From Digital Literacy to Augmented Reality

Uncovering Its Influence on Online Beauty Product Shopping

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Abstract

Introduction/Main Objectives: This study aims to analyze the influence of digital literacy, e-commerce, and augmented reality (AR) on the decision to purchase beauty products through e-commerce in Malang City.

Background Problems: Despite the rapid growth of e-commerce and the integration of AR technology in the beauty industry, consumer purchasing decisions are still influenced by challenges such as limited digital literacy, inability to physically try products, and uncertainty about AR's effectiveness. In Indonesia, particularly in Malang City, these dynamics remain underexplored, creating a need to analyze how digital literacy, e-commerce, and AR collectively shape consumer behavior in beauty product purchases.

Research Methods: Using the multiple linear regression method, this study involved the Generation Z population as the main respondents, who were selected through purposive sampling techniques based on the criteria of online shopping experience and the use of digital technology.

Finding/Results: The results of the analysis show that digital literacy has a positive and significant effect on purchasing decisions, where consumers' ability to access and evaluate digital information increases confidence and shopping efficiency. In contrast, e-commerce shows a negative but significant influence, caused by obstacles such as slow internet access, fake products, and poor service experience. Meanwhile, AR provides the most powerful and positive influence, with features such as Virtual Try-On that increase consumer interactivity and confidence.

Conclusion: The conclusion of this study emphasizes the importance of increasing digital literacy and optimizing AR to encourage purchases, as well as improving the quality of e-commerce to overcome structural barriers.

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Keywords: Digital Literacy, E-Commerce, Augmented Reality, Purchase Decisions, Beauty Products

Introduction

Technological developments in recent years have revolutionized various aspects of people's lives, including the way they communicate, work, and meet economic needs. Innovations such as the internet and digital platforms have opened up huge opportunities for businesses, with significant increases in sales through wider and more efficient access (Rabani et al., 2024). This technology not only simplifies daily interactions but also changes market dynamics, where buying and selling transactions can be carried out without geographical restrictions. One of the main manifestations of this development is the rise of e-commerce, which is defined as electronic commerce activities through electronic media, allowing buyers and sellers to interact virtually (Dewi, 2022). In this context, society is no longer limited to physical gatherings; Instead, they can access products from various regions, even international, which increases the economic potential for business actors.

Digital literacy plays a central role in this era, as it involves the ability of individuals to access, evaluate, integrate, and share information through digital technology. This concept includes critical thinking skills to sort out accurate information from online sources, which is important to avoid fraud and digital crime (Dewi, 2022). Research shows that high digital literacy not only increases efficiency in product search but also positively influences purchasing decisions. For example, digitally literate consumers can more easily compare prices, read reviews, and verify product authenticity, reducing the risk of loss. In e-commerce, digital literacy is key to maximizing the benefits of a platform where users can securely manage personal information and make informed choices.

E-commerce itself offers significant positive values, such as time savings, wide product variety, and ease of transactions across regions. However, the negative aspects cannot be ignored, including the inability to see the product in person, which increases the risk of fraud and consumer dissatisfaction (Hapshoh & Wusko, 2025). In Indonesia, e-commerce platforms already have high users.

The beauty product industry is one of the fastest-growing sectors, driven by public awareness of self-care and personal identity. Beauty products not only serve as a treatment tool but also as a means to boost confidence, so effective marketing is crucial. In marketing beauty products in e-commerce, a special strategy is needed so that consumer obstacles that cannot be tried directly can be overcome.

One of the technological innovations that has changed the e-commerce landscape is Augmented Reality (AR), which integrates virtual elements into the user's real-life experience. AR allows consumers to interact with digital objects through devices such as smartphones, creating immersive experiences that increase engagement (Hapshoh & Wusko, 2025). In beauty product marketing, AR has been used for virtual simulations, such as trying on makeup or skin analysis, which helps consumers make more accurate purchasing decisions. On some e-commerce platforms, features such as SkinCam and BeautyCam utilize AR to analyze skin types, detect aging, and provide cosmetic product recommendations (Pratama et al., 2024).

Although the accuracy of these AR features is influenced by external factors such as lighting and camera quality, research shows that AR has a positive impact on purchase conversions, especially in the online retail industry (Pratama et al. (2024); Hapshoh & Wusko (2025)). This innovation is in line with the transformation of mobile technology that has become an integral part of the modern lifestyle, where smartphones play a key role as the primary tool for digital consumption and interaction.

