WebAR Adoption and Consumer Engagement in E Commerce

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Chapter 1

Introduction

1.1 Introduction to Augmented Reality (AR) and its Evolution

The commerce landscape has been transformed by technology, pushing businesses to innovate and engage with consumers. Augmented Reality (AR) is a recent technological advancement with significant potential (Guinan *et al.*, 2019). AR combines real and virtual worlds in operations. It enhances electronic commerce by improving how products are displayed, experienced, and purchased. WebAR enables AR experiences in web browsers, eliminating the need for specific apps. This simplifies user experience and allows businesses to showcase products interactively. In the increasingly competitive online commerce, integrating WebAR is essential for businesses (Jeon *et al.*, 2020).

During 1960-2000:

Ivan Sutherland and colleagues conducted pioneering AR research. AR originally focused on military, medical, and industrial prototypes and platforms (Martínez *et al.*, 2014). ER research advanced significantly in the 1990s. Tom Caudell's ARToolKit enabled developers to create AR experiences. This innovation facilitated further exploration in the field Xu *et al.*, 2015).

In Mid-2000:

The popularity of smartphones with cameras and computing capabilities has made augmented reality (AR) more widespread. Layar and Wikitude are AR apps that introduce the public to location-based AR experiences on their mobile devices (Chen *et al.*, 2018).

In 2016 and 2017:

Pokémon GO by Niantic became a global hit, showcasing the popularity of augmented reality (AR). The game combined geolocation and AR technology, encouraging users to explore their surroundings for virtual Pokémon. This event helped people understand and accept AR (Comunello and Mulargia, 2017).

1.2 E-commerce Revolution: Changing Dynamics and Consumer Expectations

1.2.1 Changing Dynamics In E-Commerce

The exchange of products and services has changed little due to e-commerce. It is driven by digital technology, internet access, and changing customer preferences. This has greatly affected traditional commerce. It has created new dynamics and expectations for businesses and customers. In the corporate world, both large and small businesses can compete globally (Palmarini *et al.*, 2017). E-commerce platforms allow businesses to display products and offer consumers many choices. With data analytics and AI, businesses can personalize product suggestions and marketing strategies, increasing customer satisfaction and loyalty. The popularity of smartphones has also made mobile shopping more convenient (Huang *et al.*, 2018).

The use of mobile apps and optimized websites has made buying on mobile devices easier and more efficient, boosting e-commerce. Firms are fusing online and offline channels to provide a seamless purchasing experience (Amin and Govilkar, 2015). Consumers can research products online, buy in stores, or do both. Integration of different elements ensures consistency and convenience throughout the shopping process. Social media platforms are now vital for businesses to display products, interact with customers, and utilize influencer marketing to amplify sales and brand recognition (Torregrosa *et al.*, 2015).

1.2.2 Consumer Expectations in E-Commerce

Customers possess a strong inclination towards seamless and effective purchasing experiences, including rapid website loading, effortless navigation, and speedy checkout. Same-day or next-day delivery options are becoming expected (Anooja, 2016). Consumers desire more transparency in all aspects of the purchasing experience, such as item particulars, costs, shipping fees, and return protocols. Building trust is crucial in business, so transparency is important for maintaining lasting customer relationships. Consumers furthermore desire a vast array of high-quality products to choose from. (Bhat *et al.*, 2016).

Consumers desire detailed product information, images, and reviews for better purchasing decisions.

Personalized recommendations based on interests and behaviour are expected. Consumers value modified offerings and relevant information from e-commerce platforms. The security of financial and personal data is a concern (Kalia *et al.*, 2018). Users require secure payment gateways, data privacy compliance, and clear privacy policies. Exceptional customer service is highly anticipated. Consumers prefer prompt and attentive service, easy returns and exchanges, and timely issue resolution. E-commerce platforms and companies should promote sustainability, ethical practices, sustainable packaging, fair trade principles, and corporate social responsibility (Mohdhar and Shaalan, 2021).

1.3 Integration of Augmented Reality in E-commerce

The use of augmented reality in e-commerce enhances the digital shopping experience. Buyers can virtually interact with products and see them in their surroundings before buying. Augmented reality tech allows virtual product trials for apparel, accessories, makeup, and glasses. Using a smartphone or webcam, consumers can evaluate the appearance of a product on themselves in real time, helping them make informed choices about size, fit, and style (Cuomo *et al.*, 2020).

