

SKINSITE

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SKINSITE

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ABSTRACT

From the past to the present, the marketing of skincare products in Thailand has grown every year. However, there is still information about Thai products that is not published and is not accessible enough, causing consumers to lack access to information, making it less popular than it should be. Thai products are of good quality, no less than other countries, are reasonably priced, and are suitable for Thai skin types. There are quite several websites that publish information about skincare products, but even so, each website hardly has any Thai brand products. Most of them, if they have any, are international brands. However, for Thai skincare products, there are almost none or none at all on each website. In addition, some features on the website, such as searching and product information, have flaws in finding the key information, or not enough information, the design is difficult to use and not up-to-date, etc.

This project aims to solve the problem of users' access to information so that users can know more about Thai brands and trust the quality and safety of the products by creating a website that we will call **SkinSite**. We also develop a product comparison system that can compare up to 3 products. There is also a system for calculating product scores to measure how good the quality is and how suitable it is for the skin type, including a warning system for users to be aware of products that contain ingredients that users are concerned about, and can also create their own routine sets. If we do it for us, we will develop it further in the future as an application and adjust it to fit other products.

KEYWORDS: THAI SKINCARE / PERSONALIZED SKINCARE / SKINCARE /

WEB APPLICATION

77 P.

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CHAPTER 1

INTRODUCTION

This chapter includes problem identification, project objectives, project scope, expected benefits, and document organization.

1.1 Problem Statement

The global skincare market continues to expand, with countries such as the United States (23,594.38 million U.S. dollars), Japan (22,330.33 million U.S. dollars), and China (20,703.43 million U.S. dollars)[1, 2] leading in sales. However, Thailand's skincare sales reached 1,034.65 million US dollars in 2023 [3]. This skincare market remains underserved on both international and local platforms. The primary challenge for the Thai skincare brand is being overshadowed by international competition. Their limited visibility on existing e-commerce websites, where foreign products dominate. This leads to limited accessibility, a lack of detailed information, and little customer interaction with Thai skincare products.

Most current skincare platforms focus on international brands, making it difficult for consumers to explore Thai products with the same level of quality. Thai facial skincare brands often provide basic details by description of product, ingredient lists, and prices. There is also a lack of analysis of ingredient safety, potential allergy, and suitability for different skin types. Furthermore, existing platforms lack extensive comparison functions, forcing users to evaluate based on their preferences, budget, or specific skincare needs.

To address these issues, we propose SkinSite, a dedicated website designed to enhance the accessibility and visibility of Thai skincare products. This website will offer comprehensive product details, including ingredient safety analysis, user reviews, and personalized skincare routine recommendations. It will also enable notification safety based on many factors, like allergens, product benefits, and individual concerns, such as cruelty-free formulations or oil-free products. SkinSite strives to fill a critical mar-

ket gap by supporting local brands and empowering consumers to make well-informed purchasing decisions through a structured and transparent evaluation system.

1.2 Objectives of the project

- To develop a website for Thai skincare brands, including various features, for example, product information, credible reviews, and price comparisons, aimed at attracting a range of users.
- To explore needs of users for Thai skincare brands kind of features and functions do they need to make decisions and must have an easy-to-use interface.
- To develop a database of Thai skincare products with detailed descriptions, and ingredient lists.

1.3 Scope of the Project

This project involves developing websites that provide detailed information on Thai facial skincare. The products are organized into 14 distinct categories, covering approximately 125 items. Data will be collected manually from various sources, including official websites and e-commerce platforms that sell skincare products. The research team aims to gather as much relevant data as possible, given that information on Thai products is dispersed across multiple sites. The goal is to consolidate this information into a centralized resource on our website for improved accessibility and comprehensiveness.

1.4 Expected Benefits

This project focuses on recommendations for a skincare website dedicated to facial products. It addresses the display of product information, user reviews and ratings, product comparisons, search, and sorting functions to enhance user decision-making. Here's a comprehensive analysis of the benefits of your bilingual Thai skincare product comparison website across four key categories:

1.4.1 Benefits for Users

The platform empowers users to make informed decisions by providing detailed product information in English, allowing both local and international users to compare

prices, ingredients, and effectiveness with ease. A built-in scoring system translates complex data into simple, digestible insights. Additionally, the platform offers a convenient, all-in-one solution for Thai skincare research, featuring personalized accounts to save favorites and receive skin concern notifications. Advanced search and filtering capabilities further enhance the user experience by saving time and helping users find products that best suit their needs.

1.4.2 Benefits for Merchants

Merchants benefit from increased market exposure by directly reaching a targeted audience interested in skincare. The platform serves as a showcase for product features and strengths, helping build brand recognition. Access to user reviews and behavior data offers valuable customer insights, allowing businesses to track trends and benchmark against competitors. Transparent product information not only fosters consumer trust but also gives brands the opportunity to share their story and values, ultimately contributing to stronger brand identity and credibility.

CHAPTER 2

BACKGROUND

This chapter provides an overview of the key standards used to evaluate skincare product safety, focusing on the Environmental Working Group (EWG) guidelines. It introduces three main criteria: the EWG VERIFIED® certification, Hazard Score, and Data Availability. These measures help assess potential health risks and the reliability of scientific data behind each ingredient. They serve as the foundation for analyzing Thai skincare products in this project.

2.1 Related measures of the skincare rating

2.1.1 EWG Verified



Figure 2.1: EWG Verified Mark

The Environmental Working Group (EWG) is a nonprofit, nonpartisan organization dedicated to helping you live your healthiest life. The Environmental Working Group's (EWG) Skin Deep® database [4] evaluates personal care products using two rating systems including Hazard Score and Data Availability

Hazard Score [5] ranges from 1 to 10, indicating the potential health risks associated with a product's ingredients. A lower score suggests fewer known hazards, while a higher score indicates greater concern.

Data Availability [6] reflects the extent of scientific research available on a product's ingredients, categorized as none, limited, fair, good, or robust. A higher data availability rating signifies that more information is available to assess the ingredient's safety.

Moreover, EWG Verified [4] is the highest standard EWG awards for products

that avoid chemicals of concern, disclose all ingredients (including fragrance components), and meet EWG's strictest health and transparency criteria. Products with the EWG VERIFIED® mark are vetted by EWG's scientists to ensure adherence to the highest health standards.

When evaluating products, it is ideal to look for those with a low hazard score, high data availability, and, if possible, the EWG VERIFIED® mark for additional assurance of safety and transparency.

2.1.2 Hazard Score



Figure 2.2: Hazard Score

The Environmental Working Group [7] assesses the safety of chemical ingredients in cosmetics and skincare products by giving hazard scores, which are ranked from 1-10, with 1 representing the safest and 10 representing the most possible risk of harm. The hazard score system accounts for several factors, including toxicity, allergenicity, bioaccumulation, and environmental effects on humans and ecosystems. For example, higher level 9-10 hazard score ingredients may cause increased skin irritation, endocrine disruption, or longer-term health consequences. By using hazard scores, hazard-scoring organizations like EWG present information about chemical ingredients so consumers can make informed decisions about the products they use and, as a result, whether or which products to purchase. EWG believes this rating system keeps ingredient safety and users' exposure to chemical ingredients more transparent and considered over time.

The level of Hazard Score is as follows:

- **0–2:** Low hazard (generally safe)
- **3–6:** Moderate hazard (use with caution)
- **7–10:** High hazard (potentially unsafe)

2.1.3 Data Availability

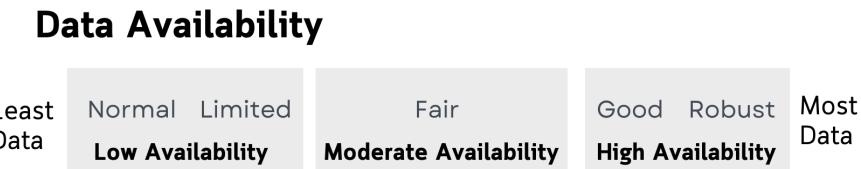


Figure 2.3: Data Availability

This metric Figure 2.3 reflects the extent of scientific research available for a product's ingredients. The scores represent the safety level of each ingredient based on the available data in the database and the number of scientific studies related to it. This ranking also reflects the extent of scientific understanding of each substance. Some cosmetic ingredients may not have been thoroughly researched, while they may show low hazard scores, this could be due to a lack of sufficient data. Therefore, the less information available, the greater the uncertainty regarding their safety.

According to the Environmental Working Group (EWG) [7], consumers are advised to choose products with low hazard ratings and at least a “fair” level of available information. To determine the level of data availability, EWG evaluates scientific research using two primary data sources. The first set, accounting for 50% of the assessment, is based on the scope of data available in the Skin Deep database [7], which compiles information from approximately 60 public government sources. The second 50% is derived from the number of studies indexed in PubMed [8], a government-supported scientific publication database.

CHAPTER 3

RELATED WORKS

We conducted a survey and analyzed various websites to compare their features and functions. This chapter presents work relevant to or useful for this project's research.

Functions	Features	Websites											
		1	2	3	4	5	6	7	8	9	10	11	
Search	Text	Brand	●	●	●	●	●	●	●	●	●	●	
		Product Name	●	●	○	●	●	●	●	●	●	●	
		Ingredient Concern	○	○	○	○	○					○	
		Ingredient	●	○	○							●	
		Benefit/Product Goal	○	○	○	○	○	○				○	
	Filter	Only 1 Filter	●		●			○	●		●		
		More than 1 filter	●		●	●	●		●	●		●	
Recommendations		●	●	●	●				○		○		
Sorting		●	●	●	●	●	●		●	●	●	●	
Wishlist		●	●	●	●	●	●	●	●	●	●	●	
Skin Routine Set												●	
Review		●	●	●		●	●	●		●	●	●	
Product Comparison				●			●	●				●	
User Account Management		●	●	●	●				●	●	●	●	

Table 3.1: Website Function and Feature Comparison Table

Table 3.1 provides an analysis of eleven websites identified as most relevant to the project, with each website represented by a number as follows: Cosmenet [9], Konvy [10], Jeban [11], Beautrium [12], Shopee [13], Lazada [14], Incidecoder [15], Skincarisma [16], EWG's Skin Deep [7], CosDNA [17], SkinSort [18].

The analysis shows that most websites provide essential features, including brand name and product name search, sorting options for displaying products, and a wishlist function for saving products of interest. In the table, these features are denoted by bullet symbols (●).

However, certain websites exhibit functionality limitations, specifically with inaccurate and incomplete product results. For instance, Konvy [10] and Lazada [14] display products that are irrelevant to the user search queries, potentially undermining user experience and the effectiveness of the search function. Additionally, incomplete product listings appear on some platforms during text-based searches; only product names that exactly match the search terms are shown, while other relevant products are omitted. This issue is observed on the Jeban [11], Beautrium [12], Skinsort [18], Shopee [13], and Lazada websites [14], as indicated by circle symbols (○) in the table.

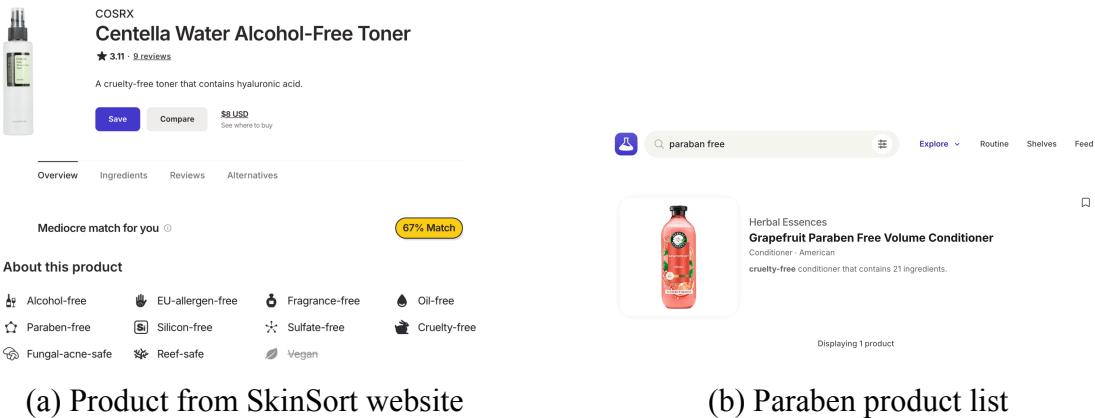


Figure 3.1: Example of the other website

For example, when searching for “paraben free” on the SkinSort website [18], only one product appears in the search results, as shown in Figure 3.1b. However, upon clicking and exploring other product pages, it becomes evident that several of them are actually labeled as paraben-free. This detail is visible in the product attributes section, such as in Figure 3.1a. This highlights a limitation in keyword-based filtering and the need for improved metadata tagging in product listings.

Furthermore, some advanced features—such as creating a skin routine set, product comparison, and advanced search options—are absent on certain platforms, as represented by blank boxes in the table.

CHAPTER 4

METHODOLOGY

This chapter explains the overall software design through analysis and design. It comprises four parts: Requirement Gathering, Analysis and Design, and a System Testing and User Testing.

4.1 Requirement Gathering

The requirements-gathering process involved understanding consumer behavior, purchasing patterns, and preferences for Thai skincare brands. The survey results highlighted that most consumers were young adults, especially students, who had regular skincare routines and purchased products every 1-3 months. They relied on social media and online platforms such as Konvy [10], Watsons [19], and Beautrium [12] to research products. These websites highlighted the need for accessible and detailed product information. Consumers' key decision-making factors included product quality, price, and user reviews. Additional emphasis was placed on safety certifications, ingredient details, and promotions. Thai skincare brands appeal to consumers due to their affordable prices and suitability for the country's skin type. Still, concerns such as misinformation, counterfeit products, and lack of certification must be addressed. The most trusted purchase channels for users were duty-free shops and drugstores.

For website design, the survey results focused on usability, clarity of information, and user-friendly interfaces. Users wanted effective filtering options for skin types, concerns, and price ranges, as well as detailed product comparisons and ingredient information. Other desired features included personalized recommendations, user reviews, and product ratings. In terms of usability, users wanted powerful search features, image search, and the ability to save favorite products. Users' preferred website look was modern, simple, and easy to navigate, with a light or neutral color scheme to make it easy to read and appealing to the eye. More detail about survey and analysis are in Chapter 5.

4.2 Analysis and Design

4.2.1 Flow

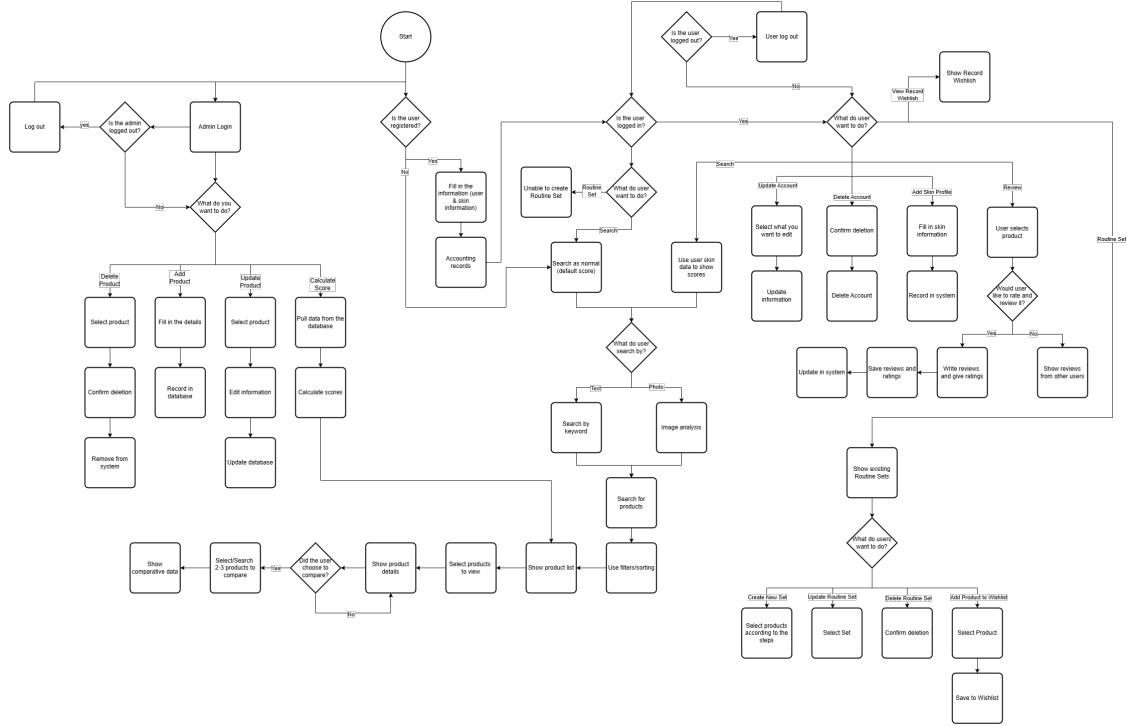


Figure 4.1: Flow of this project

The SkinSite System comprises five core modules: Product Management, Search System, User Management, Product Review, and Personalized Skin Preparation. Figure 4.1 shows the Flow Diagram of the system starts when a user or administrator accesses the platform. Administrators can manage products by adding, updating, and deleting product details, as well as calculating product scores based on ingredients, ingredient risks and safety, and skin compatibility. The search system allows users to search for products via text search and advanced filters, with options to sort by popularity, score, and personal score. Users can also compare products based on key attributes such as ingredients, price, and skin compatibility.

