



Jurnal Teknologi Informasi dan Komunikasi

Vol: 15 No 02 2024

E-ISSN: 2477-3255

Accepted by the Editor: 27-01-2024 | Revision: 06-08-2024 | Published: 30-11-2024

Implementation of Virtual Try-On Product to Enhance Customer Satisfaction

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Abstract

In the digital age, customer experience is key to business success. Augmented Reality (AR) technology offers immense potential to enhance the shopping experience, particularly through virtual try-on features. This research aimed to analyze the impact of implementing AR Product, specifically the virtual try-on feature, on customer satisfaction at PT Dua Naga Kosmetindo. The study employed the System Development Life Cycle (SDLC) waterfall model to develop and implement the virtual try-on feature on the E-Colux website. Black Box testing and User Acceptance Testing (UAT) were conducted to assess the success of the implementation and user acceptance levels. Black Box testing revealed a 100% success rate, while UAT yielded an average score of 87.7%. The results indicated a significant positive correlation between the use of virtual try-on and customer satisfaction, particularly in the dimension of product satisfaction (86%-95%). Female respondents and younger generations exhibited higher satisfaction levels. This research demonstrates that the implementation of virtual try-on can significantly enhance customer satisfaction. However, further research with a larger and more diverse sample is needed to generalize these findings. Additionally, studies on the long-term impact of virtual try-on on customer loyalty and business performance are warranted.

Keywords: Augmented Reality, E-commerce, Customer Satisfaction, System Development Life Cycle (SDLC), Virtual Try-On

1. Introduction

In the era of the Industrial Revolution 4.0 characterized by rapid digitization, are faced with new challenges in meeting increasingly high customer expectations. Customer experience is now a key determinant of business loyalty and success. Customers are no longer just looking for quality products, but also interesting, personal, and satisfying shopping experiences.

Augmented Reality (AR) technology emerged as an innovative solution to this challenge. AR [1], which allows users to see virtual objects in the real world, offers huge potential to change the way customers interact with products.

One of the promising AR applications in improving customer experience is a virtual try-on product [2]. With this technology, customers can "try" the product virtually before buying it, giving a more realistic picture of how the product will look and feel. Virtual try-on has been applied in a wide range of industries, from fashion and cosmetics to furniture and automotive [3]. Early research suggests that virtual try-on can improve customer engagement, product understanding, and purchasing intent.

In an increasingly advanced digital age, customer experience is a crucial factor in business success. Augmented Reality (AR) technology presents itself as an innovative solution to enhance the shopping experience and customer interaction with products [4]. AR, which combines the real world with real-time digital elements, has great potential in improving customer satisfaction. One example is the research that will be done at PT Dua Dragon Kosmetindo, which will implement AR, especially virtual try-on products, into their websites. The study will involve 35 customer respondents and aims to test how AR can improve shopping experience and satisfaction.

Previous research by Svetlana Bialkova [5], it has been shown that AR can improve customer engagement, product understanding, and purchasing intentions. However, the study focuses more on the use of AR in product marketing and promotion, rather than on the direct implementation of AR Products to increase customer satisfaction. Studies on the impact of AR Product on customer content are limited.

Several studies have revealed the positive impact of AR on consumer experience. Hajer Ghodhbani [6], found that AR increases customer engagement and purchasing intent in online shopping. AR helps consumers understand complex products better [7]. However, this study has not specifically addressed the impact of AR Product on overall customer satisfaction.

There is a gap in research in understanding how virtual implementation of a try-on product can directly affect customer satisfaction. This research aims to fill that gap by testing the impact of a virtual tri-on products implementation on client satisfaction in a comprehensive way, including the satisfaction dimension of products, services, and shopping experiences. [8].

AR technology has been widely adopted in a variety of industries, including retail, manufacturing, and education. In the retail context, AR is used to provide a more interactive and personal shopping experience. For example, IKEA Place allows customers to visualize IKEA furniture in their home before buying. In manufacturing, AR is used to improve workers' efficiency and productivity by providing real-time work instructions. [9]. In education, AR is used to enhance learning experiences by making learning materials more interactive and interesting.

