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Master's Thesis

The Impact of Digitalization on International Trade in the EU: Opportunities and Challenges

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DIPLOMA THESIS ASSIGNMENT

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International Trade and Business

Thesis title

The Impact of Digitalization on International Trade in the EU: Opportunities and Challenges

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Objectives of thesis

The main objective is to examine how digitalization affects international trade in the European Union.
The sub-objectives of the thesis will be:
to identify emerging opportunities and challenges,
to propose recommendations for businesses and policymakers in the EU to adapt to the new conditions.

Methodology

Literature Review: Analyzing existing research and publications on digitalization and international trade in the EU.
Data Analysis: Examining statistical data and reports related to digital trade and e-commerce in the EU.
Expert Interviews: Conducting interviews with representatives of EU companies engaged in international markets and specialists in digitalization.
Case Studies: Studying specific examples of companies in the EU that have successfully implemented digital technologies in their international trade activities.

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60 – 80 pages

Keywords

Digitalization, International Trade, E-commerce, Blockchain, Digital Payments, Artificial Intelligence (AI), Cybersecurity, Data Protection, Digital Services Act (DSA), Digital Markets Act (DMA)

Recommended information sources

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Declaration

I declare that I have worked on my master's thesis titled "The Impact of Digitalization on International Trade in the EU: Opportunities and Challenges" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague 31.03.2025 _____

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The Impact of Digitalization on International Trade in the EU: Opportunities and Challenges

Abstract

Digitalization is one of the fastest growing areas in the global economy. It has undoubtedly affected international trade. The EU, as one of the most influential and powerful economic unions, has found opportunities but also challenges. The introduction of advanced technologies such as e-commerce, blockchain, digital payments and artificial intelligence. However, with the benefits come big risks such as cyber security, differences in the digital level of countries, the flow of digital data and its protection.

This study investigates the impact of digitalization on international trade, examining key barriers and opportunities, and the legal and regulatory frameworks that directly affect digitalization in global trade, with a focus on digital trade regulation, including the Digital Services Act (DSA) and the Digital Markets Act (DMA), and their impact on the EU business environment.

Keywords: Digitalization, International Trade, E-commerce, Blockchain, Digital Payments, Artificial Intelligence (AI), Cybersecurity, Data Protection, Digital Services Act (DSA), Digital Markets Act (DMA)

Abstrakt

Digitalizace je jednou z nejrychleji rostoucích oblastí světové ekonomiky. Nepochybně ovlivnila mezinárodní obchod. EU jako jedna z nejvlivnějších a nejsilnějších hospodářských unií našla příležitosti, ale také výzvy. Zavádění pokročilých technologií, jako je elektronický obchod, blockchain, digitální platby a umělá inteligence. S výhodami však přicházejí i velká rizika, jako je kybernetická bezpečnost, rozdíly v digitální úrovni zemí, tok digitálních dat a jejich ochrana.

Tato studie zkoumá dopad digitalizace na mezinárodní obchod, zkoumá hlavní překážky a příležitosti a právní a regulační rámce, které přímo ovlivňují digitalizaci v globálním obchodě, se zaměřením na regulaci digitálního obchodu, včetně zákona o digitálních službách (DSA) a zákona o digitálních trzích (DMA), a jejich dopad na podnikatelské prostředí EU.

Klíčová slova: Digitalizace, mezinárodní obchod, elektronický obchod, blockchain, digitální platby, umělá inteligence, kybernetická bezpečnost, ochrana údajů, zákon o digitálních službách (DSA), zákon o digitálních trzích (DMA).

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1 Introduction

Particularly in the EU, the fast evolution of digital technology has fundamentally changed the character of world trade. Global events and shifts in consumer behaviour have accelerated the digital revolution and generated fresh worldwide corporate strategies. Regarding digital trade, the European Union (EU) is the top commercial entity in the globe. Apart from fresh prospects, it presents certain difficulties. Many fresh ideas have surfaced thanks to digitalization, which has also drastically changed people's life and the way companies run. Under this category are systems for online payments, markets, and Internet of Things apps. These technical developments have affected micro-, small-, and medium-sized companies as well. These changes have hampered their capacity to react as well as their fresh global trading opportunities. Reacting to this change, the EU has started initiatives including the Union Customs Code (UCC) and the Digital Single Market agenda to maximize digital trade while guaranteeing compliance and security. Digitalization and international trade cut across many different spheres, including laws, infrastructural development, privacy, and data security. The already complex issue will get more difficult as EU countries strive to be both domestically compliant with digital commerce laws and globally competitive. The European Union must realize how digitalization affects world trade (ICS2) if it is to apply innovative technologies like the Import Control System and create digital contacts with other nations. The impetus for this research came from learning how digitization is altering EU businesses internationally. We examine in this post the advantages and drawbacks of digitization, stressing the possibility for better trade efficiency and market access accompanying it as well as the legislative obstacles, cybersecurity problems, and deficiencies of the digital infrastructure. The results will add to the continuous discussion on how the European Union may effectively carry out its digital trade plan.