The user management module allows users to register, update their profiles, and manage their skin profile settings. Registered users can view product rating information based on their skin type and edit or delete comments in the product review module. The skincare routine set module allows users to create and update skincare routines, manage wish lists, and receive alerts about ingredient concerns based on their skin profile.

4.2.2 Timeline

Timeline	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Analysis Of User Requirement									
• Problem Identification									
• Motivation and Scope									
• Research Related Work									
• User Survey Analysis									
System Analysis and Design									
System Implementation and Testing									
• Implementation									
• Data preparation									
• Testing and Feedback									
Survey On User Satisfaction									
• User Satisfaction Survey									

Figure 4.2: Timeline in this project

The main tasks and steps of the project are divided into 4 main stages. The user requirements analysis stage (August 2024 - November 2024) involves identifying the problem, defining the project scope, and researching related tasks to establish relevance. The user survey analysis, conducted from late October to early November, provides information on user needs and helps guide the system design. After that, the system analysis and design stage (October 2024 - January 2025) translates the collected user requirements into structured system components, including structure charts, scoring methods, UI design, and ERD for database management.

The system implementation and testing stage (December 2024 - April 2025) focuses on creating a user-friendly platform, organizing data, and customizing features. The testing process, which begins in mid-January, collects feedback for necessary improvements. Finally, the system satisfaction stage (March 2025 - April 2025) collects user feedback to evaluate the platform's performance and improve its usability.

4.3 System Testing and User Testing

4.3.1 Test Plan Overview

1. **Test Objective:** To evaluate the functionality, integration, and usability of both the user and admin interfaces in the Skinsite website platform, including main modules like search, product review, user, personalized skin preparation, and admin

management.

2. Participants

- General users
- Admin users

3. Scope

- Unit Function Testing
- Integration Testing
- User Acceptance Testing (UAT)

4.3.2 User Acceptance Testing (UAT) Plan

1. **Test Objective:** To evaluate if real users can smoothly perform all critical functions within the system, both on the user-facing platform and the admin management dashboard. This includes usability, functionality, and task completion accuracy.

2. Acceptance Criteria

- Users can complete typical tasks without prior training.
- All forms (product, brand, review, etc.) save and reflect updates correctly.
- Product filters and sort options work as intended.
- Admin panel allows full CRUD (Create, Read, Update, Delete) operations.

3. Test Group Requirements

- **Target Group Size:** 30 participants
- **User Mix:**
 - 10 general skincare users
 - 10 new users with no prior system knowledge
 - 5 users with various skin types for realistic filtering tests

- 5 testers with admin privileges

4. **Test Execution Process:** The test execution process begins with a briefing session, where participants are informed about the list of tasks they need to perform. However, no step-by-step instructions are provided to simulate real user behavior. During the testing session, observation is conducted to monitor whether tasks are completed successfully and how easily users can navigate the system. After completing the tasks, participants are asked to fill out a feedback form to share their thoughts on usability, design, and overall experience. Throughout the process, any bugs or issues encountered are documented and categorized based on their severity and impact, allowing the development team to prioritize fixes accordingly.
5. **Deliverables:** The User Acceptance Testing will result in a set of key deliverables that reflect both functional validation and user experience insights. These include completed UAT test case forms, which detail the scenarios tested, results, and any deviations from expected behavior. A summary report of bugs and usability issues will be compiled to help the development team prioritize fixes. In addition, qualitative feedback from users will be analyzed to identify opportunities for UI/UX enhancement. Finally, an approval checklist will be used to assess whether the platform meets the required standards and is ready for deployment.

CHAPTER 5

REQUIREMENT GATHERING

5.1 Target Group

The project targets individuals of all genders and age groups, but mainly focuses on teenagers and students who are interested in Thai facial skincare products available through modern trade channels. These consumers value accessible, reliable products supported by clear marketing and trustworthy information.

5.2 Survey

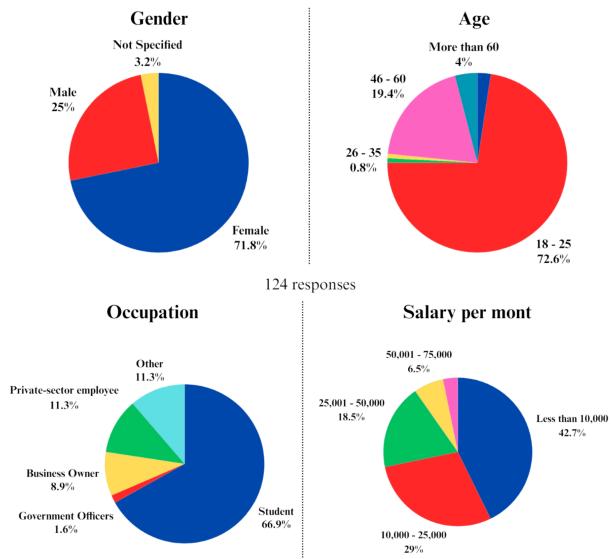


Figure 5.1: Pie chart showing overall of respondents information

The survey focused on consumers of facial skincare products, particularly Thai brands, and their preferences for website design features. As shown in Figure 5.1, a total of 124 participants took part in the survey, conducted from October 24 to November 5, 2024. The demographic breakdown revealed the following:

- **Gender:** 71.8% were female, while 25% were male.
- **Age:** The majority (72.6%) were aged 18–25, followed by 19.4% who were under 18.

- **Occupation:** Most participants (66.9%) were students, while another 33.1% were private-sector employees, business owners, government officers, and others.
- **Income:** The largest group (42.7%) earned between 25,001–50,000 baht monthly, followed by 29% earning 10,000–25,000 baht.

The survey explored consumer behavior, purchasing habits, and decision-making factors as shown in Figure 5.2 for skincare products. Key findings include:

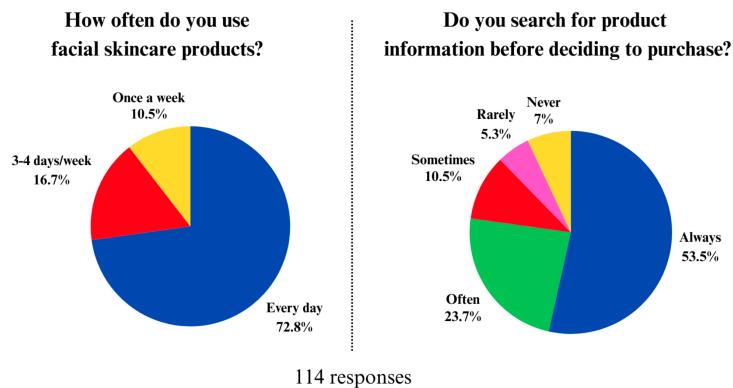


Figure 5.2: Pie chart showing overall the frequency of using facial skincare and the frequency of searching the product information

- **Skincare Usage:** Over 91.9% of respondents use facial skincare products, with 72.8% applying them daily. Most make purchases every 1–3 months.
- **Influence of Social Media:** Social media was the most influential factor in purchasing decisions, followed by recommendations from friends and family, and user reviews. Traditional media, such as TV and magazines, played a minimal role.
- **Research Before Purchase:** More than half (53.5%) of respondents always research products before buying. Popular platforms for research include Konvy, Watsons, and Beautrium, where users value personalized recommendations, detailed product descriptions, and ingredient lists.
- **Decision-Making Factors:** The primary factors influencing purchase decisions were product quality, price, and user reviews. Additional considerations included safety certifications, promotions, and reputable brands.

- **Interest in Thai Brands:** A significant 99.1% expressed interest in using Thai facial skincare products. Specifically, 59.6% said their interest depends on the brand, while 39.5% showed interest regardless of the brand. Only 0.9% were not interested at all.

5.3 Results

The survey identified essential features and preferences for a skincare website as shown in Figure 5.3:

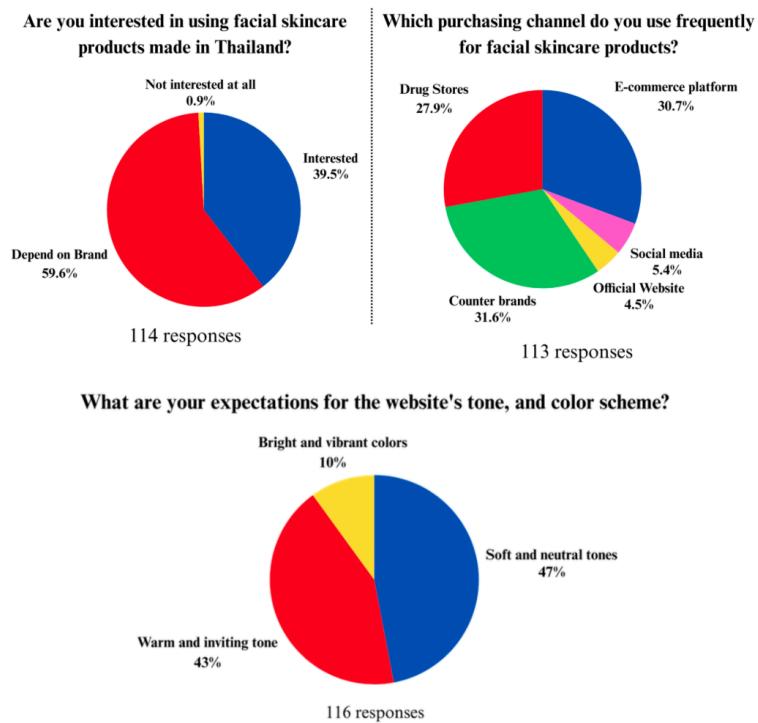


Figure 5.3: Pie chart showing overall the essential features and preferences for a skincare website

- **Website Design Features:** Participants highlighted the need for useful filters (e.g., skin type, concerns, price), detailed product comparisons, and customer reviews and ratings. Transparency in ingredient details and safety certifications was also highly valued. Personalized skincare recommendations and the ability to save favorite products were frequently requested.
- **Design Preferences:** Respondents preferred light and neutral color schemes (47%)

or warm and friendly tones (43%). They favored designs that were modern, minimalist, elegant, and easy to navigate.

- **Purchase Preferences:** Online shopping was appreciated for its convenience, discounts, user reviews, and fast delivery. In contrast, in-store shopping allowed users to physically inspect and compare products, check quality, try items before purchasing, and enjoy exclusive promotions.

Overall, the findings emphasize the importance of user-friendly, modern website designs that prioritize convenience, transparency, and personalization. Features like advanced search tools, detailed product comparisons, and visually appealing designs were highlighted as key to enhancing the user experience.

CHAPTER 6

ANALYSIS AND DESIGN

6.1 System Architecture

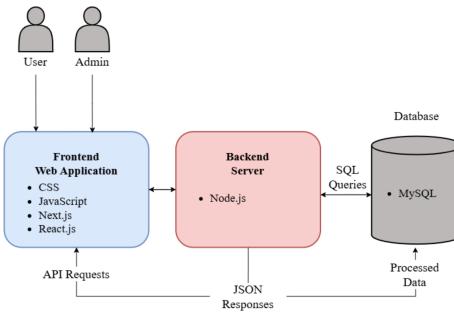


Figure 6.1: The System Architecture of this Project

Figure 6.1 shows the system architecture of the SkinSite website to ensure seamless communication between four key components: User, Frontend, Backend, and Database. This architecture supports a responsive web application delivering relevant skincare product information while maintaining structured and secure data management.

- **User:** This is the entry point of the system where users interact with the Skinsite website. Users can view product details, search for skincare products, and save routines. The user experience (UX) is supposed to be easy and responsive to the website, ensuring accessibility to a broad audience.
- **Frontend:** The front end serves as the visual and interactive layer of the website. Built using modern web technologies (e.g., CSS, JavaScript, Next.js, React.js), it handles:
 1. Displaying skincare product details, images, and categories.
 2. Managing user interaction (e.g., clicking buttons, navigating pages).
 3. Sending user input to the backend via API requests.
- **Backend:** The backend processes logic and serves as the bridge between the frontend and the database. Implemented using server-side technologies, the backend is responsible for:

1. Handling API requests from the front end.
 2. Executing business logic such as routine creation, product filtering, or wishlist updates.
- **Database:** The SQL-based database stores all core information required by the system. This includes:
 1. Skincare product data (e.g., product name, brand, ingredients, usage, benefit, concern).
 2. User account information (e.g., Email, Password, User Concern, saved routines).
 3. Relational data such as product-ingredient associations, skin type compatibility, and user reviews.

6.2 Structure Chart

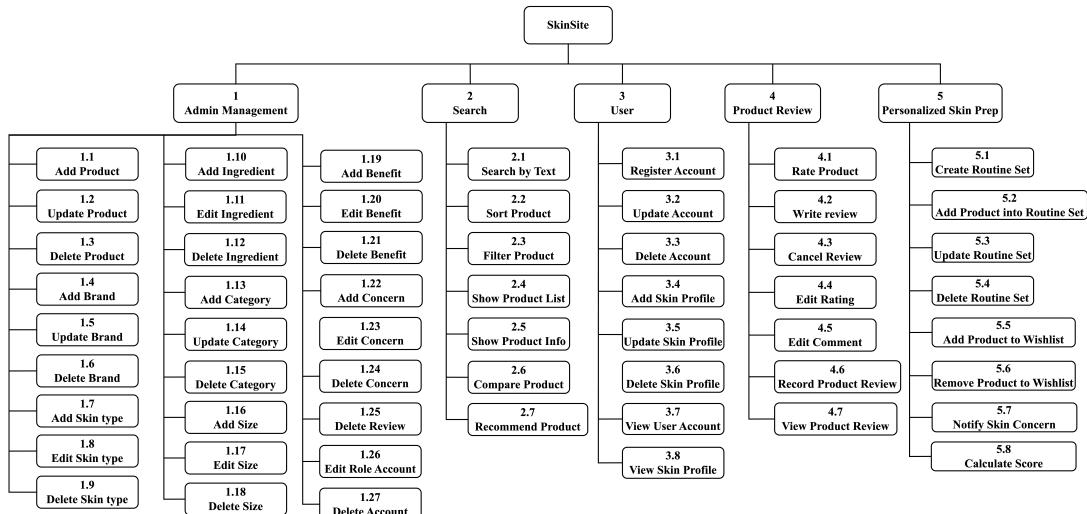


Figure 6.2: Structure Chart

From gathering data from Chapter 3 and Section 4.1, we designed the SkinSite features as shown in Figure 6.2 that provides an overview of the structural organization of the SkinSite website comprising 5 subsystems: Admin Management, Search, User, Product Review, and Personalized Skin Preparation.

