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A Project Report Submitted in Partial Fulfillment of B.Sc. Degree in Computer Science

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Abstract

This document outlines an online marketplace concept designed to empower small businesses and enhance the customer experience. Functioning as a two-sided platform, it facilitates seamless transactions between sellers and buyers. However, it transcends traditional marketplaces by integrating cutting-edge technologies like Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR). This convergence fosters an immersive and personalized shopping environment. AI personalizes product recommendations, while VR allows for virtual store exploration with interactive 3D models. AR integration (potential future development) could further enhance product visualization within a user's real-world environment. This innovative approach empowers small businesses to showcase products in a captivating and interactive manner, fostering a dynamic and competitive marketplace that benefits both consumers and vendors.

AI serves as a virtual shopping companion, leveraging advanced algorithms to understand user preferences and past purchases. This personalized approach translates into curated product recommendations, ensuring customers encounter items that resonate with their unique needs and desires. VR technology takes customer engagement to a whole new level. Imagine stepping into a virtual mall unlike any other, where meticulously recreated 3D models of products come alive. Customers can virtually explore these stores, examining product details in real-time, comparing sizes with ease, and even virtually trying on clothing or visualizing furniture placement within their own homes. This immersive experience bridges the gap between the physical and digital worlds, fostering a level of engagement that surpasses traditional online shopping.

Looking towards the future, the potential integration of Augmented Reality (AR) promises to further enhance the customer experience. Imagine the ability to virtually place a piece of furniture in your living room or see how a new pair of shoes will look on your feet, all from the comfort of your own home. This seamless blending of the virtual

and real world empowers customers to make informed purchasing decisions, fostering greater confidence and satisfaction.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGER

CHAPTER 1: INTRODUCTION

1.1What does the information system mean?

A Next-Generation Online Marketplace for Small Businesses:

This concept outlines a cutting-edge online platform designed to empower small businesses and connect them directly with customers. It functions as a two-sided marketplace, fostering seamless transactions between sellers (small businesses) and buyers (customers). However, this platform takes it a step further by integrating advanced technologies like Artificial Intelligence (AI), Virtual Reality (VR), and 3D Modeling to create a truly immersive and personalized shopping experience.

Objectives of the project:

Streamlined Transactions: Dedicated buyer and seller accounts simplify the buying and selling process, allowing for efficient order management and

II. communication. Secure Payments: The platform facilitates online payments with secure options

for most purchases, ensuring financial protection for both parties.

III. Customization with Clarity:

Customers can specify order details within predefined categories, saving time for both parties. Additionally, material transparency through clear component listings allow informed purchase decisions.

IV. Local Focus:

The platform prioritizes local businesses by highlighting highlyrated nearby options in searches, promoting community engagement.

Custom Order Support:

Customers can request specific product features, catering to unique needs and fostering a personalized shopping experience.

V. AI-Powered Enhancements:

• Smart Search Functionality: Utilize AI to enable natural language search for products, making it easier and faster for customers to find what they need.

• Personalized Recommendations: Leverage AI to analyze customer behavior and purchase history,recommending products that resonate with their interests and increasing customer satisfaction.

Conversational Search:

• Implement AI-powered chatbots or voice assistants to answer customer questions in real-time, provide product recommendations and guide them seamlessly through the purchase process.

VI. Immersive Shopping Experience: Walk around a virtual marketplace, examine products up close, and interact with virtual sales assistants for a more realistic shopping experience.

VII. Social Shopping: Invite friends or family to join you in the VR marketplace for a fun and interactive shopping experience.

VIII. 3D Modeling: Showcase products using high-quality 3D models. This allows customers to:

• View Products from All Angles: Rotate and zoom in on 3D models for a detailed examination of products.

• Enhanced Product Visualization: 3D models provide a more realistic representation of products compared to traditional images.

Benefits:

• For Small Businesses: Gain access to a wider market, reduced overhead costs compared to physical storefronts, reach new customer segments, and leverage AI for product insights and marketing strategies.

• For Customers: Enjoy a personalized and convenient shopping experience with local businesses and unique offerings, benefit from customization options, experience secure online transactions, and have the option for a more immersive and interactive shopping experience through VR and 3D modeling. Overall, this platform creates a win-win situation for both small businesses and customers, fostering a thriving online marketplace that leverages cutting-edge technologies for a truly next-generation shopping experience.

1.2 The project idea

The motive behind our application is to entirely change the shopping experience and make it as realistic and fun as possible. We will provide tools and assists from latest technology such as AI, VR, XR, AR which has never been utilized in an IS before, which would immerse the user in the virtual world.

CHAPTER 2:

ANALYSIS AND SYSTEM REQUIREMENTS

2.1 SDLC Phases

PLANING PHASE

The planning phase is the fundamental process of understanding
why an information system should be built and determining how the
project team will go about building it, first we should define the main idea of project (business) to introduce a summary of a business value to the steering committee and the project sponsor then when the project is approved it will Enter into the other phases.

ANALYSIS PHASE

Who will use this system?

Entrepreneurs and Crafters: People who make and sell handmade goods, such as artists, jewelers, or bakers, could find this platform valuable to showcase their products and connect with a wider audience.

Those Looking for E-commerce Solutions: Businesses that don't currently have an online presence or are looking for an alternative to larger marketplaces could find this platform user friendly and cost-effective.

Local Shops and Service Providers: This includes businesses like boutiques, restaurants, cafes, salons, handyman services, and any other small business that could benefit from increased customer reach and direct sales.

Gen Z: could be the target user model. Gen Z tend to enjoy tech and game infused experiences and appreciate small businesses. They'd be drawn to a futuristic shopping experience.

Fans of extended reality (XR) and Virtual Reality (VR): the app incorporates XR and VR features, which would attract people who already enjoy these technologies in gaming or other applications.

Eco-Conscious Consumers: it could potentially address sustainability concerns by offering features like life-cycle information on products or service/product reviews and rating and by

facilitating seamless returns and resales.

users with special needs: this could potentially enhance their satisfaction with the shopping experience through VR/XR technology which would provide a sense of validation.

What will the system do?

The system will permit small businesses and connect them directly with customers. It functions as a two-sided marketplace, fostering seamless transactions between sellers (small businesses) and buyers (customers). The key of success for this new marketplace would lie in effectively targeting its audience, offering unique features or a strong value proposition compared to existing options, and building a user base on both the seller and customer sides.

Where and when will it be used?

This two-sided marketplace system could be used literally anywhere and anytime with an internet connection! The beauty of online platforms is that they transcend physical location. So, if there are small businesses with products or services to sell and customers with internet access, this system could be used:

• Globally: The platform could be designed to support sellers and customers worldwide, though language barriers and international shipping would need to be addressed.

• Nationally: It could focus on connecting small businesses and customers within a specific country.

• Locally: The platform might be designed to serve a particular city or region, fostering a strong sense of community support for small businesses.

DESIGN

The design phase is a crucial step in the development of any system, First of all, it requires going through the design phase. It includes phase:

• **Technical components:** This involves defining the hardware, software, and network infrastructure needed to run the system. This includes things like the type of computers, operating systems, databases, and network protocols.

• **User Interface (UI), forms, and reports:** The design phase determines how users will interact with the system. This includes designing user-friendly interfaces, forms for data entry, and reports for displaying information.

• **Specific programs, databases, and files:** Here, the specific software programs, databases, and files required for the system's operation are identified. This might involve designing custom programs or selecting existing software that meets the needs.

In our program we will develop many features that include:-

1. 3D modelling
2. AI
3. VR

The VR feature is available in our program and has a unique experience here in (Beit Fina)

1) For design we must define goals for this experience: -

You can walk around, examine products up close, and even interact with virtual sales assistants, with advanced VR technology, you can try on clothes virtually through a customized avatar and check if the size is suitable, It's not a personal activity.you You can invite friends or family to join you in the virtual mall etc.

2) Explore WebVR Frameworks:

WebVR frameworks allow you to build VR experiences directly within a web browser. Popular options include:

• **A-Frame:** A free, open-source framework known for its ease of use.

• **Daydream VR:** Focused on mobile VR experiences for smartphones.

• **Unity VR/Unreal Engine SDK:** These powerful game engines can create complex VR experiences but require more programming knowledge.

3)design VR: VR design principles differ from traditional web design. Consider these aspects:

• **360-degree content:** Use panoramic images or videos to create the VR environment.

• **User interaction:** Design intuitive ways for users to navigate and interact with the VR world using VR controllers or head movement.

• **Comfort and usability:** Prioritize smooth performance and avoid overwhelming users with complex controls.

4) Resources and Tools:

• Several resources can aid your VR website development:

• **VR Design Guidelines:** Established by VR platform providers like Oculus and Google, these guidelines offer best practices for VR design.

• **Sample Projects:** Explore existing VR websites for inspiration. Look for projects built with your chosen framework.

The 3D MODELLING also feature is available in our program it make your eyes inviting you to engage.

