

Project Report

INTRODUCTION

1.1 Project Overview

This project involves building a **full-stack e-commerce platform** where users can browse products, make purchases, and track orders, while administrators can manage inventory, process orders, and analyze sales data. The website will include essential e-commerce functionalities such as user authentication, product search, a shopping cart, secure payments, and an admin dashboard.

Key Features:

- **User Authentication** – Secure login, registration, and password recovery.
- **Product Catalog** – Organized categories, search functionality, and filters for easy navigation.
- **Shopping Cart & Checkout** – Cart management, multiple payment options, and order confirmation.
- **Order Management** – Order tracking, status updates, and automated invoice generation.
- **Admin Dashboard** – Product management (add, edit, delete), sales reports, and customer insights.

Technology Stack:

- **Frontend:** React.js or Next.js with Tailwind CSS for responsive design.
- **Backend:** Node.js (Express) or Python (Django/Flask) for server-side logic.
- **Database:** PostgreSQL (for structured data) or MongoDB (for flexibility).
- **Authentication:** JWT for sessions, with optional OAuth (Google/Facebook login).
- **Payments:** Integration with Stripe or PayPal for secure transactions.
- **Deployment:** Hosted on AWS or Vercel for scalability and reliability.

The project will be developed in **agile sprints**, with each sprint focusing on a core feature (e.g., authentication in Sprint 1, product catalog in Sprint 2). Testing and security audits will ensure a smooth and secure user experience.

1.2 Purpose

The primary goal of this e-commerce platform is to **provide a seamless online shopping experience** for customers while enabling businesses to efficiently manage sales, inventory, and customer relationships.

Key Objectives:

- **For Customers:**
 - Offer a **user-friendly interface** to browse, search, and purchase products.
 - Ensure **secure transactions** with multiple payment options.
 - Provide **real-time order tracking** and personalized recommendations.

- Enhance engagement with **discounts, wishlists, and reviews**.
- **For Businesses (Admin/Sellers):**
 - Streamline **product management** (adding, updating, and removing items).
 - Monitor **sales performance** through analytics and reports.
 - Automate **order processing** and inventory updates.
 - Improve customer retention with **promotions and loyalty programs**.

By bridging the gap between buyers and sellers, this platform aims to **boost sales, improve operational efficiency, and deliver a reliable digital marketplace**.

IDEATION PHASE

2.1 Problem Statement

In today's fast-paced digital world, both customers and sellers face significant challenges in navigating the e-commerce landscape efficiently. Customers often struggle with discovering relevant products, receiving personalized recommendations, and completing purchases swiftly, especially when under time constraints. Simultaneously, sellers need powerful tools to manage orders, track sales, and analyze business performance without technical complexity.

ShopEZ aims to address these challenges by providing a seamless and user-friendly e-commerce platform that enhances the shopping experience for customers and simplifies business operations for sellers.

From the customer's perspective, the application must ensure:

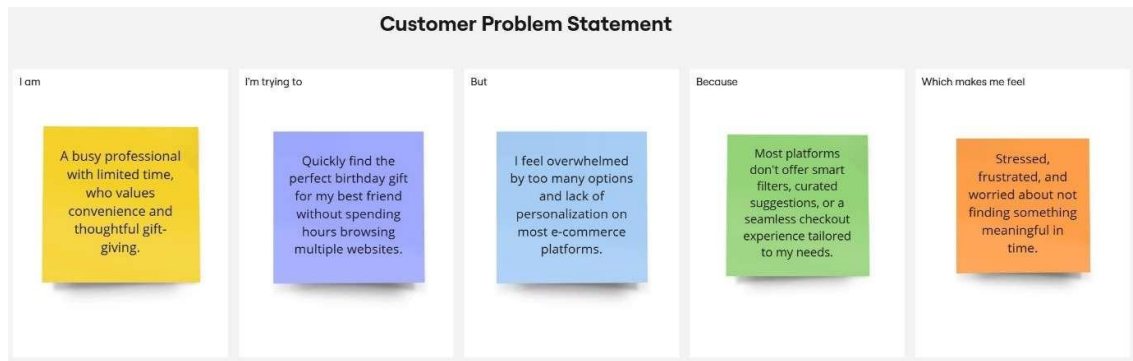
- Effortless discovery of a wide variety of products using effective categorization and filters.
- A personalized shopping experience through smart recommendation systems.
- A secure, smooth, and quick checkout process with multiple payment options.

From the seller's perspective, the platform must enable:

- Efficient order management through a centralized dashboard.
- Real-time notifications and order tracking.
- Access to insightful analytics to drive data-informed business decisions.

On the technical side, the platform must support:

- A scalable and responsive frontend that includes user interfaces for customers and administrators.
- A robust backend system with RESTful APIs for handling user actions, orders, and product management.
- A secure and structured database design for managing data related to users, carts, orders, and products.



2.2 Empathy Map Canvas

Empathy Map Canvas:

SAYS

What have we heard or can imagine her saying?

- "I just don't have the time to look through all these websites."
- "I need something nice and meaningful, but fast."
- "I wish there were fewer steps to checkout."

THINKS

What are their wants, needs, hopes, and dreams?

- "I want to make Emily's birthday special."
- "I hope I can find something stylish she'll really like."
- "This should be easier with all the tech we have these days."

DOES

What behavior have we observed or can imagine them doing?

