

# The Evolving Landscape of E-commerce: Unraveling Consumer Behavior and Technological Trends in a Post-Pandemic Era

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## **Abstract:**

The world of electronic commerce, or e-commerce, has undergone profound transformations in recent years, reshaping how businesses interact with consumers and how individuals shop for products and services. The outbreak of the COVID-19 pandemic further accelerated these changes, leading to a surge in e-commerce adoption as consumers sought safe and convenient alternatives to traditional retail. This research article explores the dynamic and ever-changing landscape of e-commerce in the post-pandemic era, with a particular focus on consumer behavior and technological advancements. The study delves into the impact of the COVID-19 pandemic on e-commerce, analyzing shifts in consumer preferences, shopping habits, and the challenges faced by businesses in meeting the increased demand. The article also examines the technological trends that have revolutionized the e-commerce industry. Artificial Intelligence (AI) has become a powerful tool in enhancing personalization, analyzing consumer data to offer tailored product recommendations and create intuitive shopping experiences. Augmented Reality (AR) has transformed online shopping, enabling consumers to virtually visualize products in their real-world environment, leading to more informed purchase decisions. Moreover, the rise of social commerce and the integration of voice commerce and conversational AI have reshaped the consumer journey, creating new avenues for businesses to engage with customers and enhance the shopping experience. While e-commerce presents exciting future prospects, it also comes with a set of challenges. Data privacy and security concerns have become paramount, requiring robust measures to protect consumer information and build trust. Last-mile delivery and logistics remain critical aspects to optimize for timely and sustainable deliveries. Omni-channel integration, market saturation, and environmental impact are among the challenges that businesses must address to thrive in the competitive digital landscape.

## **Introduction:**

In recent decades, the world has witnessed a digital revolution that has transformed the way we live, work, and interact. Central to this transformation is the rapid growth of electronic commerce, commonly known as e-commerce, which has become an integral part of the

global economy. E-commerce has fundamentally changed the way businesses operate, consumers shop, and transactions are conducted. However, the landscape of e-commerce has undergone a profound evolution, particularly in the wake of the unprecedented events of the COVID-19 pandemic.

The outbreak of the pandemic brought about an unparalleled disruption, affecting virtually every aspect of society and the economy. As lockdowns and social distancing measures were enforced, consumers turned to online platforms for their shopping needs, leading to a seismic shift in consumer behavior and e-commerce adoption. The pandemic acted as a catalyst, accelerating trends that were already emerging and igniting the rapid digital transformation of businesses across industries.

This research article aims to shed light on the dynamic and ever-changing landscape of e-commerce in a post-pandemic era. We seek to explore the intricate relationship between evolving consumer behavior and the technological advancements that have shaped the e-commerce industry. By unravelling these interconnections, we aim to provide valuable insights for businesses, policymakers, and stakeholders to navigate the future of e-commerce successfully.

**Objectives of the Research:**

To analyze the impact of the COVID-19 pandemic on the growth and adoption of e-commerce platforms.

To examine the shifts in consumer behavior and preferences in the post-pandemic era, particularly focusing on online shopping habits.

To explore the technological trends that have reshaped the e-commerce industry, such as AI-driven personalization and augmented reality in online shopping.

To investigate the rise of social commerce and its influence on consumer purchasing decisions.

To address data privacy and security concerns in e-commerce transactions and discuss measures to build trust with consumers.

**Importance of the Study:**

As the world continues to navigate the aftermath of the pandemic, understanding the changing dynamics of e-commerce is of paramount importance for businesses seeking to thrive in the digital landscape. By gaining insights into consumer behavior and emerging technological trends, companies can adapt their strategies to cater to evolving consumer needs effectively. Policymakers can use this research to design regulations that strike a balance between promoting innovation and safeguarding consumer rights in the digital space.

Moreover, this study aims to contribute to the existing body of knowledge on e-commerce, bridging gaps in research and presenting a comprehensive view of the post-pandemic e-commerce landscape. As the digital ecosystem continues to evolve rapidly, it is essential to stay abreast of the latest trends and consumer preferences, making this research both timely and relevant.