There are two main approaches to incorporating 3D models into your website: -

1) Creating and hosting your 3D Model:

• **3D Modeling Software:** If you have the creative skills, you can design your own 3D models using software like Blender, Maya, or Sketch-up. These programs offer a wide range of tools for sculpting, texturing, and animating your models.

• **Model Optimization:** Before placing the model on your website, it's crucial to optimize it for web use. This involves reducing the file size and complexity to ensure smooth loading and performance. Tools within your 3D software or online services can help with this.

• **3D Model Hosting:** There are specialized platforms like Sketchfab or Clara.io that allow you to upload and host your optimized 3D models. These platforms provide embed codes you can use to integrate your model directly into your website.

2) Using a 3D Model Viewer Library:

• **Libraries like Three.js:** For a more dynamic approach, consider using JavaScript libraries like Three.js. These libraries allow you to load, render, and interact with 3D models directly within your web browser.

• **Coding Knowledge Required:** While powerful, using libraries like Three.js requires some JavaScript programming knowledge to implement the 3D model viewer and any desired animations or interactivity.

• **Pre-made Models:** Many libraries work with various 3D file formats, allowing you to use pre-made models downloaded from online repositories.

AI in our program enhancing the customer journey in shopping in (Beit Fina)

Designing AI for your program involves carefully defining its purpose and capabilities. Here's a breakdown of the key steps: -

1) Identify the Need:

customers are greeted by helpful virtual assistants and receive personalized recommendations

tailored to their unique preferences. AI can make this a reality.

AI to answer customer questions in real-time, and guide them seamlessly through the purchase process.

Personalized Recommendations: Leverage AI to analyze customer behavior and purchase history.

2)Choose the AI Model: we have different AI models suited for various tasks

• **Machine Learning** models learn from data to make predictions or classifications.

• **Deep Learning** models, a subset of Machine Learning, are powerful for complex tasks like image or speech recognition.

• **Natural Language Processing (NLP)** models understand and process human language

3)Data Collection and Preparation:

• Ensure your data is clean, labeled accurately, and representative of the real-world scenario for optimal model performance.

4) Training the AI Model:

• This involves feeding your prepared data into the chosen AI model. The model learns from patterns and relationships within the data, enabling it to perform the desired task.

• Training can be an iterative process. You might need to adjust the model, provide more data, or fine-tune parameters to achieve the best results.

5)Integration and Testing:

• Once trained, integrate the AI model into your program. This might involve setting up APIs (Application Programming Interfaces) for communication or embedding the model directly into your code.

• Thoroughly test the AI to ensure it performs as expected. Identify and address any biases or errors in the model's output.

6)Monitoring and Maintenance:

• AI models can degrade over time as data or user behavior changes. Regularly monitor your AI's performance and retrain it with new data when necessary.

Here are some additional tips for Designing AI in our program>>

• **Start Simple:** Begin with a well-defined, achievable task for your AI.

• **Focus on Explainability:** If interpretability is crucial, choose models that allow you to understand how the AI arrives at its decisions.

• **Consider Ethical Implications:** Be mindful of potential biases in your data or model's

Outputs.

IMPLEMENTATION PHASE

Testing and installation

1.Design the User Experience (UX):

- Develop design template and simulation to visualize the user journey.

- Design intuitive interfaces for both web and VR experiences.

2.Choose the Right Technologies:

- we will choose a web development stack that supports VR integration and 3D rendering. Technologies like WebGL, WebXR , Three.js, and A-Frame are popular choices.

3.Develop the Web Platform:

- Set up the back-end infrastructure for user authentication, product management, and AI integration.

- Implement front-end components for browsing products, viewing 3D models, and interacting with AI features.

- Ensure cross-platform compatibility and responsive design for different devices.

4.Integrate VR Shopping Experience:

- Utilize VR technologies to create immersive shopping environments.

- Implement features like transport, gesture controls, and object interaction within the VR space.

5.Create and Showcase 3D Models:

- Generate high-quality 3D models of handmade products using software like Blender, Maya, or SketchUp.

- Implement 3D model viewers on the web platform for users to explore products from different angles.

6.Implement AI Product Trials:

- Integrate AI algorithms for virtual product trials, such as virtual try-on for clothing or virtual placement for home decor.

- Develop user interfaces for initiating and interacting with AI-powered trials.

7.Testing and Iteration:

- supervise thorough testing across different devices and VR platforms to ensure performance and usability.

- Gather feedback from users and iterate on features to improve the overall experience.

- Address any bugs or issues identified during testing.

8.Launch and Marketing:

- station the web platform and VR experiences to production servers.

- Develop a marketing strategy to attract users to the platform, leveraging social media, influencers, and targeted advertising.

Continuously monitor user engagement and adjust based on analytics data.

9.Maintenance and Updates:

- Regularly update the platform with new products, features, and optimization

- Provide ongoing support to users and address any technical issues promptly.

By following these steps, we can create a comprehensive web platform that combines the immersive experiences of VR with the convenience of online shopping and AI-powered product trials.

2.2 System Request:

Project sponsor:

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Table 2.2.1 – Project sponsor

Business Need

At Beit Fina, we can support the local market for small businesses, Increasing Jordan's share in the technological market Marketing can help you reach a larger audience, and help workers to produce their products at a lower cost. The features we will roll out at Beit Fina by integrating markets and adding product improvements. in our project, we will add technology such as artificial intelligence, XR, VR, and 3 modeling. Choosing and displaying a product in the new form of kidneys with modern technologies makes it an amazing experience in our evolving time. • Provide an interactive experience for customers/users. • Achieving exceptional experiences for customers to try on the • products through realistic virtual reality technology. • Review products before purchasing them. • Discover products and services in a way that makes them a real experience. • Increase sales. • Improving marketing strategies. • Increase loyalty to system providers and production team. • Increase revenues. • Increase customers' awareness of products and give them a range of alternatives. • Increase customers desire to buy. • Credibility in product representation.

Table 2.2.2 – Business Need

Requirements

the program allows the customer comfort and saves time and effort in the virtual mall
It will be so easy to search for a product using the AI search engine, and that will save users time Making the shopping experience Make it an entertaining experience using AI, VR, and AR
to display products even more spectacular and more accurately.
This technology can be used to view from various angles, providing a real or conceptual depiction of a product, that's new here in Jordan.
For the business owner, sales will be 24 hours across the site and their profits will increase.

3D modeling Requirements:

User-friendly: facilitates effortless navigation and provides convenient access to tools and commands.

Matiral: the product matiral will be more Understandable for the user Customization and

Personalization: 3D modeling enables customer to create customized or personalized products
tailored to individual customer needs and preferences.

Smooth performance: even with complex scenes, and high-resolution textures.

Realistic Detail: provide realistic detail like color, topography, reflectivity, patterns, and wear
to 3D objects and 3D scenes

AI-powered Virtual Try-On: This feature Shared between 3D modeling and AI power, for
apparel and accessories retailers, AI-powered virtual try-on features can significantly enhance customer engagement. This innovative technology allows users to see how products would look
on them before they buy, boosting confidence in their purchase decisions.

Streamlined Workflows: Integrating 3D modeling into existing workflows and systems can streamline processes, automate repetitive tasks, and improve overall efficiency. This can free up
resources to focus on more value-added activities and accelerate time-to-bait fina .

For VR, XR:

• Try before you buy: This is the main issue many users complain about with the traditional online experience. Although, with advanced VR technology, you can try on clothes virtually through a customized avatar and check if the size is suitable, see how furniture would look in your home, or even test drive virtual versions of products like cars or gadgets. Yes! Exactly like a game! This immersive experience can help you make more informed purchasing decisions, but in a fun way.
• Social Shopping: Shopping doesn't have to be a solitary activity anymore, you can invite friends or family to join you in the virtual mall, browse together, and even get real-time feedback on your potential purchases. It's like going shopping with friends without leaving your house.

• Fashion Events and sales: retailers could host virtual events like fashion shows! let users delve into the exciting social experience in their own home. Attend product launches, or exclusive sales within the VR environment. These events could create a sense of urgency and excitement, driving engagement and sales.
• A metaverse: it is essential to build a metaverse containing all the necessary elements and to provide a realistic environment for the users. with a mall-like experience, users could walk around this virtual mall and try on products to achieve a realistic way and make it desirable and fun.
• Spatial computing technology: the integration of this technology is crucial to make the experience interactive and engaging. The users should be able to interact with virtual buttons and menus to manipulate what they can see and to make the purchase process integrated with the experience itself instead of having to take off the HMD (if necessary) to go on with the traditional process.
• More inclusive: Making the 3D experience suitable for those who do not own an HMD. Traditional users should be able to experience the virtual mall through the traditional input devices like mouse, keyboard, etc. this could significantly increase awareness by the users of the XR's potential and power which could make them want to delve themselves into this new technology.

