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E-Commerce in Motion: Global and European Growth Drivers and Emerging Challenges

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Abstract

This study explores the key trends driving global and European e-commerce growth, focusing on the technological, economic, and behavioral factors that shape the evolution of the digital marketplace. Particular attention is paid to the role of Industry 4.0 technologies, artificial intelligence, and changing consumer behavior in the expansion of online sales. The research adopts a qualitative analytical approach based on secondary data sources – including international statistical databases, OECD and Statista reports, and recent scholarly publications – to capture and compare the defining characteristics of global and European markets. The analysis suggests that e-commerce growth is largely driven by digitalization, internet penetration, innovation capacity, and increasing consumer confidence. Although considerable regional disparities persist across European markets, the steady rise of digital channels appears to represent a common trend. As this study relies solely on secondary data, it does not aim to establish causal relationships; however, the findings can be interpreted as offering valuable insights for companies and policymakers seeking to design digital strategies that promote sustainable growth and competitiveness. The contribution of this study lies in providing an integrated view of e-commerce development from both global and European perspectives, bridging technological and social dimensions.

1 Introduction

With the rise of the digital economy, digitalization has fundamentally transformed how people live and work [1]. As a result, significant developments have occurred in both society and the economy, which are also reflected in the evolution of e-commerce. The increasing importance of e-commerce in recent years can be attributed to several factors. Technological advancements, the proliferation of digital devices, and the widespread availability and penetration of the internet have all contributed to the rapid expansion of the digital economy. In 2022, the estimated number of internet users worldwide reached 5.3 billion, up from 4.9 billion in the previous year, representing 66 per cent of the global population [2]. This increase clearly demonstrates the rising use of the internet, which directly supports the spread of e-commerce and the growing popularity of online shopping. In Hungary, the proportion of internet users was even higher, at 90.5 per cent [3], indicating that digitalization and online engagement have become integral to everyday life. The widespread use of mobile phones and internet connectivity has enabled faster and more affordable communication, accelerating the global expansion of e-commerce [4] [5]. The application of artificial intelligence (AI) in marketing and sales further enhances e-commerce performance by facilitating entry into digital

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markets, although its impact on financial performance is moderated by factors such as technological infrastructure and market readiness [6].

E-commerce growth in Europe is influenced by a complex set of technological, economic, social, and demographic drivers [7]. Globally, e-commerce has expanded substantially, with its share of total retail sales increasing from 7.4 per cent in 2015 to 18 per cent in 2020, and projections suggesting it could reach 21.8 per cent by 2024 [8]. This development is largely driven by the ongoing digitalisation of economies and the widespread adoption of internet technologies [9].

The COVID-19 pandemic has also reshaped global patterns, not only within e-commerce but across education, work, and social interactions. It has transformed global trends, human behaviour, business operations, and everyday life [10]. In 2020, global e-commerce sales increased by 19 per cent as a result of the pandemic [11]. These observations highlight the accelerating role of digital transformation and underscore the need for a comprehensive analysis of e-commerce growth dynamics.

The aim of this study is to explore the main factors contributing to e-commerce growth at both global and European levels, as well as to identify regional disparities within the European e-commerce market. Accordingly, the study seeks to address the following research questions:

1. What factors contribute to the growth of e-commerce at global and European levels?
2. What regional differences can be observed among European countries in terms of e-commerce development?

2 Methods

This study adopts a qualitative analytical approach based on secondary data sources, including international statistical databases, OECD and Statista reports, and recent scholarly publications. The primary objective is to explore and compare global and European e-commerce trends, with particular focus on the technological, economic, and social factors influencing their development.

The analysis is descriptive, identifying the main patterns of growth and comparing the performance of different regions. The statistical data are sourced from reliable international organisations such as Statista, the OECD, and Euromonitor International, and are supplemented by relevant scientific publications from 2020–2025.

As the research relies solely on secondary data, it does not seek to establish causal relationships. However, it offers a comprehensive interpretation of the structural and regional trends shaping e-commerce.

3 Results

3.1 Global growth of e-commerce

This section presents the overall growth dynamics of e-commerce at the global level, highlighting key statistical indicators and temporal trends that demonstrate their rapid expansion.

The application of Industry 4.0 technologies in e-commerce creates new opportunities for the digitalization of work processes [12]. This transformation involves integrating advanced technologies and adapting business models to enable firms to respond more effectively to the challenges of the digital era. The development of digital technologies has driven the digital transformation of economies and societies, contributing to sustainable development and economic growth. Research shows that this digital transformation, propelled by e-commerce, significantly influences GDP and sustainable organizational development, particularly in countries seeking to enhance their economic performance [13] [14].