6.2.1 Admin Management

The admin management is the system that allows all admins to management about the information on the web server. Admins can manage information as follows:

- **Add/ Update/ Delete Product:** Manage product information
- **Add/ Update/ Delete Brand:** Manage brand data
- **Add/ Update/ Delete Skin type:** Manage skin type options
- **Add/ Update/ Delete Ingredient:** Manage ingredient list
- **Add/ Update/ Delete Category:** Manage product categories
- **Add/ Update/ Delete Size:** Manage product size
- **Add/ Update/ Delete Benefit:** Manage skincare benefits
- **Add/ Update/ Delete Concern:** Manage skin concerns
- **Delete Review:** Remove user reviews if needed
- **Update role/ Delete Account:** Modify account roles or delete accounts

6.2.2 Search

The Search subsystem provides a product search function accessible to both logged-in and non-logged-in users. It includes the following search options:

- **Search by Text:** Users can search for products by entering keywords related to the product name, brand name, ingredients, ingredient concerns, and benefits.
- **Sort Product:** This function is a product sorting function. It is sorted by characters, price, score rating, and number of reviews.
- **Filter Product:** This function is a filter function for the data that the user wants, including category, skin type, preference concern, brand, and benefit.
- **Show Product List:** This function allows users to view a list of all products that match their search, filter, or sort, including displaying products by default characters A to Z.
- **Show Product Info:** This function allows users to view detailed product information.

- **Compare Product:** This function is about comparing two or three products. The information shown includes brand, product name, safety score, category, benefits, concerns, and ingredient list.
- **Recommend Product:** This function is to recommend products from the same category that the user has brought to compared, but if the product isn't in the same category, it will pull the category from the first product that user has selected to compare. The system will analyze the data and pull data of 10 products in that category, and display on this page, which will include brand, product name, and the number of benefits and ingredients matching. User can click on this recommend product to see the details. This function provides options for the user if there are other products of the same quality, better, or cheaper.

6.2.3 User

The user is the system that allows all users to register and edit information. Users can manage their accounts as follows:

- **Register / Update / Delete Account:** Manage user accounts with personal and skin-related info.
- **Add / Edit / Delete Skin Profile:** manage user skin profile (goals, concerns, skin type, allergy ingredients, and favorite brands).

6.2.4 Product Review

Product Review is a function that allows users to review products by commenting and giving stars, and can also edit reviews. This function can only be done by users who are members.

- **Rate and Write Review:** Rate and comment on the product. Users can only give stars and no comments.
- **Edit Rating or Comment / Cancel Review:** Modify or delete existing reviews.
- **View Reviews:** See all products the user has reviewed.

6.2.5 Personalized Skin Preparation

Personalized Skin Preparation is a function for members only. This function allows members to create their own skincare routine set, which can be edited at any

time, including recording favorite products to their wishlist. In addition, there will be a notification if the user is interested in products that they are concerned about, which information will be obtained from the user's registered skin profile. If the registered user does not fill in the skin profile, the system will not notify, and the score shown on the website will be the score from the normal skin condition that does not have any allergies or concerns.

- **Create / Update / Delete Routine Set:** Build and update day/night skincare routines with 5 customizable steps.
- **Wishlist Management:** Add or remove favorite products to/from Wishlist.
- **Skin Concern Alerts:** Notify users if a product contains allergens, concerns that match to user's preference.
- **Calculate score:** Evaluate product safety and effectiveness using a standardized score based on risk level and data from the EWG (Environmental Working Group).

6.3 User interface

From gathering data from related work to gathering user behaviors and turning them into a structural chart, we designed the interface in Figma, a collaboration tool for interface design. The report highlights the seven primary functional pages, aligning with user needs.

6.3.1 Product Information page

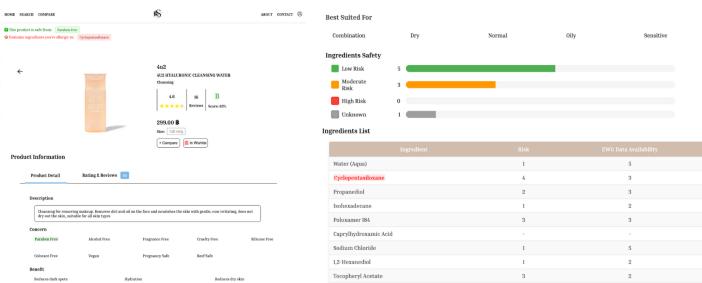


Figure 6.3: Product Information Page

The product information page is designed to provide users with comprehensive insights to support informed decision-making. As illustrated in Figure 6.3, the top section of the page highlights key product attributes, including the product name, type, average

review rating, number of reviews, and a calculated grade score ranging from 0 to 100. Additionally, when applicable, users are given the option to compare similar products.

To enhance safety awareness, the page also features an icon indicating potential allergens or sensitivity risks. Relevant cautionary details are emphasized within the product description section for clear visibility.

As users scroll further down the page, they will encounter the Product Detail section, which presents a descriptive analysis and summarized notes on ingredient concerns, benefits, and the skin types for which the product is best suited.

Moreover, the interface includes visual indicators such as risk bars that display the overall ingredient risk level, allergenicity risk score, and the corresponding research data score for each ingredient. These features collectively assist users in evaluating product safety and suitability with greater clarity and confidence.

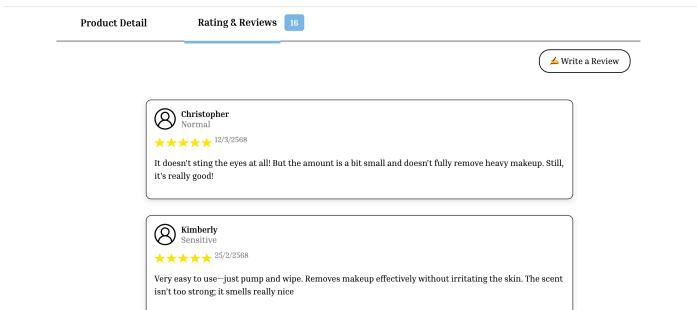


Figure 6.4: Review and Rating Page

Figure 6.4 illustrates the Rating and Reviews section, which enables users to both read and submit feedback on products. Each review includes a user rating, visually represented using star icons to convey the overall score clearly and intuitively.

6.3.2 Comparison page

The comparison page, as shown in Figure 6.5, allows users to compare up to three products simultaneously. It presents a side-by-side comparison of key elements, including product names, concern risk scores, benefits, categories, and ingredient lists. Additionally, if any product contains user-specified concerns or allergens, a warning icon appears above the product image for immediate attention. The page also includes a recommendation feature that suggests similar products aligned with the user's preferences, enhancing the overall decision-making experience.

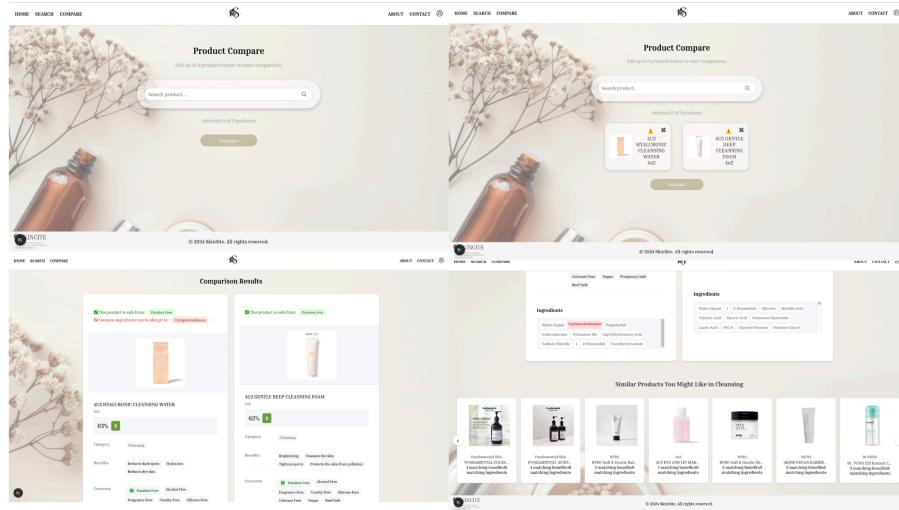


Figure 6.5: Product Comparison Page

6.3.3 The Skincare Routine Set page

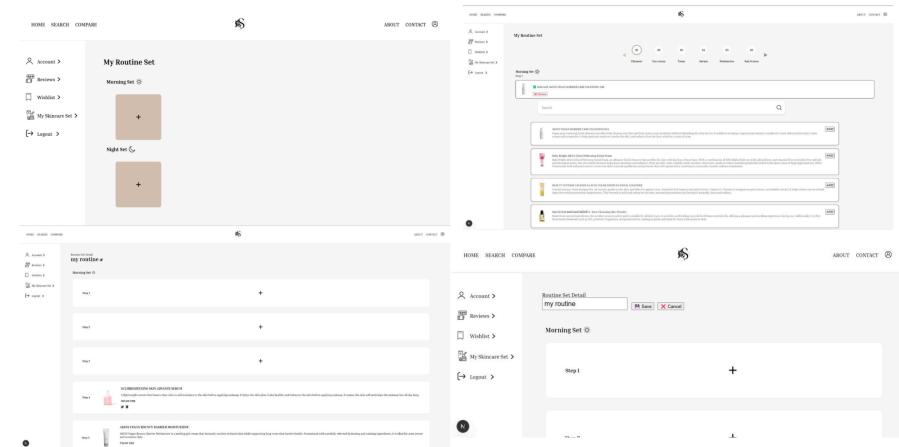


Figure 6.6: The Skincare Routine Set Page

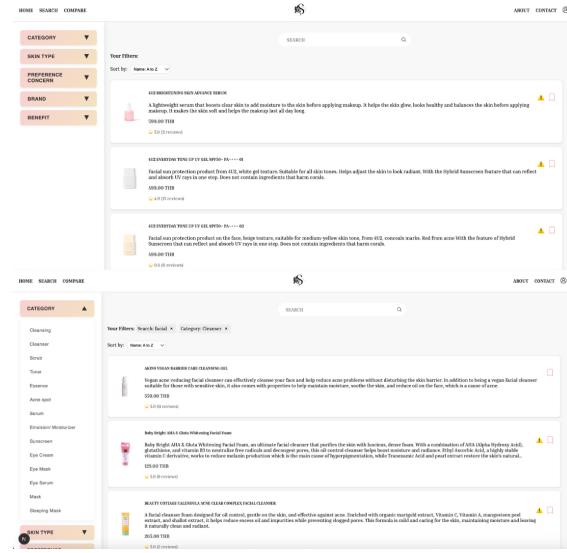
This page is dedicated to creating personalized skincare routine sets, allowing users to add, edit, or delete products based on their individual needs for both morning and night routines. As shown in Figure 6.6, the system provides a recommended sequence of skincare steps to guide users in proper product layering. Users may skip steps if desired, enabling full customization. Completed routines can be saved and modified later, offering flexibility to adjust according to changing skincare goals or preferences.

6.3.4 Search page

Category Brand

Cleansing	<input type="checkbox"/> 4u2
Cleanser	<input type="checkbox"/> AKINS
Scrub	<input type="checkbox"/> Baby Bright
Toner	<input type="checkbox"/> BEAUTY COTTAGE
Essence	<input type="checkbox"/> Bija Herbal
Acne spot	<input type="checkbox"/> BRISUTHI
Serum	<input type="checkbox"/> BK Acne
Skin Type	<input type="checkbox"/> BYBO
	<input type="checkbox"/> Cathy Doll
	<input type="checkbox"/> COSLUXE
	Preference Concern
	<input type="checkbox"/> Oily
	<input type="checkbox"/> Combination
	<input type="checkbox"/> Normal
	<input type="checkbox"/> Dry
	<input type="checkbox"/> Sensitive
	<input type="checkbox"/> Acne-prone

(a) Filter panel of Search Page.



(b) Search results page

Figure 6.7: Search Page

The product search page is designed to help users efficiently find skincare products based on their specific needs and preferences. As shown in Figure 6.7, a central search bar allows users to input keywords such as “facial” to retrieve relevant results. Once a search is performed, active filters—such as keywords, categories, and brands—appear below the bar and can be removed by clicking the “X” icon.

On the left side of the page, a filter panel, as a Figure 6.7a, enables users to narrow results by brand, category (e.g., cleanser, toner, moisturizer), skin type (e.g., oily, sensitive, dry), and concern preferences (e.g., cruelty-free, paraben-free, vegan). Selected filters instantly refine the results.

The main display area shows product cards with images, names, brief descriptions, and two icons: a bookmark icon to save items to the wishlist, and a warning icon indicating potential allergens or ingredient-related cautions. This intuitive layout—combining search, filters, and visual indicators—supports a user-friendly experience and assists users in building a personalized skincare routine.

6.4 Database Design

6.4.1 ER Diagram

The project's data storage design includes ten primary entity tables, including Account, Brand, Product, Ingredient, Allergy, Benefit, Step, SkinType, Size, and Category, to efficiently manage website data. These tables, as shown in the ER diagram 6.8, structure the relationships and dependencies essential for managing and retrieving information on the website.