For AI:

Core Functionalities: - Smart Search Functionality: Utilize AI to enable natural language search for products,
this can lead to increased conversions, improved customer satisfaction, and a more user friendly overall website experience.

- Personalized Recommendations: Leverage AI to analyze customer behavior and purchase history, recommending products that resonate with their interests and increasing customer satisfaction.

- Conversational Search: Implement AI-powered chatbots or voice assistants to answer customer questions in real-time, provide product recommendations, and guide them seamlessly through the purchase process.

- Personalized Recommendations: Leverage AI to analyze customer behavior and purchase history. use these insights to recommend products that resonate with their interests, increasing customer satisfaction and loyalty.

- Smart Search Functionality: Empower users to search for products using natural language queries. This makes searching for products more intuitive and efficient, allowing customers to find what they need quickly and effortlessly.

- AI-powered Virtual Try-On: For apparel and accessories retailers, AI-powered virtual try-on features can significantly enhance customer engagement. This innovative technology allows users to see how products would look on them before they buy, boosting confidence in their purchase decisions.

- Customization Options: Allow users to personalize products by offering AI-powered configurators. This could be for things like custom clothing (e.g., size, color,

embroidery), furniture, or electronics

- AI-powered Image Recognition and Search:

  - Visual Search: Enable users to search for products using images. They can upload an image or take a picture with their phone, and the AI will find similar or identical products on your website.
  - Personalized Styling Recommendations: Integrate AI with a recommendation engine to suggest outfits or product combinations based on an uploaded image

Table 2.2.3 - Business Requirements

Business Value

Our budget may vary due to the expansion we have put into our project, especially as the project values will change according to the updates and features we add in general.

Hosting web:

The web is a service that allows you to store your website files on an Internet-connected server.
When someone writes your website address in their browser, the browser sends a request to the
server to view the site's files. In other words, web hosting is where your web pages live.
$2.99/ 3 month - $29.99/year

Complex website: consists of more than 10 pages and includes advanced features such as an online web or inserting with social media and costs from $2,000 to $10,000 or more.

Design Type:

Custom design: It is specially designed for your website and costs from $1,000 to $10,000 or more.

Ready template: It is a pre-created design, and you can use it for a lower cost, from $50 to $500.

Marketing costs

An ad campaign on Google Ads can cost $50 to $10,000 a month or more.
It can cost an advertising campaign $50 to $5000 in the social media $ 770.000 for Hosting web, Complex Website, Design, and marketing costs.

3D modeling value:

- **Product Visualization:** In product visualization, the choice of software depends on what the designer relies on. The application may be based on the designer's vision of the 3D model of the product. Alternatively, it could rely on the photos provided as input, shaping the visualization based on these images.

- **Product Design:** Here I will mention some of the applications we can use it, their costs,

and some of their features.

- blender application: Blender is the free and open-source 3D creation suite, it supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, even video editing and game creation

- Adobe Substance 3D: is a good choice, the tools required for accessing the photos in the app are just smart hone, although we want to activate the app on us

devices to enter the product and add it to the web. So, the cost can be $600/yrs.

- SketchUp: SketchUp is one of the easiest 3D modeling software. SketchUp Free lets home users craft 3D objects right in their browser. $349 /yr: available on iPad and

pc."Create professional work"

- ZBrush: Objects created in ZBrush tend to have a hand-formed feel
  - Pricing: $29.91 per month or $359 per year for a subscription.
  - Subscription Options: Subscription and perpetual

The metaverse and different VR XR services:

- Enhanced Shopping Experience: VR malls can allow customers to virtually browse stores, examine products in detail (imagine zooming in on the weave of a fine fabric), and even try on clothes in virtual fitting rooms. This can lead to increased sales and customer satisfaction.
- Global Reach: VR malls can break down geographical barriers, allowing retailers to reach a wider audience without the need for physical stores. This can be especially beneficial for niche brands or stores in remote locations.
- Data Collection and Personalization: VR malls can collect valuable data on customer behavior and preferences within the virtual environment. This data can be used to personalize. the shopping experience, recommend products, and offer ***targeted*** advertising.
- Entertainment and Events: VR malls can go beyond just shopping. They can host virtual events, concerts, art exhibits, or even create interactive games and experiences. This can attract new customers and generate additional revenue streams.
- Market recognition: For retailers, VR malls can eliminate the need for physical storefronts, reducing overhead costs like rent, utilities, and staffing. This can be especially beneficial for smaller businesses or those looking to expand into new markets. This could attract retailers and make them resort to our application, which could potentially increase market recognition and market share.
- Estimated cost of building a simple metaverse: (Social Media/VR Mall): $25,000 - $400,000.
- Mid-Range Metaverse (Basic Game): $300,000 - $1 million
- High-Quality Metaverse (Complex Game/Virtual World): $1 million - $10 million+ (or even more)
- Maintenance: $10,000 - $100,000 per month
  This cost depends on the complexity of metaverse. A larger metaverse with more users and features will require more server resources and ongoing maintenance to ensure smooth operation.
- Content Creation: $50,000 - $500,000 per yearThe cost of content creation varies depending on the amount and complexity of content we need. Simple social features might require less content creation compared to a game world that needs constant updates with new quests, items, and environments.
- Marketing: $100,000 - $1 million per year

For AI value:

Enhanced User Experience (UX):

- Personalization: AI tailors the user experience by recommending relevant products, providing real-time search assistance and offering chatbots for 24/7 product inquiries.
- Simplified Navigation & Search: Smart search functionalities with features like

autocomplete and filters help users find what they need quickly and efficiently. AI powered visual search allows users to search for products using images, further streamlining product discovery.

- Customization: AI-powered configurators empower users to personalize products, leading to a more engaging shopping experience and potentially higher product satisfaction.

Increased Sales and Conversions:

- Personalized Recommendations: By suggesting relevant products based on user behavior, AI can nudge them towards additional purchases and increase average order value.
- Improved Search Accuracy: Smart search functionalities lead to users finding the products they're looking for faster, reducing bounce rates and increasing the likelihood of conversions.
- 24/7 Availability: AI-powered chatbots can answer product questions and address purchase concerns around the clock, potentially converting website visitors into buyers even outside of regular business hours.

Improved Operational Efficiency:

- Automated Tasks: AI chatbots can handle routine customer inquiries, freeing up human customer service representatives for more complex issues. This reduces operational costs and improves overall customer service efficiency.
- Data-driven Insights: AI can analyze user behavior data to provide valuable insights into customer preferences, search trends, and product performance. This data can be used to optimize product offerings, marketing strategies, and website functionalities.
- Reduced Development Costs: In some cases, pre-built AI solutions can be integrated with websites relatively easily, reducing development time and costs compared to building custom functionalities from scratch.

Additional Business Value Considerations:

- Brand Image: A website that leverages AI to personalize the user experience can project a more innovative and customer-centric brand image.
- Competitive Advantage: By offering AI-powered features like product customization or visual search, you can differentiate yourself from competitors and attract a wider audience.
- Scalability: AI solutions can often scale efficiently to accommodate website growth and increasing user traffic, making them a future-proof investment.

For AI Cost Estimation:

- Pre-built Solutions: $5,000 - $20,000+ per year (depending on features and usage). This includes subscription fees for pre-built recommendation engines that integrate with your website.
- In-house Development: $30,000 - $100,000+ for initial development and $5,000 - $20,000+ annually for maintenance (depending on team size, project complexity, and ongoing needs).
- Factors Affecting Cost: Complexity of Recommendations: Simple rule-based recommendations are less expensive than AI-powered solutions that consider user

behavior and product interactions for highly personalized suggestions.

- Data Storage and Management: The cost can increase if you need to store and manage large amounts of user data for training and personalization.
- Development Expertise: In-house development costs depend on your team's experience and skillset. Hiring external specialists might be more expensive but can offer faster implementation.

Benefit Estimation (Increased Revenue):
Increased Conversion Rate: AI recommendations can potentially increase conversion rates by 1- 5% (sometimes even higher).
A conservative estimate of 2% is a good starting point.
Average Order Value (AOV): Consider your current AOV to calculate the potential additional revenue per customer due to AI recommendations.
Example Calculation (Hypothetical):
Scenario: Let's assume we choose a pre-built solution with a $20,000 annual cost.
Current Conversion Rate: 2%
Website Traffic: 40,000 visitors per month (480,000 annually)
Average Order Value: $40
Increased Revenue due to AI:
Increased Conversion Rate: 2% (assumed)
Additional Revenue per Visitor: 2% * $40 AOV = 0.8$ Total Increase in Revenue: $0,8 x 480,000 visitors = $ 384,000Return on Investment (ROI):
Based on the example:
Increased Profit: Assuming a 20% profit margin, the additional sales would result in $76,800 extra profit annually ($480,000* 20%).
ROI (for pre-built solution):
ROI = ($76,800- $20,000) / $20,000 * 100 = 284%
Break-even Point (BEP):
BEP = Cost of AI Integration / Increase in Revenue due to AI
BEP (pre-built solution):
$20,000 / $384,000 = 0.052 (rounded to four decimal places)
To recover your $20,000 investment within a year through AI recommendations, you would need just over 5.2% of your website visitors to make a purchase due to the influence of the recommendations.

