

Exploring E-Commerce Landscapes: Types, Computing Techniques, and Market Trends in Malaysia

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ABSTRACT

The rapid evolution of e-commerce is reshaping global business landscapes, particularly within Malaysia's digital economy. This study examines key aspects of e-commerce, including its classifications, computing techniques, and emerging trends, specifically focusing on the Malaysian market. Adopting a review-based approach, the study analyzes technological advancements such as cloud computing, augmented reality (AR), and mobile commerce (M-commerce), emphasizing their impact on business operations and consumer behavior. Additionally, it explores the role of e-commerce in enhancing business competitiveness, addressing cybersecurity threats, and identifying emerging opportunities in the local market. The findings suggest that e-commerce, driven by technological innovation, offers substantial growth potential for Malaysian businesses. This paper contributes to the existing literature by identifying research gaps and providing actionable insights for policymakers and companies aiming to leverage e-commerce trends. Furthermore, it presents recommendations for future research, particularly in exploring the intersection of artificial intelligence and e-commerce in Malaysia.

Keywords— Electronic Commerce, Business Competitiveness, Computing Techniques, Digital Economy

INTRODUCTION

The globalization of information technology has fundamentally transformed business operations, fostering efficiency, innovation, and competitiveness in today's interconnected world. Among these transformative forces, e-commerce has emerged as a vital mechanism for conducting business transactions. As digital technologies continue to advance and online platforms proliferate, e-commerce has become an essential component of modern business, enabling seamless cross-border transactions [1] [2].

E-commerce encompasses the use of digital technologies and electronic communication to facilitate economic transactions, leading to the transformation and reconfiguration of traditional business models [3]. This digital transformation allows businesses to engage with global consumers, thereby increasing sales, revenue, and customer interaction [1]. Beyond facilitating transactions, e-commerce empowers consumers by enabling price comparisons and product browsing, whether online or in physical stores. While often used interchangeably, the terms "e-business" and "e-commerce" differ, with e-business encompassing broader functions such as marketing, logistics, and customer relations [4].

Recent trends highlight the rapid expansion of mobile commerce (m-commerce), which has significantly shifted online transactions toward mobile devices. Mobile-optimized websites, applications, and digital payment solutions have enhanced consumer convenience and transaction security. According to [5], m-commerce accounted for more than half of all e-commerce transactions in 2020, with continued growth anticipated. Similarly, social commerce has gained traction, enabling transactions directly through social media platforms such as TikTok, Instagram, and Facebook, further accelerating the adoption of online shopping [6] [7].

This paper provides a comprehensive analysis of e-commerce, exploring its various types, the computing technologies driving digital transactions, and the challenges and opportunities within the Malaysian market [8] [9].

TYPES OF E-COMMERCE

E-commerce encompasses various transaction models, each with unique characteristics and applications. The six primary types of e-commerce are: Business-to-Business (B2B), Business-to-Consumer (B2C), Business-to-Administration (B2A), Consumer-to-Consumer (C2C), Consumer-to-Business (C2B), and Consumer-to-Administration (C2A) [10], as illustrated in Figure 1.

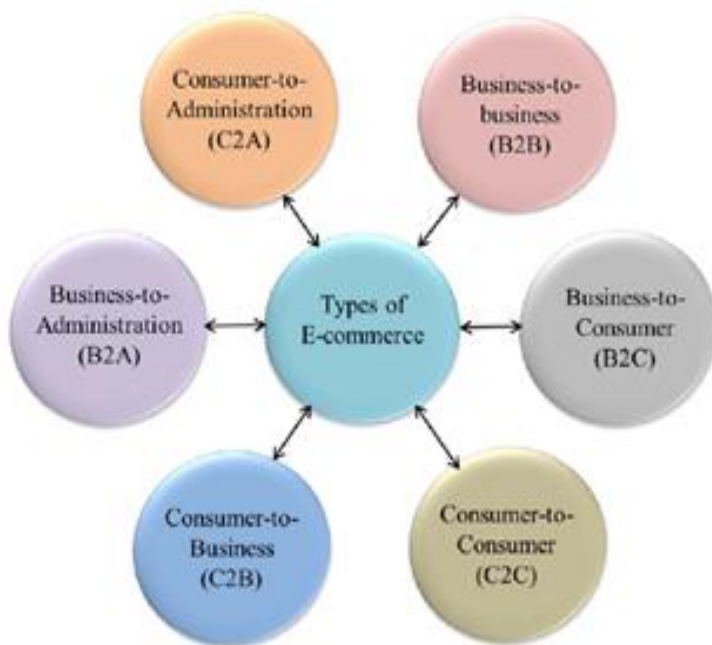


Fig. 1 Schematic illustration of the Types of the E-commerce [10]