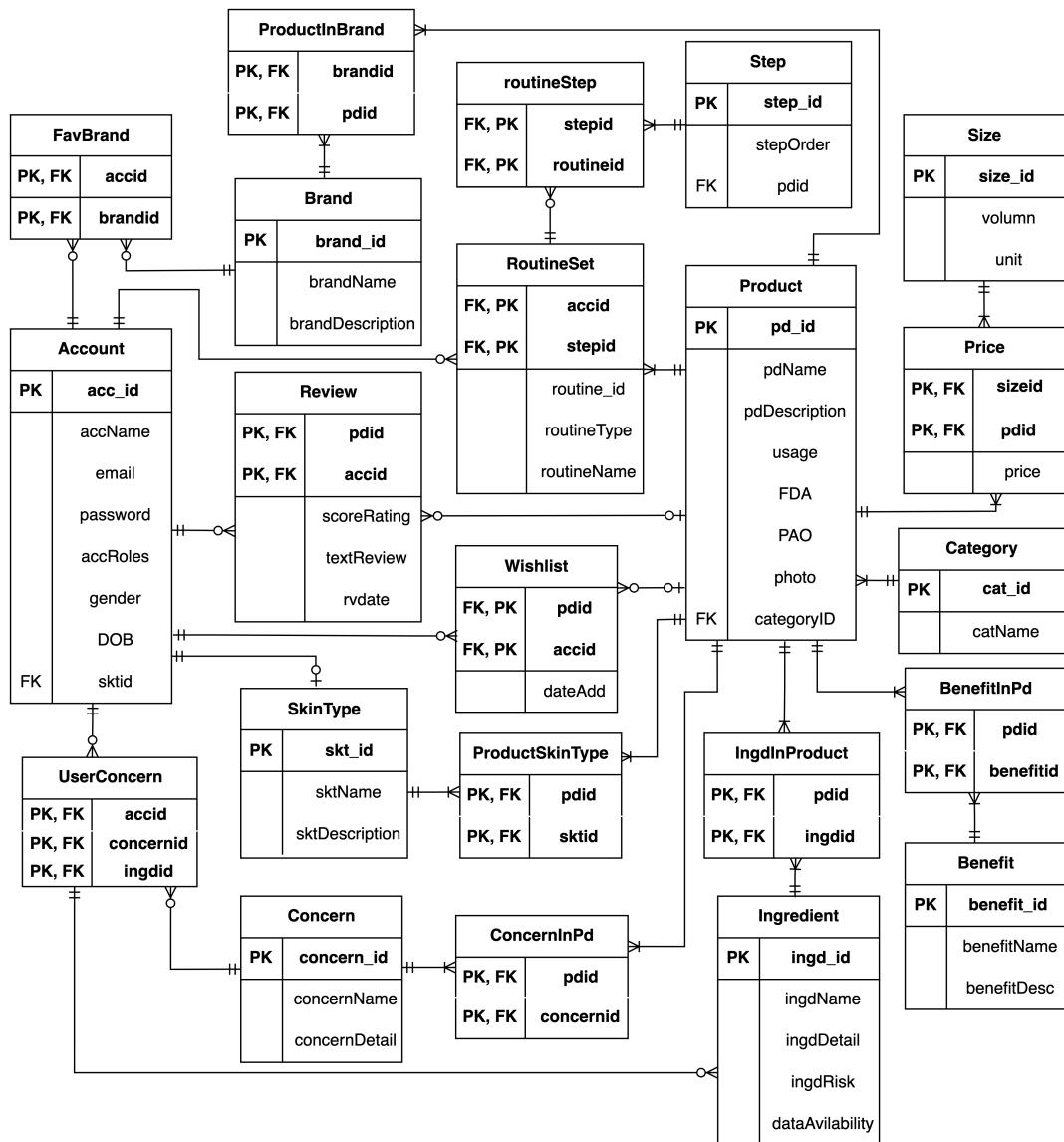


Figure 6.8: ER Diagram

6.4.2 Data Dictionary

Table Name	Attribute Name	Contents	Type	Format	Nullable	Range	Key	FK Ref Table
Brand	brand_id brandName brandDescription	Brand ID Brand Name Brand Description	CHAR(8) VARCHAR(1000) VARCHAR(3000)	BTH12345			PK	
SkinType	skt_id sktName sktDescription	SkinType ID SkinType Name SkinType Description	CHAR(8) VARCHAR(1000) VARCHAR(3000)	SKT12345			PK	
Ingredient	ingd_id ingName ingdDetail ingdRisk dataAvailability	Ingredient ID Ingredient Name Ingredient Detail Ingredient Risk Ingredient data found to be availability	CHAR(8) VARCHAR(1000) VARCHAR(3000) INT INT	ING12345		Y 1 to 10 1 to 10	PK	
Category	cat_id catName	Category ID Category Name	CHAR(8) VARCHAR(1000)	CTG12345			PK	
Size	size_id volumn unit	Size ID capacity of product a measure of volume of the product	CHAR(8) INT ENUM("g/ml", "sheet", "pair", "pads")	STH12345 123 g/ml			PK	
Benefit	benefit_id benefitName benefitDesc	Benefit ID Benefit Name of product Benefit description of product	CHAR(8) VARCHAR(1000) VARCHAR(3000)	BNF12345			PK	
Concern	concern_id concernName concernDetail	Concern ID Concern Name of product Concern Detail of product	CHAR(8) VARCHAR(1000) VARCHAR(3000)	CTH12345			PK	
Step	step_id stepOrder pdid	Step ID Product use order Product ID	CHAR(8) INT CHAR(8)	STP12345			PK	
account_skin	acc_id accName email pwd accRoles gender dob Sktid	Account ID Username Email Password Account Roles Gender Date of Birth SkinType ID of Account	CHAR(8) VARCHAR(1000) VARCHAR(320) VARCHAR(255) ENUM("Member", "Admin") ENUM("Male", "Female", "Not prefer to say") Date CHAR(8)	ATH12345 13-1-6500033699 SKT12345			PK	
product	pd_id pdName pdDescription catid pdusage FDA PAO photo	Product ID Product Name Product Description Category ID of Product Product Usage Food and Drug Administration registration number Period After Opening of the product Photo of product	CHAR(8) VARCHAR(1000) VARCHAR(3000) VARCHAR(1000) CHAR(8) CHAR(15) 13-1-6500033699 VARCHAR(1000)	PTH12345 CTG12345 Y			PK cat_id(Category)	

Table 6.1: Data dictionary for all tables used in the skincare system.

Table Name	Attribute Name	Contents	Type	Format	Nullable	Range	Key	FK Ref Table
review	pdid	Product ID of Review	CHAR(8)	PTH12345			PK,FK	pd_id(Product)
	accid	Account ID of Review	CHAR(8)	ACC12345			PK,FK	acc_id(account,kin)
	scoreRating	Product score rating	INT	1		1 to 5		
	textReview	User review	VARCHAR(1000)					
	rdate	Date of Review	DATETIME	YYYY-MM-DD 00:00:00	Y			
routineset	routine_id	Routine ID	CHAR(8)	RTS12345			PK,FK	acc_id(account,kin)
	accid	Account ID of Review	CHAR(8)	ACC12345			PK,FK	acc_id(account,kin)
	routineType	Type of Routine (Day or Night)	ENUM("Morning", "Night")	1		1 to 5		
	routineName	Routine Name	VARCHAR(1000)					
routineStep	stepid	Step ID	CHAR(8)	STP12345			PK,FK	step_id(Step)
	routineid	Routine ID	CHAR(8)	RTS12345			PK,FK	routine_id(routineSet)
wishlist	pdid	Product ID	CHAR(8)	PTH12345			PK,FK	pd_id(Product)
	accid	Account ID	CHAR(8)	RTS12345			PK,FK	routine_id(routineSet)
Price	sizeid	Size ID	CHAR(8)	STH12345			PK,FK	size_id(Size)
	pdid	Product ID	CHAR(8)	PTH12345			PK,FK	pd_id(Product)
	price	Price of product	DECIMAL(7,2)	12345.67				
FavBrand	accid	Account ID have Fav Brand	CHAR(8)	ATH12345			PK,FK	acc_id(account,kin)
	brandid	Brand ID in Fav Brand of Account	CHAR(8)	BTH12345			PK,FK	brand_id(Brand)
UserConcern	accid	Account ID have Fav concern	CHAR(8)	ATH12345			PK,FK	acc_id(account_skin)
	concernid	Concern ID in Account	CHAR(8)	CTH12345	Y		PK,FK	concern_id(Concern)
	ingdid	Ingredient allergy ID in Account	CHAR(8)	ING12345	Y		PK,FK	ingd_id(Ingredient)
ProductSkinType	pdid	Product ID	CHAR(8)	PTH12345			PK,FK	pd_id(Product)
	sktid	Skintype ID	CHAR(8)	SKT12345			PK,FK	skt_id(SkinType)
IngdInProduct	pdid	Product ID	CHAR(8)	PTH12345			PK,FK	pd_id(Product)
	ingdid	Ingredient ID	CHAR(8)	ING12345			PK,FK	ingd_id(Ingredient)
ConcernInProduct	pdid	Product ID	CHAR(8)	PTH12345			PK,FK	pd_id(Product)
	concernid	Concern ID	CHAR(8)	CTH12345			PK,FK	concern_id(Concern)
BenefitInProduct	pdid	Product ID	CHAR(8)	PTH12345			PK,FK	pd_id(Product)
	benefitid	Benefit ID	CHAR(8)	BNF12345			PK,FK	benefit_id(Benefit)
ProductInProduct	brandid	Brand ID	CHAR(8)	BTH12345			PK,FK	brand_id(Product)
	pdid	Product ID	CHAR(8)	PTH12345			PK,FK	pd_id(Product)

Table 6.2: Data dictionary for all tables used in the skincare system.

CHAPTER 7

SYSTEM IMPLEMENTATION

This chapter presents the system implementation, covering data collection, implementation logic, and technologies used. It includes methods for acquiring product and ingredient data, the applied technology stack, and key functionalities such as score calculation and search features.

7.1 Data collection

We manually collect product information from various way such as official website, official store on e-commerce platform(Shopee [13], Lazada [14]), EWG database website [6], drug store, and convenience store for gathering thai skincare product of 125 products.

7.1.1 Product

pdID	pdName	pdDescription	categoryID	usage	FDA	PAO	photo
PTH00001	4U2 HYALURONIC CLEANSING WATER	Cleansing for CTG00001	Drop the prod 13-1-6500033699				/image/ProductImage/PTH00001.jpeg
PTH00002	4U2 GENTLE DEEP CLEANSING FOAM	Facial cleansing CTG00002	Use to cleans 11-1-6500035732				/image/ProductImage/PTH00002.png
PTH00003	4U2 EYE AND LIP MAKEUP REMOVER	A semi-water oil CTG00001	Shake the bot 13-1-6500034382				/image/ProductImage/PTH00003.jpeg
PTH00004	4U2 SKIN CLEANSING SHEET	A wipe for clear CTG00001	Use to clean r 13-1-6700005082				/image/ProductImage/PTH00004.jpg
PTH00005	4U2 BRIGHTENING SKIN ADVANCE SERUM	A lightweight sc CTG00007	Drop the seru 11-1-6500042444				/image/ProductImage/PTH00005.jpeg
PTH00006	4U2 EVERYDAY TONE UP UV GEL SPF50+ PA++++ 01	Facial sun prot CTG00009	Spread the pr 11-1-6500043238	12M			/image/ProductImage/PTH00006.jpeg
PTH00007	4U2 EVERYDAY TONE UP UV GEL SPF50+ PA++++ 02	Facial sun prot CTG00009	Spread the pr 11-1-6500043238	12M			/image/ProductImage/PTH00007.jpeg
PTH00008	4U2 EVERYDAY TONE UP UV GEL SPF50+ PA++++ 03	Facial sun prot CTG00009	Spread the pr 11-1-6500043238	12M			/image/ProductImage/PTH00008.jpeg
PTH00009	4U2 EVERYDAY TONE UP UV GEL SPF50+ PA++++ 04	Facial sun prot CTG00009	Spread the pr 11-1-6500043238	12M			/image/ProductImage/PTH00009.jpeg
PTH00010	AKINS VEGAN BARRIER CARE CLEANSING GEL	Vegan acne-rec CTG00002	Press the pro 10-1-8500033815	12M			/image/ProductImage/PTH00010.jpg

Figure 7.1: Example of Product information in CSV format

We gather product data from multiple sources, including official brand websites and e-commerce platforms, categorizing them into 14 distinct types. Additionally, we collect regulatory information from the Food and Drug Administration (FDA) website [20]. Each product entry includes details such as brand, product's name, product's description, category, suitable skin type, size, and price, as shown in Figure 7.1

7.1.2 Ingredient

ingdName	ingdDetail	ingdRisk	dataAvailability
Water (Aqua)	A universal solvent used as the base for many skincare products.	1	5
Cyclopentasiloxane	A silicone that provides a silky texture and helps spreadability; often used in lightweight formulations.	4	3
Propanediol	A humectant and emollient that helps retain moisture and enhances product absorption.	2	3
Isohexadecane	A lightweight emollient that gives a non-greasy, silky feel to formulations.	1	2
Poloxamer 184	A cleansing and emulsifying agent often used to stabilize formulations.	3	3
Caprylylhydroxamic Acid	A gentle preservative with antimicrobial properties.		
Sodium Chloride	Commonly known as salt, it is used to thicken and stabilize cosmetic formulations.	1	5
1,2-Hexanediol	A humectant and preservative booster that helps keep products stable.	1	2
Tocopheryl Acetate	A form of Vitamin E that provides antioxidant benefits and protects the skin.	3	2
Glycerin	Draws moisture into the skin, keeping it hydrated.	2	3
Myristic Acid	Used for emulsifying and thickening products.	1	3
Palmitic Acid	Stabilizes formulations and enhances texture.	1	3
Stearic Acid	Emulsifier and thickener that stabilizes formulations and improves texture.	1	3
Potassium Hydroxide	pH adjuster that helps blend ingredients effectively.	5	3
Lauric Acid	Derived from coconut oil, used for emulsifying and cleansing.	1	3

Figure 7.2: Example of Ingredient information in CSV format

The process of compiling the list of ingredients for skincare products is carried out meticulously to ensure accuracy and transparency. Each ingredient is documented in a structured format: it includes the ingredient's name, ingredient's description, risk score, and a data availability score, as shown in Figure 7.2.

To gather detailed information about each ingredient, reliable online resources are utilized such as MyRevea [21], INCI Guide [22], and SpecialChem [?], are referenced to define ingredient properties, while platforms like EWG (Environmental Working Group) [7], provide assessments of risk and data availability. In addition, sources such as Sephora [?], and Lesielle [?] offer further insights into ingredient functions and compatibility with skincare formulations. This multi-source method ensures comprehensive and reliable ingredient profiles, helping users make informed decisions tailored to their specific skincare needs or concerns.

7.2 Implementation logic

7.2.1 Score calculation

The score calculate function empowers users with insights into the safety, effectiveness and suitability of skincare products, ensuring that their choices align with their personal needs and preferences by providing a structured evaluation based on the key factors of the standard score, including the Hazard Score [5], and the availability of data [6] coming from the Environmental Working Group (EWG) [7] website and skin type matching.

Factor	Weight (%)	Description
EWG Risk $\left(\left(\sum_{i=1}^N \text{ReverseRisk} \times 10 \right) \div K \right) \times 0.5$ <p>: Reverse EWG Risk = 10 - EWG Risk : K = Number of ingredients that have a Risk Score : N ingredients</p>	50%	Ingredients with lower risk scores (1-10) will be reversed (10 = best, 1 = worst).
EWG Data Availability $\left(\left(\sum_{i=1}^D \text{Data Availability} \times 10 \right) \div D \right) \times 0.4$ <p>: D = Number of ingredients that have a Data Availability score :N ingredients</p>	40%	Indicates how much reliable data exists for the ingredient, ensuring transparency.
Matching (Skin Type) If Skin type of user match with the product skin type = 10 if not = 0	10%	Measures how well the product matches a user's skin type.
Final score = Risk + EWG Data Availability + Matching (Skin Type) A is dark green, B is light green, C is yellow, D is orange, and E is red. The calculation of the full score is 100 (A: 81-100, B: 61-80, C: 41-60, D: 21-40, and E: 0-20).		

Figure 7.3: Product Score Calculation

The score calculation formula shown in Figure 7.3 calculates the score of a product by providing based on the 3 key factors, including risk (50%), EWG Data Availability (40%), and skin type compatibility (10%).

```
// 1. Risk Score (50%)
const validRiskIngredients = ingredients.filter(ing => ing.risk !== null);
let riskScore = 0;
if (validRiskIngredients.length > 0) {
  const normalizedRisks = validRiskIngredients.map(ing => (10 - ing.risk));
  const sumNormalizedRisks = normalizedRisks.reduce((sum, val) => sum + val, 0);
  const multipliedScore = sumNormalizedRisks * 10;
  const avgRisk = multipliedScore / validRiskIngredients.length;
  riskScore = avgRisk * 0.5; // max 50
}
```

Figure 7.4: Risk score

The risk score in Figure 7.4 is calculated by reversing each ingredient's risk value using the formula “10 - risk score,” thereby rewarding safer ingredients with higher values. This reversed value is averaged across all ingredients and scaled to reflect its 50% contribution to the overall score.

```
// 2. Availability Score (40%)
const validAvailability = ingredients.filter(ing => ing.ewg !== null);
let availabilityScore = 0;
if (validAvailability.length > 0) {
  const avgAvailability = (validAvailability.reduce((sum, ing) => sum + ing.ewg, 0) / validAvailability.length)*10;
  availabilityScore = avgAvailability * 0.4; // max 40
}
```

Figure 7.5: Data Availability Score

The data availability score in Figure 7.5 evaluates the transparency of ingredients by averaging the EWG availability ratings across all listed components, with higher

averages indicating better data transparency. This average is then scaled accordingly to contribute 40% to the final product score.

```
// 3. Skin Type Score (10%)
let skinTypeScore = 0;
const userSkinTypes = userSkinType?.split('-').map(t => t.trim()) || [];

if (userSkinTypes.length > 0 && productSkinTypes.length > 0) {
  const matched = userSkinTypes.filter(type => productSkinTypes.includes(type));
  skinTypeScore = Math.round((matched.length / userSkinTypes.length) * 10); // max 10
}
```

Figure 7.6: Skintype matching

Finally, the skin type compatibility score in Figure 7.6 measures how well a product matches the user’s skin type by comparing the user’s selected types with those indicated in the product’s description. The percentage of matched types is multiplied by 10, forming the remaining 10% of the total score.