Although the potential of AR in improving customer satisfaction has been widely acknowledged, research that specifically tests the impact of a virtual try-on product implementation on customer satisfying is still limited. This study aims to fill that gap by measuring the influence of virtual tri-on products on a variety of dimensions of client satisfaction, including satisfaction with products, services, and the overall shopping experience. [10].

Based on the background and library studies that have been presented, the study aims to address some of the key issues related to the implementation of Augmented Reality (AR) virtual try-on products and their impact on customer satisfaction. First, this study will examine in depth how the virtual tri-on product implementation can affect the overall customer satisfactions. Second, it will identify the dimensions of client satisfaction, such as satisfaction with a product, service, or shopping experience, which are most significantly affected by the use of a virtual try -on product [11]. Finally, the study will explore whether there are

differences in the impact of a virtual try-on product implementation on customer satisfaction based on their demographic characteristics, such as age, gender, or income level.

By answering these questions, this research is expected to provide a more comprehensive understanding of the potential of AR in increasing customer satisfaction and provide valuable insights for business actors in developing effective AR implementation strategies. [12].

The research focuses on the implementation of a virtual try-on product at PT Dua Dragon Kosmetindo, the leading cosmetics company in Indonesia. By integrating this technology into their website, PT Dua Dragon Kosmetindo hopes to provide a more interactive and personalized shopping experience for customers. The study will involve 35 customer respondents to test the impact of a virtual try-on product on overall customer satisfaction. [13].

The aim of the study is to analyze the impact of the virtual implementation of the try-on product on customer satisfaction, as well as to identify the client satisfaction dimensions most affected by the tri-on virtual product implementation.

2. Research Methods

Today's online shopping experience has become an integral part of consumer life. PT Dua Naga Kosmetindo, as a leading cosmetics company, recognizes the importance of continuous innovation to meet the needs and expectations of ever-expanding customers. One of the main innovations that the company has focused on is the introduction of a virtual try-on product feature on their website.

This advanced feature will allow customers to try a variety of cosmetic products virtually, providing a more interactive and personal experience before making a purchase. To realize this feature, the research will use the System Development Life Cycle (SDLC) method that has proven to be effective in developing high-quality software systems. [14].

The SDLC is a structured and systematic framework, consisting of a series of stages that cover planning, analysis, design, development, testing, implementation, and maintenance. Through the comprehensive implementation of the SDLC, it is expected that the virtual try-on product feature can be developed and implemented successfully, providing significant added value for the customers of PT Dua Naga Kosmetindo. Here are the SDLC stages to be applied in this study:

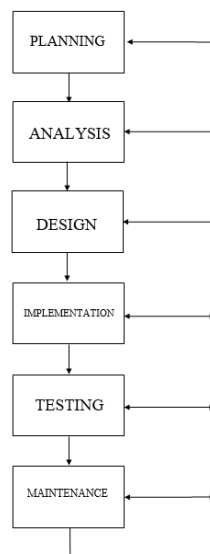


Figure 1. *Waterfall Method*

2.1. Planning

The planning phase is the foundation of the entire tri-on product virtual feature development project. At this stage, the project team will work together to identify specific user needs, either through surveys, interviews, or user behavioral data analysis. [15].

The objectives of the project will be clearly formulated, whether to increase sales, increase customer engagement, or other specific metrics. The scope of the feature will be limited to match the available resources, including the budget, time, and expertise of the developer team. A comprehensive project plan will be drawn up, including work schedules, resource allocation, and the setting of milestones of achievement. This plan will be the primary guide for the entire team to undertake the development process.

2.2. Analysis

Phase analysis digs deeper into user needs that have been identified at the planning stage. The project team will conduct market research, analyze industry trends, and study competitors to comprehensively understand the virtual feature landscape of the try-on product.