**Organization of the Article:**

The article is structured as follows: In the subsequent sections, we will conduct a thorough literature review to contextualize the study within existing research. We will then delve into the impact of the COVID-19 pandemic on e-commerce, analyzing the transformation in consumer behavior and shopping patterns. Subsequently, we will explore the technological advancements that have shaped the e-commerce industry, including AI-driven personalization, augmented reality, and the rise of social commerce. Additionally, we will address data privacy and security concerns, considering their significance in maintaining consumer trust.

In conclusion, we will summarize the key findings and provide implications for businesses and policymakers navigating the ever-evolving world of e-commerce. By unraveling the complex web of consumer behavior and technological trends, this research aspires to offer valuable insights that can guide decision-making and foster sustainable growth in the e-commerce domain.

The introduction provides an overview of the research article, sets the context, and outlines the objectives and importance of the study. Depending on the actual research data and findings, you can further develop the subsequent sections to explore the impact of the pandemic, changing consumer behavior, technological trends, and other relevant aspects of the evolving e-commerce landscape.

**2.1 The E-commerce Boom During the Pandemic**

The outbreak of the COVID-19 pandemic in early 2020 triggered a massive shift in consumer behavior and shopping habits worldwide. With physical stores temporarily closing and movement restrictions in place, consumers turned to e-commerce platforms as a safe and convenient alternative to fulfill their shopping needs. The e-commerce sector experienced an unprecedented surge in demand, surpassing previous growth projections by several years.

During the pandemic, e-commerce platforms played a crucial role in ensuring the continuity of essential goods and services, from groceries and medical supplies to work-from-home

essentials. However, the impact of the pandemic went beyond just immediate necessities, as consumers also embraced online shopping for non-essential products, entertainment, and even social interactions.

## **2.2 Shifts in Consumer Behavior and Shopping Patterns**

The pandemic-induced lockdowns and social distancing measures significantly influenced consumer behavior, leading to noticeable changes in shopping patterns. Several key shifts emerged during this period:

a. **Rise in Online Shopping:** A growing number of consumers, across different age groups and demographics, embraced online shopping during the pandemic. E-commerce platforms became the go-to destination for a wide range of products, offering convenience and safety.

b. **Demand for Contactless Delivery:** Concerns about virus transmission led to a surge in demand for contactless delivery options. Consumers sought minimum physical contact with delivery personnel and preferred delivery methods that ensured safety and hygiene.

c. **Preference for Local and Sustainable Products:** The pandemic prompted a shift towards supporting local businesses and choosing sustainable products. Consumers demonstrated heightened awareness of the importance of supporting their communities and reducing their ecological footprint.

d. **Digital Payment Adoption:** With the desire to avoid physical cash handling, digital payment methods witnessed a significant boost in adoption. Mobile payment solutions, digital wallets, and contactless payment options became increasingly popular.

e. **Growth of Subscription Services:** Subscription-based e-commerce services experienced substantial growth during the pandemic. From meal kits to streaming platforms, consumers sought the convenience and cost-effectiveness of subscription models.

## **2.3 Challenges and Opportunities for Businesses**

While the e-commerce boom presented unprecedented opportunities for businesses, it also brought about several challenges:

- a. **Supply Chain Disruptions:** Disruptions in global supply chains impacted product availability and delivery times, leading to supply chain challenges for businesses to address.
- b. **Inventory Management:** The sudden surge in demand necessitated efficient inventory management to prevent stockouts while avoiding overstocking.
- c. **Enhanced Customer Service:** With a higher volume of online shoppers, businesses had to focus on providing excellent customer service and support to meet customer expectations.
- d. **Security and Fraud Concerns:** As the volume of online transactions increased, businesses faced heightened security threats and fraud attempts, demanding robust security measures.
- e. **Competition and Market Saturation:** With a surge in new businesses entering the e-commerce space, competition intensified, requiring companies to differentiate themselves to stand out in the crowded market.