The three components combine to produce a total score out of 100, which is then translated into an overall grade (A to E) and a corresponding color that reflects safety and suitability—green for above average, yellow for average, and red for below average.

```
const getGradeColor = (score) => {
  if (score >= 81) return styles.darkGreen;
  if (score >= 61) return styles.lightGreen;
  if (score >= 41) return styles.yellow;
  if (score >= 21) return styles.orange;
  return styles.red;
};

const getGradeText = (score) => {
  if (score >= 81) return 'A';
  if (score >= 61) return 'B';
  if (score >= 41) return 'C';
  if (score >= 21) return 'D';
  return 'E';
};
```

Figure 7.7: Score Grading for Product Evaluation

The grading system in Figure 7.7 categorizes product scores into five levels, each with a corresponding grade and color to reflect quality and safety. A score of 81 or above is graded ‘A’ and shown in dark green, indicating excellent performance and strong suitability. Scores between 61 and 80 receive a ‘B’ with light green, representing good quality with minor limitations. A ‘C’ grade with yellow is assigned to scores from 41 to 60, reflecting average reliability. Scores between 21 and 40 fall into grade ’D’ and are orange, suggesting that the product needs improvement. Lastly, scores below 21 are given an ‘E’ and displayed in red, highlighting poor performance and high risk. A visual example of score calculation is available in the Appendix A.1.

7.2.2 Search page

```
const applyFilters = async () => {
  try {
    const res = await fetch(`api/api_search?query=${encodeURIComponent(searchTerm || ingredientSearch)}`);
    const data = await res.json();
    let filtered = Array.isArray(data) ? data : [];

    const groupedFilters = filters.reduce((acc, filter) => {
      if (!acc[filter.type]) acc[filter.type] = [];
      acc[filter.type].push(filter.value);
      return acc;
    }, {});

    filtered = filtered.filter(product => {
      return (
        (!groupedFilters["Category"] || groupedFilters["Category"].includes(product.catName)) &&
        (!groupedFilters["Skin Type"] || groupedFilters["Skin Type"].includes(product.sktName)) &&
        (!groupedFilters["Concern"] || groupedFilters["Concern"].includes(product.concernName)) &&
        (!groupedFilters["Brand"] || groupedFilters["Brand"].includes(product.brandName))
      );
    });

    setProducts(filtered);
    filtered.forEach((p) => fetchProductWarnings(p.pd_id));
  } catch (err) {
    console.error("✖ Error applying filters:", err);
  }
};
```

Figure 7.8: Search Filter

In this project, the product filtering function is implemented through an asynchronous function named `applyFilters`, as in figure 7.8. This function handles search input, fetches product data from the backend, applies user-selected filters, and updates the displayed results.

```
const res = await fetch(`api/api_search?query=${encodeURIComponent(searchTerm || ingredientSearch)}`);
```

The system uses the `fetch()` function to retrieve product data from the “`/api/api_search`” endpoint. The query is based on either the keyword entered by the user (`searchTerm`) or a specific ingredient (`ingredientSearch`).

```
const groupedFilters = filters.reduce((acc, filter) => {
  if (!acc[filter.type]) acc[filter.type] = [];
  acc[filter.type].push(filter.value);
  return acc;}, {});
```

To simplify the filtering process, selected filters are grouped by their types (e.g., Category, Skin Type, Brand). This makes it easier to match products against multiple criteria without writing repetitive code for each filter type.

```

filtered = filtered.filter(product => {
  return (
    (!groupedFilters["Category"] || groupedFilters["Category"].includes(
      ↪ product.catName)) &&
    (!groupedFilters["Skin Type"] || groupedFilters["Skin Type"].includes(
      ↪ product.sktName)) &&
    (!groupedFilters["Concern"] || groupedFilters["Concern"].includes(product.
      ↪ concernName)) &&
    (!groupedFilters["Brand"] || groupedFilters["Brand"].includes(product.
      ↪ brandName))
  );
});

```

The system then filters the product list. Each product is checked against the grouped filters. If a filter type is selected, the product must match at least one value in that group; otherwise, it is excluded from the results and displays “No products found”.

7.3 Technology used

7.3.1 Frontend

The frontend of the website is developed using modern web technologies, including Next.js, React.js, JavaScript, and CSS. It is responsible for rendering the user interface, displaying skincare product details, handling navigation, and managing user interactions. The frontend communicates with the backend via API requests to retrieve and update data dynamically.

7.3.2 Backend

The backend is implemented using server-side technologies that handle application logic and database communication. It manages API endpoints that receive input from the frontend, processes tasks such as skincare routine creation, product filtering, and wishlist management, and sends back the corresponding data responses. The backend serves as the core engine that bridges user actions with stored data.

7.3.3 Development environment

The development of this project was carried out on the following hardware and software environment:

- **Device:** MacBook Air with Apple M3 chip
- **Operating System:** macOS Sequoia
- **RAM:** 16 GB
- **Storage:** 512 GB SSD
- **Display:** 15.3-inch Liquid Retina display (2880 × 1864 resolution)

This environment provides sufficient performance for handling full-stack development tasks involving React.js, Next.js, and MySQL. The M3 chip, in combination with macOS Sequoia, ensures compatibility and fast execution of development tools such as Visual Studio Code, MySQL Workbench, and browser-based testing on Safari and Chrome. The large display enables comfortable multitasking, especially when working with front-end layout design and component debugging.

CHAPTER 8

TESTING

This chapter presents the evaluation of the system through two main approaches: System Integration Testing to verify functional correctness, and User Testing to assess the user experience. The results are analyzed to identify improvements and ensure the system meets its intended goals.

8.1 System testing

This system testing plan covers all core functionalities of the skincare web platform on both the user and admin sides. Key features include searching, filtering, sorting, product reviews, wishlist, and routine management, as well as product and user account administration. Testing ensures that each module functions as expected and provides a seamless experience.

User-side testing focuses on homepage search, advanced search filters, review, and personal routine management. Admin-side testing includes product management (adding, editing, and deleting) and information management (e.g., brand, size, ingredient), user management, and review management. All test cases aim to validate system integrity, data accuracy, and interface behavior before deployment.

8.1.1 Overview of Interface

Page/Function	User without registration	User with registration (no profile)	User with profile	Admin	Mobile	Desktop
Home	✓	✓	✓	✓	✓	✓
Search	✓	✓	✓	✓	✓	✓
Compare	✓	✓	✓	✓	✓	✓
About	✓	✓	✓	✓	✓	✓
Contact	✓	✓	✓	✓	✓	✓
User Account	✗	✓	✓	✗	✓	✓
Write review	✗	✓	✓	✓	✓	✓
My Reviews	✗	✓	✓	✗	✓	✓
My Wishlist	✗	✓	✓	✗	✓	✓
My Skincare	✗	✓	✓	✗	✓	✓
Display Score Product	✓(Normal)	✓(Normal)	✓(Based on profile)	✓(Normal)	✓	✓
Notify Concern	✗	✗	✓(Based on concern)	✗	✓	✓
Admin Account	✗	✗	✗	✓	✗	✓
Product Management	✗	✗	✗	✓	✗	✓
User Management	✗	✗	✗	✓	✗	✓
Management	✗	✗	✗	✓	✗	✓
Review Management	✗	✗	✗	✓	✗	✓

Table 8.1: System Function Accessibility Matrix for User and Admin

Table 8.1 overviews the system's interface access across different user types and device preferences. Users who have not registered can only access basic pages such as Home, Search, Compare, About, and Contact. Once a user registers but has not completed their skin profile, they can still access these same pages, along with the ability to write and view reviews. Users who complete their skin profile gain more personalized features, including product scores based on their skin type and the ability to receive notifications based on their concerns. For administrators they have access to a wide range of management features, such as managing user accounts, products, reviews, and more. However, these administrative functions are recommended to be used on desktop devices for optimal performance. Overall, the access to features increases as users fill out their profiles, while admins have full control over content and user management.

8.1.2 Unit Testing

Main Function	No. of Unit Function	No. of Pass Percent
Sign-up	7	100%
Log in	5	100%
Search Function	21	100%
Compare Function	6	100%
Review Function	14	100%
Wishlist Function	5	100%
Routine Set Function	9	100%
Log out	1	100%

Table 8.2: Unit Testing - User Side

Main Function	No. of Unit Function	No. of Pass Percent
Product Management	33	100%
User Management	6	100%
Information Management	28	100%
Review Management	6	100%

Table 8.3: Unit Testing - Admin Side

Table 8.2 and Table 8.3 present unit testing results for the SkinSite website, separated into the "User Side" and the "Admin Side."

Table 8.2 shows the unit testing results for the user side, comprising 9 main functions with a total of 68 unit tests. These functions include Sign-up, Log in, Home Page, Search Function, Compare Function, Review Function, Wishlist Function, Routine Set Function, and Log out. The function with the highest number of unit tests is the Search Function with 21 units, while the Log out function has the fewest, with just 1 unit. All functions passed 100% of their respective tests, indicating full functionality on the user side.

Table 8.3 presents the unit testing results for the admin side, consisting of 4 main functions with a total of 73 unit tests. These functions include Product Management , User Management, Information Management, and Review Management. Among these, Product Management contains the highest number of unit tests with 33 units, while User Management and Review Management share the lowest count with 6 units. All functionalities successfully passed 100% of their respective unit tests, confirming that the administrative operations are functioning accurately and reliably.

In summary, the unit testing results for both the user and admin sides of the Skin-Site website demonstrate complete functionality across all tested features. On the user side, all 68 unit tests across 9 main functions passed successfully, with the Search Function having the highest number of tests and Log out the fewest. On the admin side, 73 unit tests were conducted across 4 main functions, with Product Management covering the most units and both User and Review Management the least. All tests achieved a 100% pass rate, indicating a reliable and fully operational system.

8.1.3 System Integration

User Side

Table 8.4 presents the results of system integration testing for user functionalities within the skincare product platform. The testing covers four user conditions: users without login, users with login but without a skin profile, users with oily skin profiles, and users with dry skin profiles. Each function, such as product search, filter usage, viewing product details, managing wishlists, writing reviews, and creating skincare routine sets, was tested under these different conditions.

A check mark (✓) indicates that the function is available and working properly, while a cross mark (✗) denotes that the function is unavailable. In some cases, a warning message appears indicating that the output dynamically follows the user's skin profile. For the "Display score" function, a checkmark is accompanied by a description clarifying whether the displayed score defaults to normal skin or is personalized according to the user's profile.

Additionally, the gray shaded cells in the table indicate functions that are not applicable for users who have not logged in, such as user registration, login, and logout processes. These gray areas visually distinguish functionalities that are irrelevant for non-logged-in users from those that are functionally tested.

This comprehensive testing ensures that the system properly adapts to different user statuses, particularly in delivering personalized skincare recommendations based on individual profiles.

Test Title	User w/o login	User login w/o skin profile	User login w/ oily skin type	User login w/ dry skin type
User Registration		✓	✓	✓
Log in as a member		✓	✓	✓
Search the product name on the home-page	✓	✓	✓	✓
Click all filters to check (ex. Category, Skintype, Concern, Brand)	✓	✓	✓	✓
Search by benefit	✓	✓	✓	✓
Click sort (A-Z) and search product name	✓	✓	✓	✓
Click sort (A-Z) and search ingredient name	✓	✓	✓	✓
Click filter skin type & category	✓	✓	✓	✓
Search product name	✓	✓	✓	✓
Notify warning	x	x	✓ Warning: follow skin profile	✓ Warning: follow skin profile
Add a wishlist to the search page	x	✓	✓	✓
Click to view product info	✓	✓	✓	✓
Remove wishlist & add again	x ✓	✓ ✓	✓ ✓	✓ ✓
Display score	Score defaults to normal skin (53%)	Score defaults to normal skin (53%)	Score defaults to oily skin type (63%)	Score based on dry skin type (53%)
Write a review	x	✓	✓	✓
Click to compare 3 products	✓	✓	✓	✓
View product recommendations	✓	✓	✓	✓
View review history & modify review & delete review	x	✓	✓	✓
View wishlist history & check to click to view product info & go back to the previous page, & remove wishlist	x	✓	✓	✓
Create Morning Routine Set	x	✓	✓	✓
Edit Morning Routine Set name & add product in set & edit product in set & delete product in set	x	✓	✓	✓
Create Night Routine Set	x	✓	✓	✓
Edit Night Routine Set name & add product in set & edit product in set & delete product in set	x	✓	✓	✓
Logout		✓	✓	✓

Table 8.4: System Integration Testing for User Functions

Admin Side

Test Title	Admin login
Log in as an admin	✓
Product management: view, add, search, edit, delete	✓
Management tab: view tabs & search	✓
Management tab: add/edit/delete brand, skin type, etc.	✓
Review management: view, search, delete	✓
User management: view, search, change role, delete	✓
Log out as admin	✓

Table 8.5: System Integration Testing for Admin Functions

Table 8.5 illustrates the system integration testing results for core functionalities on the admin side of the platform. The table presents key tasks performed by administrators, including user authentication, product management (viewing, adding, searching, editing, and deleting products), tab management, review management, user management, and logout functionality. Each task was tested to ensure that the system responded appropriately to administrative actions.

The presence of a check mark (✓) in the "Admin login" column indicates that the respective function was successfully executed without errors. This testing ensures that essential administrative operations, which are critical for maintaining and updating platform data, are properly integrated and functional within the system.

8.1.4 User Testing

To evaluate the performance and usability of the SkinSite website, a survey was conducted targeting both user and admin perspectives. A total of 32 users and 5 administrators participated in the assessment, responding to a set of questions. The survey aimed to demonstrate the website's functions and to gather insights for further improvement. The collected data was used to analyze the success rate of each feature and function, calculate the average user satisfaction score, and identify key areas for enhancement. In addition, the survey captured qualitative feedback related to usability, available features, product presentation, and suggestions for improving the overall user experience on the SkinSite platform.

User Side

- Success Rate

Main Function	Success Rate
User Registration	100%
Login Experience	100%
Homepage Interaction	100%
Filter Use	91.7%
Compare Products	100%
Search	100%
Review Interaction	95.8%
Wishlist Functionality	100%
Routine Set Management	100%
Concern Notification	100%
Logout	100%

Table 8.6: Success Rate - User Testing for Registration

Main Function	Success Rate
Homepage Interaction	100%
Filter User	100%

Table 8.7: Success Rate - User Testing for Non-Registration

According to the survey that used data from both registered and non-registered users (as shown in Table 8.6 and Table 8.7), the success rate overall was 100%, indicating that the overall functions worked really well across the website. There were some specific functions that did not meet the success rate. For instance, the filter feature occasionally displayed incorrect data, likely due to slow system response times, which may have caused users to perceive the information as inaccurate. Additionally, on the filter, scrolling was not fully responsive. Another issue was observed in the review system, where the displayed rating did not always match the user input for example, a 4 star review was sometimes incorrectly shown as 5 stars. Despite these issues, the majority of functions met expectations, and feedback has helped identify areas for further refinement to enhance the experience for all user types.

- **Average User Satisfaction Score**

The Average User Satisfaction Score was derived from responses to nine survey questions covering various user experience aspects such as ease of use, content clarity, and overall satisfaction. Responses from both registered and non-registered users were aggregated to reflect overall sentiment. The calculation steps are shown below for further clarity:

Step 1: Average for Each Question

$$\text{Average Score} = \frac{\sum (\text{All responses for question})}{\text{Number of responses}}$$

Question	All responses for question	Number of responses	Average Score
Question 1 (Q_1)	132	32	4.125
Question 2 (Q_2)	125	32	3.90625
Question 3 (Q_3)	133	32	4.15625
Question 4 (Q_4)	134	32	4.1875
Question 5 (Q_5)	127	32	3.96875
Question 6 (Q_6)	135	32	4.21875
Question 7 (Q_7)	135	32	4.21875
Question 8 (Q_8)	137	32	4.28125
Question 9 (Q_9)	147	32	4.59375

Table 8.8: Average User Satisfaction Scores per Question

Step 2: Overall Average

$$\begin{aligned} \text{Overall Average} &= \frac{\sum (\text{Average Score of all 9 questions})}{9} \\ &= \frac{37.65625}{9} \\ &= 4.184027778 \end{aligned}$$

Step 3: Final Score (out of 100)

$$= \text{Overall Average} \times 20$$

$$= 4.184027778 \times 20$$

$$= 83.680555556 \approx 84\%$$

- **User Feedback of SkinSite website**

The user feedback collected from SkinSite indicates a strong overall user experience, as evidenced by the combined results shown in Appendix A.3, Appendix A.4, and Appendix A.5.