Examining the opportunities and the difficulties will help one to totally understand how digitalization affects EU worldwide trade. Emphasizing the requirement of SMEs in world trade, the main goal of the research is to investigate how digital transformation effects trade policy, firm operations, and regulatory systems. Moreover, it seeks to solve connected problems by identifying specific strategic ideas to enhance the running of European digital economy.

This thesis mostly looks at how digital trade is changing both inside and outside of the single market of the European Union. Task includes looking at EU trade policy and important digital technologies impacting trade including e-commerce, digital platforms, the Internet of Things, and digital payments. From the beginning of the Digital Single Market idea till now, the study investigates the development of digital trade laws and rules. The paper stresses business-to-business and business-to-consumer digital trade; it does not probe very closely the technical standards of digital systems and telecommunications infrastructure.

Companies especially SMEs find great difficulty fully using digital technologies for international trade despite the EU's developed digital infrastructure and legislative framework. Complicating digital commerce are cross-border digital trade restrictions, cybersecurity concerns, and varying technological capabilities of member states. Furthermore, the rapid development of trade policy and digital technology calls for ongoing changes to legal systems and corporate processes. For EU companies involved in international commerce, this might have both good and bad results. This paper examined the importance of realizing and assessing these issues as well as practical remedies to enhance EU digital economy.

This research acknowledges several limitations in its scope and methodology:

- The rapidly evolving nature of digital technologies means some findings may require updating as new developments emerge during the research period.
- Due to data privacy restrictions and commercial sensitivity, access to detailed company-specific information about digital trade practices may be limited.
- The study primarily focuses on EU-wide trends and policies, which may not fully capture variations in digital trade development across individual member states.
- While the research includes case studies, these may not be representative of all business scenarios across different sectors and member states.
- The analysis of technical aspects of digital infrastructure is limited to their impact on trade practices rather than detailed technical specifications.

Beginning with an introduction establishing the basis of the research and covering its background, objectives, methods, organization, this thesis methodically explores four

main themes. Emphasizing fundamental principles and trends, especially about small and medium-sized firms (SMEs), the first chapter sets the theoretical framework for the development of digital commerce inside the European Union. Following a review of important infrastructure projects and international agreements, Chapter 2 looks at the legal environment and legislative framework managing European Union digital trade. Emphasizing the advantages of efficiency, wider market access, and the challenges to adoption, Chapter 3 investigates the potential and opportunities of digital commerce inside the European Union. Aiming at enhancing digital trade inside the EU, the fourth chapter looks at legislative changes, infrastructural development, and support systems for SMEs. It also assesses here in this sector strategic concepts. The last portion of the thesis synthesizes results and their consequences for the future of digital commerce in the EU using past sections to offer a coherent analysis supported by case studies and expert comments.

2 Objectives and Methodology

2.1 Objectives

To explore how digitalization affects international trade in the European Union, identify the emerging opportunities and challenges, and propose recommendations for businesses and policymakers in the EU to adapt to the new conditions.

Research questions are:

1. How has digitalization transformed international trade practices within the European Union, and what are its primary impacts on trade efficiency and market access?
2. What are the key challenges and opportunities faced by EU businesses, particularly SMEs, in adopting digital trade practices?
3. How effective are current EU digital trade policies and regulatory frameworks in facilitating cross-border digital commerce while addressing security and privacy concerns?
4. What strategic measures can be implemented to enhance digital trade capabilities and overcome existing barriers in the EU's international trade landscape?

2.2 Methodology

- Literature review:
    - I will analyse existing research and publications on digitalization and international trade in the EU.

- Data Analysis:
    - I plan to examine statistical data and reports related to digital trade and e-commerce in the EU.

- Expert Interviews:
    - Conducting interviews with representatives of EU companies engaged in international markets and specialists in digitalization.

- Case Studies:
    - Studying specific examples of companies in the EU that have successfully implemented digital technologies in their international trade activities.

3 Literature Review

3.1 Digitalization and EU Trade: Impact and Frameworks

Digitalization has transformed international trade, reshaped economic interactions and revolutionized traditional trading models. It involves the integration of digital technologies into business and trade processes, leading to enhanced efficiency, transparency, and connectivity. The rapid advancement of technologies such as artificial intelligence (AI), blockchain, big data, and cloud computing has significantly influenced trade within the European Union (EU) and beyond. The digitalization of trade facilitates smoother interactions between businesses, governments, and consumers. It lowers barriers to entry, reduces transaction costs, and allows small and medium-sized enterprises (SMEs) to access global markets. Digital trade extends beyond e-commerce to include digital services, intellectual property transfers, and cross-border data flows(Pelser & Gaffley, 2020).

