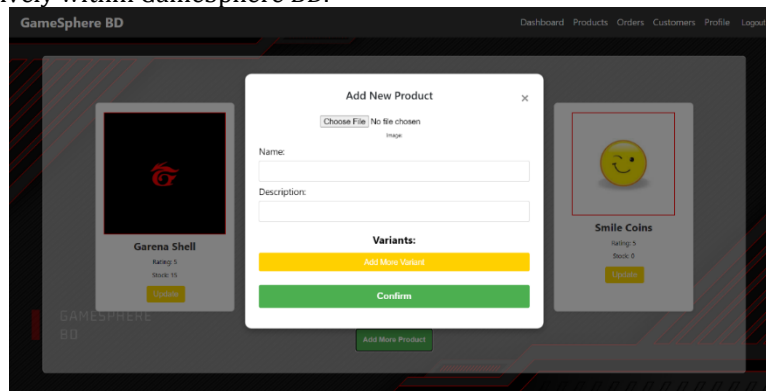
Fig.16 Product Listing Component

Fig.16 depicts the interface showcasing all products listed on the platform. Fig.17 illustrates the Edit Product interface, where existing product details such as name, image, description, price, variants, and stock levels can be modified directly in the database. It also allows administrators to add new variants if necessary.



**Fig.17 Edit Product Component**

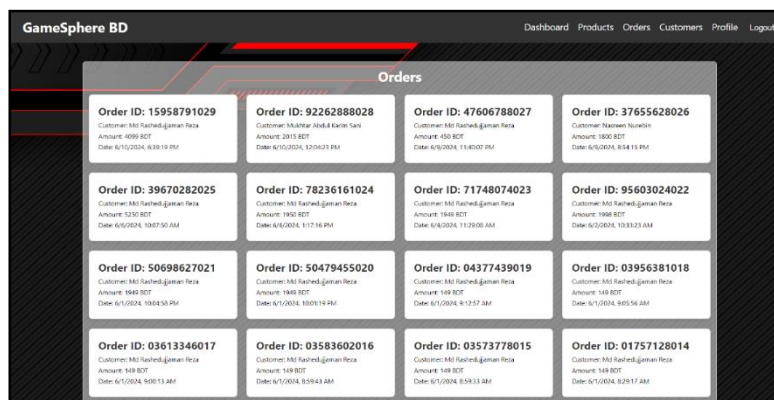
Fig.18 demonstrates how administrators can add entirely new products to the system, managing variants and stock listings efficiently. These interfaces collectively empower administrators to maintain and expand the product catalog effectively within GameSphere BD.



**Fig.18 Add New Product Component**

#### 4.5.12 Order Management Interface

Fig.19 in GameSphere BD displays all system orders in ascending order within a card view component. Each order card includes basic details such as order number, order date, and order amount.



**Fig.19 Orders Interface**

Fig.20 illustrates how clicking on each order card expands to show more detailed information in a specific information component. This feature allows administrators to quickly access comprehensive details for each individual order, facilitating efficient order management within the system.

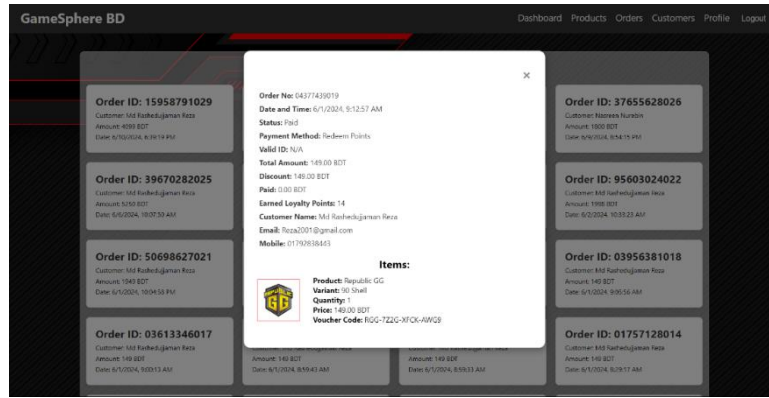


Fig.20 Order Details Interface

### 4.5.13 Report Generation Interface

Report Generation Interface generates sales order, sales trend, best 5 selling products in bar chart, best 5 buyers in bar chart for the admin to understand the business progress well based on a certain date range selected by admin. By default, it is going to show running month's report. This report can be printed to a pdf file using the print button or can be exported as excel for the purpose of advance analysis. Fig.21 shows how the data are represented through various graphs, chart and table.