1.3.1 Visualizing Products In The Real World:

The process includes developing prototypes to display the physical attributes and capabilities of a product. Computer software is utilized to generate lifelike 3D representations of the product. Visual representations are captured to highlight distinctive characteristics (Chandrasegaran *et al.*, 2013). Graphic design techniques are utilized to generate graphical representations of the product. Adding the product to virtual worlds increases customer engagement. Visual representations are created to showcase the product's usage or advantages. Digital interfaces are created to enhance user-friendliness and showcase product features (Siarohin *et al.*, 2019).

1.3.2 Interactive 3D Product Review

Businesses can use 3-D models and AR technologies to showcase their products. Customers can interact with the product through rotation, zooming, and engagement, resulting in a more immersive experience. Interactive 3D product previews are virtual simulations that customers can manipulate (Bernardo, 2015). These previews allow users to fully understand the product's design, features, and functionality. Intuitive controls make it easy for users to navigate and explore the preview. The product is thoroughly represented, highlighting its various qualities. Individuals can analyze different elements of the product to understand its internal structure (Sepulveda, 2015). E-commerce systems often include 3D previews for users to interact with before making a purchase. Interactive 3D previews have economic significance in sectors like e-commerce, transportation, furniture, electronics, and fashion. They enhance the online business experience by offering interactivity and allowing consumers to evaluate products before purchasing (Kinzinger *et al.*, 2022).

1.3.3 In-Store Navigation And Way Finding:

AR has the potential to aid e-commerce platforms with in-store navigation. The objective is to optimize the shopping experience by providing instructions and location details (Billewar, 2022). Digital or physical maps help customers visualize the store's arrangement. Smartphone programs interact with the store's navigation system for location advice and product information. Beacons track location and give notifications (Bonetti and Perry, 2017). QR codes on shelves provide more information and pricing details through smartphone scanning. Voice-guided GPS-like systems allow for inclusive navigation. Promotional information in the navigation system guides customers to exclusive deals. Physical signage with clear directions helps all travellers. Combining in-store navigation with online purchasing improves convenience (Wang *et al.*, 2018).

1.3.4 Enhanced Marketing And Advertising:

AR is used in ads and aims to engage customers and improve conversion rates. Enhanced Marketing and Advertising optimize marketing effectiveness through advanced technologies, data analysis, creative content, and tailored segmentation (Scholz and Smith, 2016). The objective is to captivate specific demographics, increase brand recognition, engage customers, and achieve successful conversion. These insights are important for making strategic decisions and optimizing campaigns. Customizing marketing messages, advertising, and content aims to provide a personalized experience (Gupta, 2021). Marketing activities are organized across platforms to maintain a consistent brand message and increase brand awareness. Effective communication and storytelling are crucial for businesses to connect with customers emotionally. Retargeting methods aim to re-engage familiar customers through appropriate ads. Marketers assess their efforts and customize campaigns using measurement tools and attribution models. Understanding the customer journey aids in formulating effective marketing strategies. Designing engaging brand experiences can include events, retail spaces, or virtual encounters (Keyser, 2015).

1.4 Understanding Web-based AR

WebAR is the use of augmented reality technology on web browsers, removing the need for downloads or installations. Combining AR with web browsers brings together the advantages of AR and the user-friendly nature of web-based platforms, making AR accessible to many people.

1.4.1 AR Technology

AR enhances the physical environment with digital overlays for a more interactive experience. WebAR is based on AR technology. AR improves the real world with digital overlays for an enriched and interactive experience.

AR technology combines virtual and real elements, enabling users to experience both simultaneously. AR systems use various technologies to monitor and understand user movements and gestures in the physical world, allowing for precise calibration and interaction with virtual entities. AR can be discovered through different display interfaces, such as smartphones, smart glasses, HUDs, and projection-based systems. AR is utilized in various sectors, including gaming, education, healthcare, retail, marketing, navigation, design, training, and more, enhancing experiences and offering innovative solutions (Christianto Christianto).

Real-Time Integration

Spatial Recognition and Tracking

Display Interfaces

Application in various Fields

1.4.2 Web Technologies

WebAR uses common web development tools to create AR experiences that are accessible through web browsers. Web technologies like HTML, CSS, and JavaScript are essential for web development. These technologies combine to generate interactive and useful web pages and applications (Chantoem and Rattanavich, 2016).