The EU has positioned itself as a global leader in digital trade by implementing policies and frameworks that support a secure and competitive digital marketplace. Regulations such as the Digital Services Act (DSA) and the Digital Markets Act (DMA) aim to foster fair competition while ensuring consumer protection. Additionally, the Digital Single Market (DSM) strategy has been instrumental in harmonizing regulations and removing obstacles to cross-border trade within the EU(European Commission, n.d.).

One in 3 out of 4 residents of the European Union buys online, the share of e-shoppers grew from 53% in 2010 to 75% in 2023, an increase of 22 percentage points(European Council, n.d.). Against the background of increasing digitalisation not only in trade but also in the services market, the EU has drafted relevant legislation that covers these areas Digital Markets Act, DMA and Digital Services Act, DSA.

This literature review aims to explore the impact of digitalization on international trade within the EU, analysing the benefits, challenges, and emerging trends. The review covers the key legal frameworks that govern digital trade, the ways in which digitalization has improved trade efficiency, and the barriers preventing the full realization of digital trade's potential. Additionally, it provides insights into future developments and

technologies that are expected to shape the EU's digital trade landscape in the coming years.

3.2 Theoretical Background of Digitalization in Trade

3.2.1 Key Concepts of Digitalization in Trade

Digitalisation in the European Union eclipses several key aspects that affect international trade, such as Digital Economy and Digital Trade. The digital economy is the economic activity that results from billions of everyday online connections among people, businesses, devices, data, and processes. The backbone of the digital economy is hyperconnectivity which means growing interconnectedness of people, organisations, and machines that results from the Internet, mobile technology and the internet of things(Deloitte, 2021).

Digitalisation is the ongoing integration of digital technologies and digitised data across the economy and society. The twin green and digital transitions accelerate the pace of change affecting all aspects of our lives and will have many consequences for the future of work(European Foundation for the Improvement of Living and Working Conditions, 2025).

3.2.2 Digital Trade

Digital trade refers to trade activities that involve the exchange of goods, services, and data through digital platforms. It includes cross-border e-commerce, digital services (such as cloud computing and software), and digital financial transactions. Digital trade removes geographical barriers, enabling companies to expand into global markets with minimal physical presence(StudySmarter UK, n.d.).

Digital commerce is expanding at a faster pace compared to traditional commerce. Over the last twenty years, the inclusion of digital trade provisions in trade agreements has significantly increased. Currently, nearly half of all regional trade agreements incorporate digital trade clauses. This is crucial, as recent OECD research indicates that the presence of a digital trade chapter in a regional trade agreement can amplify its trade impact twofold(OECD, n.d.). Technology has helped to connect the buyer and seller very easily,

now in just a couple of clicks it is easy to buy different types of products. This major part of digitisation of trade is called ecommerce

3.2.3 E-Commerce

E-commerce, or electronic commerce, is the process of buying and selling goods and services over the internet. It enables individuals and businesses to exchange both physical and digital products, as well as offer various services online(Sell on Amazon, n.d.). It can be categorized into:

Table 1: Types of E-commerce Models and Examples

B2B (Business-to-Business)	Transactions between companies	Alibaba, TradeKey
B2C (Business-to-Consumer)	Companies selling directly to consumers	Amazon, Zalando
C2C (Consumer-to-Consumer)	Individuals selling to other individuals via platforms	eBay, Etsy

Source: *Ecommerce*. (n.d.). Studocu. https://www.studocu.com/row/messages/question/9435254/iamazon-b2c-c2ciialibaba-b2b-b2ciiiebay-c2civwalmart-b2cvjdcom

These three aspects cover a very large area as e-commerce, which directly affects international trade, which every year increases the reach of the population in the EU, as studies show that 75% of the population in the EU in 2023 will buy goods or services online compared to 2012 57% per cent. The most popular type of goods is clothing and footwear, accessories account for 70 per cent of the total. But people also face problems with online shopping(Eurostat, n.d.).

E-commerce plays a pivotal role in the digitalization of international trade, enabling businesses to expand markets and enhance competitiveness. According to Eurostat (2022), 22.9% of European companies engage in e-commerce, with online sales contributing 18% of total turnover. The primary channel is companies' own websites or apps. Large enterprises dominate e-commerce (45.9%), but small businesses are growing (20.8%). E-commerce tools streamline cross-border transactions, demonstrating the increasing significance of digital technologies in global trade(Eurostat, n.d.).