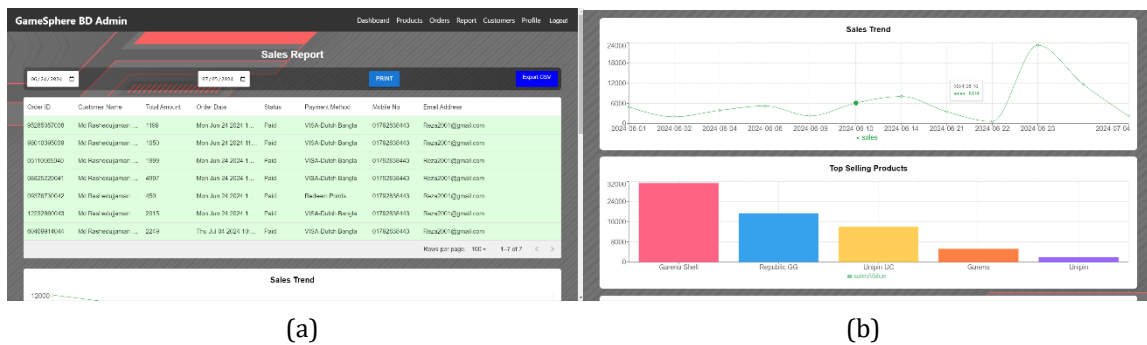


Fig.21 Report Generation Interface

## 4.6 Testing

Testing is crucial across various domains including software development, education, and design processes, ensuring requirements are met, software behavior is validated, and regressions are identified [6]. Specifically, in GameSphere BD, testing plays a pivotal role in ensuring the reliability, efficiency, and security of the platform. Various rigorous testing approaches such as unit testing, integration testing, and user acceptability testing are employed to validate the application's integrity at different levels. This section outlines these testing techniques aimed at detecting and rectifying potential faults or errors, thereby ensuring a seamless and robust user experience. GameSphere BD is committed to delivering a high-quality and dependable platform that effectively meets the needs of its users through meticulous adherence to testing protocols.

### 4.6.1 Alpha Testing

Alpha testing in software development is a critical process that assesses the functionality and quality of a software application before it goes through beta testing and is made available to real-world consumers. The testing process, as emphasized in the research publications, is conducting direct tests on the software output to verify its conformity with the anticipated outcomes [7]. The following table displays the test cases that were created and implemented for this project.

### 4.6.2 Test Cases

Table 6: Test Cases

Functional Module	Test Case	Description	Expected Result	Test Result (Pass/Fail)
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Registration	Enter a valid name, email address, phone number and password	Enter correct data for name, email, phone number and password	System accepts all entered information without any issues	Pass
	Enter mismatched passwords during registration	Provide a password that does not match the confirmation password	System displays an error message indicating password mismatch	Pass
	Attempt to register with existing email	Input details that are already registered by other users	System displays an error message indicating details are taken	Pass
	Submit registration with incomplete fields	Leave some required fields blank	System displays an error message prompting completion of all fields	Pass
Login	Login with correct email and password	Enter valid email and password.	System successfully logs the user in, redirecting to the home screen	Pass
	Login with incorrect email	Enter an email that does not exist in the system	System displays an error message indicating invalid email	Pass
	Login with incorrect password	Enter correct email but incorrect password	System displays an error message indicating incorrect password	Pass
	Login with both incorrect email and password	Enter an email and password combination that do not exist	System displays an error message indicating both username and password are incorrect	Pass
	Attempt to login with empty email and password fields	Leave both email and password fields blank	System displays an error message prompting completion of both fields	Pass
Add to Cart	Add an item to cart	Select a product variant and click add to cart button	System pop-up a dialog box indicating add to card successful	Pass
	Add same item to cart multiple time	Select a product variant that is already in cart and click add to cart button	System pop-up a dialog box indicating add to card successful and increase the quantity of the cart by ++1	Pass
	Add item to cart that is stock out by the time of adding to cart	Select a product variant and click add to cart button	System pop-up a error message in the snack bar indicating item is out of stock	Pass
Manage Cart	Increase an item quantity	Press add icon in a cart item card	System add variant by ++1 and change total amount count	Pass

	Decrease an item quantity	Press subtraction icon in a cart item card	System add variant by --1 and change total amount count	Pass
	Remove an item from cart	Swap an item card left	System Remove the item from cart list and adjust the total amount count	Pass
Wish-list Management	Add a product to wish-list	Click outlined favourite icon in the product image container	The system add product to wish-list and change the icon filling	Pass
	Remove a product from wish-list	Click filled favourite icon in the product image container	The system remove product from wish-list and change the icon filling	Pass
Profile Management	Edit profile information	Fill all field with valid data and press save button	The system update profile data successfully	Pass
	Edit profile information	Leave all field empty and press save button	The system display warning in each field to enter valid data.	Pass
	Change profile photo	Click profile photo edit icon and select a new photo and click save	System update user's profile photo instantly and show loading indicator during upload process.	Pass
	Change profile photo	Click profile photo edit icon and select nothing and click save	System keeps user's previous profile photo	Pass
Payment Management	Pay order amount	Go to checkout page and press pay button with pay amount greater than 0	System redirects to payment gateway for payment completion.	Pass
	Pay order amount	Go to checkout page toggle use loyalty point button and press pay button with pay amount less than 0	System skips redirecting payment gateway and complete the order.	Pass
	Pay order amount	Go to checkout page toggle use loyalty point button and press pay button with pay amount greater than 0	System redirects to payment gateway with payment amount of reduced discounted total.	Pass
Delivery Management	Delivery code of	Go to payment gateway and follow all steps and complete the payment	System redirects to order invoice screen instantly with item's voucher code	Pass
	Delivery code of	Go to payment gateway and cancel the payment	System pop-up snack bar with payment declined warning	Pass
	Delivery code of	Press pay button with an item that's	System redirects to order invoice screen	Pass