User needs will be outlined in detail, including interface preferences, desired features, and level of ease of use. In addition, the analysis also includes a technical feasibility study, in which the team will evaluate available technologies, such as augmented reality (AR) or artificial intelligence. (AI) [16], and determine whether the technology is suitable for the needs and budget of the project. [17], such as device compatibility issues or data security, will also be identified and anticipated.

2.3. Design

The design stage is a creative process that transforms user needs and technical analysis into a visual and functional blueprint of the virtual feature of the try-on product. UI/UX design will design an intuitive, engaging, and easy-to-use interface, taking into account the aesthetics of the brand PT Dua Naga Kosmetindo.

UX design will focus on the overall user experience, ensuring that these features provide added value and ease for customers to try the product virtually. System architecture design will include database structure, application workflows, and integration with existing systems, such as e-commerce platforms or inventory management. [18]. A mature and detailed design will be the benchmark for the developer team in building a quality tri-on product virtual feature.

2.4. Development

The development stage is an important part of the SDLC process, where the virtual try-on product feature begins to become a reality. The developer team will use the appropriate programming language, framework, and development tools to build the application according to the agreed design.

Development takes place gradually, starting with the production of basic prototypes which are then improved iteratively based on user feedback and internal testing. Technologies like AR or AI can be integrated to provide a more realistic and personalized experience for users [19]. The developer team will work with designers and testers to ensure that the Virtual Try-On Product feature not only works properly, but also meets high quality and aesthetic standards.

2.5. Testing

The testing phase is an important process to ensure that the virtual features of the product being tested function as expected and are error-free. The testing team will perform various types of testing called blackbox testing which can be seen in table 1, including functionality testing to verify that all features are working as they should, performance testing to measure the speed and responsiveness of the application, security testing to

protect user data, and compatibility testing to ensure that features can be accessed from various devices and browsers. Testing is carried out thoroughly and repeatedly, with any issues found being reported to the development team for correction. The test results will provide confidence that the virtual features of the product being tested are ready to be implemented and used by customers. [20].

2.6. Implementation

The implementation stage is when the virtual try-on product feature is launched to the public. The project team will work with the infrastructure team to integrate this feature into the PT Dua Naga Kosmetindo.

This process involves server configuration, database settings, and code adjustment so that features can run smoothly in a production environment. Prior to the official launch, the team will undertake final testing to ensure that the feature works properly in a live environment. Once the feature is launched, it will monitor user performance and feedback closely to identify problems that may arise and make improvements immediately.

2.7. Maintenance

Maintenance phase is a continuous process to ensure that the Virtual Try-On Product features remain relevant, functional, and provide added value for customers in the long term. The maintenance team will be responsible for monitoring the performance of features, fixing bugs or issues by users, and performing regular updates to keep up with technological developments and market trends.

Maintenance also includes features improvements, such as the addition of new products, performance optimization, or integration with other features on the website. With good maintenance, the virtual try-on product features will continue to evolve and provide a satisfactory experience for our customers.

Using a structured and systematic SDLC method, it is expected that this research will produce a high quality virtual try-on product feature and will be able to improve customer satisfaction of PT Dua Naga Kosmetindo.

3. Results and Discourse

This section describes the application of the SDLC model waterfall method, which includes analysis, design, implementation, and testing, in a virtual try-on product implementation on the E-Colux website as an attempt to improve customer satisfaction. Here's the result of the interface design based on the analysis and design that has been done.

The first page that appears when a user opens an application is called the home page. This page plays an important role in creating a positive first impression for the user. An attractive look, with an intuitive and aesthetic design, can attract users and encourage them to explore further. Moreover, easy-to-understand navigation is essential so that users do not feel confused when using the application for the first time.

One key element on the home page is the "Find Something" button. This button serves as the main gateway for users to access the core features of the application. With its striking design and strategic placement, this button will make it easy for the user to find what they are looking for. In addition to functional elements, the home page can also be used to display important information or the latest promotions. For example, an application can display banners that contain announcements about new features or special discounts. Thus, users will always be updated about the application.