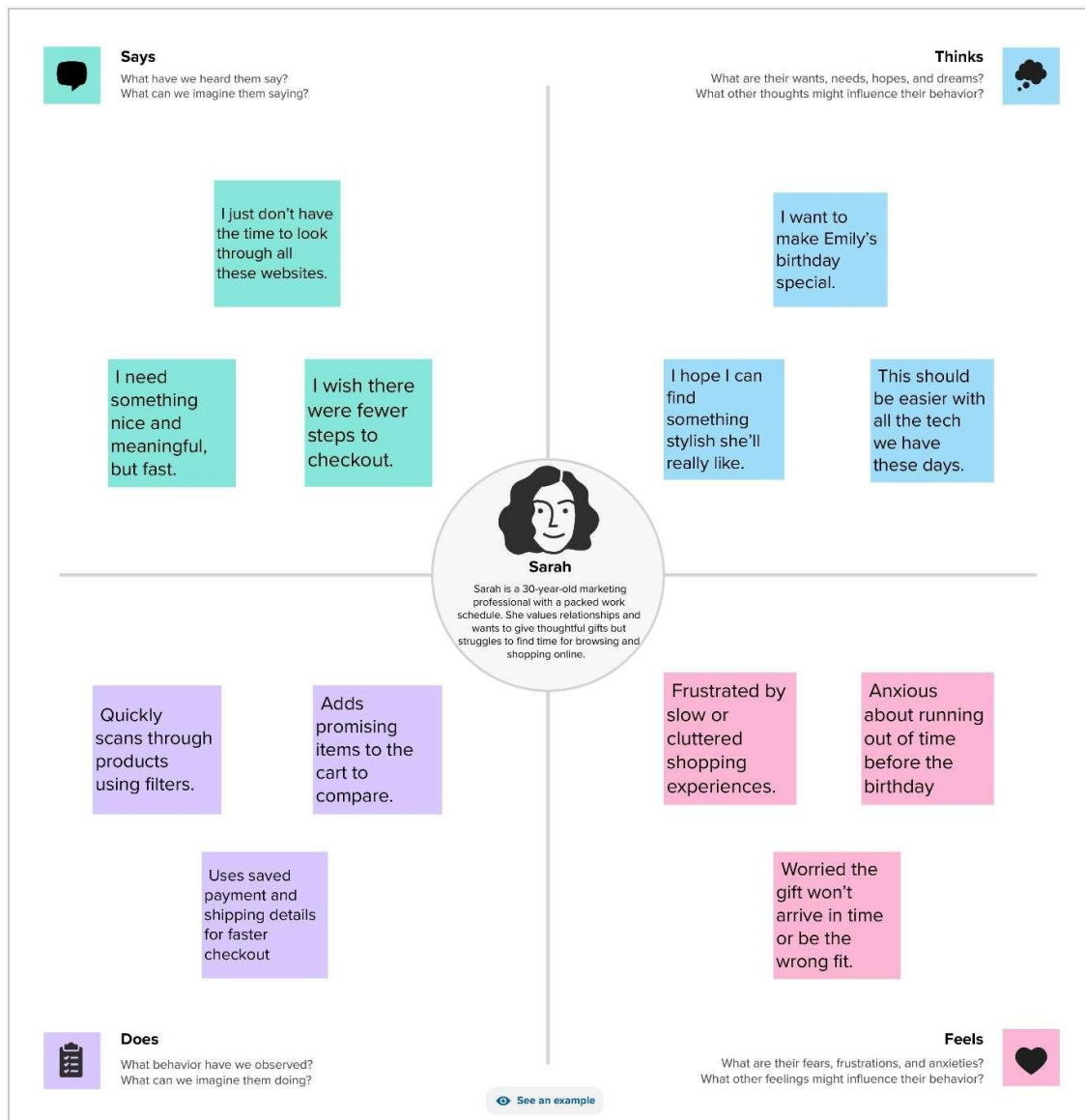
- Quickly scans through products using filters.
- Adds promising items to the cart to compare.
- Uses saved payment and shipping details for faster checkout.

FEELS

What are their fears, frustrations, and anxieties?

- Anxious about running out of time before the birthday.
- Frustrated by slow or cluttered shopping experiences.

- Worried the gift won't arrive in time or be the wrong fit.



2.3 Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- ⌚ 10 minutes to prepare
- 🕒 1 hour to collaborate
- 👥 2-8 people recommended



Before we collaborate

Review Sarah's scenario, user journey, and empathy map.

⌚ 10 minutes



A Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.



B Set the goal

Improve the user experience for time-pressed shoppers like Sarah by enhancing product discovery and simplifying the checkout process.



C Learn how to use the facilitation tools

Read about creative brainstorming techniques such as mind mapping, Crazy 8s, and prioritization matrices to help generate and sort ideas efficiently.



Define your problem statement

How Might We help busy users quickly discover and purchase personalized gifts without frustration?

⌚ 5 minutes

PROBLEM

How Might We help busy users quickly discover and purchase personalized gifts without frustration?



Key rules of brainstorming

To run a smooth and productive session



Stay in topic.



Encourage wild ideas.



Defer judgment.



Listen to others.



Go for volume.



If possible, be visual.

Step-2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

🕒 10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!



Person 1

Smart gift finder with filters (e.g., age, occasion, budget)	AI-based chat assistant for real-time gift suggestions	Gift bundles curated by theme (e.g., self-care, gadgets, books + treats)	Personalized gift quiz (result: recommended gifts)	1-click "Buy Now" shortcut for repeat purchases	Pre-wrapped gift option with custom messages
Reminders/ alerts for upcoming birthdays + pre-saved gift ideas	Customer reviews with images to help decision-making	Local delivery options for same-day gifts	Virtual gift wrapping preview tool	Build-your-own-gift-box feature	"See what your friends gifted" (social shopping)

Person 3

Person 4

3

Group ideas

Taking turns sharing the ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

🕒 20 minutes

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Group 1

Smart gift finder with filters (e.g., age, occasion, budget)

Personalized gift quiz (result: recommended gifts)

Virtual gift wrapping preview tool

Group 2

AI-based chat assistant for real-time gift suggestions

Customer reviews with images to help decision-making

Group 3

Gift bundles curated by theme (e.g., self-care, gadgets, books + treats)

Pre-wrapped gift option with custom messages

Build-your-own-gift-box feature

Group 4

Pre-wrapped gift option with custom messages

“See what your friends gifted” (social shopping)