3.2.4 Digital Platforms

Digital platforms are business models that create value by facilitating exchange between two or more interdependent groups, typically consumers and producers. They play an important role in the modern economy and have a significant impact on international trade, especially in the European Union. Digital platforms reduce transaction costs by facilitating interaction between different groups of actors, reducing the costs of information search, communication and exchange. As the number of users increases, the value of platforms increases, creating a positive feedback loop that attracts even more participants. An important aspect is the variety of monetisation models, which include commissions, subscriptions, advertising and premium services, allowing platforms to adapt to different markets. In addition, the collection and analysis of data on user behaviour allows platforms to improve services, personalise offers and increase the efficiency of operations. However, with the growing influence of digital platforms comes several challenges related to monopolisation, data privacy and fair competition, which require regulatory attention. These aspects emphasise the importance of digital platforms in the development of international trade and the digital economy in the EU(Business Insights Blog, 2024).

3.2.5 Internet of Things (IoT)

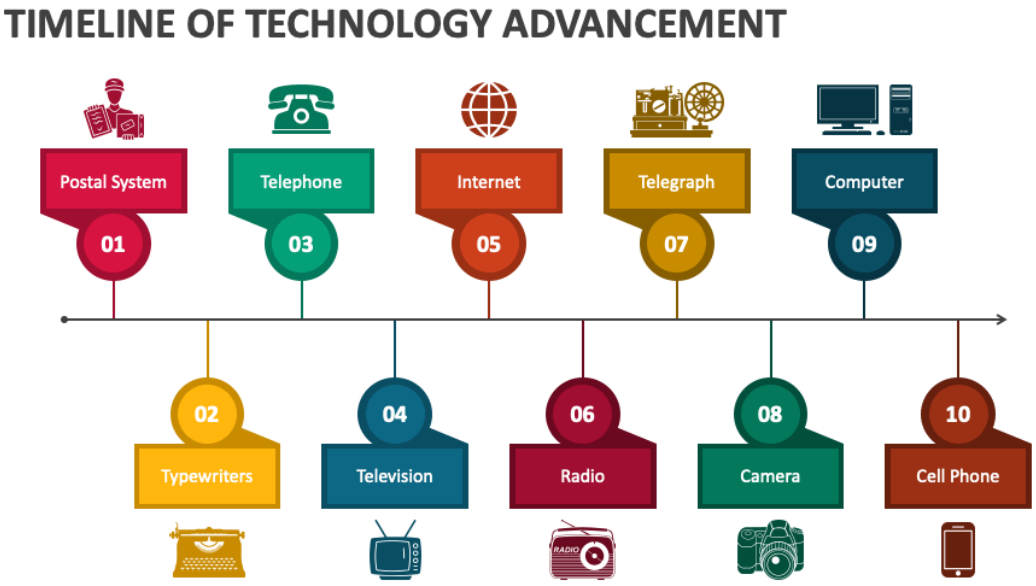
The Internet of Things (IoT) in international trade refers to a network of interconnected physical devices embedded with sensors and software that enable real-time data exchange. IoT enhances supply chain transparency by tracking goods' location and condition, allowing stakeholders to monitor shipments and reduce fraud risks. It also improves trade financing security by functioning as an oracle for smart contracts, automating payment releases based on verified events.

Additionally, IoT optimizes logistics by ensuring perishable goods maintain optimal conditions during transit, minimizing disruptions. However, challenges such as data management, legal considerations, high implementation costs, and cybersecurity risks need to be addressed. Despite these hurdles, IoT has the potential to revolutionize global trade by increasing efficiency, security, and visibility across supply chains(Trade Finance Global, 2024).

3.2.6 Digital Payments

Digital payments refer to financial transactions that occur electronically without the need for physical cash or checks. These transactions are facilitated through various methods, including credit and debit cards, mobile wallets, bank transfers, and emerging technologies like blockchain-based payments. In the European Union, digital payments have witnessed significant growth, with the total value of retail digital transactions surpassing €1 trillion annually between 2017 and 2023(European Court of Auditors, 2025). This surge has been driven by regulatory advancements, including the Payment Services Directive (PSD2), which enhances security and competition in digital financial services. The expansion of digital payments plays a crucial role in international trade by reducing transaction costs, increasing speed, and improving transparency. Faster and more secure cross-border transactions enable businesses, especially SMEs, to engage in global commerce with reduced financial friction. However, despite these benefits, regulatory challenges persist, such as the need for harmonized monitoring systems and clearer criteria for price interventions in payment services. Addressing these gaps will be critical to ensuring that digital payments continue to facilitate seamless and efficient international trade within the EU and beyond.