			price is deducted from loyalty points balance	instantly with item's voucher code		
Review Management	Review product	a	Click button in invoice, choose rating point and write comment and submit	rate text in order page, choose rating point	System creates new product rating and redirect to invoice screen back	Pass
	Edit a product review		Open Screen and change rating data and submit.	Rating and change data and	System updates existing product rating and redirect to invoice screen back.	Pass

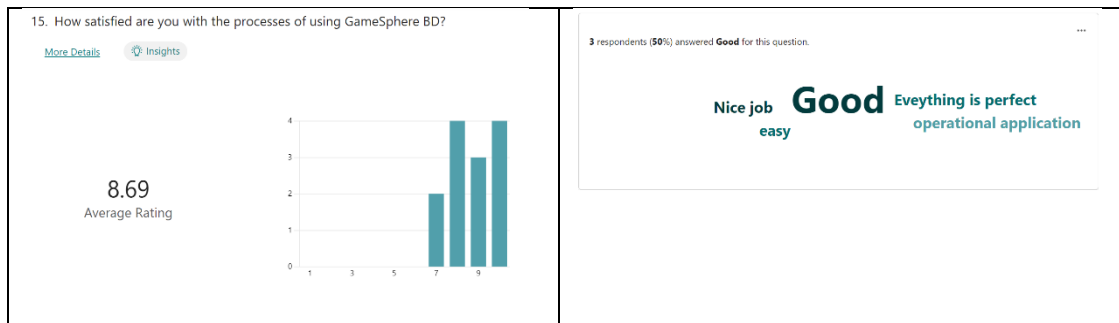
### 4.6.3 Beta Testing

Beta testing is an essential stage in software development when the product undergoes testing in real-world situations by external users prior to its official release (8). The purpose of this testing phase is to conduct external user acceptability testing, after alpha testing. It aims to identify defects, performance issues, and gather user comments in order to enhance the quality and dependability of the program (8). Comprehensive results for each user category will be shown in the following subsections.

### 4.6.4 User Acceptance Testing

During the user acceptance testing phase, GameSphere BD received positive feedback from 13 participants who praised its user-friendly interface and efficient performance. All users successfully completed registration, signed into their accounts, accessed item information, managed their cart, completed transactions, and reviewed order history. Participants appreciated concise and informative error messages, with the registration and login process rated as either extremely easy or easy by all users. Additionally, 100% of users reported seamless access to item viewing, cart management, and payment processing without complications. While 79% of customers promptly received coupon codes, a few experienced delays possibly due to internet or device issues. Overall, GameSphere BD received an average rating of 8.29 out of 10 for user experience and an average recommendation score of 8.21 out of 10, indicating strong user satisfaction and willingness to recommend the platform to others.





**Fig.22** User Acceptance Test Record

Despite the overwhelming positive input, it is recommended that the few people who offered lower ratings resolve their problems in order to ensure a continuously great user experience. The user-friendly design of GameSphere BD will be maintained, and high satisfaction will be guaranteed upon launch thanks to continual improvement based on user feedback.

## 5. Conclusion

As we finish the GameSphere BD project, it's clear that our focus on making an e-commerce tool for gamers that is easy to use has paid off. The goal of this small business solution was to make in-game purchases easier and the gaming experience better, and we made that happen. We've built a platform that puts security, ease of use, and user feedback first by planning carefully and developing it in small steps. We've made it easier and safer to buy things in games by adding things like secure payment methods, wish lists, and user reviews.

We've been able to make a platform that meets the needs of our game community by listening to users and looking at data repeatedly. As time goes on, our goal is still to keep GameSphere BD running and improve it so that it can continue to serve the game community well. The small business product's success comes from being useful, listening to users, and working hard to make the online game shopping experience better. We're proud of what we've done and look forward to the new things and changes that are still to come.

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## Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of the authors to the development of the GameSphere BD – Voucher Selling Application are delineated as follows: study conception and design: Md Rashedujjaman Reza, Dr. Mohd Zainuri Saringat; data collection: Md Rashedujjaman Reza; analysis and interpretation of results: Md Rashedujjaman Reza, Dr. Mohd Zainuri Saringat; draft manuscript preparation: Dr. Mohd Zainuri Saringat. All authors reviewed the results and approved the final version of the manuscript.

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