International Journal Multidisciplinary Science
IJML Vol 4 No. 1 | February 2025 | ISSN: 2963-8119 (print), ISSN: 2963-7821 (online), Page 146-157

Customer Experience and Satisfaction: The Impact of Augmented Reality In Online Shopping

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Article History
Received : Januari 2025
Revised : Januari 2025
Accepted : February 2025
Published : February 2025

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DOI:
https://doi.org/10.56127/ijml.v4i1.2058

Abstract: The rapid growth of e-commerce presents challenges related to limited product visualization and customer engagement, which refers to the degree to which customers feel actively involved in the online shopping experience. Augmented Reality (AR) technology has the potential to offer an innovative solution by providing an immersive shopping experience that makes customers feel as if they are interacting directly with products through virtual simulations. This research aims to explore how AR can provide a deeper customer experience and satisfaction in online shopping, such as realistically visualizing products before purchase, with an example application of the "try before you buy" feature (virtual try-on) in online shopping applications. The approach to be used in this research is quantitative, with data collection from AR users in online shopping activities. The research results are not yet obtained and are in the conceptual stage, it is hoped that this research can reveal opportunities for the use of AR as a strategic technology that can support more attractive and efficient online shopping activities. Recommendations that can be made for the future include the need for valid data collection and analysis, and the use of appropriate methodologies to explore the effectiveness of AR in greater depth. Future research topics can explore the influence of AR on customer preferences based on specific types of products or categories in online shopping.

Keywords: Augmented Reality, AR, Customer Experience, Customer Satisfaction, Online Shopping

INTRODUCTION

Rapid technological advancements have led to significant digital changes across various aspects of society, particularly in the business sector. One of the trending and widely adopted forms of digitalization in business is e-commerce, which is a digital platform that supports the interaction process of buying and selling goods (Yusuf et al, 2022). The presence of e-commerce platforms makes it easier for people to shop online to fulfill their needs and desires (Sasmita & Dewi, 2022).

According to data from 'We are Social', as of January 2024, around 59.3% of the total population in Indonesia aged from 16 to 64 shop online every week. This indicates a growing reliance on e-commerce among the populace. E-commerce platforms have transformed consumer shopping behavior, shifting from conventional in-store purchases to predominantly online transactions through digital platforms (Sasmita & Dewi, 2022). This change in shopping behavior presents opportunities for businesses involved in e-commerce to innovate further, enhancing customer experience and satisfaction to retain existing customers, reach potential customers, and increase revenue. One of the promising innovations is Augmented Reality (AR) technology (Ahdan et al, 2020).

Augmented R eality (AR) technology allows users to view visual representations of products offered in the real world through a digital environment on mobile or web applications (Rauschnabel et al., 2022). This technology has been increasingly applied acrosssvarious fields, including healthcare, tourism, education, and business (Putra et al., 2020). In the business sector, especially businesses operating in the digital sector, AR technology is utilized to create a more interactive shopping experience, which positively impacts customer satisfaction during interactions with businesses. In the context of e-commerce, this technology enables customers to virtually try products before making a purchase, addressing uncertainties and lack of trust in the product.

AR technology has begun to be widely implemented on e-commerce platforms, especially on mobile-based applications. Features such as 3D object or product simulations, virtual room visualizations for furniture usage, and digital trials for cosmetics and clothing provide an immersive shopping experience for customers. In categories like cosmetics, fashion, furniture, electronics, and others, AR technology not only serves as a visual aid but can also enhance interactive shopping experience and satisfaction during online shopping. The capabilities of this technology are the main key in influencing customers' purchasing decisions.

Based on this background, the research problem is how Augmented Reality (AR) technology affects customer experience and satisfaction in online shopping. The purpose of this research is to analyze the impact of using AR technology in enhancing the online shopping experience across various product categories and to evaluate its influence on customer satisfaction. The results of this research are expected to provide in-depth insight into how AR technology can improve customer experience and satisfaction in online shopping.