HTML (Hyper Text Markup Language)

CSS (Cascading Style Sheet)

JavaScript

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Figure 1. WebAR through E-commerce

1.5 Enhancing user experience through webAR

The process of enhancing the visitor's experience with WebAR involves using AR capabilities in web browsers to create immersive meetings. Incorporating AR into internet-based applications allows businesses to provide original and immersive experiences that attract shoppers and enhance engagement. WebAR allows consumers to interact with AR features directly through their web browser, offering a more intuitive and captivating experience (Gomber *et al.*, 2018).

1.5.1 Intuitive Interaction

Users can easily understand and use a system or interface without complex instructions or prior knowledge. The system utilizes familiar cognitive frameworks and established interface conventions, making it easier for users to anticipate and expect how it will work. The interface has consistent design features and behaviours, allowing users to transfer knowledge from one part of the system to

others. The system provides prompt and precise feedback on users' actions, helping them understand the system's response and improve their interactions (Reilhac *et al.*, 2015).

1.5.2 Engaging Interaction

An attractive design maintains user attention, which leads to user participation. Customization and personalization foster ownership. Interactive components enhance the user experience. The primary goal is to create a bond between the user and the product. The system gives prompt and positive feedback, fostering motivation and perseverance (Jong, 2015).

1.6 Adoption and Trends in WebAR in E-Commerce

The e-commerce business is increasingly adopting Web-based Augmented Reality (WebAR) as a result of its capacity to offer engaging and immersive experiences to individuals shopping online.

1.6.1 Adoption Of Webar In E-Commerce:

E-commerce firms use WebAR tech to enable product trials. Customers can try on clothing, accessories, and eyewear and arrange furniture and decor. Businesses incorporate WebAR in promotions for customer interaction. This boosts sales. E-commerce platforms create virtual showrooms for product exploration, replicating in-store experiences. Some platforms educate customers using WebAR (Moriuchi *et al.*, 2021).

The company offers AR experiences that aid users in comprehending product features. Firms utilize location-based WebAR to provide VR content for specific locations. Personalized strategies boost marketing and customer engagement. E-commerce businesses utilize WebAR for improved product packaging. Scanning technology enables consumers to access more AR content on the packaging (Hoque and Bashaw, 2020).

1.6.2 Rends of Webar In E-Commerce

WebAR aims to achieve optimal functionality on different devices. AR experiences can now be distributed more widely. Social media platforms are incorporating WebAR. Businesses use AR technology for interactive marketing and product promotion on platforms like Facebook and Instagram. Real-time collaboration in AR is becoming popular. E-commerce platforms are exploring collaborative shopping in WebAR. Advanced analytics and tracking solutions are being developed for WebAR. These solutions offer valuable insights into user behaviour and preferences, enabling organizations to enhance their strategies (Kumar *et al.*, 2016).

Several e-commerce companies are incorporating WebAR into their mobile apps, enabling app-based

interactions with AR enhancements for a comprehensive user experience. AR is utilized to enhance product development. WebAR enables users to scan physical items in their surroundings, offering relevant product recommendations and information. This improves the process of discovery, providing enhanced experiences and exploration opportunities. Businesses' adoption of WebAR to support sustainable practices is gaining traction due to increased recognition of sustainability. AR solutions are deployed to educate consumers on conservation efforts, eco-friendly products, and ethical sourcing (Fu'Adi *et al.*, 2021).

1.7 Impacts of WebAR

T the use of Web-based Augmented Reality (WebAR) greatly impacts customer engagement and conversion rates in e-commerce and marketing. This technology changes how users interact with products and brands, resulting in higher engagement and conversion rates.

1.7.1 Improved Decision-making and Confidence:

WebAR technology allows individuals to interact with virtual object models in their surroundings. The visualization feature helps users make informed decisions and increases their confidence in the product, reducing any doubts about making a purchase. Prior virtual product trials enhance consumers' comprehension of the product, decreasing the chances of returns (Nisar and Prabhakar, 2017).

1.7.2 Augmented Marketing And Advertising:

AR integration in marketing with WebAR successfully draws users and boosts engagement rates. Interactive commercials with AR encourage active engagement. WebAR provides detailed metrics like interactions, duration, click-through rates, and other data to understand user behaviour and enhance advertising strategies for higher engagement (Zurek, 2015).

1.7.3 Broader Accessibility And Reach:

WebAR removes the necessity of a separate app, making it more accessible. Access to AR experiences is easier, reaching a wider audience. WebAR's compatibility across devices and platforms ensures a consistent user experience, expanding its potential. AR information can be interacted with by users regardless of their device or operating system (Atmaca and Terzi, 2021).