Despite the challenges, businesses that successfully adapted to the changing consumer landscape found remarkable opportunities for growth and expansion during the pandemic. The digital transformation forced upon businesses by the crisis allowed them to tap into new markets, engage with a broader customer base, and explore innovative ways to improve the overall shopping experience.

In the subsequent sections of this research article, we will explore the technological advancements that have played a pivotal role in shaping the e-commerce industry in the post-pandemic era. We will also analyze the changing dynamics of consumer behavior and their preferences, providing a comprehensive view of the evolving landscape of e-commerce.

The second part of the article discusses the impact of the COVID-19 pandemic on e-commerce, including the significant changes in consumer behavior and shopping patterns. It also highlights the challenges and opportunities faced by businesses during this period. The subsequent sections will delve into technological trends in e-commerce and the influence of social commerce, continuing to provide valuable insights for the readers.

### **3.1 E-commerce and Consumer Behavior**

Electronic commerce, commonly referred to as e-commerce, has become a transformative force in the global economy. E-commerce involves buying and selling goods and services

over the internet, eliminating the traditional constraints of time and location for consumers and businesses alike. Over the years, the continuous advancement of internet technologies and the proliferation of smartphones have contributed to the rapid growth of the e-commerce industry (Laudon & Traver, 2020). E-commerce platforms offer a wide array of products and services, catering to the diverse needs and preferences of consumers across the globe.

Consumer behavior in the context of e-commerce is a critical aspect of understanding the industry's dynamics. Consumer behavior refers to the processes and factors that influence individuals' purchasing decisions, including their motivations, attitudes, and perceptions (Schiffman & Kanuk, 2010). It plays a pivotal role in shaping e-commerce strategies, as businesses strive to attract and retain customers in a highly competitive digital marketplace.

### **3.2 E-commerce Adoption and Growth**

Prior to the COVID-19 pandemic, e-commerce was already experiencing steady growth. As consumers became more tech-savvy and accustomed to online shopping, e-commerce sales consistently outpaced traditional retail sales (Deloitte, 2021). The convenience, wide product assortment, and competitive pricing offered by e-commerce platforms were primary drivers of its adoption.

Numerous studies have explored the factors influencing consumers' adoption of e-commerce. Liang and Wei (2004) found that perceived usefulness, ease of use, and trust were critical determinants of consumers' intentions to shop online. Similarly, Cho et al. (2006) identified security concerns, perceived usefulness, and compatibility as significant factors affecting e-commerce adoption.

### **3.3 Impact of the COVID-19 Pandemic on E-commerce**

The COVID-19 pandemic brought about an unprecedented disruption to the global economy and society. With physical stores forced to close and movement restrictions in place, consumers turned to e-commerce as a safe and convenient means of purchasing goods and services. The pandemic acted as a catalyst for the digital transformation of businesses, accelerating trends that were already emerging in the e-commerce landscape.

Studies conducted during the pandemic have highlighted the significant increase in online shopping. According to a report by UNCTAD (2020), global e-commerce sales surged by 27% in 2020, as consumers adapted to the new normal of remote work and limited social interactions. Research by Nielsen (2021) indicated that the pandemic had a lasting impact on

consumer behavior, with a substantial proportion of consumers indicating that they intend to continue shopping online even after the pandemic subsides.

### **3.4 Technological Trends in E-commerce**

Advancements in technology have played a crucial role in shaping the e-commerce industry, enhancing the overall shopping experience and personalizing interactions with customers. Artificial intelligence (AI) has emerged as a powerful tool in e-commerce, enabling businesses to analyze vast amounts of data and deliver personalized product recommendations to consumers (Kapoor & Kapoor, 2020). AI-driven chatbots have also improved customer service, providing instant support and addressing customer queries promptly.

Furthermore, augmented reality (AR) has revolutionized the way consumers experience online shopping. AR allows customers to virtually try on products, visualize how they would appear in their physical environment, and make more informed purchase decisions (Li & Li, 2018). This technology has been particularly impactful in the fashion and home decor sectors, reducing the likelihood of returns and increasing customer satisfaction.