Examples of a good main page appearance can be seen in Figure 2. On the image, it is seen that the original page is designed simply but still interesting. The "Find Something" button is placed in the middle of the page in a large size, making it easy to see and accessible by the user. In addition, there are also some icons that represent the main features of the application, so that users can quickly understand the functionality of the app. By paying attention to important elements such as display, navigation, and "Find Something" buttons, application

developers can create effective home pages in attracting user interest and delivering a positive user experience.

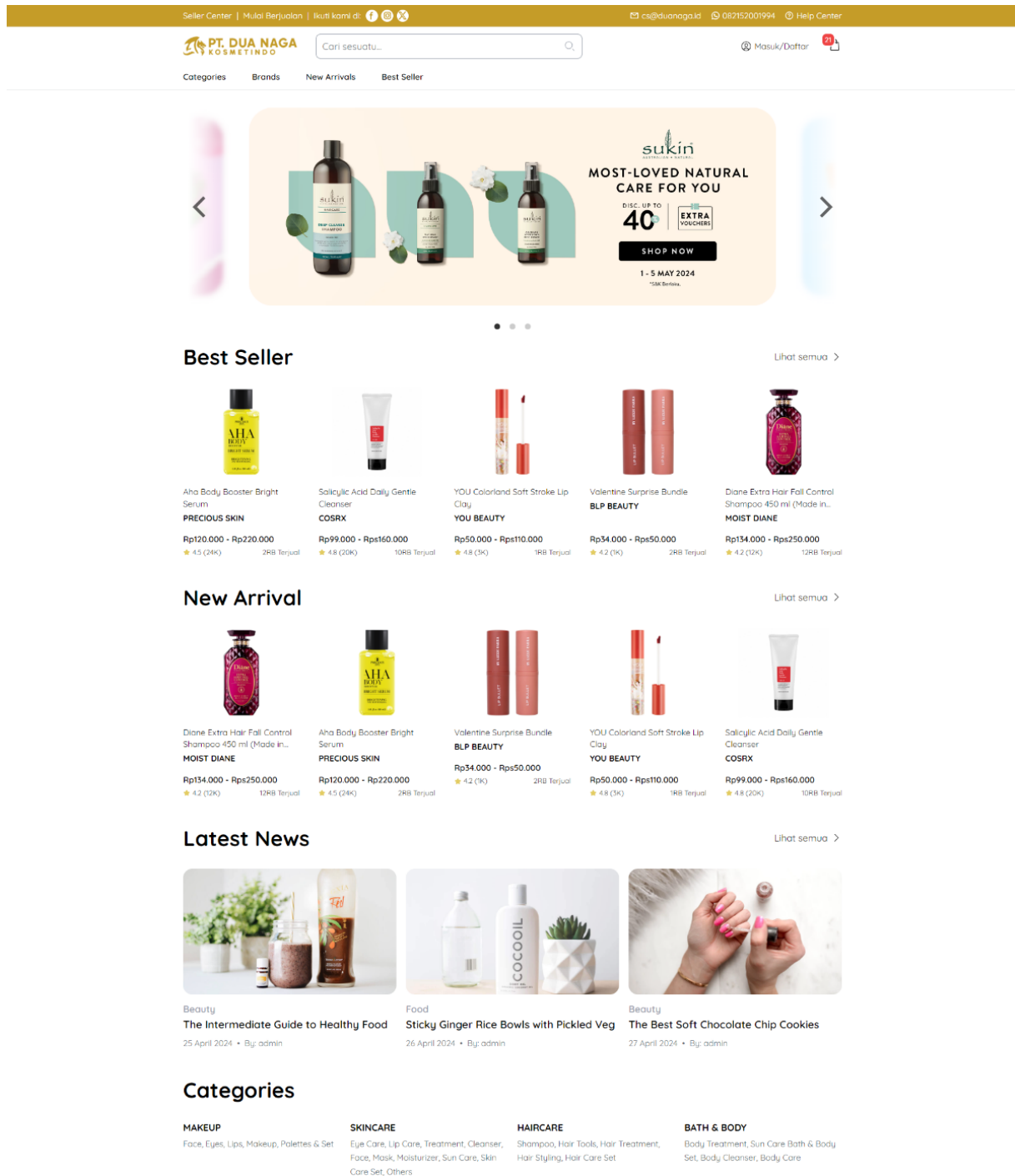


Figure 2. Home Page

The e-commerce dashboard shown in Figure 3 provides a complete overview of customer satisfaction. Monitor daily, weekly, or monthly customer purchases easily. Interactive graphs show usage trends, helping customers identify patterns and potential savings. The