Innovations such as artificial intelligence (AI), the Internet of Things (IoT), and big data analytics are strengthening e-commerce systems by optimizing supply chain management and improving customer experience [15]. Companies such as Amazon use AI-driven tools for personalization, dynamic pricing, and fraud detection, which substantially enhance operational efficiency and user satisfaction [16] [17]. AI and machine learning also support dynamic pricing, inventory management, and fraud prevention, thereby improving the overall efficiency and competitiveness of e-commerce platforms [18].

According to Jílková and Králová [19], user experience, product quality, and delivery time should be the focus of strategic planning. Enhancing user experience, ensuring product quality, and providing fast and reliable delivery have become essential priorities in the digital age. Countries with higher levels of innovation tend to experience stronger e-commerce growth, as innovation fosters sustainable consumption and drives the evolution of the e-commerce market [20].

Murdiana and Hajaoui [12] identified nine e-commerce strategies for exploiting market potential and increasing competitiveness in the Industry 4.0 era: (1) exploring and exploiting market opportunities, (2) developing a marketing strategy, (3) designing the customer experience, (4) developing the customer interface, (5) designing the marketing program, (6) utilizing customer information through technology, (7) delegating character and capability, (8) establishing systematic customer organization, and (9) evaluating the marketing program.

Qurtubi et al. [21] emphasizes the importance of e-commerce system development in integrating business processes and highlights the role of efficient e-commerce platforms and frameworks in supporting brand building and contributing to social and economic development. The development of e-commerce systems is therefore essential for businesses to strengthen their online presence and respond effectively to market changes. However, Mashalah et al. [22] point out that the success of e-commerce depends not only on technological advancements but also on understanding and satisfying customer needs. As consumer expectations evolve, firms must adapt to these changes to remain competitive.

In his study, Beyari [23] examined various aspects of e-commerce system development, identifying customer trust as one of the most critical success factors. Building trust is vital for the success of online businesses, as it strengthens brand loyalty and fosters long-term customer relationships. Beyari's [23] research also highlighted that the "new normal" lifestyle shaped by the pandemic may have lasting effects on e-commerce trends and practices, as reflected in recent statistics.

Euromonitor International forecasts that between 2020 and 2025, half of the absolute value growth in the global retail sector will occur through digital channels, corresponding to an estimated increase of USD 1.4 trillion [24]. Digital channels are thus expected to continue dominating retail – a trend that must be considered in understanding changes in consumer behavior and the resulting transformation of corporate strategies. In 2022, the estimated value of global online retail sales exceeded USD 5.7 trillion, with further increases projected in the coming years [25]. According to Oberlo's [26] forecast, e-commerce is expected to grow by 9.4 per cent in 2024, then moderate to 8.6 per cent in both 2025 and 2026, reaching total sales of USD 7.5 trillion. By 2027, global e-commerce sales are projected to rise by 7.6 per cent, surpassing USD 8 trillion for the first time. These forecasts clearly demonstrate the continued growth potential of e-commerce.

The adoption of advanced technologies such as IoT, cloud computing, and blockchain has revolutionized sectors like the grocery industry, making online shopping more efficient and secure [27]. Simultaneously, interactive innovations such as smart mirrors and virtual reality are enhancing in-store experiences, enabling traditional retailers to compete more effectively with online platforms [28].

Europe has also experienced substantial e-commerce growth, with online sales increasing from £132.05 billion in 2014 to £185.44 billion in 2016 [29]. This upward trajectory is expected to continue, with significant expansion in e-commerce activities projected by 2025 [30].

3.2 The main segments of global e-commerce

This subsection examines the main structural segments of global e-commerce, including business-to-business (B2B), business-to-consumer (B2C), and consumer-to-consumer (C2C) transactions, and discusses their relative contributions to total online sales.

According to Mashalah et al. [22], the various classifications of e-commerce – such as B2B, B2C, C2C, and government-to-business/consumer (G2B/G2C) – have emerged due to differences in digital transformation and online business operations. These categories represent distinct market segments and transaction models, each with specific characteristics.