1.7.4 Higher Conversion Rates:

WebAR facilitates user interaction with AR content, streamlining purchases. A seamless user

experience promotes user progression to checkout, enhancing conversion rates. WebAR enhances consumer confidence by offering an interactive comprehension of products, resulting in increased conversion rates and ROI (Pei *et al.*, 2019).

1.8 Benefits of WebAR

Individuals can access augmented reality (AR) content on web browsers instead of downloading apps, improving accessibility and user engagement.

WebAR enables businesses and developers to broaden their reach, irrespective of device or platform constraints.

Developing for the web may have economic advantages over managing multiple AR apps for various platforms.

WebAR's interactive features enhance user engagement, rendering it useful for marketing, education, and entertainment.

WebAR enables rapid updates through server-side implementation, obviating the necessity for user-driven manual updates.

1.9 Summary

WebAR expands businesses and developers' audiences by eliminating the need for specialized devices or platforms, making it a cost-effective and efficient tool for marketing, education, and entertainment. WebAR allows for rapid updates and iterations through server-side alterations, reducing the need for manual updates. WebAR's improved interoperability enables a wider distribution of augmented reality experiences. The integration of WebAR in social media platforms is a growing phenomenon. The inception of ARToolKit in the 1990s laid the groundwork for advancements in Augmented Reality.

Chapter 2

Literature Review

2.1 E-Commerce

The term "e-commerce" refers to the online purchasing and selling of goods and services. It is a key component of the contemporary economy. Direct-to-consumer sales and online marketplaces shape the digital market. Businesses offer physical and digital goods using subscription-based models and

mobile shopping. E-commerce benefits from worldwide reach, cost reductions, and personalized buying experiences. Challenges like logistics and competition persist. Future trends include augmented reality, artificial intelligence, and sustainability, impacting company dealings and customer connections in advancing e-commerce.

(Qiao *et al.,* 2019) mobile Web AR was proposed as a feasible and cost-effective solution for delivering MAR. Obstacles to its implementation included a lack of standards, slow web browsers, and mobile network issues. The potential and challenges of MWAR in the 5G era were examined. A scalable and adaptable MWAR solution was developed using a service-oriented architecture. The performance of the MWAR5 system was evaluated on a cooperative 5G network. Future strategies for MWAR over 5G and B5G networks were discussed.

(Kowalczuk *et al.,* 2021) The contrast between AR and web-based production. Created a model to analyze consumer response to the IKEA Place app and mobile site. Web-based is more useful; AR is more immersive and enjoyable. Emotional reactions affect engagement with AR features. Retailers can improve system quality and product information to increase media utility and engagement. High purchase intent and engagement were observed. More contact leads to increased trust in selected products.

(Turner, 2022) some of the problems with epistemology that AR systems raise were discussed. The potential of the Real-World Web to transform digital information engagement was highlighted. The Real-World Web could exacerbate three issues in the digital age. New versions of these issues are introduced by the Real-World Web. Experimental-based descriptions of virtual objects were presented. Several proposals seek to mitigate the risks associated with AR technology.

(Chandra and Kumar, 2018) the adoption of AR in e-commerce was evaluated using the TOE framework. Factors influencing organizational adoption intentions of AR were discussed. A sample from India, Singapore, and the US was examined. Factors such as customer preparedness, competitive advantage, management support, and technological expertise impact AR adoption.

Table 2.1: Review of E-Commerce

Author(s)	Aim	Technique Used	Limitation(s)

Qiao et al., 2019	Examine the capabilities of mobile Web AR (MWAR), along with its challenges and benefits.	Examined problems concerning the advancement of B5G and 5G networks.	The research uses 5G and Beyond 5G networks to solve mobile Web AR issues, but their implementation may differ in practice. The study may not have considered regional differences in network structure and technology adoption.
Kowalczuk et al., 2021	Analyze customer reactions to both augmented reality and web-based product displays.	Performed user trials and developed a model for customer reaction.	The situation might affect consumer responses; therefore, the findings might not be generalizable.
Turner, 2022	Examine the epistemological problems that AR systems, particularly the Real-World Web, provide.	A phenomenological analysis was performed, and policy-based remedies were suggested.	The paper discusses hypothetical and speculative epistemological questions about the potential effects of AR technology. Although actual research is mentioned, the study itself is mainly concerned with theoretical debates and policy recommendations.
Chandra & Kumar, 2018	Analyze organizational influences on the receipt of amplified reality in e-commerce.	Surveyed potential adopters and used the Technology-Organization-Environment (TOE) paradigm.	The research is limited to a specific timeframe and may not capture changes in AR adoption.