<https://doi.org/10.31849/digitalzone.v15i2.20845>

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comparison feature allows customers to compare consumption with previous periods, providing valuable insights for more efficient energy management.

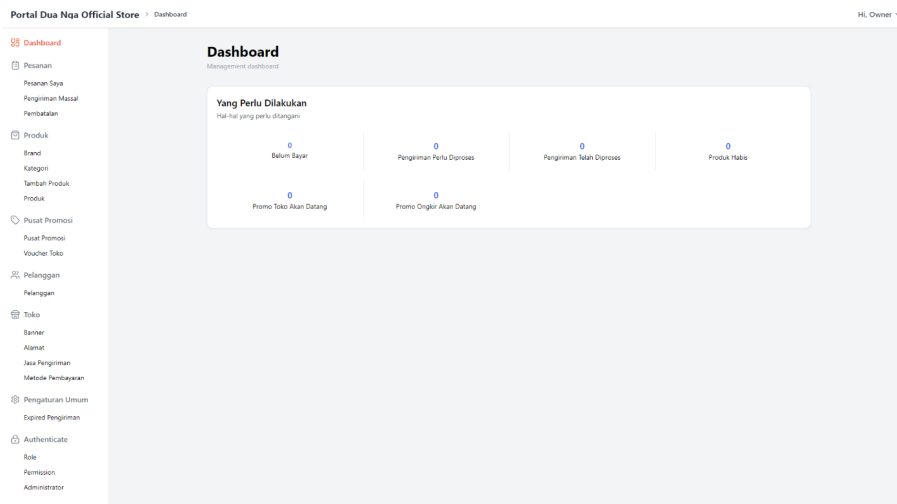


Figure 3. Dashboard page

The virtual try-on product feature on e-commerce shown in figure 4 allows customers to try fashion products virtually before buying. With augmented reality (AR) technology, customers can see how products look at themselves through their device cameras. This feature improves the online shopping experience, helps customers make better purchasing decisions, and reduces product return rates

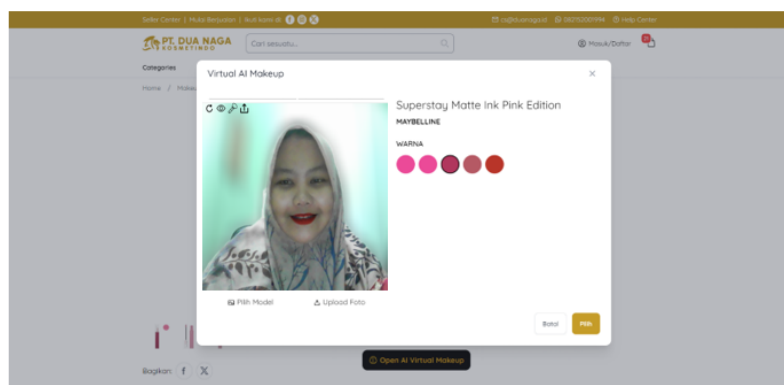


Figure 4. Implementation of virtual try-on product

E-Commerce also provides a variety of payment options that facilitate customer transactions. Choose the most suitable payment method, ranging from bank transfer, credit/debit card, to popular digital wallets. With this flexibility, online shopping in e-commerce becomes more practical and enjoyable. Available several of these payment options are shown in Figure 5.