Table 2.2.4 - Business Value

Special issues and Constraints

The rapidly evolving technology system and our opportunity to choose all possible ways to Developing a Bait Fina is something to do in our current era. We may face competitors in our field and must show flexibility to strong updates every time.

Technical Constraints: Your website requires web hosting, which can be costly and requires technical setup depending on your chosen platform.

1. Budget: It is important to accurately estimate the budget for this program to help us know how much it consumes from us and try to create the program at a lower cost and add technical features at average prices within our budget the budget will dictate the features, task, and design complexity you can achieve.

2. Hosting limitations: Your hosting plan's limitations will affect things such as storage space, bandwidth, and processing power. These can affect website speed, security, and the amount of traffic your site can handle.

Content Constraints:

1. Content creation: You'll need high-quality content like text, images, and videos to populate your website. Creating good content takes time and resources.

Design Constraints:

Accessibility, it's important to ensure your website is accessible to everyone. Some people may have difficulty using online stores, especially older people or users who are not good at using technology.

Other Constraints:

The level of interaction with products in traditional stores may not be the same for online shoppers. For some shoppers, the cost of shipping and delivery time can present barriers. Providing the same level of personal service online as in traditional stores can be a challenge. It can be difficult for customers to solve their problems or receive immediate help online. Building strong relationships with customers online can be difficult.

Technical issues:

Hardware and software limitations can affect the ability to create or render certain types of 3D models, especially if the project requires advanced features or high levels of detail.

3D modeling issues:

1. **High quality equipment:** hardware equipment needs to be allocated effectively to ensure the successful completion of the project within budget constraints.
2. **Client Requirements and Feedback:** Understanding and accommodating client preferences, feedback, and revisions throughout the project lifecycle is essential to deliver a satisfactory product.
3. **Budget Constraints:** Ensuring that the project stays within budget while meeting quality standards and client expectations can be a significant constraint, requiring careful planning and resource management.
4. **Scalability and Flexibility:** Designing 3D models that are scalable and adaptable to future changes or iterations can be challenging, especially if the project scope may evolve over time or if the 3D models need to be reused for different purposes.

The VR and XR implementation issues:

1. • VR technology is still evolving, and widespread adoption of VR headsets by consumers may take time. Additionally, creating a fully immersive and engaging VR shopping experience requires significant investment in development and design.
2. Cost and Accessibility:
    - High Cost: High-quality XR devices can be expensive, limiting accessibility for many consumers.
    - Lack of Standardization: The XR industry lacks standardization across platforms and devices, which can hinder development and user experience.
3. Lack of user awareness of XR technology.
4. XR education is inevitable and necessary because this technology is relatively new.

AI Technical Challenges:

1. Data Collection & Management: AI algorithms rely on data for training and personalization. Ensure you have a strategy for collecting, storing, and managing user data securely and complying with data privacy regulations (e.g., GDPR, CCPA).
2. Data Quality: The quality of your data significantly impacts the effectiveness of AI. Inaccurate or incomplete data can lead to poor recommendations or chatbots that misunderstand user queries.
3. Computational Resources: Some AI functionalities, particularly complex algorithms or real-time recommendations might require significant computing power. Ensure your website's infrastructure can handle the additional load.
4. Technical Expertise: Integrating AI, especially with in-house development, might require expertise in AI development, data science, and potentially API integration skills. You might need to upskill your existing team or hire specialists.

Strategic Challenges:

1. Choosing the Right AI Solution: There are numerous AI solutions available. Carefully evaluate your needs and choose a solution that aligns with your budget, technical capabilities, and website functionalities.
2. User Experience (UX) Integration: Ensure the AI functionalities integrate seamlessly with your website's design and user experience. Don't overwhelm users with complex interfaces or irrelevant recommendations.
3. Transparency & User Trust: Be transparent about how you're using AI on your website. Clearly explain how user data is collected and used and build trust with your users.

Business Challenges:

1. Cost of Integration: The cost of AI integration can vary depending on the chosen solution (pre-built vs. in-house development) and functionalities. Carefully consider the cost-benefit analysis before investing.
2. Return on Investment (ROI): Measuring the ROI of AI integration can be challenging. Develop a plan to track key metrics (e.g., conversion rates, customer satisfaction) to assess the effectiveness of your AI implementation.
3. Data Security & Privacy: Ensure your AI solution adheres to data security best practices and complies with relevant data privacy regulations. A data breach or privacy violation can damage your reputation and lead to legal consequences.

Additional Considerations:

1. • Bias in AI: AI algorithms can perpetuate biases present in the data they are trained on. Be mindful of potential bias issues in your chosen AI solution and take steps to mitigate them.
2. Ethical Considerations: Carefully consider the ethical implications of using AI on your website. For instance, how will AI recommendations impact user behavior or purchase decisions?

Table 2.2.5 – Special issues and Constraints

2.3 Feasibility analysis

2.3.1 Technical Feasibility

The rapidly evolving technology system and our opportunity to choose all possible ways to develop a Bait Fina is something to do in our current era. We may face competitors in our field and must show flexibility to strong updates every time.

Technical Constraints:

Your website requires web hosting, which can be costly and requires technical setup depending on your chosen platform.

• Budget:

It is important to accurately estimate the budget for this program to help us know how much it consumes from us and try to create the program at a lower cost and add technical features at average prices within our budget the budget will dictate the features, task, and design complexity you can achieve.

• Hosting limitations:

Your hosting plan's limitations will affect storage space, bandwidth, and processing power. These can affect website speed, security, and the amount of traffic your site can handle.

• Design Constraints:

Accessibility, it's important to ensure your website is accessible to everyone. Some people may have difficulty using online stores, especially older people or users who are not good at using technology.

• Other Constraints:

The level of interaction with products in traditional stores may not be the same for online shoppers. For some shoppers, the cost of shipping and delivery time can present barriers. Providing the same level of personal service online as in traditional stores can be a challenge. It can be difficult for customers to solve their problems or receive immediate help online. Building strong
relationships with customers online can be difficult.

Technical feasibility for 3D modeling:

Hardware and software limitations can affect the ability to create or render certain types of 3D models, especially if the project requires advanced features or high levels of detail.

1. Familiar with 3D modeling

   This feature is not ambiguous anymore, so it is easy for the user to understand it and work with it For the developers, this skill must be available for the in the developer, with certifications and experience It takes too many details to build the module of the object.

   project size

The size of 3d modules is too large in memory. If we count the number of files for each product, the

number of times each product takes to design it, and size of the software.

• The 3D model will be used to display each product as an object in the product visualization, although in

the virtual mall or the (VR).

• The 3D module is considered medium risk.

Technical Feasibility for AI:

the familiarity:

• user:

the users are very familiar with the AI technology especially now days because of the different ai tools that

being available to the local and it's become part of our life everywhere and different AI technology that is being

used today so the user is being familiar with the AI every day so it's a low risk

• programmer:

the AI technology is something new to our world, so it's still don’t have many sources for study and the number

of project that can be made by small company is very limited and have a lot of cost, so it's being a medium to

high risk to implement so we will have delays and problem if we decide to implement it inside the company

and we will have the option of develop it outside the company or to train our IT team so we can develop it
inside the company with help of an outside specialist

• the project size:

the project size after integrating the AI will increase dramatically and the number of function and features will
be a lot, so it has a high risk but with the risk come the benefits the number of the development team will
increase, and we will need more professional the length of time to the original project will extend and we might
have delay,the project will be more complicated because the AI will be integrated in a lot of different section,
and it will have a lot of using in the overall

• The compatibility:

the AI will be integrated with a lot of existing technology, and it will be a high risk to make it synchronous with
the existing system and to make all the function work right and it's a little hard to make sure that the existing
system compatible with the AI so we will try to study that in the beginning of the real project The AI will rely
on the existing data from the web app database and will store the different data in the database directly and the
data that will be produced will be the input for different existing function It will be implemented in the
company infrastructure and that will make it have a lot of loads.

Technical feasibility for VR:

• There’s a risk associated with familiarity with VR technology, Users locally aren’t aware of it, and
HMD (which might be necessary) isn’t cost effective for the average user.

• Another risk is associated with the limitation of the XR professionals and developers locally, which
might require contacting developers globally which might add to the overall cost of the project.
• The database size will be a challenge because of the need to store real time data from the users engaging
in the VR metaverse. This requires sufficient storage of the database to avoid breakdown.