Figure 1: Timeline of Technology Advancement



Source: *Timeline of Technology Advancement*. (n.d.). http://collidu.com/presentation-timeline-of-technology-advancement

3.3 The development of digital trade in the EU

One of the main agreements that has been able to set the framework for digitalisation in trade is the E-Commerce Directive (Directive 2000/31/EC), which has brought together the principles of international trade, it is important to note that in this directive it was noted that the electronic contract is equal to the paper contract, which protects both the buyer and the seller and many other supply chains.

Member States shall ensure that their legal system allows contracts to be concluded by electronic means. Member States shall ensure that the legal requirements applicable to the contractual process do not create obstacles to the use of electronic contracts and that contracts concluded by electronic means are not deprived of legal effectiveness and validity because they are in the form of an electronic contract(EUR-Lex, n.d.).

The next step was the signing of the Payment Services Directive (PSD), which established a set of rules for payments, a set of general rules for payment institutions. The acquisition of a 'passport' for payment institutions in one EU country eliminated the need for authorisation in other EU countries, facilitating the expansion of financial technology companies and payment systems. Uniform requirements for the execution times of payments in euro were introduced. For example, the "D+1" rule was introduced for euro transfers - if a payment is initiated before a certain deadline on a working day, the money must be received no later than the next working day(EUR-Lex, n.d.).

As in any trade, security is an important part and has a direct impact on profits and this area has not been without modernisation and upgrading through digitalisation. The ICS (Import Control System) was introduced in 2008 to ensure the security of goods entering the European Union. It required economic operators to provide advance data on goods so that customs authorities could assess risks before the goods arrived. The main aim of the system was to strengthen security at the EU's external borders and optimise trade procedures by ensuring the rapid detection of threats such as smuggling and terrorism(Export Hub, n.d.).

In 2013, the UCC was signed to simplify and harmonise customs procedures, which has a direct impact on the development of the digital economy and trade. The EU's Single Customs Code (UCC) has a significant impact on the digital economy in the EU by promoting the digitalisation of customs procedures such as electronic declarations, automating the calculation and payment of taxes, and improving risk management through systems such as ICS. It incentivises the creation of a single digital infrastructure to facilitate trade and increase transparency using data platforms and integration with other EU systems, which speeds up customs clearance and reduces administrative barriers. The implementation of systems such as Centralised Clearance for Import (CCI) helps businesses, including SMEs, to interact effectively with customs, improving international trade and enabling the development of the digital economy(EUR-Lex, n.d.).

The European Union's Digital Single Market (DSM) initiative, launched in 2015, marked a pivotal step towards harmonizing online economic activities across Member States. A key objective of the DSM strategy was to create a barrier-free environment for both consumers and businesses by ensuring open delivery rates and transparency in cross-border transactions. One of the earliest measures introduced under this framework was the removal of unjustified geo-blocking, which previously allowed sellers to restrict or inflate prices for consumers from other EU regions based solely on their location. Additionally, shipping and delivery service providers were obliged to disclose any hidden charges and present clear pricing structures, thus addressing longstanding concerns about opaque fees in cross-border e-commerce.

Another significant development under the DSM was the rollout of the eIDAS Regulation (electronic Identification, Authentication and trust Services). This regulation aimed to reduce bureaucratic hurdles and streamline digital interactions between public authorities, private businesses, and citizens throughout the EU. By introducing a common legal framework for electronic signatures, seals, and identification, eIDAS enhanced trust and security in digital transactions, speeding up administrative and commercial processes across different Member States.

Overall, the Digital Single Market and its supporting regulations—such as the geo-blocking ban, transparent delivery rules, and eIDAS—can be seen as a turning point in

European digitalization. They collectively reflect the EU's broader commitment to fostering cross-border digital engagement, strengthening consumer protections, and promoting a unified, innovation-friendly environment for online commerce and e-government services. This historical shift towards a more integrated digital landscape has not only benefited consumers by expanding their access to goods and services but has also provided small and medium-sized enterprises (SMEs) with new growth opportunities in an increasingly interconnected Single Market(European Commission, n.d.).

However, the rapid growth of the platform economy, the emergence of global tech giants, and the increasing complexity of online commerce highlighted new challenges. On one hand, there were intensified concerns about user protection and data privacy, and on the other, escalating allegations of market dominance abuses by the largest digital platforms. In response, the European Commission launched a major regulatory overhaul known as the "Digital Services Package." As part of this initiative, two landmark legislative acts the Digital Services Act (DSA) and the Digital Markets Act (DMA) were adopted in 2022(European Commission, 2022).

DSA effectively updates rules on intermediary liability, imposes stricter requirements for content moderation, and increases transparency regarding algorithms and advertising mechanisms.