LITERATURE REVIEW

Augmented Reality (AR)

Augmented Reality (AR) technology uses hardware such as cameras, sensors, and graphic displays used in AR technology to convey additional information of objects in the real world (Indahsari & Sumirat, 2023). This technology concept works by combining the real world and the virtual world to display a visual representation of the object in a three-dimensional form, which can help the customer understand the concept of the shape or characteristics of the object (Alfitriani et al., 2021). In addition, AR technology can not only change the way people interact with technology, but also provide new experiences that feel more alive and interesting.

According to Villegas & Sánchez (2024) in his book entitled "Augmented Reality", Augmented Reality (AR) technology began in 1901 when Baum proposed the concept of "Master Key" in his novel, which describes a glasses-shaped device that displays additional information in the real world, which is now considered the prototype of AR (Baum, 1901). Then, in 1962, Heilig introduced "Sensorama," the first immersive machine that provided users with a multi-sensory experience, followed by Sutherland's "Sketchpad" and "Sword of Damocles" in 1964 and 1968, respectively, which marked the development of 3D displays (Sutherland, 1964; Sutherland, 1968).

In 1975, Krueger developed "Videoplace," which allowed direct interaction with virtual objects using video (Krueger, 1977). Further development occurred in 1980 when Steve Mann created the first AR device, "EyeTap," which combined a head view with a camera to create an AR experience (Mann, 2013). The 1990s saw more advanced AR

developments, such as Louis Rosenberg's "Virtual Fixtures" in 1992, which was used to improve productivity (Rosenberg, 1993), and the first introduction of the term "augmented reality" by Caudell and Mizell (1992).

Later, in the late 1990s and early 2000s, AR technology developed even more rapidly, with various projects and practical applications involving real and virtual world interactions, such as "AR Quake" (Thomas et al., 2002), and the development of AR platforms by major companies such as Google and Microsoft in the 2010s, such as Google Glass (Rehman & Cao, 2017) and Hololens (Evans et al., 2017).

In the 2020s, AR continues to dominate the technology world with the development of location-based and interactive applications such as "Mario Kart Live: Home Circuit" by Nintendo (Kerdvibulvech, 2021), as well as the announcement of Apple's "Vision Pro" headset in 2023, which combines the digital world with the physical world using the spatial operating system VisionOS (Waisberg et al., in press). AR technology is expected to continue to evolve and become a widely used tool in various technological devices in the future.

Online Shopping

Online shopping was first introduced in the UK in 1979 by Michael Aldrich, who innovated by connecting a television to a computer to enable real-time online transactions. This development paved the way for the emergence of the first online bookstore in 1992 by Charles Stack, followed by the establishment of Amazon in 1994 by Jeff Bezos as one of the pioneers of global e-commerce. The development of e-commerce in Indonesia began in 1999 with the arrival of Kaskus, founded by Andrew Darwis as a discussion platform and the forerunner of online stores in Indonesia, followed by Bhinneka.com. The rapid growth of e-commerce is being driven by increasing Internet penetration among the general public. The government's awareness of the potential of e-commerce led to the development of related regulations and the emergence of various e-commerce startups such as Tokobagus in 2005, and Bukalapak and other marketplaces between 2007 and the peak of competition in 2015. This change reflects the transition of society from traditional to online transactions due to technological advancements that facilitate economic activities (Mustajibah et al., 2021).

Online shopping has become an increasingly popular cultural phenomenon in today's society, in line with the advancement of communication technology, media and rapidly growing new media. The increase in online shopping activities among the public is inseparable from the progress of information technology and the existence of new media (Farasyi et al., 2021; Sazali, 2020). Unconsciously, the development of online shopping activities has changed the pattern of people's shopping behavior. People who used to shop conventionally are now starting to switch to online shopping. This change shows that advances in communication and information technology are gradually replacing the conventional shopping culture with online shopping. In the context of online shopping, this activity functions as a leisure filler or a means of spending money (Sazali, 2020). Online shopping activities are a form of modern communication that does not require direct interaction between buyers and sellers. This activity can be carried out independently of a physical location, allowing individuals to transact from different parts of the world through electronic devices connected to the Internet. Online shopping is categorized as electronic

commerce or e-commerce, particularly in the business-to-customer (B2C) model. Before making a decision to purchase a product online, consumers typically visit Internet sites, including social media, to find information about the desired product. After that, they will evaluate and consider whether to continue purchasing the product or not (Suratno et al, 2021).