2.3.2 Operational feasibility

We can handle online business tasks including website management, product listing, marketing, and customer
service. Our team's strengths and weaknesses must be taken into consideration to identify gaps and potential
solutions. Consider the time needed to run an online shop effectively, including product sourcing, listing
creation, marketing efforts, customer interactions, and order processing. we must Explore ways to automate or
outsource tasks if time constraints are a concern.
Startup Costs: Estimate the costs of setting up your online shop, including website development, online
business platform fees, product sourcing, inventory management, marketing expenses, and potential shipping
costs.
Ongoing Costs: Consider the ongoing expenses, which include payment processing fees, domain name
renewal, marketing budget, and potential employee salaries.
Develop a comprehensive financial plan to evaluate the viability of your online shop and make educated
business choices
Ensure that your products have a viable market and a clear path to compete effectively by conducting thorough
research.
For 3D modeling: In bait fina we are looking to build a new vision of shopping at all. We try to create connect between the clients
and the business owner by building trust between both, and the 3D models made it easier to see the dimensions
of the product, how it looks in real life and the material will be more understandable for the client.

For VR:

From an organizational perspective, this project has high risk.VR technology is still evolving, and widespread
adoption of VR headsets by consumers may take time. XR devices can be expensive, limiting accessibility for
many consumers. users lack awareness of XR technology, so XR education is inevitable and necessary because
this technology is relatively new.

For AI integration:

Integrating AI search offers a significant win for both users and your organization. Users will experience faster,
more accurate searches, and discover relevant content with ease. Your staff will benefit from a reduced
workload for basic search inquiries, allowing them to focus on more complex tasks and website optimization.
However, successful implementation requires careful planning and resources, including access to high-quality
data, technical expertise, and ongoing maintenance.

2.3.3 Economic feasibility to the system

Assign Values to Costs and Benefits:

	Year 0	Year 1	Year 2	Year 3
Development -Hardware devices	$3000	_	_	_
-Metaverse	$300,000	_	_	_
-Content creation	$60.000	_	_	_
Total development cost	$363,000	_	_	_
operational				
-Software subscription (3D model)	-	$640	$640	$640
-AI subscription	_	_	$10.000	$10,000
-Maintenance	_	$120,000	$120,000	$120,00
-Marketing	_	$100,000	$100,000	$100,000

-Employee salary for 3D modeler	_	$72.000	$72.000	$72,000
Total operational cost	_	$292,640	$302,640	$302,640
Benefits -Delivery	_	$7,500	$15.000	$45,000
-VR Subscription	_	$40,000	$80,000	$120,000
-Product provider subscription	_	$168,000	$358,000	$500,000
Total	_	$208,750	$453,000	$665,000
-Net cash flow	($363,000)	($83,890)	$150,360	$362,360
-Commutative cash flow	($363,000)	($446,890)	($296,530)	$65830
-BEP	2.78 years			
-ROI	47%			

Table 2.3.3.1 – Economic feasibility to the system

Criteria for calculating the benefits:

• Assuming in the first year we have gained 10000 users, and 20% of them are constant subscribers to our service with 20$/month and the second year we have gained an extra 20000 users with 20% fixed subscription, and third year with 30000 users and so on.

• With delivery, assuming we had 5000 orders first year with 1.5$ profit. And 10000 orders by the second

year and significantly increased to 30000 by third year we get the values above.

• Assuming we take 0.2 percent commission on each order we get those values above.

Intangible benefits:

• Increase sales.

• Improving marketing strategies.

• Increase loyalty to system providers and production team.

• Credibility in product representation.

Functional requirements:

1. Main web

1.1 Process:

1.1.1 Easy access to our website and easy to function with options and view products

1.1.2 Includes multiple payment gateway integrations.

1.1.3 Users can create accounts to save personal information

1.1.4Users can filter products by price range, brands, color size, and so on.

1.2 Information:

1.2.1 Includes many technological features such as AI, 3D modeling, and AI.

1.2.2 Clear product listings with high-quality images, detailed descriptions, and specialty

1.2.3 Allow User reviews and ratings to inform buying decisions.

1.2.4 Categorize users based on purchase history and browsing behavior to send targeted marketing

messages.

2. 3D modeling

2.1 Process:

2.1.1 Allow users to see the product in 360 views.

2.1.2 Allow users to discover the real size and material of the product.

2.1.3 Allow users to experience the product as a 3D model before purchasing it.

2.1.4 The system will prompt the user to grant camera access.

2.2 Information:

2.2.1 Provide textual descriptions or metadata about the model.

2.2.2 include measuring distances, angles, or dimensions within the 3D models using built-in measurement tools.

3. AI

3.1 Process-oriented: (A process the system must perform; a process the system must do)

• 3.1.1 Product recommendations: The AI should recommend products to users based on them browsing history, purchase history, and similar user behavior.

• 3.1.2 Search query understanding: The AI should accurately interpret user search queries, even if phrased in natural language or with misspellings.
• 3.1.3 Chatbots: The AI can power chatbots that answer customer questions, provide product information, and guide users through the checkout process.
• 3.1.4 Result filtering and ranking: The AI should filter, and rank search results based on relevance to the user query, incorporating factors like product characteristics, user behavior, and past purchases.
3.2 Information-oriented: (Information the system must contain)
• 3.2.1 Product information retrieval: The AI should efficiently retrieve product information (descriptions, attributes, variations) based on user search queries.
• 3.2.2 Synonym and alias recognition: The AI should recognize synonyms and alternative phrasings for products to ensure users find relevant results even if they don't use the exact product name.
• 3..2.3 Search result diversification: The AI should present a diverse set of results that considers various product attributes, categories, and brands to cater to different user preferences.

4. VR

Processes:
4.1 allow users to navigate through the metaverse
4.2 allow users to customize a 3D avatar.
4.3 allow users to engage in social events and fashion shows.
4.4 allow users to view products and services.
Information:
4.1 include large database content.
4.2 include VR user profile.Task 5
4.3 include product suggestion for users.
4.4 include real time updates on inventory availability.

Nonfunctional requirements:

1. Main web

1.1 Operational:

1.1.1 The system should be able to work in the web browser and as an application.

1.1.2 User can add and remove items from their shopping cart

1.1.3 The checkout process should be streamlined with clear steps.

1.2 Performance:

1.2.1 Page Load Time for the web or application should load quickly under 3 seconds.

1.2.2 User interaction like clicking on the store or any feathers must be speed.

1.2.3 The platform should be able to handle a high number of concurrent users without compromising performance.

1.2.4 Implement redundancy measures for servers and databases to ensure continuous operation in case of hardware failures.

1.3 Security:

1.3.1 Apply strong password policies including minimum length character.

1.3.1 Define user roles such as admin, visitor, store owners

1.3.3 All user data, including personal information and financial details, should be encoded in rest and in transit

1.3.4 Develop a plan for responding to security incidents, including data breaches.

1.4 cultural and political:

1.4.1 The system should be able to distinguish between JD currency and currency from other nations.

1.4.2 All products have local customs.Task 5

1.4.3 Company policy is to buy computers only from Huawei.

1.4.4 Cultural Implement a system for moderating user reviews and content to prevent discriminatory or offensive language. This ensures a safe and respectful environment for everyone.

2. 3D modeling

2.1 operational:

2.1.1 The 3D models will be compatible with both mobile devices and personal computers, providing users with seamless access and functionality across multiple platforms.

2.2 performance:

2.2.1 3D models offer minimal lag and smooth animations.

2.3 Security:

2.3.1 any data transmitted between the user's device and the system's servers is encrypted using secure protocols.

2.3.2 Implement robust permission handling mechanisms to ensure that camera access is only granted when explicitly authorized by the user.

2.4 cultural and political:

2.4.1 The 3D models are compatible with all devices and accessible from any location worldwide.

3. AI

3.1 Operational:

• **3.1.1 Data pipelines and storage:** Mechanisms for collecting user data (browsing history, purchase history) and feeding it into the AI models for recommendations and search functionality. This includes storing and managing the data efficiently.Task 5

• **3.1.2 AI model training and maintenance:** Processes for training and updating the AI models used for recommendations, search, and potentially chatbots. This ensures the models stay accurate and effective over time.

• **3.1.3 Monitoring and logging:** Systems to monitor the performance of the AI functionalities, identify any errors or issues, and log relevant data for troubleshooting and improvement.

3.2 Performance:

• 3.2.1 Search response time: The AI should return search results within a specified timeframe (e.g., less than 2 seconds).

• 3.2.2 System uptime: The search engine should be available for users most of the time (e.g., 99.9% uptime).

• **3.2.3 Scalability:** The system should be able to handle increasing traffic and data volume without compromising performance. This is important as the website grows and attracts more users.

3.3 Security:

• **3.3.1 Data anonymization and privacy:** User data used by the AI system should be anonymized
and protected according to relevant data privacy regulations.

• **3.3.2 AI model security:** The AI models should be secure against manipulation or attacks that could lead to biased or misleading recommendations or search results.

• **3.3.3 System security:** The overall system needs to be secure against vulnerabilities that could compromise user data or website functionality.