Figure 5. Payment Options

Application testing is carried out through two methods: a black box to test the system's response and user acceptance to make sure the application fits the user's needs. A black box test is applied to observe how the system responds to the app being tested. The selected respondents act as users in this test. Table 1 presents the results of the Black box test.

Table 1. Black box testing

No	Feature Testing	System Reaction Wanted	Status	
1	Website	Open for 5 seconds	Successful Failed	☒ ☐
2	Menu Features	Displays a list of products and variations of items sold	Successful Failed	☒ ☐
3	Dashboard Features	Displays a list of products and variations sold and purchased by customers	Successful Failed	☒ ☐
4	AR Navigation	Smooth navigation in AR	Successful Failed	☒ ☐
5	Displaying products in AR form	The product is clearly visible	Successful Failed	☒ ☐
6	Purchase process	Order successfully placed	Successful Failed	☒ ☐
7	Payment	Payment succeeded	Successful Failed	☒ ☐
8	AR User Interaction	Responsive to user input	Successful Failed	☒ ☐

The next step is the User Acceptance Test (UAT). The aim is to ensure that the application is developed in accordance with the needs that have been analyzed on the waterfall model. In this test, respondents will be given several questions around the application, and their answers will be weighted on each assessment, ranging from "very disagreeable" to "very agreeable". Table 2 shows the details of the weighting of the values.

Table 2. Weighing values

Weight	Assessment
5	Totally Agree
4	Agree
3	Neutral
2	Disagree
1	Very disagreeable

The User Acceptance Test (UAT) was conducted involving 40 respondents. Each question is weighted on a scale of "very disagree" to "very agree". The test results, presented in Table 3, show the level of user acceptance of the developed application. This data will be used to measure overall user satisfaction, providing valuable insights for further improvement.

Table 3. User acceptance test results

Respondents	Question							
	1	2	3	4	5	6	7	8
Respondents 1	5	4	5	4	4	5	4	5
Respondents 2	5	3	4	3	5	5	4	4
Respondents 3	5	5	5	5	4	3	3	4
Respondents 4	5	5	5	3	4	4	3	5
Respondents 5	5	5	5	4	3	3	4	5
Respondents 6	5	5	5	4	3	4	4	5
Respondents 7	5	5	5	4	4	4	5	4
Respondents 8	5	4	4	5	4	4	4	5
Respondents 9	5	5	4	5	3	5	5	3
Respondents 10	5	3	5	3	3	5	3	4
Respondents 11	5	4	4	4	3	5	4	5
Respondents 12	5	5	5	5	4	5	3	4
Respondents 13	5	4	4	5	4	4	4	5
Respondents 14	5	5	3	4	5	5	5	5
Respondents 15	5	5	5	5	3	4	4	5
Respondents 16	5	4	3	4	4	5	4	5
Respondents 17	5	5	3	4	4	5	5	5
Respondents 18	4	4	4	4	3	4	5	5
Respondents 19	5	5	5	5	3	4	5	4
Respondents 20	4	4	4	4	4	4	4	4
Respondents 21	5	4	5	3	4	5	5	4
Respondents 22	5	5	4	4	3	5	4	5
Respondents 23	4	5	5	4	5	5	4	5
Respondents 24	5	5	4	5	5	4	4	5
Respondents 25	4	5	4	4	3	4	5	4
Respondents 26	4	4	4	5	4	5	5	4
Respondents 27	4	4	4	5	5	4	5	4
Respondents 28	4	4	5	5	3	3	5	4
Respondents 29	4	4	5	5	5	5	4	5
Respondents 30	5	5	5	5	4	4	4	5
Respondents 31	5	5	4	4	3	5	5	5
Respondents 32	5	5	4	5	4	5	5	5
Respondents 33	4	5	3	5	5	5	4	5
Respondents 34	5	4	4	5	4	5	5	4
Respondents 35	5	4	4	5	5	5	4	5
Respondents 36	5	5	4	4	3	5	5	5
Respondents 37	5	5	4	5	4	5	5	5
Respondents 38	4	5	3	5	5	5	4	5
Respondents 39	5	4	4	5	4	5	5	4
Respondents 40	5	5	4	4	3	5	5	5
Total	166	157	151	153	136	156	150	160
Score	95	90	86	87	78	89	86	91