Online shopping is growing, but in the past, online shopping activities were typically conducted through websites or applications that displayed only product images, descriptions, prices, and reviews from previous consumers. Consumers relied solely on visuals and text to evaluate the products they wanted to buy, without any direct interaction with the seller. During the shopping process, consumers do not have the opportunity to ask questions directly to the seller. All purchase decisions were entirely dependent on the information available on the product page. However, the development of online stores occurs, such as the existence of live streaming in e-commerce

Live streaming e-commerce has emerged as a significant new phenomenon in the retail and digital marketing industry, which has experienced rapid development in recent years. The concept integrates elements of online shopping with live interaction between sellers and consumers through live broadcasts, creating a more dynamic and immersive shopping experience. Advances in streaming technology and increased Internet accessibility, especially through mobile devices, have facilitated the rapid expansion of live streaming e-commerce. Through this platform, sellers can promote and demonstrate products live in real time, while consumers are given the opportunity to interact directly with sellers, ask questions, and make purchases directly and instantly (Rusdiana et al., 2024).

The concept of e-commerce refers to the method of conducting business transactions through an Internet-based platform. E-commerce allows sellers to market their products online and access the global market in a more effective and efficient way. On the other hand, e-commerce also facilitates convenience and speed for consumers in purchasing products. E-commerce encompasses various forms of electronic commerce, such as business-to-consumer (B2C), business-to-business (B2B), and consumer-to-consumer (C2C) transactions. This phenomenon has revolutionized the way people around the world shop and conduct business by enabling faster, more efficient, and convenient transactions without leaving home (Prasetyo, 2023).

In addition to live streaming, features such as virtual try-on have also developed. Beck & Crie (in Viohafeni & Aliyah, 2023) explain that virtual try-on is a feature that allows the manipulation of product images to simulate the experience of using real products. Online stores are developing virtual try-on features using Augmented Reality (AR) technology, where AR technology inserts computer-generated virtual objects into the real environment and allows real-time interaction. Virtual features are gaining interest as a method for consumers to explore and evaluate different products without the need for face-to-face interaction or physically trying on the product. This technology allows consumers to quickly assess whether or not a product matches their preferences, which in turn can influence their purchasing decisions (Basegmesz & Yaman, 2021).

Customer Satisfaction

According to Vavra (2002), customer satisfaction is a customer's emotional response to the difference between their previous experience and their expectations of a product or

service provided by a business. This satisfaction can also be influenced by the actual outcomes experienced by customers after interacting with the business or after using their products and services. Vavra (2002) also identifies several variables that can affect customer satisfaction, including:

1. Product Quality
   Product quality affects customer satisfaction. Products that meet or exceed customer expectations will undoubtedly increase their satisfaction.
2. Certain Aspects of Performance
   Several aspects of product performance such as design, functionality, and product durability can influence customer perceptions and levels of satisfaction.
3. Transaction Execution
   Transaction processes which include sales presentations, delivery of goods, repair visits, and handling product problems or complaints, can influence customer satisfaction. Quick, responsive, and efficient service from businesses will increase customer satisfaction.
4. Pre-Purchase Relationship
   Interactions that are built and occur before purchase, such as marketing and information support to customers, can create positive responses that can affect customer satisfaction.
5. Post-Purchase Relationship
   Interactions occurring after a purchase, which include customer service and support, are important to maintain customer satisfaction levels.
6. Perception of Business
   Customers' perceptions of a business's reputation and brand image can influence their assessment of satisfaction.