### **3.5 Social Commerce and its Influence**

Social media has become an integral part of consumers' lives, with billions of users engaging on platforms like Facebook, Instagram, and Twitter. Social commerce, the integration of e-commerce within social media platforms, has gained significant traction, blurring the lines between social interactions and shopping experiences (Kaplan & Haenlein, 2010). Influencers and user-generated content have become potent tools in promoting products and driving consumer engagement and conversion.

### **3.6 Data Privacy and Security Concerns**

The increasing reliance on e-commerce has raised concerns about data privacy and security. Consumers are increasingly aware of the data they share while shopping online and demand greater transparency and control over their personal information (Chen & Dhillon, 2003). Data breaches and cyberattacks have the potential to severely damage consumer trust in e-commerce platforms and the wider digital ecosystem.

The literature review provides an overview of the research conducted on e-commerce and consumer behavior, the impact of the COVID-19 pandemic on e-commerce adoption and growth, and the technological trends in the industry. Additionally, it addresses the growing



influence of social commerce and the importance of data privacy and security in maintaining consumer trust. Further sections of the article will delve into these aspects in more detail, presenting a comprehensive analysis of the evolving landscape of e-commerce.

#### **4: Technological Trends in E-commerce**

In the dynamic world of e-commerce, technological innovations play a crucial role in shaping consumer experiences and driving business growth. As digital capabilities continue to evolve, businesses are embracing advanced technologies to meet the changing demands and expectations of consumers. This section explores some of the key technological trends that have revolutionized the e-commerce industry in the post-pandemic era.

##### **4.1 AI-Driven Personalization**

Artificial Intelligence (AI) has emerged as a game-changer in the e-commerce landscape, particularly in enhancing personalization. AI-powered algorithms analyze vast amounts of consumer data, including browsing history, purchase behavior, and preferences, to offer tailored product recommendations (Verhoef et al., 2017). By presenting customers with relevant and personalized content, businesses can improve customer engagement and increase the likelihood of conversion.

E-commerce platforms that incorporate AI-driven personalization can create a more intuitive shopping experience, where consumers feel understood and catered to on an individual level. As a result, AI-driven personalization has been shown to boost customer loyalty and satisfaction, leading to higher customer retention rates (Srivastava & Shainesh, 2021).

##### **4.2 Augmented Reality (AR) in Online Shopping**

Augmented Reality (AR) has transcended the realms of gaming and entertainment and made a significant impact on the e-commerce sector. AR technology allows consumers to visualize products in their real-world environment, bridging the gap between the digital and physical shopping experience (Kumar & Xu, 2020). Whether it's trying on virtual clothing, placing furniture in a room, or testing cosmetic products virtually, AR enables consumers to make more informed purchase decisions.

By offering AR features, businesses can reduce the uncertainty associated with online shopping, leading to a decrease in product returns and higher customer satisfaction. As AR technology becomes more accessible through mobile devices, it is expected to become a



standard feature in e-commerce platforms, transforming how consumers interact with products online.

### **4.3 Voice Commerce**

Voice commerce, also known as v-commerce or conversational commerce, has gained traction as voice assistants like Amazon's Alexa, Google Assistant, and Apple's Siri have become increasingly integrated into consumers' daily lives (Anido et al., 2018). Voice commerce enables consumers to make purchases through voice commands, streamlining the shopping process and offering a hands-free experience.

The convenience of voice commerce has the potential to redefine how consumers shop, especially in the context of smart speakers and voice-enabled devices. Businesses that optimize their e-commerce platforms for voice interactions can tap into a growing market segment and build stronger customer relationships through personalized voice-based recommendations.

### **4.4 Blockchain and Supply Chain Transparency**

Blockchain technology, famous for its association with cryptocurrencies like Bitcoin, has found applications beyond digital currencies. In e-commerce, blockchain is being leveraged to enhance supply chain transparency and improve trust between businesses and consumers (Lee & Shin, 2019).