Step-3: Idea Prioritization

4

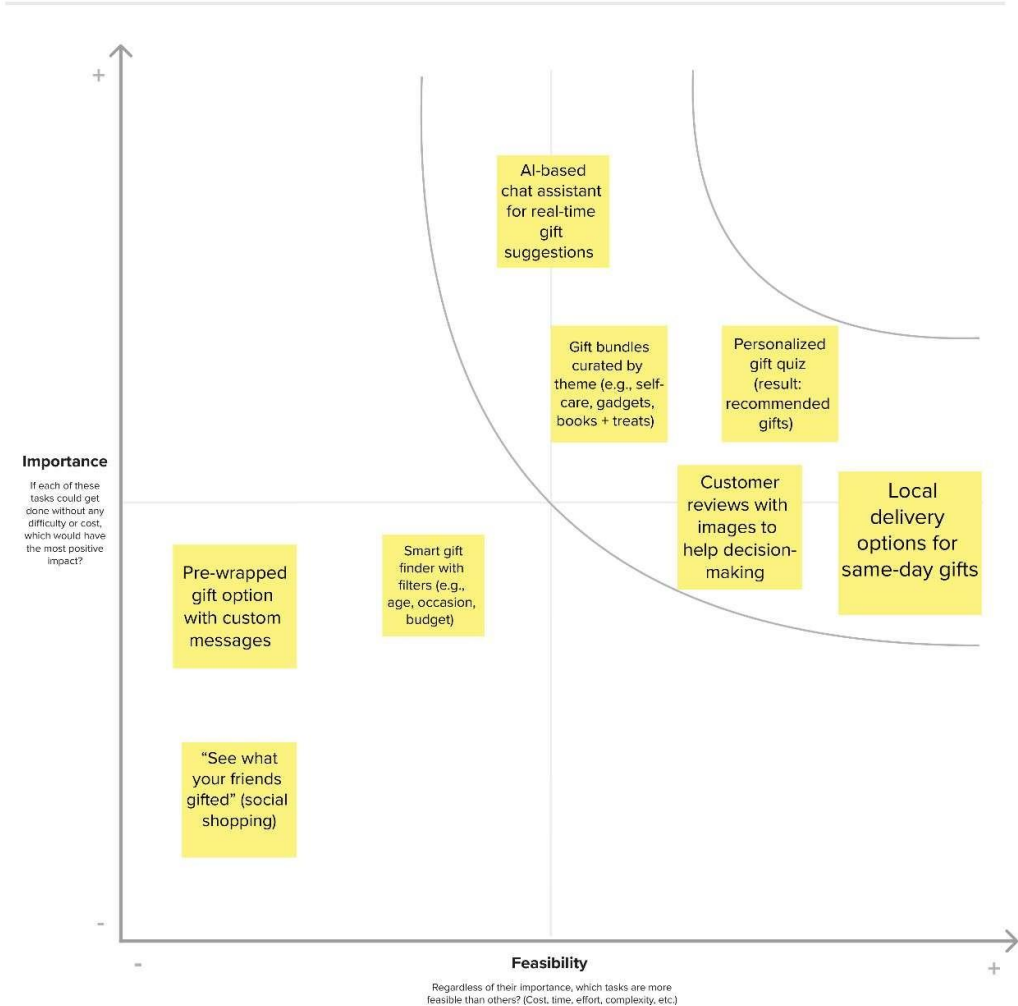
Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

🕒 20 minutes

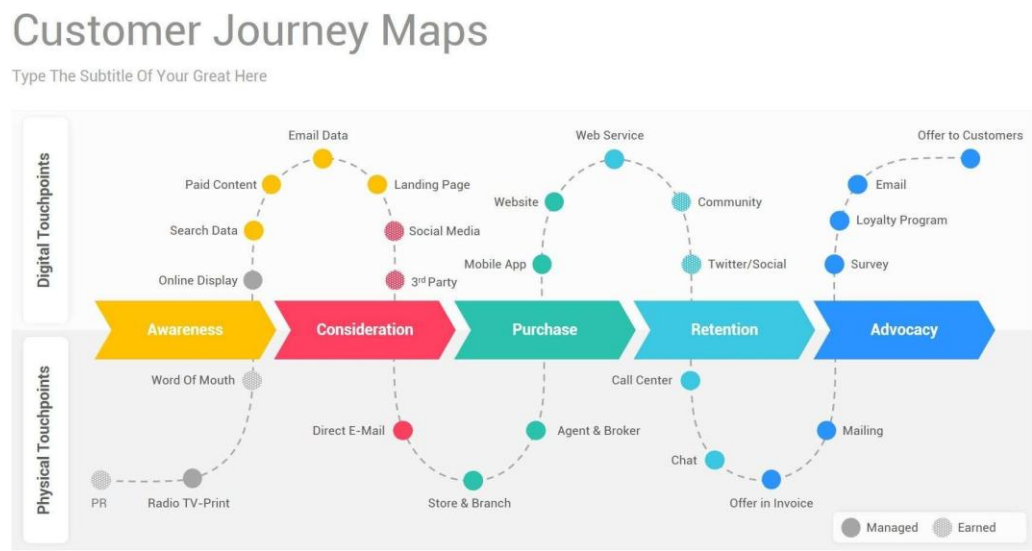
TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H** key on the keyboard.



REQUIREMENT ANALYSIS

3.1 Customer Journey map



3.2 Solution Requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Forgot Password (Reset link via Email) Change Password from Profile
FR-4	Password Management	Forgot Password (Reset link via Email) Change Password from Profile
FR-5	User Profile Management	View and Edit Profile Info Upload Profile Picture Manage Preferences
FR-6	Dashboard	

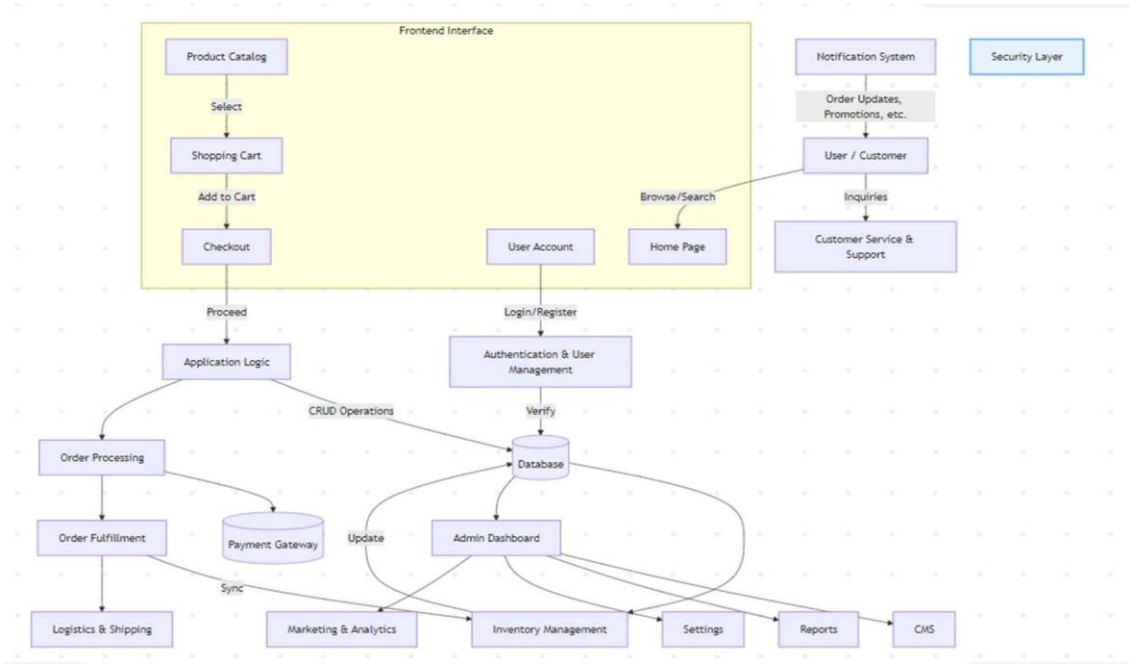
		Show Personalized Dashboard Show Recent Activities or Transactions
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Non-functional Requirements:

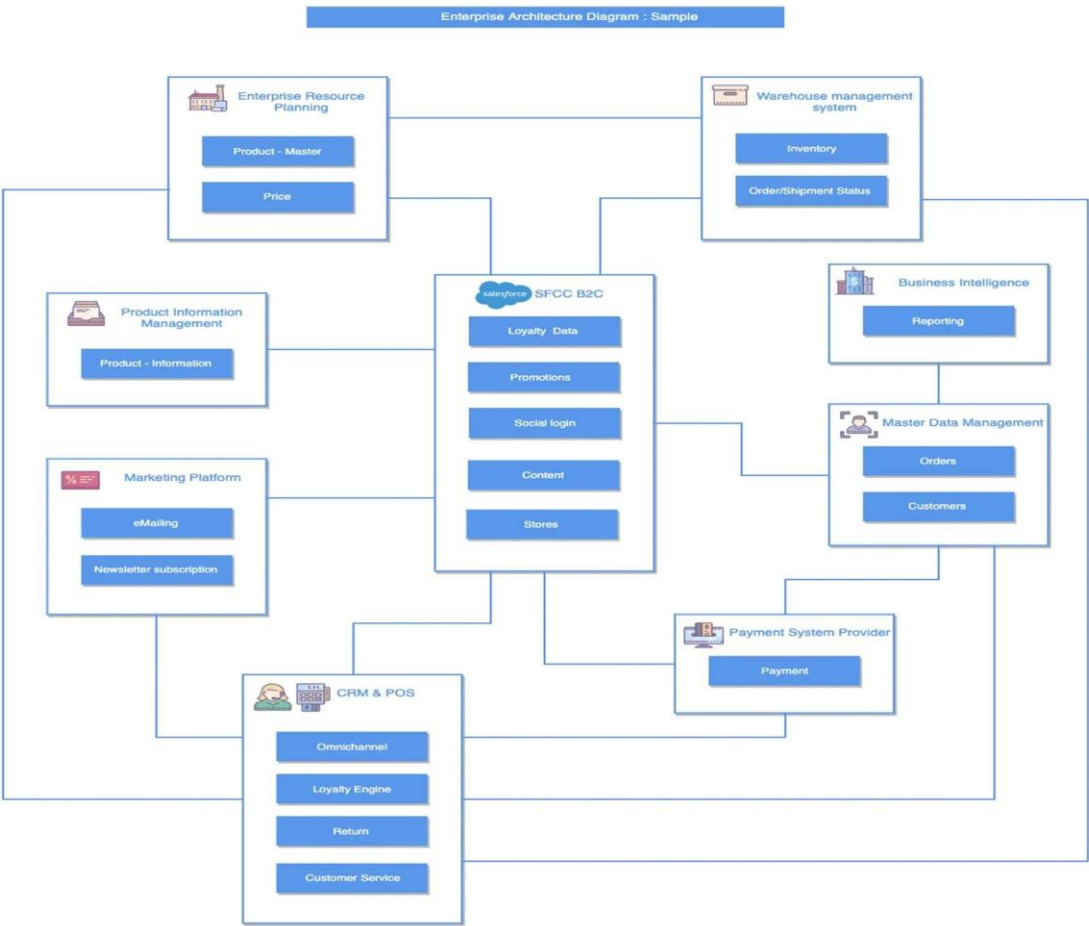
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Ensure UI/UX design is intuitive, especially on mobile and tablets.
NFR-2	Security	Encrypt sensitive data and apply role-based access control.
NFR-3	Reliability	Should have mechanisms like retries, logging, and monitoring for robustness.
NFR-4	Performance	Should support 500 concurrent users with under 3-second response time.
NFR-5	Availability	Application should ensure 24/7 uptime with scheduled maintenance alerts.
NFR-6	Scalability	Should handle 10x increase in user base without degradation.
NFR-7	Maintainability	The system should allow easy debugging and modular updates.
NFR-8	Portability	The application should run on all major browsers and devices.
NFR-9	Localization	Support multiple languages based on user region.
NFR-10	Auditability	Maintain logs for all user and admin actions for auditing purposes.

3.3 Data Flow Diagram



3.4 Technology Stack



PROJECT DESIGN

4.1 Problem Solution Fit

Top Section – Define CS, fit into

This section identifies your **target customers** and what's holding them back:

1. **Customer Segments (CS):**
Who are your customers? Define them clearly — individuals, companies, or user roles.
 2. **Customer Constraints (CC):**
What limitations or barriers do your customers face in solving the problem? This includes lack of knowledge, tools, or budget.
-

Middle Section – Focus on J&P, tap into BE, understand

This is the heart of the canvas — you explore **customer problems and behaviors**:

2. **Jobs-To-Be-Done / Problems (J&P):**
What specific tasks or issues are your customers trying to solve?
 3. **Problem Root Cause (RC):**
What are the underlying reasons why these problems exist? Think beyond the symptoms.
 4. **Behaviour (BE):**
What are your customers currently doing to deal with the problem? This helps you understand current alternatives or workarounds.
-

Bottom Left – Identify strong TR & EM

This area focuses on customer **emotions and motivation**:

3. **Triggers (TR):**
What events or frustrations push customers to seek a solution?
 4. **Emotions Before / After (EM):**
What do customers feel before the problem is solved? What do they feel after using your solution?
-

Bottom Right – Extract offline & online CH of BE

This helps you determine **how customers act**:

8. **Channels of Behaviour (CH):**
 - 8.1 **Online:** Where do customers look for solutions online (e.g., Google, reviews, YouTube)?
 - 8.2 **Offline:** Where do they turn offline (e.g., word of mouth, in-person feedback)?
-

Bottom Center – State Solution

10. Your Solution (SL):

This is where you describe your product or service. It should clearly match the problem and constraints previously outlined.