In recent research, Merugu & Mohan (2020) define customer satisfaction as the evaluation of their experience when shopping online, which includes various aspects such as product quality, services provided, and interactions with businesses. They have also identified several variables used to measure customer satisfaction in online shopping, which include:

1. Ease of Use
   Ease of use refers to an intuitive user interface and easy navigation within the e-commerce platform. A high level of usability allows customers to quickly find the products that they are looking for without any difficulty. Efficient and structured search features can simplify the online shopping process, ultimately impacting customer satisfaction.
2. Service Reliability
   Service reliability in an e-commerce platform can include the promises made to their customers. If an e-commerce platform promises delivery within 24 hours, they must be able to fulfill this promise in order to build customer satisfaction.
3. Security
   Security aspects involve the protection of customers' personal data and financial transactions. Security features such as data encryption and two-factor

authentication can help create a safer online shopping environment, which can increase customer satisfaction during their transactions.

4. Responsiveness
   Responsiveness refers to the assistance provided to customers. Customer support features such as live chat can increase customer satisfaction by providing answers to their questions or problems.
5. Assurance
   Assurance refers to the knowledge and politeness of employees who assist customers in receiving good service, which will certainly increase customer satisfaction.
7. Communication
   The ability to provide easily understandable information on e-commerce platforms is crucial for customer satisfaction. Features such as order status notifications, promotions, and product information are forms of communication with customers.

Based on this comparison, it can be concluded that in the context of online shopping, customer satisfaction refers to the extent to which customer expectations or desires are met when shopping online through e-commerce platforms. Specifically, customer satisfaction is the result of their evaluation of the products, features and services they use, whether they meet their expectations and hopes or not (Sasongko, 2021). Customer satisfaction can also be influenced by the use of various features available on e-commerce platforms. One of the most popular technological features that is currently being widely implemented on e-commerce platforms is Augmented Reality (AR), which allows customers to try or see visual representations of the products offered by businesses (Rauschnabel et al, 2022). Moreover, AR technology can help reduce customer uncertainty and lack of trust in products. In this study, we utilize several variables to help measure customer satisfaction regarding the use of AR technology in online shopping, which include:

1. Quality of Interaction
   The quality of interaction in the context of using AR technology for online shopping refers to the interaction between customers and virtual elements within AR technology when shopping online. Customers interact with AR technology to view products from various angles and even customize products according to their preferences and desires. High-quality interaction between customers and AR technology can enhance customer satisfaction by creating an engaging experience (Rorizanda & Suharto, 2024).
2. Perception of Technological Innovation
   Customers' perceptions of technological innovations, such as the implementation of AR technology on e-commerce platforms, can influence their satisfaction levels. Customers tend to feel more satisfied when businesses adopt technologies that assist and enhance their shopping experiences (Oktaviani et al., 2024).
3. Ease of Use
   Ease of use refers to how intuitive and simple AR technology can be used by customers without facing any difficulties. If customers can easily find the features they need, they tend to be more satisfied. A user-friendly interface design with

clear instructions can help customers in using AR technology (Nugroho & Anggara, 2024).

4. Immersive Experience
   Immersive experience refers to the engagement and experience felt by customers when using AR technology in e-commerce platforms. This experience may include how well AR technology immerses customers in a virtual environment that can help them make decisions, which can then also impact their satisfaction (Chou et al, 2023).
5. Benefits
   Benefits refer to how effectively AR technology assists customers in reducing uncertainty and making the right purchase decision. If AR technology helps customers in their decision-making process, they are likely to feel more satisfied (Hapsari, 2024).

Customer Experience

The term "Customer Experience" describes the overall interactions and relationships that customers have with a business or brand, encompassing all touchpoints from start to finish. According to Philipp Klaus (2014) in his book "Measuring Customer Experience: How to Develop and Execute the Most Profitable Customer Experience Strategies," customer experience includes all aspects of the customer journey, including interactions with employees, product quality, and even the digital experiences offered. Klaus (2014) also mentioned that customer experience is influenced by several variables, including:

1. Emotions
   One of the most important aspects of customer experience is emotions. Customers' evaluations of their overall experience are affected by the emotionsA satisfying experience heavily relies on prompt digital customer support. Customers expect immediate responses through online chat features or social media, which are effective in resolving their issues. that arise during their engagement with the brand. For example, buyers are more likely to return and make future purchases if they feel valued and happy during the buying process..
2. Cognition
   Cognition involves how customers assess quality, price, and superiority in a product. Customer satisfaction and brand loyalty are higher when customers feel they receive good value for their purchases.
3. Points of contact
   Each interaction between a business and its customers is referred to as points of contact, starting from product discovery to post-purchase service. Important points of contact include the first impression when customers visit a website or app, an easy payment process, and post-purchase support.