Business to Business (B2B)

B2B e-commerce involves the exchange of goods, services, or information between businesses rather than between businesses and individual consumers. This model typically caters to wholesale transactions, where one business sells products in bulk to another business. B2B transactions are often more complex due to the larger volumes involved, as well as the diverse payment methods, product catalogs, and variations in products required by different companies. Leading examples of rapidly expanding B2B companies include Flexfire LED, Assurant, and Spectrum Audio, which provide specialized products and services to other businesses, rather than individual consumers.

Business to Consumer (B2C)

B2C is the most commonly recognized form of e-commerce, in which businesses sell products or services directly to end consumers through online platforms. This model allows companies to reach a global market, offering a 24/7 online presence where customers can browse products, make purchases, and receive customer support. B2C platforms include online stores, digital marketplaces, and various e-commerce websites that provide goods ranging from consumer electronics to groceries. Notable examples include Amazon, Alibaba, and Walmart.

Consumer to Consumer (C2C)

In the C2C model, transactions occur between individual consumers, typically facilitated by a third-party platform that provides a marketplace for these exchanges. C2C e-commerce allows consumers to sell goods or

services directly to other consumers. Popular platforms such as eBay, Craigslist, and Poshmark enable individuals to engage in e-commerce without the need for a traditional intermediary. C2C transactions often involve second-hand goods or peer-to-peer services, offering convenience and cost savings to both buyers and sellers.

Consumer to Business (C2B)

The C2B model represents a reversal of the traditional e-commerce paradigm. In this model, consumers offer products or services to businesses, rather than businesses providing goods or services to consumers. Common examples include freelance platforms like Upwork and Fiverr, where individuals offer their services to businesses in need. Similarly, consumers might sell photographs on platforms like iStockphoto or contribute to crowdsourced content that companies can utilize. C2B transactions are also commonly found in crowdsourcing and product review platforms, where businesses purchase consumer-generated content or insights.

Business to Administration (B2A)

B2A e-commerce involves online transactions between businesses and government agencies. This type of e-commerce is prevalent in sectors such as finance, social security, legal services, and employment. Companies providing digital solutions may offer services related to taxes, public records, or healthcare management to government entities. With the growth of e-government initiatives, the volume of B2A transactions has significantly increased, as governments worldwide adopt digital platforms for public services and administrative functions.

Consumer to Administration (C2A)

In the C2A model, transactions occur between individual consumers and governmental bodies or public administration systems. These transactions typically involve services such as paying taxes, applying for government benefits, or participating in public programs like remote learning or social security. For example, students engaging in online education platforms or individuals submitting tax returns online are part of the C2A model. This category is expanding rapidly, particularly with the rise of digital government services and the integration of e-services into daily life.

COMPUTING TECHNIQUES IN E-COMMERCE

The advancement of computing technologies has significantly enhanced the efficiency and scalability of e-commerce. These innovations reduce operational costs, improve communication between vendors and consumers, and enable sophisticated promotional strategies. Modern e-commerce operations rely on a robust digital infrastructure comprising information technology, communication systems, and data management techniques [4]. Key technological advancements transforming e-commerce include:

1. Cloud Computing – Enables scalable infrastructure, reducing costs while ensuring security and reliability [11].
2. Augmented Reality (AR) – Enhances the online shopping experience by allowing customers to visualize products in real-world environments [12].
3. Shoppable Videos – Allows consumers to purchase directly through interactive video content, improving engagement and conversion rates [13].
4. Voice Commerce – Facilitates hands-free transactions through voice assistants such as Amazon Alexa and Google Assistant.
5. Chatbots and Conversational AI – Improves customer service efficiency by providing instant responses and personalized recommendations [14].
6. Blockchain Technology – Strengthens transaction security by ensuring transparency, reducing fraud, and enhancing trust in e-commerce transactions [15].

These technologies continue to redefine online shopping experiences, providing businesses with new opportunities for customer engagement and operational efficiency.