Problem-Solution fit canvas 2.0 Purpose / Vision

Define CS, fit into	1. CUSTOMER SEGMENT(S) CS Who is your customer? Online shoppers (individual customers), small and medium e-commerce businesses, marketplace sellers.	6. CUSTOMER CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. Limited trust in existing platforms, concerns over payment security, delivery reliability, lack of customization, high platform fees.	5. AVAILABLE SOLUTIONS AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital marketing. <ul style="list-style-type: none"> Shopify, WooCommerce, Magento - offer standard solutions, but can be complex or expensive for small sellers. Some rely on social media sales without proper inventory systems. 	Explore AS.
	2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. <ul style="list-style-type: none"> Customers want to find products quickly and checkout smoothly. Sellers want to manage inventory, orders, and payments seamlessly. Businesses need a scalable platform with minimal downtime. 	9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. <ul style="list-style-type: none"> Monolithic platforms are slow to adapt and scale. Poor integration between services (catalogue, payment, delivery). Outdated or cluttered interfaces cause cart abandonment. Sellers lack real-time analytics to make data-driven decisions. 	7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related, find the right solar panel installer, calculate usage and benefits, indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace). <ul style="list-style-type: none"> Customers leave platforms due to slow pages or payment errors. They compare platforms based on delivery speed and ease of use. Sellers use multiple fragmented tools for inventory and sales tracking. 	
3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. <ul style="list-style-type: none"> Cart abandonment due to payment failure. Delayed deliveries or wrong product listings. Inability to scale during festive or high-traffic seasons. 	10. YOUR SOLUTION SL If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour. A microservice-based e-commerce platform that separates services like product catalog, user management, cart, order tracking, payment, and notification. It integrates with third-party APIs for delivery and payment, supports multi-device access (mobile/web), and provides real-time analytics dashboards for sellers.	8. CHANNELS of BEHAVIOUR CH 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7. Customers search Google, YouTube reviews, influencer recommendations, browse e-commerce platforms, use price comparison tools.	Extract online & offline CH of BE	
4. EMOTIONS: BEFORE / AFTER EM How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident, in control - use it in your communication strategy & design. <ul style="list-style-type: none"> Before: Frustration, insecurity, impatience, lack of trust. After: Confidence, control, satisfaction, loyalty. 	8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. Word of mouth, physical stores, product trials, feedback from community or forums.			

Problemsolution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license
 Created by Daria Nepriakhina / Amaltama.com

AMALTAMA

4.2 Proposed Solution

Sl.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Fragmented online shopping experiences, lack of unified access across web and mobile, unreliable service availability, and delays in search, cart, order, and payments.
2.	Idea / Solution description	A scalable microservices-based e-commerce platform that enables seamless product browsing, search, cart management, order placement, payments, and delivery tracking.
3.	Novelty / Uniqueness	Uses modern architecture (microservices + cloud-native deployment), integrated monitoring, fast cart access via Redis, search via Elasticsearch, and multi-platform support.

4.	Social Impact / Customer Satisfaction	Offers a smoother user experience, faster load times with CDN, better personalization and reduced cart abandonment through optimized checkout and notifications.
5.	Business Model (Revenue Model)	Commission from sellers, transaction fees, subscription plans for premium users, ad-based promotions, and partnerships with delivery/payment providers.
6.	Scalability of the Solution	Easily scalable by design—each service can be independently deployed and scaled. Supports global expansion with cloud infrastructure and CDN support.

4.3 Solution Architecture

This diagram represents the architecture of a scalable and modular **e-commerce platform**, detailing the interaction between various frontend clients, backend microservices, databases, and third-party services.

1. Front-End Clients

- **Web Browser** interacts with the **Web Application** built using React or Angular.
- **Mobile App** interacts with the **Mobile Application** developed for iOS and Android.

Both platforms connect to the backend through an **API Gateway**.

2. API Gateway

- **API Gateway (Kong / AWS API Gateway)** is responsible for routing requests from clients to the appropriate backend services. It also handles concerns like rate limiting, authentication, and monitoring.

3. Core Backend Services

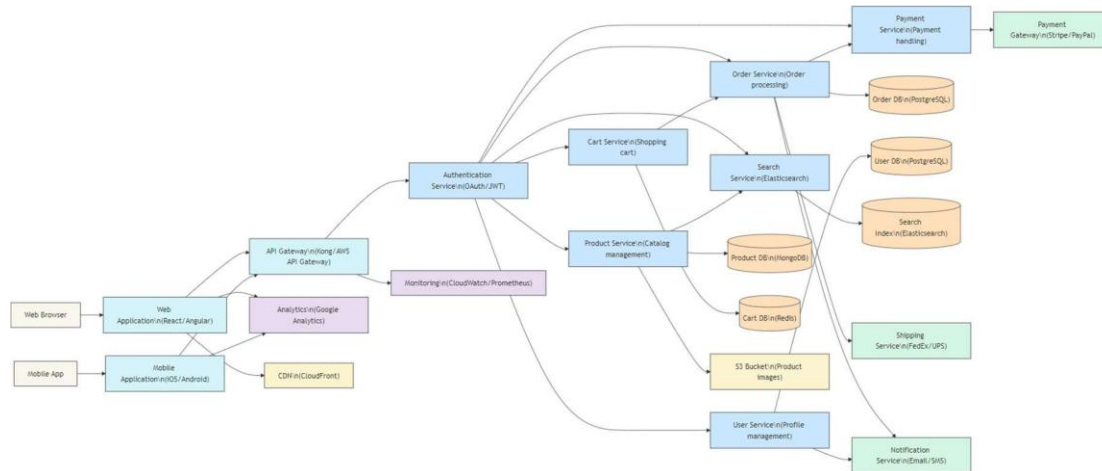
- **Authentication Service (OAuth / JWT)**
Manages user authentication and authorization. Issues secure tokens for session management.
- **Cart Service (Shopping Cart)**
Manages users' shopping carts. Connects with the **Cart DB (Redis)** for fast, in-memory access to cart data.
- **Product Service (Catalog Management)**
Handles product information and images. Interacts with:
 - **Product DB (MongoDB)** to store product data
 - **S3 Bucket** for product image storage