Starting with usability (Appendix A.3a), most users found the website easy to navigate, with 37.5% rating it “Easy” and 28.1% “Very easy”, reflecting the clarity of the site’s layout and the accessibility of core functions such as product search and review submission. This ease of navigation appears to contribute directly to broader user satisfaction, as 53.1% of users were “Satisfied” and 31.3% “Very satisfied” with their overall experience (Appendix A.3b). Furthermore, 71.9% of respondents reported that the website fully met their expectations in terms of functionality and ease of use (Appendix A.1c), reinforcing the connection between intuitive design and perceived value.

In terms of core features (Appendix A.4), users responded favorably to the search function, with 46.9% finding it “Effective” and 37.5% “Very effective” (Appendix A.4a). Similarly, the skin type filter (Appendix A.4b) was rated “Very helpful” by 50% of users, and the product comparison feature (Appendix A.4c) received the strongest endorsement, with 65.8% rating it “Very useful”.

The survey results A.5 show that users responded positively to the website’s information accessibility and product variety. From appendix A.5a, significant 78.2% found it easy or very easy to access skincare information, while only 3% experienced difficulty. In terms of product information in appendix A.5b, 68.5% rated it as helpful and complete, with just 5.2% finding it insufficient. Regarding product variety in appendix A.5c, 62.4% were satisfied or very satisfied, and only 6.4% were dissatisfied. These results reflect that the website is user-friendly, informative, and meets user expectations effectively.

Admin Side

- **Success Rate**

According to the success rate data based on the admin side as shown in Table 8.9, there is a 100% success rate for all admin functions that were tested. This includes where the users had to log into the admin site to prove they could log in so from that

Main Function	Success Rate
Login	100%
Product Management	100%
Managements (Brand, skintype, etc.)	100%
Review Managemnet	100%
User Management (Search, Chnage role, Delete)	100%
Logout as admin	100%

Table 8.9: Success Rate - Admin Side

point on, we included admin functions such as product admin, product categories (brand and skin type), reviews, user admin (searching, changing roles and deleting users) and another function of being able to log out as admin. This 100% success rate indicates a stable and functional administrative function of the website and proves that the website admin functions were all valid as all major admin tasks were able to be fulfilled in the test without failure.

- **Admin Feedback of SkinSite website**

User feedback collected on the admin side (Appendix A.6, Appendix A.7, and Appendix A.8) reflects a consistently positive experience. In terms of User Experience (Appendix A.6a), 80% of users rated the site as “Fairly easy” and 20% as “Very easy,” which leads to similarly favorable navigation ratings (Appendix A.6b) 80% gave a score of “5” and 20% rated it “4”. This positive perception extends to Satisfaction (Appendix A.7a), with 60% rating it as “Pretty good” and 40% as “Very good,” leading to high overall satisfaction of system performance (Appendix A.7b) 80% rated the site “5” and 20% rated it “4”. Feature and Function feedback were also strong: 80% found the product search function worked “Very well” (Appendix A.8a), and all users found product adding/removing and updating “Very convenient” and “Very easy” (Appendix A.8b, and Appendix A.8c). Overall, the results highlight the website’s effective design and functionality, particularly in usability, navigation, and product management.

CHAPTER 9

CONCLUSION

9.1 Discussion

This project aimed to enhance the accessibility, understanding, and usability of Thai skincare products through the development of a dedicated web platform and supporting database. The first objective was achieved by creating the SkinSite website, which provides detailed product information and supports personalization based on users' skin types and concerns. The second objective focused on identifying user needs and issues with existing skincare websites. Through problem analysis and survey, pain points including product information ambiguity, a lack of sufficient filtering function, and a lack of comparison functionalities were uncovered—discoveries which informed the platform's development. Lastly, this project created a database of 125 Thai skincare products and 758 ingredients based on data collected from Thai skincare official websites. The database underlies proper listings of products as well as contextually applicable recommendations. To assess platform quality and user reception, a satisfaction survey consisting of 9 questions was conducted, resulting in an overall user satisfaction score of 84%. This reflects a positive reception and indicates the platform's success in meeting user needs. Overall, the project offers a user-centric solution that bridges gaps in current skincare platforms, promotes Thai skincare brands, and allows users to make intelligent product decisions.

9.2 Limitation

While the platform was developed with the aim of offering comprehensive and trustworthy information on Thai skincare products, certain constraints became apparent during the implementation and data collection phases. These limitations not only influenced the quality of the database but also affected the platform's ability to deliver a fully personalized experience to its users.

The first major limitation relates to data completeness. Despite efforts to gather detailed product information, some Thai skincare brands, particularly smaller or SME brands, provided minimal publicly available data. As a result, several product entries in the system are incomplete, leading to inconsistencies in product profiles. This lack of information may reduce user trust and hinder the visibility of these products within the platform.

The second limitation involves the system's current level of personalization. While users can receive product suggestions based on general skin types, more specific needs, such as allergen avoidance, ingredient concentration sensitivity, or awareness of "Period After Opening" (PAO) durations, are not yet supported. These features are especially important for users with sensitive skin, allergies, or safety concerns, and their absence limits the platform's ability to offer nuanced, user-centric recommendations.

In summary, although the system successfully introduces an organized structure for Thai skincare product data, these limitations indicate areas for improvement. Addressing gaps in product data and enhancing personalization features in future updates will be crucial steps toward building a more inclusive, reliable, and user-tailored skincare platform.

9.3 Future Work

To enhance the platform's value and better address user needs, our team have been identified several directions for future improvement. These include expanding the product database, improving accessibility, and incorporating more sophisticated personalization tools. The goal is to transform the current system into a more comprehensive, user-centric solution for navigating the skincare landscape.

First, expanding the range of Thai skincare brands, particularly by including more small and medium-sized enterprises (SMEs), is a priority. Promoting lesser-known local brands on the platform will not only increase their visibility but also support domestic businesses. This expansion will enrich the product selection and offer users a broader variety of skincare options that may better align with their preferences or budgets.

Second, Adding the platform into a dedicated mobile application will greatly improve usability and accessibility. A mobile app allows users to conveniently access

skincare information and personalized recommendations anytime, anywhere. With a responsive and intuitive design, the app can deliver a seamless experience tailored to modern usage habits, making the platform more approachable and widely adopted.

Third, future versions will focus on enhancing personalization features. This includes implementing allergen warnings, ingredient sensitivity monitoring, and intelligent product suggestions based on user profiles or historical interactions. Integrating skin-type analysis and dynamic recommendation algorithms will empower users to make safer, more informed decisions, thereby increasing the platform's reliability and trustworthiness.

In summary, the proposed future developments aim to address current limitations while expanding the platform's reach and impact. By increasing brand diversity, offering mobile access, and incorporating intelligent features, the platform will be better equipped to meet user expectations and provide meaningful support in navigating the complex world of skincare.

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APPENDIX A

ANY EXTRA INFORMATION

This section provides additional information, including user surveys and unit testing results, to enhance the reader's understanding of the project. It aims to offer supporting details that clarify user interactions, system behavior, and overall usability.

A.1 Score Calculation

Example of Score Calculation

The following is the ingredient list for the AKINS Vegan Barrier Care Cleansing Balm, a product specifically designed for individuals with oily and sensitive skin. The formulation comprises a total of 30 ingredients. Of these, 2 ingredients lack an assigned EWG risk score [5], and 3 ingredients have no available data [6]. Consequently, the EWG risk score in this example is calculated based on 28 ingredients, while the data availability score is derived from 27 ingredients.

Ingredient	Risk	EWG Data Availability
Water (Aqua)	1	5
Glycerin	2	3
Phenoxyethanol	4	4
Glyceryl Oleate	1	3
Citric Acid	2	4
Tocopherol	2	3
Ethylhexylglycerin	2	3
Salicylic Acid	8	2
Ceramide NP	1	2
Ethylhexyl Palmitate	1	3
Cetyl Ethylhexanoate	1	2
Polyglyceryl-3 Cocoate	1	2
Trihydroxystearin	1	2
Glyceryl Behenate	3	2
Polyglyceryl-6 Octastearate	1	2
Olea Europaea (Olive) Fruit Oil	-	-
Aloe Barbadensis Leaf Extract	1	2
Canola Oil	1	3
Ceteareth-25	2	4
Cetyl Alcohol	1	3
Behenic Acid	1	4
Cholesterol	1	2
Ceramide NS	1	2
Ceramide AP	1	2
Ceramide EOP	1	2
Ceramide EOS	-	-
Caprooyl Phytosphingosine	1	-
Caprooyl Sphingosine	1	2
Ascorbyl Palmitate (Vitamin C Palmitate)	2	3
Lecithin	4	4

Table A.1: Example of Ingredient Risk and EWG Availability

Step 1: Risk Score Calculation (50 percent of Total Score)

$$\left(\left(\sum_{i=1}^N \text{ReverseRisk} \times 10 \right) \div K \right) \times 0.5$$

:Reverse EWG Risk = 10–EWG Risk
:K = Number of ingredients that have a Risk Score
:N = Ingredients

Figure A.1: Risk Calculation formula

$$\begin{aligned}
 \text{Reverse the risk score} &= \sum_{i=1}^N (10 - \text{EWG Risk}_i) \\
 &= (10 - 1) + (10 - 2) + (10 - 4) + (10 - 1) + (10 - 2) \\
 &\quad + (10 - 2) + (10 - 2) + (10 - 8) + (10 - 1) + (10 - 1) \\
 &\quad + (10 - 1) + (10 - 1) + (10 - 1) + (10 - 3) + (10 - 1) \\
 &\quad + (10 - 1) + (10 - 1) + (10 - 2) + (10 - 1) + (10 - 1) \\
 &\quad + (10 - 1) + (10 - 1) + (10 - 1) + (10 - 1) + (10 - 1) \\
 &\quad + (10 - 1) + (10 - 2) + (10 - 4) \\
 &= 213 \\
 \text{Multiply by 10} &= 213 \times 10 \\
 &= 2130 \\
 \text{Divide by the number of ingredients (average)} &= \frac{2130}{28} \\
 &= 82.5 \\
 \text{Weight 50\%} &= 82.5 \times 0.5 \\
 &= 41.25
 \end{aligned}$$

Step 2: Data Availability Score Calculation (40 percent of Total Score):

$$\left(\left(\sum_{i=1}^N \text{Data Availability} \times 10 \right) \div D \right) \times 0.4$$

: D = Number of ingredients that have a Data Availability score
 : N = Ingredients

Figure A.2: Data Availability Calculation formula

$$\begin{aligned}
 \text{Sum of Data Availability} &= \sum_{i=1}^N \text{Data Availability} \times 10 \\
 &= (5 \times 10) + (3 \times 10) + (4 \times 10) + (3 \times 10) + (4 \times 10) + (3 \times 10) \\
 &\quad + (2 \times 10) + (2 \times 10) + (2 \times 10) + (3 \times 10) + (4 \times 10) + (2 \times 10) \\
 &\quad + (2 \times 10) + (2 \times 10) + (2 \times 10) + (2 \times 10) + (3 \times 10) + (4 \times 10) \\
 &\quad + (3 \times 10) + (4 \times 10) + (2 \times 10) + (2 \times 10) + (2 \times 10) + (2 \times 10) \\
 &\quad + (2 \times 10) + (3 \times 10) + (4 \times 10) \\
 &= 760 \\
 \text{Average (divide by 27)} &= \frac{760}{27} \\
 &= 28.1 \\
 \text{Weighted 40\%} &= 28.1 \times 0.4 \\
 &= 11.26
 \end{aligned}$$

Step 3: Skin Type Matching Score (10 percent of Total Score):

$$\begin{aligned}
 \text{User Skin Type} &= \text{"Oily"} \\
 \text{Product Suitable For} &= \text{"Oily"} \\
 \text{Matching Score (Weighted 10\%)} &= 10
 \end{aligned}$$

Step 4: Final Score

$$\begin{aligned}\text{Total Score} &= 41.25 + 11.26 + 10 \\ &= 62.5 \\ &= 63 \\ \text{Grade} &= \text{B}\end{aligned}$$

A.2 Unit Testing

Unit testing verifies the correct behavior of individual system features by testing them in isolation with defined inputs and expected outputs. This section covers key website functions such as registration, sign-in, search, comparison, and routine creation through simulated user interactions.

Each scenario includes a comparison between the expected outcome and the actual system behavior. The outcome is summarized using visual status symbols for clarity and consistency.

The meaning of each symbol is as follows:

- ✓ indicates that the system functioned as expected (Pass),
- ○ indicates that the system worked but with unresolved conflicts or minor issues,
- ✗ indicates that the system did not perform as intended (Fail).

A.2.1 User Unit Testing

User Unit Testing is a process in which real users are instructed to interact with the website by performing specific tasks based on predefined scenarios. This method aims to evaluate whether the system responds correctly to common user behaviors and to ensure that individual features work as intended in real-world usage.

The testing is divided into eight key functional areas: sign-in, login, search, compare, review, wishlist, routine set, and log out. Each function is tested independently to observe its accuracy, reliability, and user experience. This approach helps identify both functional issues and usability improvements from the perspective of actual users.

Test Title	Expected Result VS Actual Result	Status
Register with all fields	Expected: Register, redirect, save data Actual: Registered, redirected, correct profile info	✓
Register with existing email	Expected: Show “Email already exists”, stay on form Actual: Message shown, form not submitted	✓
Register with mismatched passwords	Expected: Show “Passwords do not match!”, stay on form Actual: Message shown, form not submitted	✓
Register without name, gender, birthdate	Expected: Show warning, prevent submission Actual: Alerts shown, user can't proceed without filling fields	✓
Register without Skin Type, Skincare Goal, Preferences Concern, Allergies, Brand	Expected: Allow registration without those fields, editable later Actual: Registered successfully, empty fields shown correctly on profile	✓
Click “+” to add Skincare Goal, Preferences Concern, Allergies, Brand	Expected: Add input field each click, all values saved Actual: New input fields appeared and data saved	✓
Click “-” to remove Skincare Goal, Preferences Concern, Allergies, Brand	Expected: Selected field should be removed Actual: Selected fields were removed correctly before saving	✓

Table A.2: Registration and Profile Interaction Test Results

The table A.2 presents the results of testing the user registration functionality on the website. Each row represents a specific test case covering different user scenarios, such as providing all required information, using a duplicate email, entering mismatched passwords, omitting optional or required fields, and interacting with dynamic form elements like adding or removing skincare preferences.

This table provides a clear and structured assessment of the registration process by comparing expected results with actual outcomes. It helps identify functional completeness, usability, and any edge-case inconsistencies that may need to be addressed in future development stages.

The table A.3 presents the results of unit testing for the sign-in functionality as a registered member. Each test case simulates a specific login scenario, including attempts with an unreg-

Test Title	Expected Result VS Actual Result	Status
Log in with an unregistered account	Expected: Show “Invalid email or password.”, prevent login Actual: Error shown, user not logged in	✓
Log in with a registered account	Expected: Login success, redirect to account page Actual: User logged in and redirected correctly	✓
Log in with wrong email or password	Expected: Show “Invalid email or password.”, prevent login Actual: Error shown, login prevented	✓

Table A.3: Sign-in Functionality Test Results as Member

istered account, a valid registered account, and incorrect credentials. The purpose of these tests is to verify that the authentication system correctly handles valid and invalid login attempts.

In all cases, the system behaved as expected: it prevented login when incorrect or unregistered credentials were used, and successfully allowed access and redirected the user when valid credentials were provided. These results indicate that the sign-in mechanism is functioning reliably and securely under normal usage conditions.