2.2 Web-based Augmented Reality

The combination of digital innovation and online engagement is exemplified by web-based augmented reality (AR). Web-based AR incorporates AR technology into web browsers, eliminating the requirement for separate programs and thereby increasing accessibility and engagement. Web-based AR connects the virtual and real worlds in unique ways, benefiting various industries. Web technologies like WebXR enable users to interact with augmented reality overlays, presenting opportunities for companies, schools, and developers. Web-based AR is a versatile tool that can redefine our digital interactions, enhancing online shopping and education through virtual try-ons and dynamic content.

(Kumar, 2022) the research focuses on AR in online procurement, exploring causes, effects, and methods. Education aims to identify research areas. Customer experience impacts values and attitudes. The study identifies top journals, theories, and methodologies. It offers a framework for understanding customer interaction with AR in online purchases. The study suggests more research in consumer engagement, AR marketing, and the social aspects and downsides of AR.

(Yavuz *et al.,* 2021) studied issues on utilizing moveable amplified realism in Turkey. The app "Augment" was used in interviews for a research study on MAR and AR. The study had three components and used over a hundred variables. Results showed security and privacy as key factors for MAR app use. Designers should consider these factors. Variables affecting MAR app use were identified. Problems with MAR apps include performance, security, display, and location tracking. User acceptance of new skills is a concern in rapidly developing sectors. This investigation also highlighted considerations of companies and app developers.

(Elveny *et al.*., 2021) The product name was examined and used to categorize similar goods from five websites. The Jaro Winkler Distance technique was used to group items in online stores. A system was developed to collect items from five websites. The accuracy of product grouping in the online shop was 81.27% in 20 test runs. Jaro-Winkler Distance is a new method for matching item names. It calculates the editing distance between two strings by transposing characters. The Jaro Winkler Distance method uses a prefix scale to improve accuracy when the strings have the same starting character.

(Ljubisavljević *et al.,* 2021) Created an augmented reality-based online shop. An examination of virtual reality technologies was conducted. An investigation into the potential uses of augmented reality in e-commerce was conducted. The integration of augmented reality into existing plans for electronic shops was also explored. The practical part of the paper showed the creation of an online store with WooCommerce solutions. The online store used augmented reality to help customers shop. The performance of the system was monitored.

(Berman and Pollack, 2021) Centred on a six-step methodology for the effective planning and execution of AR: Explored AR's potential in marketing; analyzed goods, channels, and markets for AR;

selected AR applications; created AR apps; evaluated AR structures; evaluated AR program effectiveness. Marketers get data to plan and implement an effective AR strategy. Explored the impact of AR on marketers.

(Lam *et al.,* 2021) the A2W browser, an AR tool for recommending online content, was demonstrated. It is integrated into a user-centred internet surfing experience made possible by AR headsets. A browser was developed on an AR headset to prove the effectiveness of the A2W framework. The A2W browser uses a content-based sifting technique to display AR-driven web content. In experiments, 20 participants found that the A2W browser saved time compared to using a smartphone. A2W-supported internet browsing in workplaces is faster than normal web glancing.

(Lixăndroiu *et al.*., 2021) Examined the similarity in views between standard electronic internet buying and augmented reality-based electric trade. Studied the impact of personality factors and attitudes on electronic trade. Discovered that augmented reality increases purchase intentions. Identified connections between personality traits and online shopping habits. External locus of control and low emotional stability may predict impulsive buying. Utilized the Zugara application for the quasi-experimental design. Choose a browser-based tool for the AR dressing room due to simplicity and cost-effectiveness. This technology enables users to control the software with hand motions and virtually try on clothing.

(Cannavo and Lamberti, 2020) The paper outlines the exploration of AR, VR, and Blockchain in various sectors. It highlights the potential benefits of integrating technology. The Blockchain has simplified transactions. There is a case for combining these technologies. The use of CryptoAR Wallett, which incorporates AR and Bitcoin, is recommended. Early research suggests that the CryptoAR Wallet offers a more engaging and informative experience compared to a traditional wallet interface.