3.4 Cultural and Political:

• **3.4.1 Recommendation bias:** The AI recommendations should avoid biases based on user demographics (e.g., race, ethnicity, gender). This ensures a fair and inclusive shopping experience for all users.

• **3.4.2 Culturally appropriate language:** Chatbots and any other AI interactions should use culturally sensitive language that avoids offensive or insensitive terms.Task 5

• **3.4.3 Transparency:** The website should be transparent about its use of AI and how it avoids biases based on political views or affiliations. This builds user trust and avoids concerns about political manipulation.

• **3.4.4 Explainability:** While not directly a cultural requirement, explainability can be relevant here too. Being able to explain the rationale behind recommendations or search results can help users trust the AI and avoid concerns about political bias in the results.

4. VR

4.1 Security:

1.4.1 users must specify the visibility of their profile/avatar information.

4.2 Performance:

4.2.1 achieve credibility in product representation.

4.2.2 allow multiple simultaneous users in VR mall.

4.2.3 provide high quality metaverse to enhance immersion.

4.2.4 provide a refund policy in case of inconvenience.

4.2.5 provide a high embodiment-illusion.

4.2.6 provide a high plausibility illusion (representation of a possible real-life scenario in VR needs to
match people's expectations).

4.3 Culture:

4.3.1 provide inclusivity in avatar customization/representation to respect diversity.

4.3.2 include many languages to target as much audience possible.

4.4 Operational:

4.4.1 system can run on meta quest 2/3 and any HMD device.

4.4.1 VR can run on IOS/Android mobile pho

CHAPTER 3:

SYSTEM DESIGN

3.1 UML Use Case Diagram:

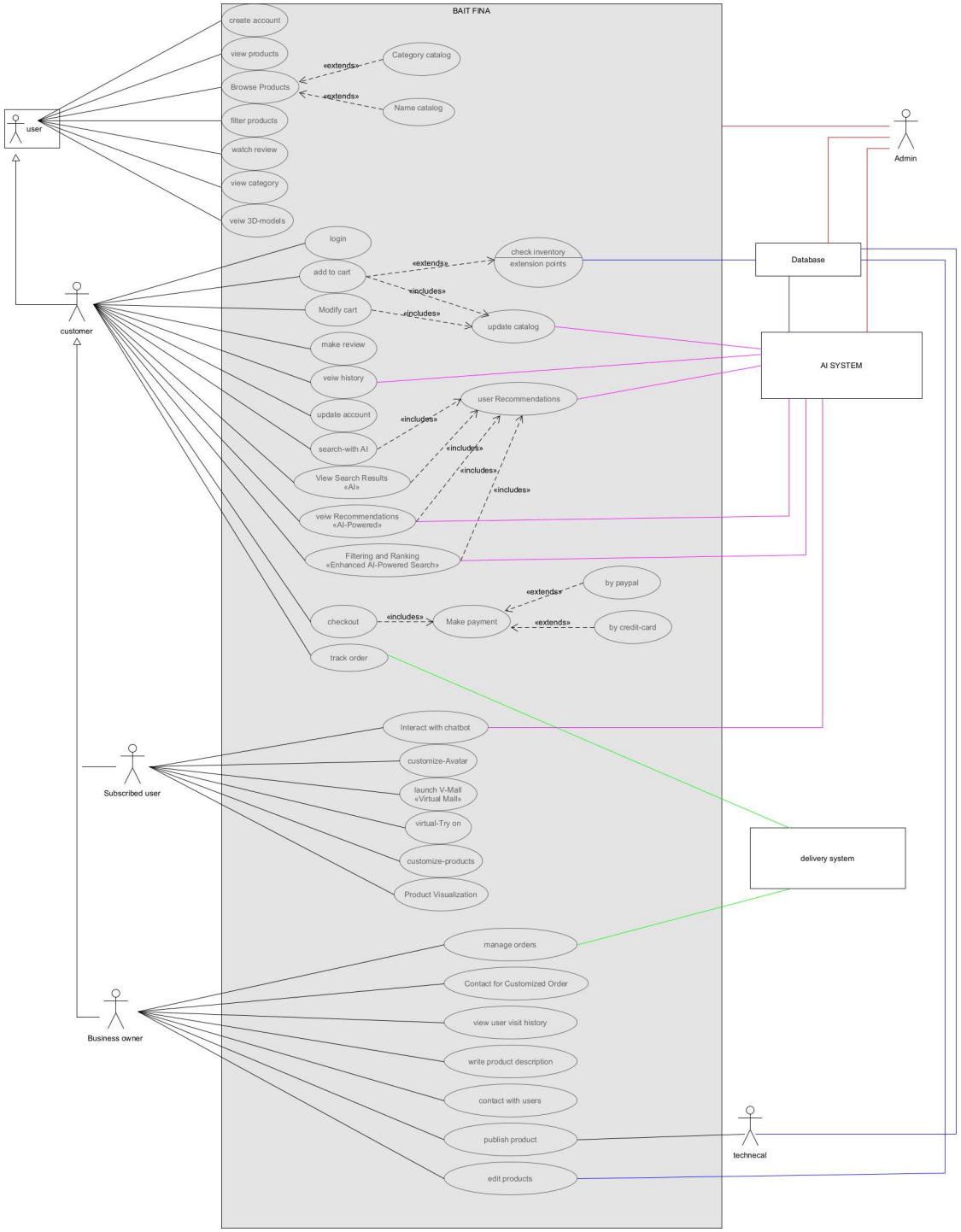

Figure 3.1.1- UML Use Case Diagram

3.2 Use Case Specification:

Use case name	**Create account**
Summary description	Users can create an account or log in to an existing one.
Precondition	User connected with internet. Make sure it's not a reboot.
Main flow	1.User accesses the registration/login page. 2. User enters their details (name, email, password, etc.) for registration or login credentials. 3.System validates the information. 4.User receives confirmation of successful registration or login.

Table 3.2.1 – create account

Use case name	**View products**
Summary description	Users can view available products.
Precondition	None
Main flow	1.User navigates to the product catalog. 2. User filters and sorts of products based on various criteria (e.g., price, category, rating). 3.User views detailed product descriptions, images, and reviewe

Table 3.2.2 – View products

Use case name	**Browse Products**
Summary description	Users can search for specific products using keywords.
Precondition	None
Main flow	1. The user enters keywords in the search bar. 2. System displays search results relevant to the keywords. Users refine searches using filters if necessary.

Table 3.2.3 - browse product

Use case name	**Filter products**
Summary description	helps users narrow down their search to find products that meet their specific requirements
Precondition	None
Main flow	1. The user accesses the product catalog page from the main menu or homepage. 2. The user sees filter options available on the catalog page, such as price range, categories, ratings, brands, and other product-specific attributes. 3. The user selects one or more filter criteria. 4. System Applies Filters 5. System Displays Filtered Results

Table 3.2.4 - filter product

Use case name	**Watch review**
Summary description	Users can review and leave reviews and ratings for products they have purchased
Precondition	1. The review and rating are published on the product page. 2. The user's review history is updated. 3. The system may use review data for analytics and product improvement.
Main flow	1. Users select a product they have purchased. 2. User clicks on "Write a Review." 3. User submits a rating and written review. 4. System publishes the review after validation

Table 3.2.5 - watch review

Use case name	**View category**
Summary description	users can view products within a specific category
Precondition	None.
Main flow	1. Navigate to Categories: User accesses the "Categories" option from the main menu or homepage. 2. Select Category: User selects a specific category (e.g., "Electronics"). 3. View Category Page: System displays products within the selected category. 4. Interact with Products: User browses, sorts, and filters products within the category. 5. View Product Details: User selects a product to view its detailed information.

Table 3.2.6 - view category

Use case name	**view 3d models**
Summary description	The 3D model view allows users to interact with a virtual representation of the product, providing a more immersive and detailed understanding of its features and appearance
Precondition	None.
Main flow	1. the user sees an option to view the product in 3D. 2. The user clicks the "View in 3D" button. The system loads the 3D model interface. 3. The system renders the 3D model of the product, allowing the user to interact with it. 4. The user can rotate, zoom, and pan the 3D model to examine it from different angles and perspectives. 5. Exit 3D Model View: User exits the 3D model view and returns to the product details page.

Table 3.2.7 – view 3d models

Use case name	**Login**
Summary description	Users can create accounts and log in.
Precondition	Have app launched.
Main flow	1. User Initiates Login 2. User Provides Credentials. 3. System Authenticates Credentials. 4. Successful Login. 5. System Presents Main Interface.

Table 3.2.8 – login

Use case name 11	**Add to cart**
Summary description	Allow users to add products to their cart.