Technologies Changing E-Commerce

The e-commerce landscape is evolving rapidly, driven by emerging technologies that enhance the customer shopping experience and introduce innovative methods for online retailers to engage with consumers. One such technology is Augmented Reality (AR), which enables customers to visualize products in real-world environments before making a purchase. This immersive technology has transformed online shopping by allowing consumers to virtually try on clothing and accessories or preview furniture and home décor within their living spaces. Companies such as IKEA (IKEA Place), Houzz, Sephora, and Shopify have already incorporated AR into their platforms, providing a more interactive and personalized shopping experience. As AR technology advances, it has the potential to bridge the gap between digital and physical retail, offering a level of consumer engagement that traditional e-commerce cannot achieve [12]. By integrating AR, e-commerce businesses can enhance the shopping experience, increase sales, and strengthen long-term customer relationships in an increasingly competitive market. Figure 2 illustrates an example of the IKEA Place application.



Fig. 2 Example IKEA place application

Another emerging technology transforming the e-commerce experience is shoppable video content, which enables users to purchase products directly from a brand's video advertisements or promotional material. This format has gained significant traction in 2023, with businesses reporting conversion rates of up to 30% through interactive video elements [13]. Shoppable videos create an engaging and immersive shopping experience by allowing viewers to click on displayed products and make purchases without leaving the video. Leading brands such as Burberry, Rebecca Minkoff, and Sephora have adopted this technology to drive sales and enhance customer engagement. By integrating shoppable videos, e-commerce platforms can improve digital experiences, increase conversion rates, and strengthen brand loyalty.

Additionally, voice shopping is reshaping the e-commerce industry, driven by voice assistants such as Amazon Alexa, Google Assistant, and Apple Siri. This technology allows customers to browse products, add items to their carts, and complete purchases using voice commands. With ongoing advancements in natural language processing (NLP), voice commerce presents an opportunity for businesses to offer hands-free, intuitive shopping experiences tailored to customer preferences and lifestyles [11]. The increasing convenience of voice shopping, combined with its potential for enhanced personalization, suggests that this technology may become a standard purchasing method across various industries as it continues to evolve.

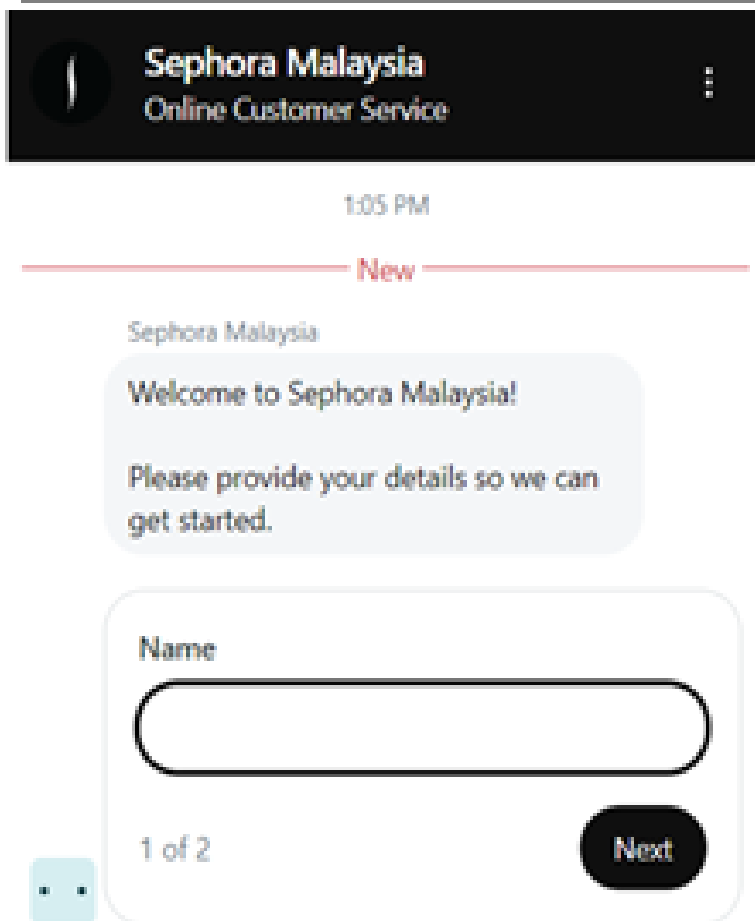


Fig. 3 Sephora Chatbox

Chatbots have become an essential component of e-commerce platforms, significantly enhancing customer support and overall user experience. By leveraging Conversational AI, businesses can provide real-time customer assistance, recommend products, and facilitate transactions. This technology improves customer satisfaction by addressing inquiries promptly and reducing response times. Leading companies such as SnapTravel, Nike (StyleBot), Whole Foods, and Sephora have integrated chatbots to engage consumers, streamline purchasing processes, and efficiently resolve customer concerns (Sharma et al., 2022). As AI-driven solutions continue to advance, chatbots are expected to play an increasingly prominent role in e-commerce, further enhancing customer engagement and operational efficiency.