DMA introduces a set of obligations and prohibitions aimed at preventing market abuses by large digital platforms designated as "gatekeepers." These obligations include ensuring fair access to critical services and data for competing firms, among other requirements. Together, the DSA and DMA represent a significant shift in the EU's regulatory approach, setting unified standards for all participants in the digital market—including companies based outside the EU that provide services to European consumers. These acts mark the next stage in the evolution of legal frameworks for online commerce, reflecting the EU's efforts to foster a fair and secure environment amidst the ongoing digitalization of global trade.

However, as the volume of international trade grew and technology evolved, the need to improve the system became apparent. This led to the creation of ICS2, an updated

version that began to be implemented from 2021. ICS2 uses more advanced technology to analyse risk and process data in real time, which significantly speeds up processes and improves accuracy. Unlike ICS, which was limited to basic data collection, ICS2 is capable of more sophisticated risk analyses, allowing it to better respond to threats and adapt to increasing volumes of trade, especially in the e-commerce sector.

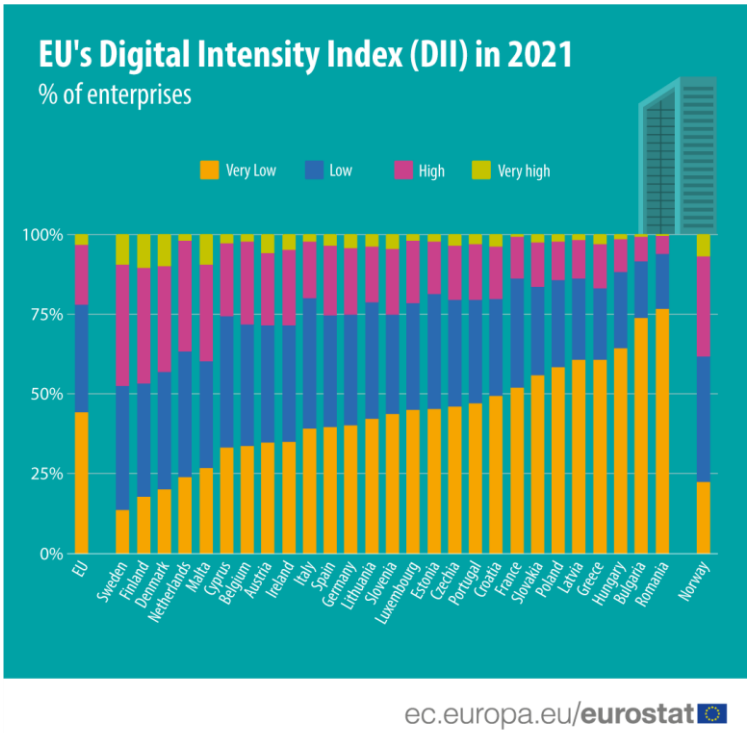
As with all systems, the digitalisation of this system required new reforms to existing doctrines such as PSD and ICS, the rise of online payments, smart wallets and smartphone use led to the signing of PSD2, which also protects users from fraud Strong Customer Authentication (SCA) is one of the points of PSD2.

The main reasons for updating the system were the need to enhance security, cope with increased trade volumes, and utilise the power of new technologies to process data more efficiently. The implementation of ICS2 has enabled the EU to speed up risk analysis, improve goods handling and security, and speed up customs procedures. The move to ICS2 was an important step in the digitalisation of trade, simplifying processes and minimising delays, which is particularly important in the growing e-commerce environment.

The upgrade of ICS to ICS2 thus meets the challenges of modern trade by providing better control over external security, increasing transparency and speeding up processes, which in turn contributes to the development and digitalisation of international trade(Taxation and Customs Union, n.d.).

Technologies have so many terms and designations and necessarily a developing system can generate new terms and their designations. But the digitalisation of trade in the European Union has basic designations.

Figure 2: How digitalised are the EU's enterprises?



Source: Eurostat. (2022, August 26). How digitalised are the EU's enterprises? *Eurostat.* https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220826-1

3.4 Digitalization's Effect on International Trade SMEs

Mostly affecting small and medium-sized firms (SMEs), technology shapes world trade. Modern global economy depends increasingly on foreign trade. Because of their great use of digital technologies that have revolutionized the way businesses used to run, small and medium-sized enterprises (SMEs) now have more opportunities than ever before to compete in worldwide markets. The lowering of past entrance restrictions brought about by digitalization allows small enterprises to now enter overseas markets. Without opening offices abroad, small and medium-sized companies (SMEs) can contact consumers all over by e-commerce and websites. Starting actual stores or offices abroad expenses more than this virtual expansion does. Russian internet markets including Ozon Global and Wildberries are being used by Chinese e-commerce enterprises to evade taxes and standard trade rules(Langley, 2024).