(Pinaria *et al.,* 2021) Developing a system to provide information and food purchasing for the neighbourhood without leaving their houses is an aspiration. The RAD approach aids researchers in creating a culinary application. A system has been created for buying and selling food in Manado City using IT and web-based applications. The system includes an admin and a user. The admin section allows for inputting, modifying prices, and managing food data. Users can view prices and make purchases. This application helps buyers and sellers with online purchases and learning web browser technology. It also facilitates the sharing of sales and purchases.

(Munoz *et al.,* 2023) e-commerce's history, theories, and models are examined. Current trends and challenges are analyzed, taking into account the industry's global and ever-changing nature. Rapid innovations in business models and products complicate matters.

Table 2.2: Review of Web-based Augmented Reality

Author(s)	Aim	Technique Used	Limitation(s)

Kumar, 2022	Give a thorough analysis of AR in online shopping, including its causes and effects.	Analyzed a variety of literature, identifying important directions for further study.	Augmented reality in e-commerce is a dynamic topic with limited applicability. The conclusions of the study may not be universally relevant, only pertaining to specific AR features.
Yavuz et al., 2021	Find out what influences mobile augmented reality use in Turkey.	Carried out a quantitative experimental investigation to pinpoint the main relevant variables.	The research examined the factors affecting the implementation of portable augmented reality in Turkey. It may not be relevant to other areas.
Elveny et al., 2021	Create a method for classifying the items in an online store using Jaro-Winkler distance.	The Jaro-Winkler Distance method was employed to conduct testing and categorize products.	The study's findings may not apply to other aspects of e-commerce or AR as it focuses on categorizing items from online stores. Naming practices for specific products could affect the accuracy of the Jaro-Winkler Distance algorithm.
Ljubisavljević et al., 2021	Create an online electronic store with augmented reality elements.	Augmented reality technologies were examined and added to an online store, and system performance was tracked.	The study created an electronic store with augmented reality characteristics; therefore, its conclusions might not apply to other kinds of augmented reality apps. WooCommerce was used for the study's execution, which can limit its applicability to other e-commerce platforms.

Berman & Pollack, 2021	Describe a six-step procedure for developing and putting into practice an AR marketing strategy.	Outlined the planning process phases and spoke on how AR maturity affects them.	The research provides a planning method for AR strategies, although it may not take into account each person's particular circumstances and problems. The report examines the maturity of AR, however, different businesses may see different rates of AR development.
Lam et al., 2021	Create a context-aware content suggestion AR web browser for AR headsets.	A2W browser was implemented, and tests were done to gauge performance.	Although the studies for the study was done in controlled environments, actual user experiences can differ. The A2W browser is made for AR headsets, which might not cover all possible uses for AR.
Lixăndroiu et al., 2021	Examine opinions of both standard internet purchasing and e-commerce based on augmented reality.	Conducted a quasi-experimental study employing a personality-centric approach.	Personality factors are linked in the study to online purchasing activity, although individual tastes might differ greatly. The research may not encompass all AR applications because it is particularly focused on AR in retail scenarios.

Cannavo & Lamberti, 2020	Discuss the potential applications of augmented reality, virtual reality and blockchain in e-commerce.	Did a preliminary investigation and presented a case study of CryptoAR Wallett.	The study suggests a prototype; therefore, its results could not accurately represent acceptance and usage in the actual world. The study's conclusions might not be applicable in other situations because its main objective is to combine VR, AR, and Blockchain for product visualisation.
Pinaria et al., 2021	Create a web-based e-commerce platform for the purchase and sale of food, then evaluate its performance.	The food application was designed and implemented using the RAD technique.	Because the study is specifically designed for Manado City, its results might not apply to other areas or places. The system that has been built is centred on purchasing and selling food; thus, it might not be able to handle other e-commerce industries.
Munoz et al., 2023	Give a general review of e-commerce, including its basis in history, theoretical foundations, and current developments.	Discussed the development of e-commerce, its history, theoretical underpinnings, models, and current developments.	The study focuses largely on giving an academic overview of e-commerce, hence its conclusions could not completely account for the real-world difficulties that firms encounter. Since e-commerce is a dynamic industry, the report might not include the most recent trends and advancements.

2.3 Summary

The potential of augmented reality in online shopping is combined with web-based augmented reality e-commerce. Customers can use a web browser to view and interact with virtual goods in their actual

environment. Web-based AR e-commerce is more user-friendly because it doesn't require specialized software. Customers can use their smartphones to see virtual goods in their surroundings. This immersive experience improves the decision-making process. Augmented reality in web-based e-commerce can boost consumer confidence and reduce product returns, revolutionizing online shopping.

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