- **Search Service (Elasticsearch)**
Enables product search functionality. Syncs with:
 - **Search Index (Elasticsearch)**
 - Pulls data from **Product Service**
 - **Order Service (Order Processing)**
Processes customer orders. Communicates with:
 - **Order DB (PostgreSQL)**
 - **Notification Service** for sending order confirmations
 - **Payment Service (Payment Handling)**
Manages payments and connects to external:
 - **Payment Gateway (Stripe / PayPal)**
 - **User Service (Profile Management)**
Manages user profiles and account information. Uses:
 - **User DB (PostgreSQL)**
 - **Shipping Service (FedEx / UPS)**
Handles shipping integration and tracks delivery of orders.
 - **Notification Service (Email / SMS)**
Sends messages and alerts to users for order status, payment confirmations, etc.
-

4. Supporting Components

- **Monitoring (CloudWatch / Prometheus)**
Collects logs, metrics, and alerts for system performance and reliability.
- **Analytics (Google Analytics)**
Tracks user behavior and provides insights on site/app usage.
- **CDN (CloudFront)**
Distributes static content (like images, scripts, and stylesheets) to enhance front-end performance.

Solution Architecture Diagram:



PROJECT PLANNING & SCHEDULING

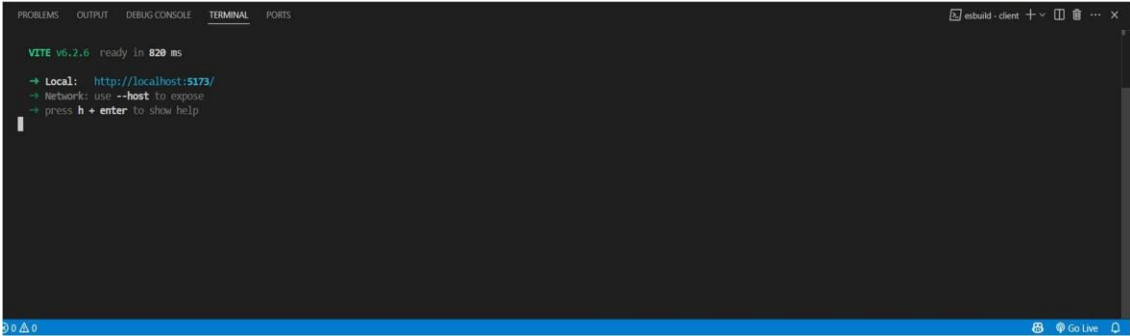
5.1 Project Planning

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Kundan Mandal
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Vatsal Soni
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Kundan Mandal
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	Sanchit Pratik Gaikwad
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	Kundan Mandal
Sprint-2	Dashboard	USN-6	As a user, I can view my account information and recent activity	2	High	Kundan Mandal
Sprint-2		USN-7	As a user, I can see suggestions or tips based on my activity	2	Medium	Vatsal Soni
Sprint-3	Profile Management	USN-8	As a user, I can update my personal information like name, photo, and password	2	Medium	Sanchit Pratik Gaikwad
Sprint-3		USN-9	As a user, I can delete my account if I no longer wish to use the service	3	Low	Kundan Mandal

FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Time taken to deploy localhost:



RESULTS

7.1 Output Screenshots

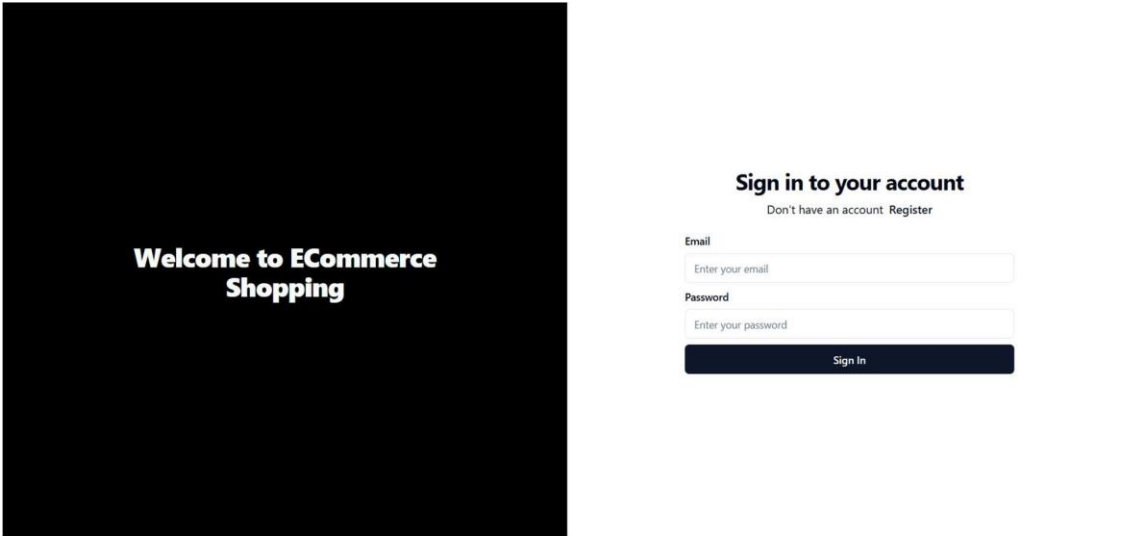


Fig 7.1 Sign-in Page

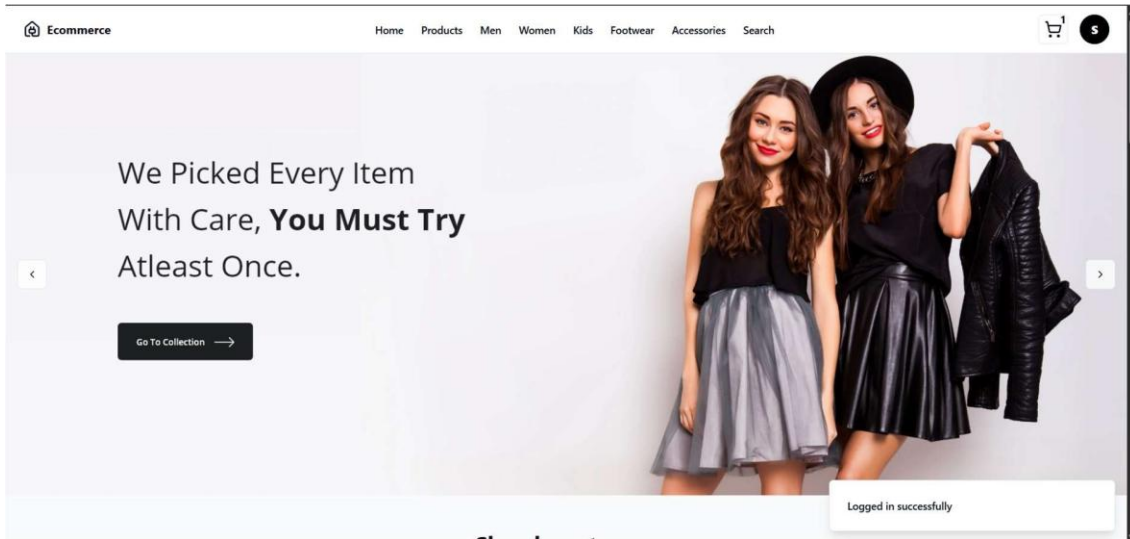


Fig 7.2 Home Page

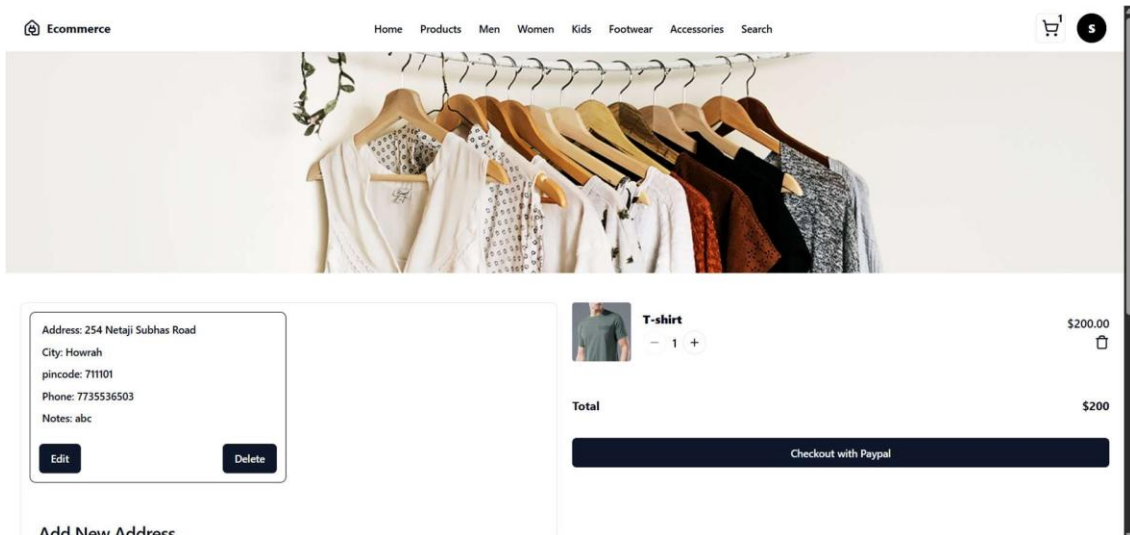
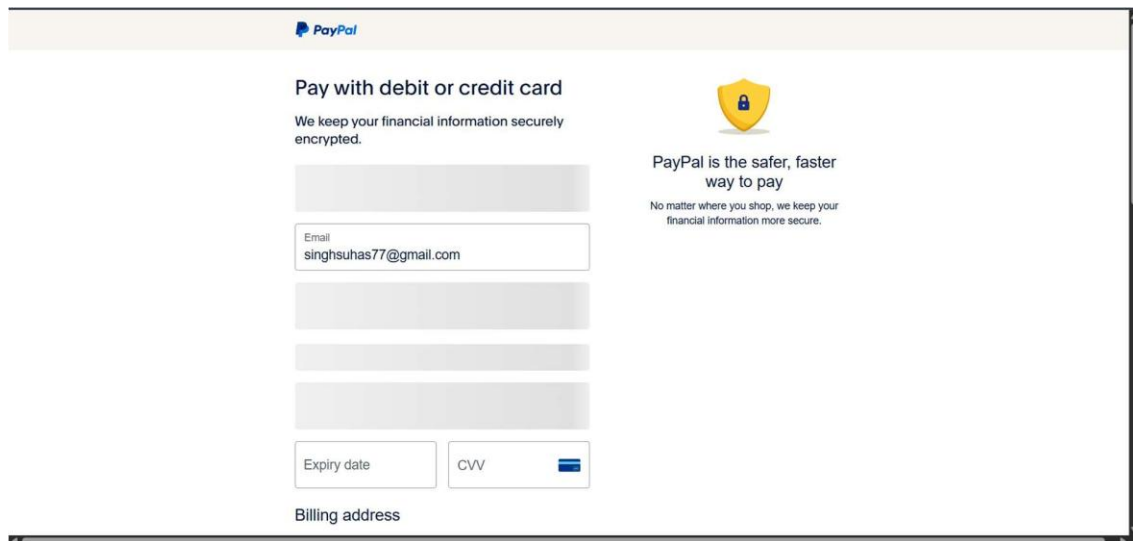


Fig 7.3 Cart



Pay with debit or credit card

We keep your financial information securely encrypted.

PayPal is the safer, faster way to pay

No matter where you shop, we keep your financial information more secure.