The cosmetics industry in Indonesia has experienced very rapid growth, with the emergence of many products that are consumer favorites. Cosmetics companies continue to innovate to

meet the demands of a dynamic market, including through the integration of AR technology in e-commerce. However, amid fierce competition, the understanding of how these technologies affect consumer behavior still needs to be explored further. Previous research has shown that AR can increase buying interest and purchase decisions, but the impact is not always significant, depending on cultural and regional contexts (Hapshoh & Wusko, 2025).

In Malang City, as one of the educational and economic centers in East Java, the use of e-commerce for beauty products shows a fairly high trend. This cannot be separated from the characteristics of Malang as a student city inhabited by thousands of students from various regions, thus making the digital behavior of its people very active and dynamic. Students who are familiar with digital technology tend to seek convenience and practicality in shopping, including for personal care and beauty needs. In addition, increasing internet penetration, technology infrastructure support, and rampant promotions from various e-commerce platforms have also encouraged the high interest of the Malang people in online shopping. This phenomenon makes Malang not only an education center, but also a potential market for the digital-based beauty industry, where modern lifestyle trends and the need for appearance are increasingly influencing people's consumption patterns.

Based on this phenomenon, this research is important because digital literacy, e-commerce, and AR are intertwined in shaping online purchasing decisions. The formulation of the problem in this study includes an investigation of whether digital literacy affects the purchase decision of beauty products, whether Augmented Reality (AR) affects the purchase decision of beauty products, and whether e-commerce affects the purchase decision of beauty products. This research aims to analyze these relationships in depth, focusing on the dynamics of local consumers amid the development of digital technology and e-commerce market competition.

Digital Literacy

Digital literacy refers to the ability of individuals to master, use, and utilize digital information and technology effectively. According to Paul Gilster, as quoted by the Ministry of Education and Culture, digital literacy involves mastering technology through devices such as computers to access information (Alfiyansyah et al., 2024). Feri Sulianta added that digital literacy is the skill of using digital technology and information in the fields of academics, work, and daily life (Rabani et al., 2024). This concept encompasses a wide range of literacy, such as IT, information, technology, media, and visual literacy, which is becoming more important in the digital environment. Digital literacy is integrative, involving skills to process information, communicate effectively, create content, and think critically about the impact of technology (Hapshoh & Wusko (2025); Aulia & Fatmawati (2023)).

Overall, digital literacy combines information, technology, computer, visual, media, and communication literacy, allowing individuals to read, understand, write, and create new content. This includes awareness, attitudes, and the ability to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources, as well as communicate and build new knowledge in a social context (Setiawan, 2024). Digital literacy also encourages people to become smart digital citizens, increasing productivity through access to information, new experiences, and digital-based job opportunities, including digital marketing for entrepreneurs.

Digital Literacy Indicators

Digital literacy indicators include cultural aspects (understanding the context of the digital world), cognitive (the ability to reason and assess content), constructive (the ability to create something), communicative (understanding communication networks), confidence, creativity (new innovations), critical (content evaluation), and social responsibility (Dewi, 2022). This

indicator helps measure an individual's ability to interact with digital technology ethically and effectively.

E-Commerce

E-commerce is a business activity that involves consumers, manufacturers, service providers, and intermediary merchants through computer networks such as the internet. According to Sianipar & Djamaluddin (2023), e-commerce includes buying and selling transactions via the internet. Aco & Endang (2017) explain that e-commerce allows online transactions without time or place restrictions, expanding the market at a low cost. In general, e-commerce is the process of buying and selling products, services, and information electronically through a computer network, with the internet as the main driver of its development.

Types of E-Commerce

Shafwah et al. (2024) identified six types of e-commerce: (1) Business-to-Consumer (B2C), which reaches out to individual consumers for retail purchases; (2) Business-to-Business (B2B), intercompany transactions; (3) Consumer-to-Consumer (C2C), where individuals sell through the platform; (4) Mobile E-Commerce (m-commerce), transactions via mobile devices; (5) Social E-Commerce, using social networks; and (6) Local E-Commerce, focusing on local services such as on-demand.

E-commerce indicator

Irawaty et al. (2025) stated that e-commerce indicators that affect business development include: (1) Internet access, which increases competitiveness through speed; (2) Ease of information, utilizing data for innovation; (3) Human resource ability, to operate and utilize technology; and (4) Managerial responsibility, in business decision-making.

Augmented Reality (AR)

Augmented Reality (AR) is a technology that combines 2D or 3D virtual objects into a real environment in real-time, displaying additional information that cannot be received directly by humans. According to Haris & Hendrati (2018), AR combines virtual and real worlds, where virtual objects such as text, animations, or videos are projected onto the physical environment. Wahyudi et al. (2019) explained that AR is a combination of virtual objects with the real, interactive, and 3D worlds, dominated by the addition of visual information with 6 degrees of freedom.