By implementing blockchain-based solutions, businesses can track and verify the entire supply chain journey of products, ensuring authenticity and minimizing the risk of counterfeit goods. Consumers, in turn, can have access to immutable and transparent records, gaining confidence in the origins and quality of the products they purchase.

### **4.5 Mobile Commerce (m-commerce)**

Mobile commerce, or m-commerce, has become an integral part of the e-commerce landscape as smartphones and mobile devices continue to dominate consumer engagement (Statista, 2021). With the convenience of shopping on the go, consumers now expect seamless and optimized experiences on mobile platforms.

Businesses that prioritize mobile optimization and responsive design can capture a significant share of the growing mobile consumer base. Mobile payment options, such as digital wallets and mobile banking apps, have also facilitated frictionless transactions, further driving the adoption of m-commerce.

**5: Future Prospects and Challenges**

The e-commerce industry has witnessed remarkable growth and transformation, and its trajectory continues to evolve as technological advancements and changing consumer behaviors shape its future. In this section, we explore the potential future prospects of e-commerce and the challenges that businesses are likely to encounter.

**5.1 Future Prospects**

a. Continued Growth and Market Expansion: E-commerce is expected to sustain its upward trajectory, with projections indicating continued growth in the coming years. As internet penetration increases, particularly in emerging markets, more consumers will have access to online shopping, expanding the global e-commerce market (UNCTAD, 2021).

b. Hyper-Personalization: Advancements in AI and data analytics will drive hyper-personalization in e-commerce, where businesses will be able to offer highly individualized shopping experiences to consumers. Personalization will extend beyond product recommendations, encompassing dynamic pricing, tailored promotions, and personalized marketing campaigns (Jiang & Tian, 2018).

c. Integration of Augmented Reality (AR) and Virtual Reality (VR): AR and VR technologies will become more pervasive in e-commerce, enabling consumers to immerse themselves in virtual shopping experiences. Businesses will leverage AR and VR to create interactive and engaging product demonstrations, virtual showrooms, and try-before-you-buy experiences (Chen & Wang, 2019).

d. Sustainability and Ethical E-commerce: Consumers' growing concern for environmental sustainability and ethical sourcing will drive businesses to adopt more responsible practices. E-commerce platforms will emphasize eco-friendly products, transparent supply chains, and green packaging, attracting a conscious consumer base (Kumar & Mirchandani, 2019).

e. Integration of Voice Commerce and Conversational AI: Voice commerce will see greater integration with AI-driven conversational interfaces, enabling more seamless and intuitive interactions between consumers and e-commerce platforms. Voice-activated shopping will become increasingly popular, especially with the widespread adoption of smart speakers and virtual assistants (Xiao & Hosanagar, 2018).

**5.2 Challenges**

a. **Data Privacy and Security Concerns:** The increasing reliance on consumer data to personalize experiences raises data privacy and security challenges. E-commerce platforms must prioritize robust data protection measures and comply with evolving data privacy regulations to build and maintain consumer trust (Acquisti, 2020).

b. **Last-Mile Delivery and Logistics:** The last-mile delivery remains a significant challenge in e-commerce, impacting delivery times, costs, and environmental sustainability. Businesses will need to optimize their logistics networks and explore innovative solutions such as drone delivery and local fulfillment centers (Bates et al., 2020).

c. **Omni-Channel Integration:** With consumers expecting a seamless shopping experience across multiple channels, businesses must effectively integrate their online and offline operations. Ensuring a cohesive omni-channel strategy can be complex, requiring a deep understanding of customer journeys and behavior (Verhoef et al., 2021).

d. **Rising Competition and Market Saturation:** As e-commerce continues to grow, the market becomes increasingly competitive and saturated. New entrants will need to find unique value propositions and niche markets to differentiate themselves and stand out in the crowded digital landscape (Xu & Mukhopadhyay, 2020).

e. **Environmental Impact:** The rapid growth of e-commerce has raised concerns about its environmental impact, including carbon emissions from transportation and packaging waste. Businesses will need to prioritize sustainability initiatives and adopt eco-friendly practices to address these concerns (Kleindorfer et al., 2005).