Email
singhsuhas77@gmail.com

Expiry date CVW

Billing address

Fig 7.4 Payment Gateway

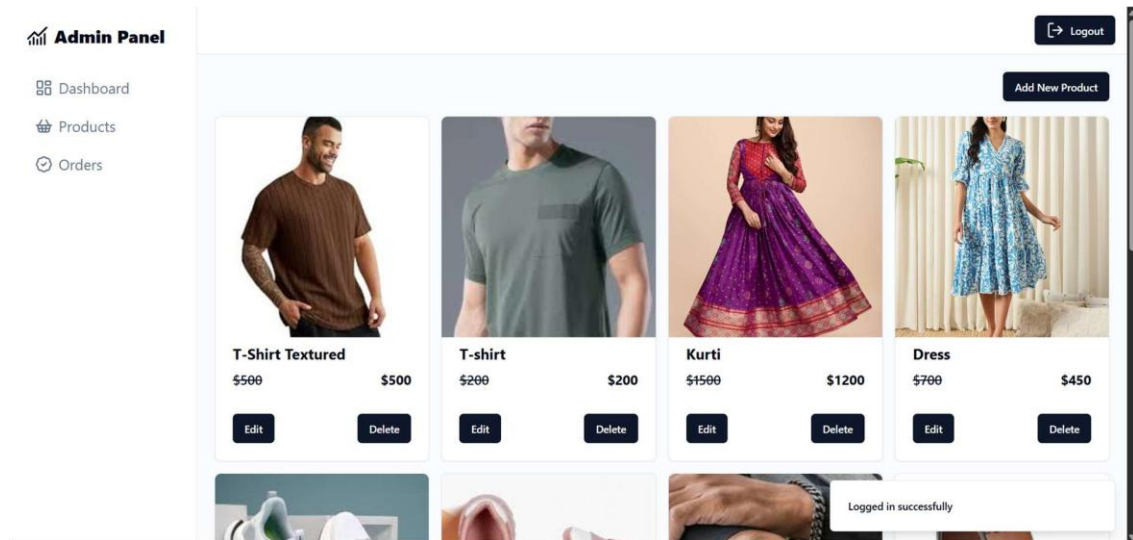


Fig 7.5 Admin Page

ADVANTAGES & DISADVANTAGES

Advantages:

- **24/7 Accessibility** – Customers can shop at any time, increasing sales opportunities.
- **Global Reach** – Expands the market beyond physical locations to a worldwide audience.
- **Lower Operational Costs** – Reduces expenses such as rent, utilities, and in-store staff.
- **Convenience** – Provides users with easy browsing, quick checkout, and home delivery.
- **Scalability** – The platform can grow to accommodate more products and customers without significant infrastructure changes.
- **Data-Driven Insights** – Tracks customer behavior and preferences to improve marketing and inventory management.

- **Automation** – Streamlines order processing, inventory updates, and customer notifications.

Disadvantages:

- **Security Risks** – Vulnerable to cyber threats such as data breaches and payment fraud.
- **Lack of Personal Interaction** – Customers cannot physically examine products before purchasing.
- **Shipping Challenges** – Delays, high costs, and damaged deliveries can affect customer satisfaction.
- **Technical Issues** – Website downtime or bugs may lead to lost sales and frustrated users.
- **Competition** – High competition in the online marketplace requires continuous marketing efforts.
- **Dependence on Internet Access** – Customers without reliable internet cannot access the platform.
- **Return Management** – Handling returns and refunds can be complex and costly.

CONCLUSION

The proposed e-commerce website offers a comprehensive digital solution for modern businesses seeking to establish or expand their online presence. By leveraging key features such as user-friendly product browsing, secure transactions, and efficient order management, the platform aims to enhance the shopping experience for customers while providing businesses with valuable tools for growth and operational efficiency.

While the website presents significant advantages—including 24/7 accessibility, global reach, and cost savings—it also comes with challenges such as security risks, shipping complexities, and intense market competition. Addressing these drawbacks through robust cybersecurity measures, reliable logistics partnerships, and data-driven marketing strategies will be essential for long-term success.

Ultimately, this e-commerce platform represents a strategic investment in the digital marketplace, capable of driving sales, improving customer engagement, and adapting to evolving market demands. With careful planning and continuous optimization, it can serve as a powerful tool for businesses to thrive in the competitive world of online retail.

FUTURE SCOPE

The e-commerce platform is designed with scalability and adaptability in mind, ensuring it can evolve with technological advancements and changing market trends. Below are key areas for future expansion and enhancement:

1. Advanced Personalization

- Integration of **AI-driven recommendations** based on user behavior and purchase history.
- Implementation of **dynamic pricing** strategies tailored to individual customers.

2. Enhanced Mobile Experience

- Development of a **dedicated mobile app** with features like AR-based product visualization and one-click purchasing.

- Optimization for **progressive web apps (PWAs)** to ensure offline accessibility and faster loading.

3. Omnichannel Integration

- Synchronization with **physical stores** for features like "buy online, pick up in-store" (BOPIS) and real-time inventory tracking.
- Support for **social commerce**, enabling purchases directly through social media platforms.

4. Expansion of Payment Options

- Adoption of **cryptocurrency payments** to cater to a broader audience.
- Integration with **buy now, pay later (BNPL)** services for flexible payment solutions.

5. Improved Logistics and Delivery

- Implementation of **drone or autonomous vehicle deliveries** for faster shipping.
- Partnerships with **local logistics providers** to reduce delivery times and costs.

6. Sustainability Initiatives

- Introduction of a **carbon footprint calculator** to help customers make eco-friendly choices.
- Options for **eco-friendly packaging** and rewards for sustainable shopping practices.

7. Advanced Analytics and AI

- Use of **predictive analytics** to forecast trends and optimize inventory.
- AI-powered **chatbots and virtual assistants** for 24/7 customer support.

8. Global Expansion

- **Multi-language and multi-currency support** to enter international markets.
- Compliance with **regional regulations** (e.g., GDPR, CCPA) to ensure data privacy and security.

9. Subscription and Loyalty Programs

- Launch of **subscription-based models** for recurring revenue.
- Enhanced **loyalty programs** with personalized rewards and exclusive offers.

10. Blockchain for Transparency

- Use of **blockchain technology** to ensure product authenticity and supply chain transparency.
- Secure and tamper-proof **customer reviews and ratings**.

APPENDIX

Project Demo Link: <https://drive.google.com/file/d/1Hp-jdoz9awVv1Jxf7mpCLaRWd7o7KK8B/view?usp=sharing>