By means of digital solutions enabling communication and transactions, small and medium-sized companies could also better manage foreign orders, payments, and customer support. Electronic bills and digital payment systems accelerate financial transactions,

improve cash flow control, and help to save costs. Small and medium-sized companies (SMEs) rely on this effectiveness considering their limited resources(Jean, 2024).

If small and medium-sized companies (SMEs) embrace digital technology to increase their operational performance, they could become more competitive globally. Automating some company processes including customer service, inventory control, and supply chain management will increase output and aid to lower costs. The OECD argues that by enhancing performance, supporting innovation, and streamlining procedures, digitization may help SMEs compete more fairly with larger businesses(OECD, n.d.).

Small and medium-sized companies (SMEs) who run abroad find great difficulty obtaining trade finance. Digitalization brings fresh financial technologies (fintech) that provide different means to receive money, so helping to partly solve this issue. Digital platforms help small businesses to receive loans faster and more simply by connecting them with other investors and financial institutions. Data presented to the AIM Congress shows that digitalization enables small and medium-sized companies (SMEs) to participate in global trade, therefore promoting innovation and new job opportunities(Aim Congress, n.d.).

Blockchain technology makes financial transactions safer and more transparent, hence financial institutions and commercial partners all around also trust it. Establishing long-lasting commercial ties and obtaining trade financing call for this confidence. Using digital technology might be challenging for small and medium-sized companies even with all the advantages. In their attempts toward digital transformation, small and medium-sized firms (SMEs) could run across issues including insufficient funds, a lack of digital knowledge, or unstable digital equipment. The OECD argues that smaller companies follow behind in digital transformation since they lack internal resources, skills, knowledge of the issues, and financial means to implement the reforms(OECD, n.d.).

Legislative systems should help small and medium-sized companies (SMEs) undergo digital transformation to support global trade. The government oversees establishing guidelines for online behaviour, encouraging technology literacy, and financing the acceptance of new technologies as well as their implementation.

Governments must work together to create digital systems capable of interacting with one another and setting the relevant policies so promoting cross-border digital trade(Chen et al., 2021). Research by UNCTAD reveals that digitizing commerce improves trade administration and border constraints, so enhancing trade control and reducing trade costs and so stabilizing international supply chains. Should more nations join international efforts to automate trade processes, small and medium-sized firms (SMEs) will find it easier conducting business with foreign countries(UN Trade and Development, 2023).

3.5 EU Digital Trade Regulations and Policy Framework

Enforcing a strict framework of rules and regulations controlling online trade guarantees the orderly functioning of market access, security, and fair competition by the European Union (EU). To address problems including cyberattacks, data privacy difficulties, and unfair competition from non-EU businesses, the European Union has passed many rules to advance and defend digitalization in international trade. Several technologies are gradually changing the nature of Internet commerce. These call for artificial intelligence (AI), blockchain technology, and quantum computers. This shows how always changing the rules and controlling it is (Jütten & European Parliamentary Research Service, 2024). Among the most important EU regulations controlling online behaviour is the General Data Protection Regulation (GDPR). Though its main goal is to protect personal data, the General Data Protection Regulation (GDPR) severely limits cross-border data flow, affecting the digital economy. Companies handling the personal data of EU citizens could face more rules, which would have an impact on their trade contacts with non-EU nations. Entities outside the EU struggle to follow the strict GDPR data security rules while conducting digital business with European rivals. Companies have paid more to follow these guidelines, which has made trade negotiations with nations like the US more difficult as data privacy laws vary.

The Digital Markets Act (DMA) and the Digital Services Act (DSA) mark two further major developments in EU digital commerce policy. Particularly about online advertising, e-commerce, and content control, the DSA promotes responsibility and openness in controlling digital platforms. This legislation creates a consistent legal framework for EU platforms, therefore directly impacting the digital economy. The DMA targets big digital gatekeepers to eradicate anti-competitive behaviours and guarantee fair

chances for European businesses on internet markets. The new rules have fundamentally changed digital business models, which calls for large IT companies to change their operational strategies (*The Digital Services Act Package*, 2025). The eCommerce Directive defines the country of origin to guarantee consistent standards among all online service providers. For a long time, the European Union's approach to online trade has revolved mostly around this basic element. The fast expansion of digital trade calls for quick updates and reinforcement of rules. New laws the European Commission has proposed to solve these shortcomings are the Data Governance Act and the upcoming EU Data Act. These criteria help governments and companies to exchange data while maintaining personal privacy and guaranteeing fair opportunity. By limiting access to too much data and improving data accessibility and portability, the EU Data Act seeks to empower people and companies (*E-Commerce Directive*, n.d.).