Statista [31] defines e-commerce as the online buying and selling of goods and services. More broadly, e-commerce can be divided into three main subcategories: B2B, B2C, and C2C commerce. B2B e-commerce involves digital transactions between businesses operating as manufacturers,

wholesalers, and retailers [32]. These transactions are typically complex and involve the exchange of large quantities of goods and services between firms. B2C e-commerce refers to online transactions of goods and services between a business and an individual consumer, including online retail, online marketplaces, direct-to-consumer (D2C) e-commerce, and paid digital content [33]. The B2C segment targets the consumer market, enabling buyers to purchase directly from businesses. C2C e-commerce denotes online transactions between private consumers conducted through online marketplaces, auction platforms, or classified advertisements, without the intermediation of a third party [34]. This segment allows consumers to sell and purchase directly from one another. The following section presents statistical data illustrating the relative significance of each market segment.

3.3 Regional disparities and trends

This subsection examines regional disparities, particularly among European countries, and identifies the key indicators that explain the uneven development of e-commerce across the continent. According to Bucevska and Bucevska [7], internet accessibility, income levels, and education collectively determine the development of e-commerce in Europe, influencing both sales volumes and the demographic composition of online shoppers. Trust, social norms, and networks – collectively referred to as social capital – also play a crucial role, as countries with stronger trust networks show higher participation in digital commerce [35].

In terms of gross merchandise volume, B2B e-commerce sales are highest in Asia. Between 2012 and 2020, the value of B2B e-commerce transactions in China quadrupled, reaching 27.5 trillion yuan in 2021 [32]. In recent years, China has become a dominant player in global B2B e-commerce, supported by the development of digital infrastructure, the expansion of inter-company online transactions, and government initiatives promoting the digital economy.

Technological advancements have also created new opportunities in emerging markets. For example, Bangladesh, with its high internet penetration and increasing use of smart devices, demonstrates substantial potential for e-commerce growth [36]. E-commerce has enhanced global trade by reducing transaction costs and improving efficiency, thereby transforming traditional trade models and enabling firms to reach a wider customer base [37] [38].

According to Statista's [11] e-commerce report for 2021, the three largest B2C e-commerce markets globally were China (USD 1,343.5 billion in revenue), the United States (USD 537.7 billion), and Europe (USD 460.5 billion). Although these markets differ significantly in consumer behavior, technological infrastructure, and regulatory frameworks, B2C e-commerce continues to expand dynamically, providing considerable opportunities for firms seeking international market entry. The sustained growth and substantial revenues generated by online sales indicate that e-commerce will remain a key component of global retail in the coming years.

Urbanization is another critical factor, as urban consumers show greater openness to innovative delivery solutions such as autonomous delivery robots and parcel lockers [39]. Asia also dominates the C2C e-commerce sector, reflecting its leadership in B2B and B2C markets. In 2022, C2C transactions accounted for one-quarter of China's online retail sales, with products sold on Taobao – the country's largest online platform – reaching a gross value of USD 711 billion in 2021 [40]. Platforms such as Taobao play a vital role in expanding China's online retail market by offering a broad product range and enabling direct consumer-to-consumer transactions. Their popularity is expected to continue growing in the coming years.

The European Union's e-commerce market is also expanding rapidly. It is estimated that by 2027: revenues will exceed USD 1 trillion; user penetration in the most developed EU markets will surpass 60 per cent; and approximately one-fifth of EU business revenues will be generated through online sales channels [41].

Policies that promote innovation, ensure fair competition, and safeguard consumer protection are essential for the sustainable development of e-commerce [42]. Small and medium-sized enterprises (SMEs) in Europe are increasingly adopting e-commerce, making a significant contribution to their overall turnover. Nevertheless, substantial variations persist across countries in e-commerce adoption and revenue generation [30] [43].

The European B2B e-commerce market accounted for 6 per cent of global gross merchandise volume in 2021 [44]. This share is expected to reach USD 1.8 trillion by 2025, although growth has

been tempered by Brexit, the COVID-19 pandemic, supply chain disruptions, and inflation [45]. These factors have posed challenges to the European B2B market, affecting commercial activity and market dynamics. Brexit altered trade relationships and regulatory frameworks between the United Kingdom and the EU, while the pandemic and associated restrictions further strained supply chains. In addition, economic uncertainty and inflation have influenced firms' commercial decisions. Digital transformation and increased investment in e-commerce may support market recovery and foster long-term growth within the European B2B sector. In the European B2C market, based on e-commerce revenues in 2021, the three largest online shopping markets were the United Kingdom (€254 billion), France (€123.4 billion), and Germany (€100 billion) [46]. Beyond absolute revenue, however, the share of e-commerce in each country's GDP provides a more comprehensive picture of its economic impact. In 2021, e-commerce accounted for 10.26 per cent of GDP in the United Kingdom, followed by Denmark (7.83 per cent) and Greece (7.09 per cent) (Coppola, 2023b). In comparison, Hungary's e-commerce revenue reached €2.32 billion, representing 2.78 per cent of its GDP. Although this share is lower than in the largest EU markets, it nonetheless reflects the growing importance of e-commerce in the Hungarian economy. The data is presented in Table 1.