Based on the test results in Table 3, the system is working well and is in line with the previous analysis. No bugs were found in the system, and all tested units have met expectations. The system runs smoothly and gives the desired response. User Acceptance Testing also results in a high score, which will be used to calculate user satisfaction with applications developed using the following formula (1).

$$n = 100 / 175 * \Sigma p \quad (1)$$

Description:

n = Score

Σp = Total query results

The scores obtained are then grouped using the formula (2) to evaluate whether the application has met the needs of the user.

$$x = \Sigma d / n \quad (2)$$

Description:

x = Final score

Σd = Amount of data

n = A lot of data

The total score obtained by adding all the scores of each question is 702. The total number of scores that can then be divided by the amount of data is 8 questions. The final score that can be used the calculation of the average with the formula of the number of data divided by the quantity of data was 87.7%. Based on the final score which can be achieved of 87.7% then the e-commerce developed has met the needs of the user.

In addition, the results of the research showed that there was a significant positive impact between the implementation of a virtual try-on product on customer satisfaction. Respondents who used the virtual feature of a try-On product a higher level of satisfaction compared to those who did not use the feature. This is in line with previous research that showed that AR can improve the shopping experience and customer satisfaction.

Further analysis revealed that the implementation of a virtual try-on product had the most significant impact on the customer satisfaction dimensions related to the product. Respondents who used this feature felt more satisfied with the product they purchased because it provided a more realistic picture of how the product would look on them. In addition, the virtual try -on product also helped respondents to understand the product better, thereby increasing their confidence in making a purchase.

The study also found differences in the impact of a virtual try-on product implementation on customer satisfaction based on demographic characteristics. Female respondents tended to be more satisfied with this feature than male respondents. This may be due to differences in interests and shopping behaviour between the two groups. In addition, younger respondents also showed higher levels of satisfaction with the virtual features of the try-on product. This can be attributed to a higher rate of technology adoption among the younger generation.

The findings of this study make an important contribution to understanding the impact of a virtual try-on product implementation on customer satisfaction. These findings show that a virtual tri-on Product not only improves the shopping experience, but also has a significant positive impact on customer overall satisfaction, especially in terms of product satisfaction; these findings support previous research that showed that AR can improve customer engagement, product understanding, and purchasing intent.

This research has some limitations, including a relatively small number of respondents and a focus on one cosmetic company. Future research may involve larger and more diverse samples to test the generalization of these findings. Furthermore, future research could also

explore the long-term impact of virtual try-on product implementation on customer loyalty and business performance.

4. Conclusion

In conclusion, this research has successfully implemented the virtual try-on product feature on the E-Colux PT Two Dragon Kosmetindo website using the SDLC model waterfall method. The blackbox test results showed a 100% success rate, which means the entire feature works well as expected. User Acceptance Testing also yielded a high score with an average of 87.7%, indicating that the system meets the needs of the user. The virtual try-on product feature has been shown to improve overall customer satisfaction, especially in the product satisfaction aspect, where the average score for product-related questions reaches 86% to 95%.

Furthermore, the study revealed that the positive impact of virtual try-on product implementation was more significant for women respondents and the younger generation. This opens up an opportunity for PT Two Dragon Kosmetindo to develop a more targeted marketing strategy. Nevertheless, the study has a limited number of respondents and a focus on one company. Advanced research with larger and more varied samples could reinforce the validity of these findings. In addition, a study of the long-term impact of virtual try-on products on customer loyalty and business performance can be an exciting next step.

5. Acknowledgement

We extend our deepest gratitude to Kedaireka for their trust and support through this grant. We also thank PT. Dua Naga Kosmetindo for their partnership and invaluable contribution to our team. We will make the best use of this grant and support to further develop this research. We would also like to express our sincere gratitude to Digital Zone journal for their consideration of our manuscript.

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