Precondition	You must have an account. Must be logged-in
Main flow	1. User Selects Product. 2. Review of Product Details. 3. Product Information. 4. Visuals. 5. Pricing and Availability. 6. Choose Configuration. 7. Select Quantity (Optional). 8. Initiate Add to Cart. 9. System Validates Selection. 10. Cart Update Confirmation. 11. Visual Confirmation. 12. Cart Update. 13. User Action: The user has a choice to: Proceed to Checkout

Table 3.2.9 – add to cart

Use case name	**Modify cart**
Summary description	Users can remove, add, update their cart.
Precondition	1. Users must login. 2. Users must have items in their cart.
Main flow	1. Access Shopping Cart. 2. Review Cart Items. 3. Product Details. 4. Quantity. 5. Price. 6. Modify Cart Items. 7. Update Quantity. 8. Remove Item. 9. Apply Changes. 10. Add More Products (Optional). 11. Proceed to Checkout or Save for Later.

Table 3.2.10 – modify cart

Use case name	**Make review**
Summary description	Users
Precondition	You must have an account. Must be logged in.
Main flow	1. We can rate by 5-star system. 2. The user can add their comment (personal view).

Table 3.2.11 – make review

Use case name	**View history**
Summary description	Users can view their past order history.
Precondition	1. Users must have items ordered 2. Must be logged-in
Main flow	1. Access History View. 2. History Scope Selection. 3. History Display. 4. Chronological Listing. 5. Categorization. 6. Details for Each Entry. 7. Interact with History Entries. 8. Revisit Websites. 9. Search Again. 10. Remove Entries. 11. Exit History View

Table 3.2.12 – view history

Use case name	**Update account**
Summary description	This includes changing personal details such as name, email, password, shipping address, and other profile information.
Precondition	You must have an account. Must be logged-in
Main flow	1. Submit Changes: User submits the updated information. 2. Validate Changes: System validates the updated information. 3. Update Account: System updates the account information in the database. 4. Confirm Update: System displays a confirmation message. 5. Receive Confirmation: User receives an optional confirmation email/notification

Table 3.2.13 – update account

Use case name	**Search with AI**
Summary description	This use case allows a customer to find products on the website using a search query. The system interprets the query and retrieves relevant product listings.
Precondition	You must have an account. Must be logged-in
Main flow	1. The customer enters a search query in the search bar. 2. The system interprets the search query, considering factors like natural language phrasing and potential misspellings. 3. The system retrieves products from the website's database that match the search query with the help of the AI system. The system displays a list of relevant product search results to the customer depending on his preferences.

Table 3.2.14 – search with ai

Use case name	**View Search Results (AI)**
Summary description	This use case allows a customer to see a list of products retrieved based on their search query on an e-commerce website. The system filters and ranks the search results based on their relevance to the user's query.
Precondition	The customer has entered a search query in the website's search bar.
Main flow	1. The customer submits their search query. 2. The system retrieves products from the website's database that match the search query terms. 3. The system leverages AI to analyze the search query and product data (including characteristics, descriptions, and user reviews). 4. The AI ranks the search results based on their relevance to the user's query, considering factors like keyword matching, product popularity, and user behavior patterns. 5. The system filters the search results based on additional filters that the customer may choose (optional). 6. The system displays the ranked and filtered search results to the customer on the website.

Table 3.2.15 - view search result (AI)

Use case name	**view Recommendations**
Summary description	This use case describes the process of an AI system recommending products to users on an online shopping platform based on their browsing history, purchase history, and similar user behavior analysis.
Precondition	1. The user has interacted with the online shopping platform 2. The user has an established browsing history or purchase history.
Main flow	1. The user browses products, views categories, or searches for keywords on the platform. 2. The system passively collects data on the user's interaction 3. If available, the system retrieves the user's past browsing and purchase history. 4. The AI recommendation engine analyzes the collected user data. 5. It identifies patterns and relationships between the user's interactions and product attributes. 6. It utilizes data from similar user behavior to identify relevant product trends. 7. Based on the analysis, the engine generates a list of recommended products. 8. The recommended products are displayed to the user in various locations on the platform 9. The recommendations are presented clearly and visually appealing. 10. The system may personalize the display by prioritizing highly relevant items or showcasing product variety.

Table 3.2.16 – view recommendation

Use case name	**Filtering and Ranking**
Summary description	This use case describes the process of an AI system filtering and ranking search results on an online shopping platform based on the user's search query. The AI considers factors like product characteristics, user behavior data, and past purchases to deliver relevant results.
Precondition	The user enters a search query into the platform's search bar.
Main flow	1. The system captures the user's search query and parses it for keywords and intent. 2. The AI search engine utilizes the processed query to identify relevant products from the platform's database. 3. It analyzes product characteristics like title, description, category, brand, and specifications. 4. The engine leverages user behavior data to understand user preferences. 5. If available, it incorporates past purchase data to personalize results based on past buying habits. 6. Based on this comprehensive analysis, the AI assigns a relevance score to each product. 7. The system filters out irrelevant products based on pre-defined criteria 8. The remaining products are ranked based on their assigned relevance scores. 9. Products with higher scores, indicating greater relevance to the user's query and preferences, are displayed first in the search results. 10. The filtered and ranked search results are presented to the user. 11. Product information like title, image, price, and brief description are displayed. 12. The system may offer additional filtering options for further refinement.

Table 3.2.17 - filtering and ranking

Use case name	**checkout**
Summary description	Users can proceed with purchasing the items in their cart.
Precondition	You must have an account. Must be logged-in
Main flow	1. The user views the cart and clicks "Proceed to Check out." 2. User enters shipping and billing information. 3. User selects a payment method. 4. User reviews the order and confirms the purchase. 5. The system processes the payment and provides an order confirmation.

Table 3.2.18 – checkout

Use case name	**Track order**
Summary	Users can track the status of their orders.
Precondition	You must have an account. Must be logged-in
Main flow	1. User logs into their account. 2. User navigates to the "Order History" or "Track Order" section. 3. Users view the status of their orders.

Table 3.2.19 – track order

Use case name	**Update catalog**
Summary description	Users can modify the category of items based on what they need.
Precondition	The product interface view must be opened.
Main flow	1. Access Catalog Management. 2. Browse or Search Catalog. 3. Select Item for Update. 4. Edit Item Details. 5. Basic Information. 6. Additional Attributes. 7. Manager Media. 8. Upload New Media. 9. Edit or Delete Existing Media. 10. Review and Submit Changes. 11. Update Confirmation

Table 3.2.20 - update catalog

Use case name	**User Recommendations // INCLUDED**
Summary description	This use case allows a customer to see personalized product recommendations on the website. These recommendations are generated by an AI system that considers the customer's browsing history, purchase history, and similar user behavior.
Precondition	1. The customer has browsed products or purchased items on the website. 2. The AI system has analyzed the customer's browsing history and purchase history.
Main flow	1. The customer visits the website. 2. The system retrieves the customer's browsing history and purchase history from the database. 3. The AI system analyzes the customer's data and identifies patterns or preferences. 4. Based on the analysis, the AI system generates a list of recommended products. 5. The system displays personalized product recommendations to the customer on the website.

Table 3.2.21 - user recommendations

Use case name	**Make payment**
Summary description	This use case describes the process for a customer to make a payment for their online shopping card on a website.
Precondition	1. The customer has selected items and added them to their shopping cart. 2. The customer has created an account or opted for guest checkout 3. The customer has reviewed their order details
Main flow	1. Customer Selects Payment Method 2. Customer Enters Payment Information 3. The system securely transmits the payment information to the payment gateway. 4. The payment gateway verifies the information with the issuing bank or financial institution. 5. The system displays a loading indicator while processing the payment. 6. The system confirms the order and displays a success message to the customer. 7. The customer receives an email confirmation with order details. 8. The order is processed for fulfillment (inventory update, shipping preparation).

Table 3.2.22 – make payment

Use case name	**Interact with Chatbot**
Summary description	This use case describes a customer interacting with a chatbot on a website. The chatbot utilizes AI to understand the customer's questions, provide product information, and guide them through the shopping experience.
Precondition	1. The customer is on the e-commerce website or app where the chatbot is deployed. 2. The chatbot is operational and available for interaction.
Main flow	1. The customer initiates a chat with the chatbot by clicking on a chat window or using a designated chat interface. 2. The customer interacts with the chatbot by asking questions in natural language or selecting options from a menu. 3. The chatbot leverages AI to process the customer's input and identify the intent behind their query. 4. Based on the intent, the chatbot retrieves relevant information from its knowledge base or performs actions such as product searches. 5. The chatbot delivers a response to the customer's query, which may include text, images, or product recommendations. 6. The conversation continues as the customer interacts further with the chatbot, potentially seeking additional information or guidance.

Table 3.2.23 – interact with chatbot

Use case name	**Custom Avatar**
Summary description	**Allow users to customize their virtual Avatar**
Pre-condition	1. Be a registered user. 2. Be logged in.
Mainflow	1. Browse Customization Options. 2. Select Customization Element. 3. Configure Customization. 4. Preview Customization (Optional). 5. Apply Customization. 6. See Customization Applied.