Test Title	Expected Result VS Actual Result	Status
Search product name on Homepage	Expected: Show dropdown of related products, click redirects to product info Actual: Dropdown appeared with matches, redirect worked as expected	✓
Click on “Go to search”	Expected: Redirect to full search page Actual: User was redirected to search page without issue	✓
Search by product name	Expected: Display products matching Actual: The product is not shown correctly	✓
Search by category name	Expected: Show products under that category Actual: Products from that category are displayed correctly	✓
Search by skin type name	Expected: Show products under that skin type Actual: Products from that skin type are displayed correctly	✓
Search by concern name	Expected: Show products under that concern Actual: Products from that concern are displayed correctly	✓
Search by benefit name	Expected: Show products under that benefit Actual: Products from that benefit are displayed correctly	✓
Search by brand name	Expected: Show products under that brand Actual: Products from that brand are displayed correctly	✓
Search by ingredient name	Expected: Show products under that ingredient Actual: Products from that ingredient are displayed correctly	✓
Filter by category	Expected: Show products in that category Actual: Products under that category are displayed correctly	✓
Filter by skin type	Expected: Show products for that skin Actual: Products for that skin are displayed correctly	✓
Filter by benefit	Expected: Show products that benefit Actual: Products for that benefit are displayed correctly	✓

Table A.4: Search Functionality Testing – Part 2: Searching and Filtering

Test Title	Expected Result VS Actual Result	Status
Filter by preference concern	Expected: Show products for that preference concern Actual: Products displayed that preference concern correctly	✓
Filter by brand	Expected: Show products from that brand Actual: Products from that brand are displayed correctly	✓
Sort by popularity (Highest reviews)	Expected: Sort by highest review count Actual: Sorted by reviews correctly	✓
Sort by A-Z	Expected: Sort products alphabetically (A-Z) Actual: Products sorted from A-Z correctly	✓
Sort by Z-A	Expected: Sort products alphabetically (Z-A) Actual: Products sorted from Z-A correctly	✓
Sort by Highest Score	Expected: Sort products by highest score Actual: Products sorted by highest score correctly	✓
Sort by Low to High Price	Expected: Sort products by price (low to high) Actual: Products are sorted from low to high price correctly	✓
Sort by High to Low Price	Expected: Sort products by price (high to low) Actual: Products are sorted from high to low price correctly	✓
View product list	Expected: Sorted by product ID Actual: Products sorted by product ID	✓

Table A.5: Search Functionality Testing – Part 2: Filtering, Sorting and Viewing

The unit testing for the search functionality in table A.4 and A.5 covers a wide range of user actions, including searching by keyword, filtering, sorting, and navigating to product listings. The tests were designed to verify the accuracy and responsiveness of the system when users perform common tasks such as typing a product name on the homepage, clicking search shortcuts, or applying filters based on categories, skin types, concerns, benefits, brands, and ingredients.

Overall, the system performed as expected in all test scenarios. Filters and sorting features—such as sorting by review count, alphabetical order, score, and price—functioned correctly and displayed the appropriate results.

In conclusion, the search system is functionally reliable and user-friendly, with most features working seamlessly across different use cases. The testing results confirm that the search experience on the platform aligns well with user expectations.

Test Title	Expected Result VS Actual Result	Status
Compare 1 product (compare page)	Expected: Show warning for 1 product Actual: Text warning below compare button that there is 1 product compared	✓
Compare 2 products (compare page)	Expected: Show comparison page with 2 products Actual: Comparison page displayed with correct details for two products	✓
Compare 3 products (compare page)	Expected: Show comparison page with 3 products Actual: Comparison page displayed with all three products side by side	✓
Compare more than 3 products (compare page)	Expected: Only 3 products displayed on comparison page Actual: Only the first 3 products displayed, additional selections ignored	✓
Click compare button (2 products) (product info page)	Expected: Show message for adding a product and ask to compare now or add more Actual: Messages showed correctly, comparison page opened after selecting two products	✓
Click compare button (3 products) (product info page)	Expected: Show step-by-step messages for 3 products Actual: After adding 3rd product, the comparison page opened showing all three products	✓

Table A.6: Comparison Feature Unit Testing Results

Table A.6 presents the unit testing results for the product comparison feature, assessing six different scenarios to ensure proper functionality. These include comparing one, two, three, and more than three products on the comparison page, as well as testing the compare button from the product information page. The system successfully passed all test cases, showing expected results across every scenario. For example, when only one product was selected, the system issued a proper warning, and when comparing two or three products, it accurately displayed product details side by side. The limit of displaying only three products was also correctly enforced when users attempted to compare more than three items.

The results confirm that the feature works correctly across all tested cases, including limiting comparisons to three products and showing accurate product details. The system behavior matched expectations, resulting in a 100

Test Title	Expected Result VS Actual Result	Status
Write a Review as a member	Expected: User can write a review, name, and skin type shown Actual: User can write a review and it shows correctly with name and skin type	✓
Write a Review without logging in	Expected: System alerts to login before writing review Actual: Alert shown to login before writing review	✓
Write a review with only a star rating	Expected: Allow star rating only, show “No review text available” Actual: Star rating added, message shown correctly	✓
Write a review of a product previously reviewed	Expected: Systems do not allow users to write the review again, showing “Error submitting review: Failed to submit review” Actual: Systems do not allow users to write the review again, showing “Error submitting review: Failed to submit review”	✓
View Review History	Expected: Display user’s review history Actual: Review history shown correctly	✓
Sort reviews A-Z	Expected: Sort reviews A-Z Actual: Reviews sorted by product name in A-Z order	✓
Sort reviews Z-A	Expected: Sort reviews Z-A Actual: Reviews sorted by product name in Z-A order	✓
Sort reviews by newest first	Expected: Sort reviews by newest first Actual: Reviews sorted by newest date	✓
Sort reviews by oldest first	Expected: Sort reviews by oldest first Actual: Reviews sorted by oldest date	✓
Delete a review	Expected: Review removed from list Actual: Rating updated successfully	✓
Edit a review (both star & comment)	Expected: Only rating updated Actual: Review updated correctly	✓
Edit rating only	Expected: Sort products alphabetically (Z-A) Actual: Products sorted from Z-A correctly	✓
Edit comment only	Expected: Only comment updated Actual: Comment updated successfully	✓
Navigate between pages of reviews	Expected: Show next/previous pages correctly when more than 5 reviews Actual: Next and previous pages navigated correctly	✓

Table A.7: Review Feature Unit Testing Results

The table A.7 summarizes the results of unit testing for the review functionality on the website. This test covered a variety of user interactions, such as writing a review with or without logging in, submitting only a star rating, trying to review a product more than once, and editing or deleting existing reviews. Additional tests validated review sorting (A-Z, Z-A, newest first, oldest first), review history view, and navigation between review pages.

All functionalities performed as expected. The system correctly enforced login requirements, prevented duplicate reviews, allowed partial review submissions, and handled user edits and deletions reliably. Sorting features accurately arranged reviews based on specified criteria, and pagination worked seamlessly when navigating through large numbers of reviews.

Overall, the review system is stable and complete, offering a user-friendly and error-free experience across all tested scenarios.

Test Title	Expected Result VS Actual Result	Status
Search product name in wishlist	Expected: Product added to wishlist, icon changes to “In Wishlist” Actual: Product added to wishlist, icon changed to “In Wishlist”	✓
Add product to wishlist	Expected: System alerts to login before writing review Actual: Alert shown to login before writing review	✓
Remove wishlist on product info page	Expected: Product removed from wishlist, icon returns to default Actual: Product removed, icon returned to default	✓
Remove wishlist from wishlist page	Expected: Product removed from wishlist list Actual: Product removed from wishlist list	✓
Add to wishlist without logging in	Expected: System alerts to login before adding to wishlist Actual: Alert shown to login before adding to wishlist	✓

Table A.8: Wishlist Feature Unit Testing Results

The table A.8 outlines the unit testing results for the wishlist feature. Key functionalities tested include adding and removing products from the wishlist through both the product page and the wishlist page, as well as system behavior when actions are attempted without user authentication.

All tested scenarios produced the expected outcomes. The system successfully handled visual updates to icons, enforced login requirements when necessary, and correctly removed items from the wishlist when requested. These results confirm that the wishlist system is functioning properly, offering users a consistent and intuitive experience.

Test Title	Expected Result VS Actual Result	Status
Create Morning routine set	Expected: Successfully create morning routine set Actual: Morning routine set created successfully	✓
Create Night routine set	Expected: Successfully create night routine set Actual: Night routine set created successfully	✓
View morning routine set	Expected: View morning routine set that exist Actual: Morning routine set displayed correctly	✓
View night routine set	Expected: View night routine set that exist Actual: Night routine set displayed correctly	✓
Change routine set name	Expected: Routine set name modified successfully Actual: Name updated and saved correctly	✓
Edit the existing product in routine	Expected: Edit product in routine Actual: Product updated and added successfully	✓
Delete product in routine set	Expected: Product removed from routine Actual: Product deleted from routine set successfully	✓
Add new product to routine set	Expected: New product added to routine set Actual: Product added successfully	✓
Delete routine set	Expected: Routine set deleted successfully Actual: Routine set deleted as expected	✓

Table A.9: Routine Set Feature Unit Testing Results

The table A.9 presents the unit testing results for the routine set feature, which allows users to create and manage personalized skincare routines. Test cases included creating morning and night routine sets, viewing saved sets, editing routine names and products, and performing add/remove actions within the routine.

All test scenarios passed successfully, with the system displaying correct functionality across UI interaction and backend updates. Whether adding new products, changing routine names, or deleting entire routines, the platform responded as expected and maintained consistent data

accuracy. This confirms that the routine management feature is stable, functional, and ready for real user interactions.

Test Title	Expected Result VS Actual Result	Status
Log out	Expected: User logs out successfully Actual: User logged out and redirected to login page	✓

Table A.10: Log Out Feature Unit Testing Result

A.2.2 Admin Unit Testing

The admin unit testing A.10 focuses on verifying the functionality available exclusively to administrators within the system. These features allow admins to manage the content and structure of the website efficiently. The test cases are categorized into five main functional areas: Admin Login, Product Management (including adding, editing, and deleting products), User Account Management, Data Management (such as managing brand names, ingredients, and product sizes), and User Review Management.

Each test ensures that the admin interface operates correctly, enabling accurate control over product data, user activity, and overall content governance. The results help confirm that administrative tasks can be executed reliably, maintaining the integrity and usability of the platform.

Test Title	Expected Result VS Actual Result	Status
Log in with a registered account but not an admin account	Expected: User logs in but is not granted admin access Actual: User logged in without admin access	✓
Log in with a registered admin account	Expected: User logs in and gains admin access, including a redirect to the admin account page Actual: Admin user logged in and granted admin access, including a redirect to the admin account page	✓

Table A.11: Admin Login Unit Testing Results

The table A.11 summarizes the results of unit testing for the admin login functionality. Two key scenarios were evaluated: logging in with a registered user account that lacks admin privileges, and logging in with a registered admin account. The objective was to ensure that the system correctly restricts or grants access based on user roles.

In both cases, the system behaved as expected. Regular users were successfully logged in but denied access to the admin interface, while admin users were granted access and correctly redirected to the admin account management page. These results confirm that the role-based access control mechanism functions properly and maintains secure boundaries between administrative and general user permissions.

Test Title	Expected Result VS Actual Result	Status
Click Add product	Expected: Click on the 'Add Product' button Actual: 'Add Product' button clicked successfully	✓
Add product name	Expected: Product name entered successfully Actual: Product name added correctly	✓
Add brand name in product	Expected: Brand name entered Actual: Brand name added correctly	✓
Add category in product	Expected: Category selected from dropdown Actual: Category added successfully	✓
Add skin type in product	Expected: Enter skin types correctly Actual: Skin types added correctly	✓
Add PAO in product	Expected: PAO value entered correctly Actual: PAO value entered correctly	✓
Add FDA in product	Expected: FDA registration number entered Actual: FDA registration number entered	✓
Add Size in product	Expected: Size volume and unit entered Actual: Size added correctly	✓
Add Price in product	Expected: Price entered correctly Actual: Price entered correctly	✓
Add 3 ingredients in product	Expected: 3 ingredients selected Actual: Ingredients added successfully	✓
Add product description in product	Expected: Product description entered Actual: Product description added correctly	✓
Add usage in product	Expected: Usage instructions entered Actual: Usage instructions added correctly	✓

Table A.12: Admin Product Adding Unit Testing Results

Test Title	Expected Result VS Actual Result	Status
Add product image in product	Expected: Product image uploaded Actual: Image uploaded successfully	✓
Save product after add	Expected: Product saved successfully Actual: Product saved successfully	✓
Search product by ID	Expected: Product found by ID Actual: Product found successfully by ID	✓
Search product by name	Expected: Product found by name Actual: Product found successfully by name	✓
Click Edit	Expected: Edit button clicked successfully Actual: Edit button clicked successfully	✓
Edit all fields	Expected: All fields updated successfully Actual: All fields edited and saved correctly	✓
Edit product name	Expected: Brand name updated Actual: Brand name changed successfully	✓
Edit brand name	Expected: Category updated Actual: Category changed correctly	✓
Edit category	Expected: Skin type updated Actual: Skin types updated correctly	✓
Edit skin type	Expected: Show products for that skin Actual: Products for that skin displayed correctly	✓
Edit PAO	Expected: PAO updated Actual: PAO modified successfully	✓
Edit FDA	Expected: FDA number updated Actual: FDA number modified correctly	✓
Edit Size	Expected: Size updated Actual: Size changed successfully	✓
Edit Price	Expected: Price updated Actual: Price changed successfully	✓
Add 1 ingredient to product	Expected: New ingredient added Actual: Ingredient added successfully	✓
Delete 1 ingredient from product	Expected: Ingredient removed Actual: Ingredient removed successfully	✓
Edit product description	Expected: Description updated Actual: Product description changed successfully	✓

Table A.13: Admin Product Adding, Searching, and Editing Unit Testing Results

Test Title	Expected Result VS Actual Result	Status
Edit usage	Expected: Usage instructions updated Actual: Usage instructions modified successfully	✓
Edit product image	Expected: Image updated Actual: New image uploaded successfully	✓
Delete product	Expected: Product deleted successfully Actual: Product deleted successfully	✓

Table A.14: Admin Product Editing and Deleting Unit Testing Results

The admin product management unit testing A.12, A.13, and A.14 thoroughly evaluates the core functionalities provided to administrators for handling product-related operations on the platform. The tests cover the full product lifecycle, including adding a new product, editing existing product details, searching by ID or name, and deleting products.

All processes, such as inputting product details (e.g., brand, category, size, ingredients), uploading images, and submitting form data, were performed successfully, with the system responding as expected. Additionally, editing specific fields like product name, price, description, or even ingredients was executed seamlessly. Search functionalities also proved effective, accurately locating products via both ID and name. Deletion operations confirmed the system's ability to remove products without residual errors.

Overall, the testing results indicate that the admin product management system is robust, fully functional, and reliable across all tested scenarios. This ensures that administrators can maintain accurate and up-to-date product information, supporting a smooth backend operation for the skincare platform.

Test Title	Expected Result VS Actual Result	Status
Delete user account	Expected: User account deleted successfully Actual: User account deleted successfully	✓
Change member to admin role	Expected: Member role changed to admin Actual: Member role updated to admin successfully	✓
Change admin to member role	Expected: Admin role changed to member Actual: Admin role updated to member successfully	✓
Search user by ID	Expected: User found by account ID Actual: User found successfully by account ID	✓
Search user by name	Expected: User found by name Actual: User found successfully by name	✓
Delete user account	Expected: User account deleted Actual: User account deleted successfully	✓

Table A.15: Admin User Management Unit Testing Results

The admin user management unit testing A.15 assesses the platform's functionality related to user account control and role management. The tested scenarios include deleting user accounts, changing roles between member and admin, and searching for users by ID or name. All test cases executed successfully, demonstrating that the system accurately performs role transitions, handles account deletions without issue, and retrieves user information correctly. These results confirm the reliability of the administrative features used to maintain user account access and permissions on the platform.