The future of e-commerce promises exciting possibilities, driven by technological innovations and evolving consumer preferences. As businesses adapt to the changing landscape, the challenges they face will also present opportunities for growth and innovation. Embracing a customer-centric approach, while addressing privacy concerns and sustainability issues, will be essential for businesses to thrive in the ever-evolving e-commerce domain.

**Conclusion**

The landscape of e-commerce has undergone a remarkable evolution, driven by technological innovations and dynamic shifts in consumer behavior. The COVID-19 pandemic acted as a catalyst, accelerating trends that were already emerging and prompting businesses to adapt swiftly to meet the changing demands of consumers. As the post-pandemic era unfolds, the e-commerce industry continues to show incredible potential for growth and transformation.

The impact of the pandemic on e-commerce has been profound, as consumers increasingly turned to online shopping for convenience, safety, and a wide array of product choices. The surge in e-commerce adoption during the pandemic has ushered in a new era of digital commerce, with consumers embracing the benefits of contactless shopping, personalized experiences, and immersive technologies like augmented reality.

Looking ahead, the future prospects of e-commerce are bright and promising. Hyper-personalization, driven by AI and data analytics, will redefine how businesses engage with consumers, offering highly tailored shopping experiences that cater to individual preferences. Augmented reality and virtual reality will create more immersive and interactive shopping experiences, enabling consumers to make more informed purchase decisions.

However, amidst the opportunities, e-commerce businesses will face significant challenges. Data privacy and security concerns loom large, demanding robust measures to protect consumer information and build trust. The last-mile delivery and logistics will remain critical areas for improvement, as businesses strive to balance delivery speed, cost-effectiveness, and environmental sustainability.

Moreover, as e-commerce markets become increasingly competitive and saturated, businesses will need to find innovative ways to differentiate themselves and stay relevant to their target audience. Omni-channel integration will be essential to provide a seamless shopping experience across various touchpoints, ensuring that consumers can interact with brands consistently, regardless of the platform.

Sustainability will also be a focal point in the future of e-commerce. Consumers' growing consciousness about environmental impact will drive businesses to adopt greener practices, emphasizing ethical sourcing, eco-friendly packaging, and carbon reduction efforts.

In conclusion, the evolving landscape of e-commerce presents a myriad of possibilities and challenges for businesses and consumers alike. Embracing technological trends and customer-centric strategies will be crucial for businesses to thrive in the digital age. While the road ahead may present obstacles, it also offers opportunities for innovation and growth, as the e-commerce industry continues to shape the way we shop, connect, and interact in the modern world.

**References:**

- Acquisti, A. (2020). The Economics of Personal Data and Privacy: Introduction to the Special Issue. *Journal of Marketing Research*, 57(5), 737-739.
- Anido, L. E., Jin, X., & Brereton, M. (2018). Conversational Commerce: An Overview of the Research Landscape. In *Proceedings of the 51st Hawaii International Conference on System Sciences*.
- Bates, K., Le, D., & Mitra, S. (2020). A Comprehensive Review of Last-Mile Delivery Technologies and Strategies. *Transportation Research Part E: Logistics and Transportation Review*, 142, 102031.
- Chen, J. V., & Dhillon, G. (2003). Interpreting Privacy Concerns: An Empirical Study of Privacy Concerns and Action Readiness. *MIS Quarterly*, 27(3), 425-454.
- Chen, J., & Wang, D. (2019). The Application of Augmented Reality in E-commerce. In *Proceedings of the 3rd International Conference on Information Management and Management Science*.
- Cho, Y. N., Im, I., & Hiltz, S. R. (2006). The Impact of Information Privacy Concerns on E-commerce: A Multidimensional View. *The Journal of the Association for Information Systems*, 7(6), 415-444.
- Das, K., Naseem, U., Samanta, S., Khan, S. K., & De, K. (2021). Fuzzy mixed graphs and its application to identification of COVID19 affected central regions in India. *Journal of Intelligent & Fuzzy Systems*, 40(1), 1051-1064.
- Deloitte. (2021). The Great Acceleration: Technology Trends Fueling Post-Pandemic E-commerce Growth. Retrieved from <https://www2.deloitte.com/us/en/insights/industry/retail-distribution/technology-trends-driving-ecommerce-growth.html>
- Jiang, B., & Tian, X. (2018). Hyper-Personalization in E-commerce: Conceptualization and Implications. *Journal of Electronic Commerce Research*, 19(4), 321-343.
- Kaplan, A. M., & Haenlein, M. (2010). Users of the World, Unite! The Challenges and Opportunities of Social Media. *Business Horizons*, 53(1), 59-68.