Table 3.2.24- customer avatar

Use case name	**Launch V-Mall**
Summary description	Launch the VR feature
Pre-condition	1. Be subscribed. 2. Be logged in.
Mainflow	A user puts on a VR headset and enters a virtual shopping mall.

Table 3.2.25 - lunch v-mall

Use case name	**Virtual Try-On**

Summary description	Allow users to try on products in a VR mall.
Precondition	1. Be a subscribed user. 2. Have an HMD connected. Launch VR mall
Main flow	1. User Selects Product. 2. Initiate VTO Experience. 3. Grant Device Access (Optional). 4. Choose VTO Method (Optional). 5. Camera Access. 6. Pre-captured Images. 7. Positioning and Adjustment (Optional). 8. Virtual Product Overlay. 9. Customization Options (Optional). 10. Change product color or style variations. 11. Adjust the fit of the virtual product (e.g., sizing for clothes). 12. Apply virtual makeup or accessories in conjunction with the product. 13. Interact with Virtual Product (Optional). 14. Save or Share VTO Results (Optional). 15. Exit VTO Experience.

Table 3.2.26 – virtual try on

Use case name	**Customize products**
Summary description	**Allow users to customize certain products based on their preferences.**
Pre-condition	1. Be a registered user. 2. Be logged in.

Main flow	1. Open a product 2. Open customization feature 3. Browse Customization Options. 4. Select Customization Element. 5. Configure Customization. 6. Preview Customization (Optional). 7. Apply Customization. 8. See Customization Applied.

Table 3.2.27 – customize product

Use case name	**Product Visualization**
Summary description	Allow users to view products through AR technology.
Precondition	1. Have AR products interface launched. 2. The user must be subscribed 3. Click on product.
Main flow	1. User Initiates AR Experience. 2. Device Accesses Camera. 3. System Overlays 3D Model. 4. User Interacts with Model. 5. Additional Information.

Table 3.2.28 – product visualization

Use case name	**Manage orders**
Summary	This use case describes the process for a small business owner to efficiently handle and process customer orders from creation to fulfillment
Precondition	1. The small business owner has an account on the online marketplace platform. 2. Customers have placed orders for products listed by the business owner.
Main flow	1. The business owner can access a dedicated order management section within their seller dashboard. 2. The system displays a list of all incoming orders, including details like: o Order ID, customer information, order date, and time. o Ordered items o Shipping address and chosen shipping method. o Payment confirmation status. 3. The owner can update the status of each order throughout the fulfillment process: o Unfulfilled: Order received but not yet processed. o Processing: Order details verified, inventory reserved, and packing in progress. o Shipped: Order packaged and shipped with tracking information updated. o Completed: Order delivered and fulfilled. o Canceled: Order canceled by customer or seller 4.For each order, the owner can initiate fulfillment actions: o Inventory Management: Deduct ordered quantities from available stock to maintain inventory accuracy. o General Order Notifications: Inform customers about order status updates via automated emails triggered by the system. 5.The business owner can handle potential order issues: o Order Cancellation Requests: Process customer requests to cancel orders before fulfillment. o Order Returns and Refunds: Manage customer returns and initiate refunds through the platform's process

Table 3.2.29 - manage orders

Use case name	**Contact for Customized Order**
Summary	This use case describes the process for a small business owner to initiate contact with a potential customer who has expressed interest in a customized product.
Precondition	1.Acustomer has shown interest in a customized product offered by the small business owner on an online marketplace platform. 2. This interest might be indicated through: - Selecting a "customization" option on the product listing. - Adding a message in the order notes section with details about their desired customization. - Contacting the seller directly through the platform's messaging system
Main flow	1.The small business owner is notified about the customer's interest in a customized product. 2.The business owner utilizes the platform's communication tools to initiate contact with the customer. 3.The business owner aims to understand the customer's specific customization requirements: o Discuss the desired customizations in detail o Clarify any limitations or possibilities regarding customization for the specific product. o Estimate additional costs associated with the customization. 4.If the customer confirms their desired customization and agrees to any additional costs: o The business owner may need to update the order details on the platform to reflect the customized product. o The owner can proceed with processing the customized order, potentially requiring adjustments to the fulfillment workflow. 4.If the customer decides against customization, the order can be processed as a standard product or potentially canceled based on their preference.

Table 3.2.30 – contact for customize product

Use case name	**View user visit history**
Summary	allows authorized users to access and review a record of past visits made by other users
Precondition	For business owner account
Main flow	1. Accesses Visit History 2. System Displays Visit History. 3. User Reviews Visit Details

Table 3.2.31 – view user visit history

Use case name	**Write product description**
Summary	allows business to create descriptions for products within a system
Precondition	For business owner account
Main flow	1. Accesses Product Description Editor 2. Enters Description Content 3. User Saves Description 4. Preview Description 5. Publish Description

Table 3.2.32 – create account description

Use case name	**Contact with users**
Summary	This use case describes the various methods users can employ to initiate contact with the online shop's business owners.
Precondition	1. The system facilitates interaction between small businesses (sellers) and customers (buyers). 2. The user (either seller or buyer) has a reason to contact the other party (e.g., order inquiries, product clarifications, customer service requests).
Main flow	1.The seller initiates contact through platform-provided methods **1.1. Internal Messaging System:** The platform offers a secure messaging system for sellers and customers to communicate directly. **1.2. Order-Specific Communication:** The seller can send messages directly attached to a specific customer's order for targeted communication. 2.The customer initiates contact through platform-provided methods 3.Regardless of who initiates contact, both parties can exchange messages and documents for effective communication. 4.The seller and customer aim to resolve the issue or address the inquiry effectively. 5.This may involve providing information, offering solutions, or escalating the issue to platform support if necessary.

Table 3.2.33 – contact with user

Use case name	**Publish product**
Summary	This use case describes the process for a small business owner to publish a new product on an online marketplace platform.
Precondition	1. The small business owner has an account on the online marketplace platform. 2. The product information (name, description, specifications, images) is prepared. 3. The business owner has determined the appropriate category and target audience for the product.
Main flow	1. The business owner navigates to the product creation section within the platform's seller dashboard. 2. The system prompts the owner to enter essential product details: o **Basic Information:** Product name, description, category selection. o **Details and Specifications:** Key features, dimensions, weight, materials, etc. (optional, depending on the platform). o **Inventory and Pricing:** Stock quantity, pricing strategy (including potential discounts). o **Shipping Details:** Shipping weight, dimensions, and cost (flat rate or calculated based on location). o **Media and Content:** Upload high-quality product images and videos (if applicable). 3. Once the product details are entered, the business owner reviews the information for accuracy. 4. The platform may have a review process where the product details and compliance with platform policies are checked. 5. Depending on the platform, this review might be automated or involve manual approval by platform staff.

Table 3.2.34 - publish product

Use case name	**Edit products**
Summary	This use case describes the process for a small business owner to edit the details of an existing product on an online marketplace platform.
Precondition	1. The small business owner has an account on the online marketplace platform. 2. The owner wants to modify the information of a product they previously published.
Main flow	1. The business owner navigates to the product management section within their seller dashboard. 2. The system displays a list of their published products. 3. The owner selects the specific product they want to edit. 4. The platform provides an interface for editing various product attributes. 4. The owner can modify details such as: o **Basic Information:** Update product name, description, or category. o **Details and Specifications:** Edit key features, dimensions, weight, materials, etc. (optional). o **Inventory and Pricing:** Adjust stock quantity, pricing strategy (including discounts). o **Shipping Details:** Update shipping weight, dimensions, or cost. o **Media and Content:** Replace or add new high-quality product images and videos (if applicable). 6.Once the edits are complete, the owner reviews the updated information for accuracy. 7. The system allows the owner to save the change. Depending on the platform, changes might take immediate effect or require another review process.

Table 3.2.35 - edit product

CHAPTER 4: CONCLUSION

In conclusion, this system analysis project has identified key requirements and constraints that seamlessly integrate AI, VR, AR and a robust marketplace. In this online marketplace system (Beit fina) we addressed and identified business needs and offered significant improvements over the existing systems to enhance the online shopping experience and incorporate advanced technologies in the IS. This innovative approach leverages artificial intelligence to personalize the shopping experience, recommend products, and streamline navigation within the virtual mall. Additionally, the marketplace functionality empowers a diverse range of vendors to reach a global audience, fostering a dynamic and competitive virtual retail environment. By bridging the gap between cutting-edge technology and traditional shopping experiences, this virtual mall has the potential to revolutionize the retail landscape, offering unparalleled convenience, personalization, and accessibility for both consumers and businesses. The project's next phase will delve into the intricate design and development of this virtual space, ensuring a smooth user experience and a thriving virtual marketplace. This comprehensive analysis lays the groundwork for the creation of a truly transformative marketplace that will redefine the future of online shopping.