Test Title	Expected Result VS Actual Result	Status
View SkinType table	Expected: SkinType table displayed Actual: SkinType table displayed correctly	✓
Search SkinType by ID	Expected: SkinType found by ID Actual: SkinType found successfully by ID	✓
Search SkinType by name	Expected: SkinType found by name Actual: SkinType found successfully by name	✓
Manage SkinType	Expected: SkinType can manage add/edit/delete Actual: SkinType can manage add/edit/delete successfully	✓
View Brand table	Expected: Brand table displayed Actual: Brand table displayed correctly	✓
Search Brand by ID	Expected: Brand found by ID Actual: Brand found successfully by ID	✓
Search Brand by name	Expected: Brand found by name Actual: Brand found successfully by name	✓
Manage Brand	Expected: Brand can manage add/edit/delete Actual: Brand can manage add/edit/delete successfully	✓
View Ingredient table	Expected: Ingredient table displayed Actual: Ingredient table displayed correctly	✓
Search Ingredient by ID	Expected: Ingredient found by ID Actual: Ingredient found successfully by ID	✓
Search Ingredient by name	Expected: Ingredient found by name Actual: Ingredient found successfully by name	✓
Manage Ingredient	Expected: Brand can manage add/edit/delete Actual: Brand can manage add/edit/delete successfully	✓
View Category table	Expected: SkinType deleted Actual: SkinType deleted successfully	✓
Search Category by ID	Expected: Brand table displayed Actual: Brand table displayed correctly	✓

Table A.16: Admin Information Management Unit Testing Results (Part 1)

Test Title	Expected Result VS Actual Result	Status
Search Category by name	Expected: Brand found by ID Actual: Brand found successfully by ID	✓
Manage Category	Expected: Category can manage add/edit/delete Actual: Category can manage add/edit/delete successfully	✓
View Size table	Expected: Size table displayed Actual: Size table displayed correctly	✓
Search Size by ID	Expected: Size found by ID Actual: Size found successfully by ID	✓
Search Size by volume	Expected: Size found by volume Actual: Size found successfully by volume	✓
Manage Size	Expected: Size can manage add/edit/delete Actual: Size can manage add/edit/delete successfully	✓
View Benefit table	Expected: Benefit table displayed Actual: Benefit table displayed correctly	✓
Search Benefit by ID	Expected: Benefit found by ID Actual: Benefit found successfully by ID	✓
Search Benefit by name	Expected: Benefit found by name Actual: Benefit found successfully by name	✓
Manage Benefit	Expected: Benefit can manage add/edit/delete Actual: Benefit can manage add/edit/delete successfully	✓
View Concern table	Expected: Concern table displayed Actual: Concern table displayed correctly	✓
Search Concern by ID	Expected: Concern found by ID Actual: Concern found successfully by ID	✓
Search Concern by name	Expected: Concern found by name Actual: Concern found successfully by name	✓
Manage Concern	Expected: Concern can manage add/edit/delete Actual: Concern can manage add/edit/delete successfully	✓

Table A.17: Admin Information Management Unit Testing Results (Part 2)

Table A.16 includes the unit testing results for three main modules in the admin panel: Skin-Type, Brand, and Ingredient. Each module is tested across key functionalities—viewing data tables, searching by ID and name, and managing data through add, edit, and delete operations. All 11 test scenarios in this part were executed successfully, with each function achieving its expected output, indicating that the basic product-related data management system works correctly from the admin side.

Table A.17 continues with the testing of four additional modules: Category, Size, Benefit, and Concern. These modules undergo similar test actions: view, search (by ID or specific value), and management operations. A total of 18 test cases are presented, and each of them passed successfully. This confirms that the system ensures consistent functionality and stability across all administrative sections, reinforcing the reliability of the full product management backend.

Test Title	Expected Result VS Actual Result	Status
Search reviews by account ID	Expected: Reviews found by account ID Actual: Reviews displayed correctly by account ID	✓
Search reviews by account name	Expected: Reviews found by account name Actual: Reviews displayed correctly by account name	✓
View all reviews history of a product	Expected: Reviews history displayed Actual: Reviews for the product displayed correctly	✓
Delete a review	Expected: Review deleted successfully Actual: Review deleted correctly	✓
Sort reviews by date (New to Old)	Expected: Reviews sorted by date from new to old Actual: Reviews sorted correctly by date	✓
Sort reviews by star rating	Expected: Reviews sorted by star rating Actual: Reviews sorted correctly by rating	✓

Table A.18: Admin Review Management Unit Testing Results

Table A.18 summarizes the unit testing results for the admin review management system. The table includes six key test cases related to searching, viewing, deleting, and sorting product reviews. Specifically, it covers search functionality by both account ID and name, full review history display for a product, successful deletion of a review, and sorting by both date and star rating. All test scenarios passed successfully, indicating that the review management features work reliably and meet the expected behavior in every case.

Table A.19 presents the unit testing result for the admin log-out functionality. This test verifies

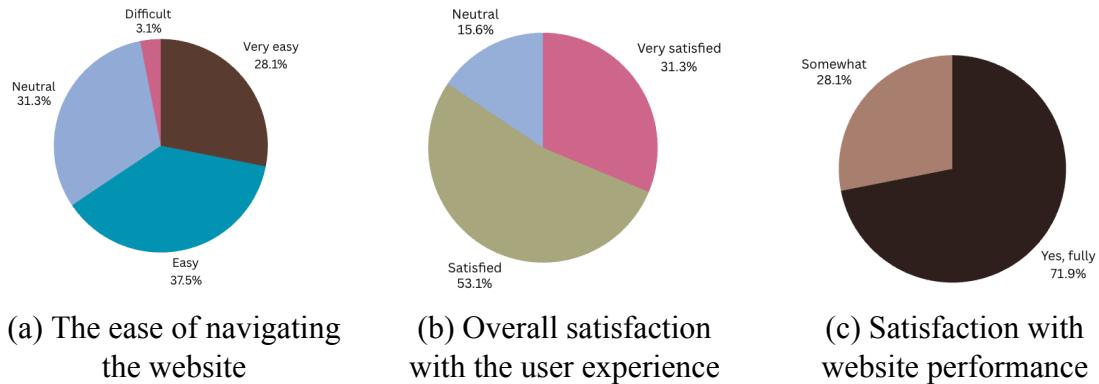
Test Title	Expected Result VS Actual Result	Status
Log out	Expected: Admin logs out successfully Actual: Admin logged out and redirected to the login page	✓

Table A.19: Admin Log Out Unit Testing Result

whether the system correctly handles the process when an admin user logs out of the platform. The expected behavior is that the admin should be successfully logged out and redirected to the login page. The actual result confirmed that the system performed this action as intended. With the test marked as passed, it indicates that the session termination and redirection mechanism work reliably within the admin panel.

A.3 User Testing

- User Feedback of SkinSite website



(a) The ease of navigating the website (b) Overall satisfaction with the user experience (c) Satisfaction with website performance

Figure A.3: Survey results on user usability with the website

The first pie chart A.3a illustrates users' perceptions regarding the ease of navigating through the website. The largest group of respondents, 37.5%, indicated that they found the website easy to navigate, followed by 31.3% who responded neutrally. Another 28.1% rated the navigation experience as very easy. Only 3.1% of users reported difficulty in navigating the website. These results suggest that the overall user experience was positive, with a combined 65.6% of participants rating the navigation as either easy or very easy.

The second pie chart A.3b illustrates users' overall satisfaction with their experience on the website. The majority of respondents, 53.1%, reported feeling satisfied, making it the largest segment. This was followed by 31.3% who expressed that they were very satisfied. Meanwhile,

15.6% of users responded neutrally, indicating neither satisfaction nor dissatisfaction. Overall, the data suggests a high level of user satisfaction, with 84.4% of participants expressing positive feedback. Users expressed feeling "Neutral" (15.6%).

The third pie chart A.3c presents users' responses regarding whether the website met their expectations in terms of functionality and ease of use. A large majority, 71.9%, stated that the website fully met their expectations, while 28.1% felt it somewhat met their expectations. This indicates that overall user expectations were largely fulfilled, with all respondents reporting at least a moderate level of satisfaction in this area.

The results from all three pie charts indicate a strong overall user experience with the website. The majority of users found the site easy to navigate, were satisfied with their experience, and felt that the website met their expectations in terms of functionality and usability. High percentages across all categories—ease of navigation (65.6%), overall satisfaction (84.4%), and expectations met (100%) demonstrate that the website effectively delivers a user-friendly and fulfilling experience, with minimal reports of difficulty or dissatisfaction.

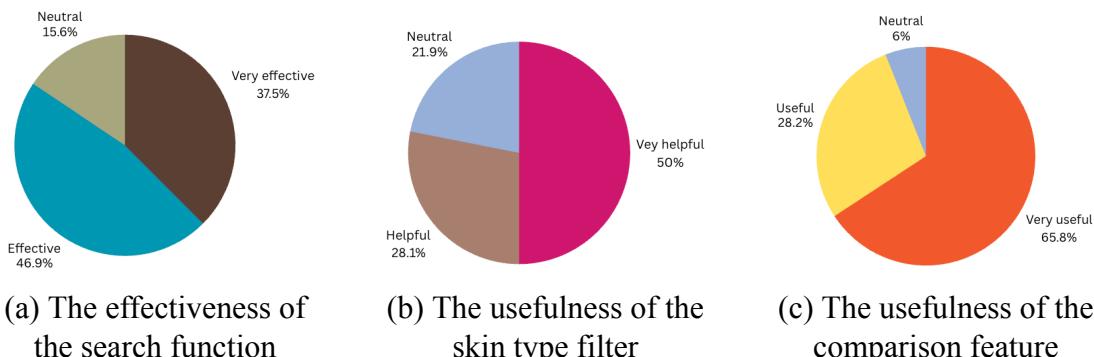


Figure A.4: Survey results on user features and functions with the website

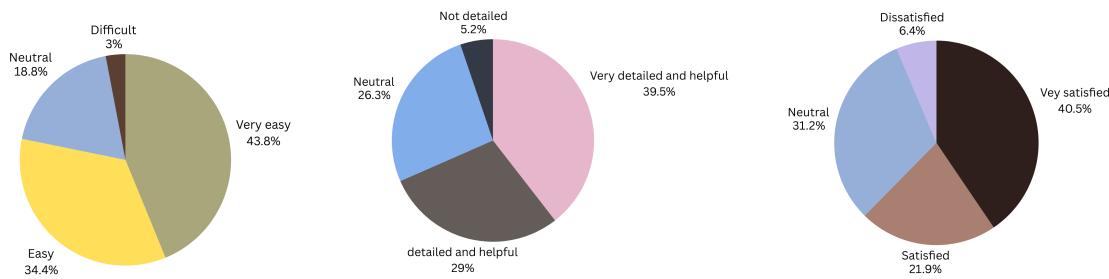
The first pie chart A.4a illustrates how users rated the effectiveness of the website's search function in helping them find skincare products or information. The largest portion, 46.9%, found the search feature effective, followed by 37.5% who rated it very effective. Meanwhile, 15.6% remained neutral. These results suggest that a majority of users found the search function beneficial, with 84.4% giving it a positive rating.

The second pie chart A.4b reflects users' opinions on the usefulness of the skin type filter when narrowing down product options. Half of the respondents (50%) found the filter very helpful, while 28.1% rated it as helpful. A smaller portion, 21.9%, responded neutrally. Overall, 78.1%

of users found the skin type filter to be helpful or very helpful, highlighting its relevance in improving search precision.

The third pie chart A.4c presents feedback on the usefulness of the product comparison feature. A significant majority, 65.8%, rated it as very useful, followed by 28.2% who considered it useful. Only 6% of users were neutral. With a combined 94% that expressed a positive experience, this feature received the highest approval among the three, indicating its strong impact on user decision making.

In summary, the platform's features, including search, skin type filtering, and product comparison, were well-received by users, with each showing strong positive feedback. Their effectiveness in supporting product discovery and decision-making significantly contributed to the overall user satisfaction.



(a) The ease of finding skincare information (b) The helpfulness of product information (c) The satisfaction with product variety

Figure A.5: Survey results on product variety, detail, and information accessibility

The first pie chart A.5a illustrates the ease with which users were able to find skincare-related information. A substantial 43.8% found it very easy, and 34.4% rated it as easy. Meanwhile, 18.8% responded neutrally, and only 3% found it difficult. This reflects the website's strength in delivering accessible and user-friendly information.

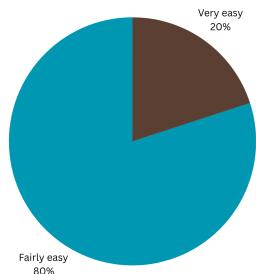
The second pie chart A.5b presents feedback on how detailed and helpful the product information was. The majority, 39.5%, rated the information as very detailed and helpful. Another 29% considered it detailed and helpful, while 26.3% felt neutral. Only 5.2% believed the information lacked sufficient detail. This suggests that the site's content is generally perceived as informative and thorough.

The third pie chart A.5c shows users' satisfaction with the variety of skincare products available on the website. The largest proportion, 40.5%, were very satisfied, followed by 31.2%

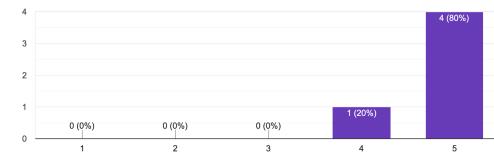
who felt neutral. A total of 21.9% expressed satisfaction, while only 6.4% reported being dissatisfied. These results indicate that most users were pleased with the diversity of products offered.

The feedback reflects a strong positive perception of the website's content offerings. Users reported ease in finding details, clarity of information, and high levels of satisfaction with product variety—key aspects contributing to a seamless and informative browsing experience.

- Admin Feedback of SkinSite website



(a) Website usage experience



(b) Navigation performance rating

Figure A.6: User (admin) feedback on website usability and navigation experience

The first chart A.6a illustrates admin users' perceptions of overall website usage. A significant majority of 80% described the platform as "Fairly easy" to use, while the remaining 20% rated it as "Very easy." These results indicate that all participating admin users found the website intuitive and accessible, with no reports of difficulty.

The second chart A.6b shows how admin users rated the website's navigation on a 5-point scale. The results reveal that 80% gave the highest score of 5, while the remaining 20% gave a score of 4. No users selected ratings from 1 to 3. This indicates a strong consensus that the navigation system was intuitive and efficient.

Overall, both visualizations demonstrate that admin users experienced a smooth and satisfactory interaction with the website. The consistently high scores across usage and navigation reflect the platform's effectiveness in meeting usability standards for administrative users.

The first chart A.7a represents users' overall impressions of the system. A majority of 60% described the system as "Pretty good," while the remaining 40% rated it as "Very good."



(a) Overall impression of the system

(b) System performance rating

Figure A.7: User evaluation of overall system quality and performance

This reflects a generally favorable perception, with all users expressing positive views and no negative responses recorded.

The second chart A.7b shows how users rated the system's performance on a 5-point scale. Most users (80%) gave it the highest rating of 5, and the remaining 20% rated it as 4. No ratings were given below 4, indicating that users were highly satisfied with the system's functionality and responsiveness.

These results suggest that the system meets user expectations well, providing a reliable and positively received experience across both general impression and performance dimensions.



(a) Product search functionality

(b) Convenience of managing products

(c) Ease of updating product information

Figure A.8: Admin evaluation of key system features and functions

The user feedback on the website's features and functions , as shown in Figure A.8a was overwhelmingly positive. For the product search function, 80% of users stated that it "Worked very well," with 20% stating that it "Pretty good/Worked well." When asked about the convenience of the function to add or remove a product figure A.8b, 100% of respondents rated it as "Very convenient." Similarly, 100% of respondents rated how easy it was to update product information A.8c, such as editing price and size, as "Very Easy."

The overall positive feedback confirms that users were able to efficiently, conveniently, and simply interact with the website's key features and functions related to products.