Emerging technologies are also transforming personalized shopping experiences. Beacon technology, which utilizes Bluetooth Low Energy (BLE) signals, can detect nearby mobile devices and deliver targeted content and promotional offers based on a customer's location and preferences (Jiang et al., 2023). This innovation enables businesses to send personalized promotions, attract foot traffic to physical stores, and strengthen omnichannel retail strategies. Additionally, cross-channel integration is becoming increasingly important in ensuring that customers can seamlessly transition between different devices and platforms while maintaining their shopping progress. This feature enhances continuity and convenience, reducing friction in the purchasing journey [11].

Furthermore, mobile payment solutions, including digital wallets such as Apple Pay and Google Pay, continue to improve convenience and security in e-commerce transactions. By streamlining the checkout process and offering secure payment options, e-commerce platforms can reduce cart abandonment rates and increase conversion rates, contributing to a smoother and more efficient shopping experience [1].

Blockchain technology has also emerged as a pivotal tool in enhancing the security of online transactions. By providing transparency, traceability, and fraud prevention, blockchain ensures secure payments and guarantees product authenticity through smart contracts and decentralized ledgers [15]. This innovation significantly reduces fraud risks and fosters trust between consumers and online retailers. Additionally, the integration of

biometric authentication methods, such as fingerprint scanning, facial recognition, and iris scanning, further enhances security in e-commerce transactions, providing customers with a secure and convenient authentication process [16].

E-COMMERCE CHALLENGE

While e-commerce offers numerous advantages, it also presents several challenges for businesses and consumers. Like other technological advancements, e-commerce continues to encounter hurdles that affect both buyers and sellers in the digital marketplace.

Intense Market Competition

The e-commerce industry is highly competitive, with numerous businesses vying for consumer attention. To differentiate themselves from competitors, companies must implement innovative marketing strategies, offer high-quality products, and provide exceptional customer service. Maintaining competitiveness requires continuous investment in technological advancements and infrastructure to ensure a seamless user experience. Online shopping platforms must be equipped with robust technical capabilities to manage website traffic, process transactions efficiently, and adapt to evolving consumer preferences. Keeping pace with rapid technological developments and ensuring system reliability remain significant challenges for e-commerce businesses.

Cybersecurity Risks

As e-commerce grows, so do cybersecurity threats. Online platforms are increasingly vulnerable to cyber risks such as data breaches, hacking, and identity theft. Protecting sensitive customer information and ensuring secure transactions remain critical concerns for businesses operating in the digital space [17]. Studies highlight that cybersecurity is among the most pressing challenges for online retailers, requiring companies to implement advanced security measures and comply with data protection regulations [4]. Strengthening encryption protocols, fraud detection systems, and user authentication methods is essential for mitigating security risks.

Adapting to Market Trends and Consumer Behavior

E-commerce businesses must remain flexible and responsive to changing market trends and consumer behavior. Rapid technological advancements, shifting consumer preferences, and the emergence of new sales channels require businesses to adopt agile strategies. Successful adaptation involves integrating digital transformation initiatives, embracing social commerce, and leveraging personalized marketing to cater to evolving consumer expectations. Businesses that fail to adjust risk losing relevance in an increasingly dynamic and competitive market.

Building Customer Trust and Confidence

Establishing and maintaining customer trust is essential for long-term success in e-commerce. However, concerns related to online privacy, data security, and fraudulent activities can undermine consumer confidence. To address these concerns, businesses must prioritize transparency, accountability, and secure transaction mechanisms. Implementing clear data protection policies, providing secure payment options, and maintaining consistent customer communication can help build trust and differentiate a brand from its competitors. Strengthening consumer confidence fosters long-term relationships, enhances customer loyalty, and drives sustainable business growth.