In recent research, Asakdiyah et al. (2023) state that customer experience in online shopping is defined as the mental perception of customers when interacting with the value provided by online businesses. Asakdiyah et al. (2023) also defined several variables used to measure customer experience in online shopping, including:

1. User-Friendly Experience Design

A design that prioritizes user comfort is one of the main components in creating a satisfying experience on digital platforms. Clear information presentation, intuitive user interfaces, and simple navigation are important aspects to consider when designing websites, mobile applications, and other platforms.

2. Responsive Digital Customer Experience
   A satisfying experience heavily relies on prompt digital customer support. Customers expect immediate responses through online chat features or social media, which are effective in resolving their issues.
3. Data-Driven Personalization
   Brands can create a more relevant experience by leveraging data-driven personalization, analyzing customer preferences and purchase history. This results in a more personalized experience and strengthens the relationship between the brand and customers.
4. Consistent Multi-Channel Integration
   Consistent multi-channel integration can create a satisfying customer experience. Customers often interact with brands through various platforms, such as email, social media, mobile applications, and websites.
5. Clear and Transparent Information Presentation A positive experience on digital platforms is created when information is presented clearly and transparently. Customers greatly appreciate clear explanations about product details, prices, and the terms and conditions applicable to each brand.
6. Digital Loyalty Programs
   Digital loyalty programs work well to retain customers and enhance their experience. Businesses can offer incentives such as points, discounts, or exclusive offers to encourage customer loyalty.
7. Technology Integration
   Businesses must keep up with the latest technological advancements to ensure a satisfying customer experience. The use of technologies such as chatbots, artificial intelligence, and others can significantly improve service quality. In addition, Continuous Innovation is essential to ensure that businesses continue to create added value for customers.
8. Security and Privacy
   In the digital era where everything is connected, maintaining customer security and privacy needs to be a priority. Customer trust can be built by thoroughly protecting their data and communicating privacy policies with transparency and clarity.

The comparison between these two research lies in their context and focus. Klaus (2014) is more relevant in the pre-digital era, where direct interactions and emotional relationships with customers were at the core of the business experience. Otherwise, the research by Asakdiyah et al. (2023) highlights the changing needs of customers in the digital era, where technology serves as the main foundation for creating fast, easy, and personalized experiences. This transformation illustrates the evolution of business approaches from human-centered relationships to technology-based experiences. Customer experience can also be influenced by the use of various features available on e-commerce platforms. One technology that is now starting to become popular is Augmented Reality

(AR), which adds a new dimension to customer interactions with products and deepens customer engagement. Not only that, this technology also plays a significant role in adding value and attractiveness to a business (Lovendra, 2022).In this research, we use several variables to measure customer experience related to the use of AR technology in online shopping, which include:

1. Customer Emotions
   The use of Augmented Reality technology can have a significant emotional impact on customers' shopping experiences. Positive experiences, such as feeling happy and impressed when seeing a product in an interactive 3D form, can increase customer satisfaction and encourage customers to make repeat purchases (Enyejo et al., 2024).
2. Cognition and Product Understanding Customers' ability to evaluate information obtained through augmented reality is part of cognition. Customers' confidence in making purchases increases when they can more easily understand the size, color, and functionality of product thanks to interactive and clear visualizations (Bathia, 2024).
3. Interaction with AR Technology
   One of the key elements that shapes the shopping experience is the quality of customer interaction with augmented reality technology. This technology can provide significant customer experiences by allowing customers to interact with products virtually so that it can help customers in making decisions (Chou et al., 2023).
4. Trust in Products
   Augmented reality can enhance customers' trust in products purchased online. With this technology, customers can feel more confident that the products they choose meet their expectations, such as seeing how a piece of furniture looks in their virtual living room or trying on products such as lipstick interactively (Lovendra, 2022).