Table 1. Online shopping market size in 25 countries in Europe in 2021

	Country	Share of GDP (%)	E-commerce revenue (billion €)
1	United Kingdom	10.26	254
2	Denmark	7.83%	22.8
3	Greece	7.09	14.4
4	Spain	6.64	82.11
5	Czech Republic	6.4	12.48
6	Poland	5.37	24.76
7	France	5.19	123.4
8	Portugal	4.43	8.51
9	Romania	4.19	6.88
10	Netherlands	3.57	27.9
11	Norway	3.29	10.78
12	Germany	3.24	100
13	**Hungary**	**2.78**	**2.32**
14	Finland	2.76	5.84
15	Austria	2.72	9.6
16	Sweden	2.6	12.76
17	Russia	2.59	42.6
18	Ukraine	2.56	3.89
19	Ireland	2.53	8.8
20	Bulgaria	2.5	1.25
21	Italy	2.35	38.6
22	Belgium	2.12	9.7
23	Turkey	2.09	12.57
24	Switzerland	1.94	13.02
25	Luxembourg	0.99	0.53

Source: Coppola [46]

Although France and Germany record high e-commerce revenues (€123.4 billion and €100 billion, respectively), their shares of GDP are relatively modest (5.19 per cent and 3.24 per cent). Hungary, by contrast, ranked 23rd in e-commerce revenue but 13th in GDP share, suggesting substantial growth potential in its online market. Overall, the analysis confirms that e-commerce growth is driven by an interplay of technological and socio-economic factors. However, regional disparities remain considerable across Europe, as discussed in the following section.

The most active online shoppers in Europe are in the 25-54 age group, reflecting a key demographic trend [20]. There has also been a notable rise in online purchasing among Generation Y, particularly for consumer electronics [47].

4 Discussion and conclusion

The findings of this study provide a comprehensive overview of the main drivers shaping e-commerce growth globally and across Europe. In response to the first research question, the results indicate that technological progress, digital infrastructure, and evolving consumer behavior together contribute to the rapid expansion of online markets. These factors underpin the strong growth of e-commerce in Europe, shaping the digital marketplace and driving broader economic development.

Market-specific dynamics further illustrate Europe's regional diversity. For example, Romania has experienced rapid e-commerce expansion, fueled by automation and the effects of the COVID-19 pandemic, whereas Greece continues to face challenges related to digital transformation and sociocultural barriers [48] [49].

E-commerce has become a rapidly expanding sector globally and within Europe, driven by technological advancements, shifting consumer behaviors, and the transformative impact of the pandemic. Although challenges such as cybersecurity risks and digital divides persist, the opportunities for economic growth and innovation remain considerable [50] [51]. These findings confirm that digital readiness and innovation capacity are decisive factors in determining the pace and depth of e-commerce adoption.

E-commerce growth also helps reduce the urban–rural income gap by improving equitable access to goods and services, thereby promoting more balanced economic development [52]. Technological advances have further shaped consumer behavior, with factors such as perceived usefulness and enjoyment significantly affecting purchase intentions on platforms like TikTok Shop [53].

Regarding the second research question, the analysis reveals that substantial regional disparities persist across Europe. Northern and Western European countries typically exhibit higher levels of digital maturity, stronger logistics infrastructures, and greater consumer trust in online transactions, whereas Southern and Eastern European countries continue to face challenges related to limited infrastructure and lower digital literacy. These differences highlight the need for targeted policy support and investment in digital education and infrastructure to achieve more balanced and inclusive growth across the continent.

In summary, the rise of e-commerce has been driven by a combination of technological innovation, environmental factors, and evolving consumer behavior. Monitoring these trends is crucial, as digital channels are expected to continue dominating global retail markets [24] [25]. E-commerce represents a powerful engine for economic development – creating employment opportunities, increasing export volumes, and contributing to GDP growth [9] [51]. However, sustaining this momentum requires ongoing technological innovation, the cultivation of consumer trust, and the harmonization of regulatory frameworks across European markets.

This study demonstrates that while global e-commerce growth is universally driven by digitalization, Europe's regional diversity necessitates differentiated strategies to foster inclusive and sustainable digital transformation.

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