AR is applied in various fields, such as medicine (simulated operations), entertainment (visual effects), military exercises (war simulation), engineering design (visualization), robotics (control), and consumer design (product promotion). AR devices include markers (unique markers for object detection) and Head-Mounted Displays (HMDs), such as opaque and see-through. AR methods include Marker-Based Tracking (using markers for virtual worlds), Markerless AR (without markers, such as Face Tracking, 3D Object Tracking, Motion Tracking, and GPS-Based Tracking for smartphone applications).\

Augmented Reality (AR) Indicator

Haris & Hendrati (2018) identified three characteristics of AR as indicators: (1) Augmentation, the addition of virtual information to the physical world; (2) Interactivity, real-time interaction between users and virtual media; and (3) Registration, integration of virtual objects into the real world so that it feels like a part of it.

Purchase Decision

Purchasing decisions are the actions of consumers in choosing and determining the purchase of goods or services to meet their needs. According to Aji et al. (2020), this involves transactions based on product evaluation. Pratama et al. (2024) define it as consumer behavior in choosing and using products. Kotler & Armstrong (2020) explain that purchasing decisions are part of consumer behavior, where individuals choose products for satisfaction. In general, the purchase decision is the selection of alternative problem solving with real follow-up, followed by evaluation and subsequent attitude.

Stages of the Purchase Decision Process

Sianipar & Djamaluddin (2023) outline four stages: (1) Problem recognition, where consumers identify needs; (2) Searching for information, active or passive to collect data; (3) Evaluate alternatives, set goals and select options; and (4) Post-purchase behavior, involving satisfaction or dissatisfaction that affects future purchases.

Purchase Decision Indicators

Setiawan (2024) states four indicators: (1) Product choice, purchase decision or not; (2) Brand choice, choose trusted brands; (3) Purchase quantity, product volume; and (4) Time of purchase, frequency such as daily or monthly.

Research Methods

The analysis used in this study is multiple linear regression. The population in this study is Generation Z, which is a group born between 1997 and 2012 and is known as iGeneration because it grew up in the era of technology, internet, and social media. According to Arum, Zahrani, and Duha (2019), Generation Z is a young age that is productive and active in digital activities. The research was focused on Malang City, East Java, on the condition that respondents lived or carried out daily activities in the city. The selection of Generation Z as the target population is based on the characteristics of those who have high digital literacy, are active in the marketplace, and are responsive to promos, product visuals, and other user reviews. In addition, Generation Z is more receptive to new technologies such as Augmented Reality in online shopping because they like personalized and interactive experiences.

The research sample was determined by purposive sampling technique. The criteria for respondents chosen are those who have purchased beauty products on e-commerce at least once, so that they have real experience in purchasing decisions. In addition, respondents must use smartphones, be active on E-Commerce platforms, and have tried the Augmented Reality feature. With these criteria, the research sample is expected to be able to provide relevant and valid data to test the influence of digital literacy, E-Commerce, and Augmented Reality on beauty product purchase decisions.

In this study, the first hypothesis regarding the influence of digital literacy on the purchase decision of Maybelline beauty products refers to the findings of Dewi (2022) who stated that digital literacy has a positive and significant effect on purchase decisions. This shows that the higher the ability of consumers to access and use digital technology wisely, the greater the trust and convenience felt in online shopping.

The second hypothesis related to the influence of E-Commerce on purchase decisions is supported by research by Dewi (2022), who found that E-Commerce makes a positive

contribution by providing ease of transactions and a comfortable shopping experience, even with digital literacy, can explain 48.7% of the influence on online purchase decisions. This finding is strengthened by research by Andriani et al. (2023) which shows that E-Commerce has a positive and significant effect on the purchase decision of Wardah products in female students of the Faculty of Economics and Business, University of Palangka Raya. The convenience factor, system quality, and services offered by digital platforms such as Shopee, Tokopedia, and TikTok Shop have been proven to encourage consumer buying interest.

Meanwhile, the third hypothesis regarding the influence of Augmented Reality (AR) on beauty product purchase decisions is based on several studies. Hapshoh & Wusko (2025) found that AR Marketing has a positive but insignificant effect on consumers' purchase decisions and repurchase intentions. In contrast, Zahara & Lestari (2024) show that the AR feature in mobile shopping applications has a significant effect on the purchasing decisions of Generation Z consumers, especially for first-time buyers. Research by Pratama et al. (2024) also emphasized that AR-based Virtual Try-On technology has a positive impact on cosmetic purchase decisions in Indonesia by increasing trust, engagement, satisfaction, and reducing product return rates. Furthermore, Wulandari et al. (2023) added that Virtual Try-On has a positive and significant effect on customer engagement, which then mediates the relationship between AR and purchase decisions, so that the higher the customer involvement, the stronger the influence of AR on purchase decisions.