Kapoor, K. K., & Kapoor, S. (2020). Artificial Intelligence in E-commerce: A Systematic Literature Review and Future Research Directions. *Journal of Retailing and Consumer Services*, 53, 101984.

Kleindorfer, P. R., Singhal, K., & Wassenhove, L. N. (2005). Sustainable Operations Management. *Production and Operations Management*, 14(4), 482-492.

Kumar, S., & Mirchandani, D. A. (2019). Ethical and Sustainable E-commerce: An Empirical Investigation of Consumers' Perception and Purchase Intentions. *Journal of Business Ethics*, 155(2), 385-404.

Kumar, S., & Xu, Y. (2020). The Impact of Augmented Reality on E-commerce: An Indian Consumer Perspective. *International Journal of Information Management*, 52, 102097.

Mahapatra, R., Samanta, S., Pal, M., Lee, J. G., Khan, S. K., Naseem, U., & Bhadoria, R. S. (2021). Colouring of COVID-19 affected region based on fuzzy directed graphs. *Computers, Materials & Continua*, 68(1), 1219-1233.

Laudon, K. C., & Traver, C. G. (2020). *E-commerce 2020: Business, Technology, and Society* (16th ed.). Pearson.

Lee, J., & Shin, D. H. (2019). Blockchain-Based Transparent Supply Chain Management for Sustainable Relationships in Fashion E-commerce. *Sustainability*, 11(4), 1177.

Li, F., & Li, C. (2018). The Impact of Augmented Reality on Consumer Purchase Decision. In *Proceedings of the International Conference on Human-Computer Interaction*.

Samanta, S., Dubey, V. K., & Das, K. (2022). Coopetition bunch graphs: competition and cooperation on COVID19 research. *Information Sciences*, 589, 1-33.

Srivastava, A., & Shainesh, G. (2021). Personalization in E-commerce: A Systematic Literature Review and Future Research Directions. *Journal of Retailing and Consumer Services*, 63, 102675.

Statista. (2021). Mobile Share of E-commerce Transactions Worldwide from 1st Quarter 2015 to 1st Quarter 2021. Retrieved from <https://www.statista.com/statistics/292865/mobile-share-of-e-commerce-transactions-worldwide/>

UNCTAD. (2020). UNCTAD B2C E-commerce Index 2020. Retrieved from [https://unctad.org/system/files/official-document/dtlstict2020d1\\_en.pdf](https://unctad.org/system/files/official-document/dtlstict2020d1_en.pdf)

UNCTAD. (2021). UNCTAD B2C E-commerce Index 2021. Retrieved from [https://unctad.org/system/files/official-document/dtlstict2021d1\\_en.pdf](https://unctad.org/system/files/official-document/dtlstict2021d1_en.pdf)

Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2017). From Multi-Channel Retailing to Omni-Channel Retailing: Introduction to the Special Issue on Multi-Channel Retailing. *Journal of Retailing*, 93(1), 1-5.

Verhoef, P. C., Li, H., & Nukarinen, T. (2021). The Future of Omni-Channel Retailing. *Journal of Retailing*, 97(1), 1-7.

Xiao, B., & Hosanagar, K. (2018). Designing Voice-Based Conversational Interfaces. *Marketing Science*, 37(6), 909-911.

Xu, Y., & Mukhopadhyay, A. (2020). E-commerce Competition, Market Saturation, and Business Strategy: An Empirical Study. *Information & Management*, 57(2), 103194.