RESEARCH METHODOLOGY

Research Hypothesis

This study aims to prove the following hypothesis:

H0 : The use of AR technology in e-commerce platforms has no effect on increasing customer satisfaction and customer experience in online shopping.

H1 : The use of AR technology in e-commerce platforms has a positive effect on increasing customer satisfaction and customer experience in online shopping.

The hypothesis in this research serves to provide direction and assist in collecting and analyzing relevant data. By formulating the right hypothesis, irrelevant data collection can be avoided, ensuring focus remains on the predetermined variables. The primary goal behind selecting these hypotheses is to address the research problem and test the impact of AR technology on customer experience and satisfaction during online shopping.

The data collection will be conducted through a survey designed with appropriate and relevant questions aimed at measuring predetermined variables related to customer satisfaction and experience. The data collection process involves respondents who have previously used both AR technology and e-commerce platforms.

Once the data is collected successfully, analysis will be performed using the Smart PLS application to examine relationships between the predetermined variables. This analysis aims to determine how AR technology influences customer experience and satisfaction during online shopping. The findings of this research are expected to provide insight into how AR technology can enhance customer experience and satisfaction while also assisting businesses in creating better technological innovation strategies to boost customer experience and satisfaction when shopping online. Additionally, the hypotheses in this research should serve not just as a basis for testing but also as a guide to understand the impact of AR technology usage on customer experience and satisfaction in this digital era.

DISCUSSION

This research aims to analyze the impact of Augmented Reality (AR) technology on e-commerce platforms on customer experience and satisfaction in online shopping. Through this study, we hope to find a positive correlation between the implementation of AR technology and the enhancement of customer satisfaction and experience during the online shopping process.

For data collection, we will use a questionnaire specifically designed to measure customer experience and satisfaction. This questionnaire will be directed towards individuals who have used augmented reality technology and shopped online through e-commerce platforms.

The first step is to select relevant informants, specifically active users of e-commerce platforms and users who have previously utilized AR technology. The questionnaire that will be developed will include questions about the frequency of AR use while shopping, experiences interacting with the technology, satisfaction levels with products purchased using AR technology, and their perceptions regarding the ease and benefits of AR throughout the purchasing process.

To reach the appropriate respondents, the questionnaire will be distributed online through channels such as social media, community groups, and relevant discussion platforms. Data will be collected by asking respondents to fill out the questionnaire according to their experiences.

We hope this research can provide a deep understanding of the relationship between the use of AR technology and customer satisfaction levels. This study is expected to prove that the implementation of augmented reality can enhance customer satisfaction by offering a more informative and interactive shopping experience. Additionally, this research aims to identify how augmented reality influences purchasing decisions and establish the overall online shopping experience for customers.

The results of this research are expected to serve as a guide for e-commerce businesses in optimizing the use of AR technology as part of their marketing strategies. Thus, they can improve customer satisfaction and the quality of the customer experience. We hope these findings can make a tangible contribution to the industry's development in creating more innovative and relevant customer experiences in an increasingly evolving digital era.

CONCLUSION

The conclusion of this research includes the next steps to be taken after compiling the introduction, literature review, and research methodology. The next stage of this research will be focusing on developing the survey designed to collect relevant and comprehensive data from respondents. After the questionnaire has been distributed, the next stage is to analyze the data that has been obtained using the Smart PLS application. This analysis aims to assess the impact of AR technology usage on customer experience and satisfaction during online shopping by identifying relationships between existing variables and testing the predetermined hypotheses.

With this approach, we believe that the findings of this research will contribute to a better understanding of the impact of AR technology usage in e-commerce platforms on customer experience and satisfaction, as well as provide new insights in the relevant field.

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