Result

1. The Influence of Digital Literacy (X1) on Purchase Decisions

The results of the analysis show that digital literacy has a positive and significant effect on the purchase decision of beauty products in e-commerce The value of the regression coefficient of B = 0.087 with a t-count of 7.753 and a significance of 0.000 (<0.05) confirms that the higher the digital literacy, the more likely consumers are to make a purchase. Digital literacy measured through cultural, cognitive, constructive, communicative, confident, creative, critical, and responsible indicators has been proven to strengthen purchasing decisions. This means that consumers who are able to understand digital ethics, critically assess information, communicate effectively, are confident in using technology, are creative in looking for promos, and are responsible for digital transactions will be more aware, selective, and confident in buying products online.

2. The Influence of E-Commerce (X2) on Purchase Decisions

In contrast to digital literacy, the E-Commerce variable actually shows a negative but significant influence on purchase decisions. The value of the regression coefficient of B = -0.070, with a t-count of -3.097 and a significance of 0.003 (<0.05), suggests that a bad experience in e-commerce use can reduce buying interest. Factors that affect include slow internet access, confusion due to the large selection of products, the rise of counterfeit products, consumers' lack of familiarity with new features such as Virtual Try-On, as well as negative experiences related to platform management (e.g. poor reviews, slow response to complaints, and inconsistent product availability). This indicates consumers are more cautious or choose to buy directly in physical stores to avoid risks.

3. The Influence of Augmented Reality (X3) on Purchase Decisions

Augmented Reality (AR) is proven to have the most and significant influence on purchasing decisions. The value of the regression coefficient of B = 0.337, with a t-count of 10.753 and a significance of 0.000 (<0.05), suggests that the quality of AR strongly determines consumer

decisions. AR features, specifically Virtual Try-On, allow consumers to view products in real-time, improving the perception of product quality and value. AR interactivity that allows consumers to rotate, zoom in, and try products virtually creates a more enjoyable and realistic shopping experience. The accuracy of the AR system in placing virtual objects stably also increases consumer confidence. Thus, AR is an important factor that encourages consumers to be more confident and fast in making decisions to purchase beauty products in e-commerce.

Discussion

This study proves that digital literacy (X1) has a positive and significant effect on the decision to purchase beauty products in e-commerce. This shows that the higher the ability of consumers to understand, assess, and use digital technology wisely, the greater their tendency to make conscious and responsible purchases. On the other hand, the E-Commerce variable (X2) actually has a negative but significant influence on purchase decisions. These findings indicate that although e-commerce platforms offer easy access and information, obstacles such as network quality, confusion due to many choices, the rise of fake products, and poor experiences in services can reduce consumer buying interest. Meanwhile, Augmented Reality (X3) is proven to have the most and significant influence on purchasing decisions. Interactive features such as Virtual Try-On are able to increase the perception of product quality, provide a more realistic shopping experience, and strengthen consumers' confidence to buy beauty products in e-commerce online.

The results of this study are interesting because they show that there is a difference in the direction of influence between variables. Digital literacy and Augmented Reality consistently strengthen purchasing decisions, in line with the characteristics of Generation Z who are used to technology and love interactive shopping experiences. However, the negative influence of E-Commerce indicates that there are structural problems in the online shopping ecosystem, such as low trust due to fake products and suboptimal service quality. This is an important note for brands and e-commerce platforms to improve system quality, strengthen transaction security, and ensure more consistent user experience. Thus, the digital marketing strategy of beauty products should emphasize more on increasing consumer digital literacy and the use of AR technology, while improving aspects of e-commerce services so that they do not become obstacles in purchasing decisions.

Conclusion

Based on the results of the research, there are several suggestions that can be given to related parties. Beauty product business actors in e-commerce are advised to continue to improve their digital marketing strategies by strengthening consumers' digital literacy through education on how to shop safely, recognize original products, and utilize digital features wisely, while optimizing Augmented Reality (AR) technology such as Virtual Try-On which has proven to have the greatest influence on purchase decisions. On the other hand, improving the quality of e-commerce services by increasing access speed, clarifying product information, tightening supervision of sellers so that they do not sell fake products, and improving the complaint handling system so that consumers feel safer and more comfortable. For the next researcher, it is recommended to expand the scope of the population by comparing or expanding between generations, as well as adding other variables such as the influence of influencer marketing or customer reviews which also play a big role in the decision to purchase beauty products. Thus, collaboration between brands and platforms is key to strengthening consumer trust while increasing the effectiveness of digital marketing.

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