E-COMMERCE TRENDS AND POTENTIAL IN THE MODERN MARKET MALAYSIA

E-commerce in Malaysia continues to evolve, offering businesses significant opportunities while presenting various challenges that must be addressed to remain competitive. One of the primary challenges is the intensely competitive market, where numerous businesses vie for consumer attention. To differentiate themselves, companies must implement innovative marketing strategies, offer high-quality products, and enhance customer service to maintain a strong market presence [11]. Additionally, the rapid advancement of digital technologies

requires businesses to continuously invest in robust technical infrastructure to manage website traffic, ensure seamless transactions, and enhance user experiences. As e-commerce scales, companies must also focus on system reliability and adaptability to keep pace with shifting consumer preferences and technological trends [12].

Beyond competition and infrastructure, cybersecurity remains a critical concern for e-commerce businesses. The increasing reliance on digital platforms has exposed companies and consumers to risks such as data breaches, hacking, and identity theft. To ensure secure transactions and protect customer data, businesses must invest in advanced security technologies and comply with data protection regulations. Failure to address these issues can result in significant financial losses and reputational damage. As cyber threats continue to evolve, businesses must adopt proactive security measures, such as encryption protocols, fraud detection systems, and multi-factor authentication, to safeguard their platforms and maintain consumer trust [15][17].

Moreover, adapting to changing market trends and consumer behavior is essential for sustaining long-term success in Malaysia's dynamic e-commerce landscape. With consumers increasingly embracing mobile commerce (m-commerce) and social commerce, businesses must remain agile and responsive to these shifts [1]. The integration of emerging technologies, such as voice commerce and augmented reality (AR) shopping, can further enhance customer engagement and drive sales. Companies that fail to adopt digital transformation initiatives and omnichannel strategies risk falling behind in an ever-evolving marketplace [14].

Another major challenge is establishing and maintaining consumer trust, which is crucial for the success of online businesses. Many consumers remain hesitant to share personal information or conduct transactions on unfamiliar platforms due to concerns over online privacy, data security, and fraudulent activities. To build trust, businesses must prioritize transparency, accountability, and clear communication regarding their privacy policies and data protection measures. By implementing secure payment gateways, clear refund policies, and strong customer support, e-commerce platforms can foster long-term customer relationships and differentiate themselves from competitors [11].

In conclusion, while the Malaysian e-commerce sector presents vast growth potential, businesses must address challenges related to market competition, cybersecurity threats, evolving consumer preferences, and trust-building. By leveraging technological advancements, enhancing security frameworks, and improving customer experiences, e-commerce businesses can drive innovation, sustain growth, and strengthen their position in the digital economy.

CONCLUSIONS

E-commerce is set to remain a central force in the global business landscape, continuously shaping market dynamics and consumer behavior. Its rapid expansion has redefined traditional market structures by creating new economic opportunities and extending market boundaries. Beyond fostering economic growth, e-commerce has enhanced consumer accessibility to goods and services, improving overall quality of life by providing greater convenience and flexibility. However, despite its numerous advantages, e-commerce also presents challenges, particularly for traditional industries struggling to maintain competitiveness in an increasingly digitalized economy.

A major challenge in e-commerce adoption is the disparity between economically developed and developing countries. In less developed nations, infrastructure limitations, such as low internet penetration and restricted digital access, create significant barriers to entry. In contrast, developed countries have witnessed faster e-commerce adoption due to well-established technological infrastructure. As internet accessibility continues to improve worldwide, e-commerce is expected to expand even further, though businesses in some regions may still face difficulties in transitioning to digital platforms.

One of the most compelling advantages of e-commerce is convenience, which plays a vital role in fostering customer loyalty. The ability to shop at any time, from any location, and access multiple payment options makes online commerce highly attractive to consumers. Businesses that offer seamless user experiences, including personalized recommendations, secure transactions, and efficient delivery services, are more likely to gain a

competitive advantage. Furthermore, e-commerce allows businesses to expand product offerings and increase regional market presence, overcoming geographical constraints associated with traditional retail operations.

Despite its benefits, sustained growth in e-commerce requires continuous adaptation. Businesses must innovate to address cybersecurity concerns, evolving consumer behaviors, and the need for reliable digital infrastructure. As the digital marketplace advances, companies must remain agile and responsive to emerging technologies and market trends to ensure long-term success. Ultimately, e-commerce will continue to reshape global commerce by driving economic growth, enhancing consumer experiences, and transforming business models. However, organizations that fail to embrace digital transformation and technological advancements risk falling behind in an increasingly competitive landscape.

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