The digital commerce policy of the European Union covers trade agreements. Thanks to digital trade clauses included in bilateral and multilateral trade agreements, which concurrently protect EU regulatory independence, European digital companies can market their products worldwide. Recent agreements including those between the EU and the United Kingdom as well as between the EU and Japan have combined electronic commerce's regulatory frameworks (EU-Japan Digital Partnerships, 2024).

This strategy guarantees consistency in rules for all the engaged parties and helps digital transactions. To make sure that digital trade stays a basic feature of future economic alliances, the European Union is negotiating extensively with allies including Australia, the United States, and Mercosur. These trade agreements have as their main goal encouraging cross-border electronic commerce.

The European Union has suggested a Digital Levy to guarantee that internet behemoths fairly pay taxes in many different areas. Along with their own opinions, the OECD and the G20 have sparked worldwide debates on digital taxes. A fairer tax system is needed to discourage big internet companies from hiding their riches from the government. International trade is affected by the European Union's stance on digital taxes, which it has developed using agreements on cross-border tax rules for digital goods and services with worldwide partners. Several non-EU nations, including the US, have voiced

concerns that the Digital Services Tax (DST) unfairly targets American online businesses, so intensifying the argument on the acceptance of the law (Epic, 2021). Digital resilience and cybersecurity take the front stage in the European Union's digital commerce plan. The Network and Information Security (NIS) Directive and its successor, NIS2, help to boost cybersecurity within the European Union by reducing the risk of cyberattacks endangering the infrastructure necessary for digital commerce. This is a major development since cloud computing, artificial intelligence, and blockchain technology are becoming more and more important in the internet business. The Cybersecurity Act helps to support these initiatives by creating a structure to guarantee the security of digital goods and services all over the European Union. The European Union has stepped up its efforts in reaction to the explosion in cyberattacks. Laws like the Cyber Resilience Act seek to improve the safety of software and linked devices for business use(*Cybersecurity Policies*, n.d.).

The EU is carefully improving its current infrastructure in line with upcoming digital trade. The European Digital Strategy is evidence of ongoing efforts to position Europe as a leader in digital transformation. The Digital Decade 2030 has as its goals improved digital infrastructure, more use of artificial intelligence and blockchain, and a coherent data market. Using these regulations, which will also enable digital commerce, the European Union will greatly affect the formulation of worldwide standards for digital trade. Funding for projects like the European Blockchain Services Infrastructure (EBSI) by the European Union (EU) shows the bloc's will to lead in worldwide digital commerce (*Europe's Digital Decade: 2030 Targets | European Commission*, n.d.).

Problems persist despite these changes. Small and medium-sized businesses (SMEs) trying to increase their online sales could find the severe limitations too burdens. Moreover, the EU must take a diplomatic posture on cybersecurity, digital taxes, and data flows to make sure its policies do not prevent European businesses from reaching abroad markets. Different restrictions on digital trade aggravate tense relations between the European Union and big economies such as China and the United States. The European Union must decide how to protect consumer rights while keeping company competitiveness and innovation.

Figure 3: Digitalization and EU Trade: Impact and Frameworks



Source: Digital Transformation Erasmus+ Project. (2020, January 28). *Legal parameters of digital transformation – Digital Transformation | Erasmus+ Project*. Digital Transformation | Erasmus+ Project. https://digital-transformation-tool.eu/legal-parameters-of-digital-transformation/

3.6 Digitalization in EU International Trade: Opportunities and Challenges

Digitalization has changed the way the European Union approaches foreign policy. Many businesses have reported as a result increased efficiency, faster transactions, and better relationships. The EU's economic plan gives digitization top importance. There are chances and challenges that must be resolved with creative policies and projects. I will talk about how EU businesses are influenced by digital technologies. We shall assess the benefits and drawbacks of certain technologies.

For EU trade, one major benefit of digitization is improved supply chain management. Many digital technologies help to improve clarity, lower administrative loads, and enable real-time product monitoring. Among the options are blockchain, artificial intelligence, and the Internet of Things (IoT). Automating customs clearance processes and documentation helps worldwide companies save time and money. Reflecting its dedication to the Single Market as well as the Digital Single Market, the European

Union's policies to remove digital barriers and promote an ideal business climate are especially admirable (European Economic and Social Committee et al., 2019). The improved accessibility that digitalization has enabled for the application of big data analytics and artificial intelligence in trading choices presents a great opportunity. Forecasting market demand, streamlining processes, and fraud detection let AI-driven algorithms support companies and politicians in making better-informed judgments. Along with EU investments in digital infrastructure, Horizon Europe and the European Data Strategy help to advance artificial intelligence and big data research and development. This maintains the edge of competitiveness in digital trading. By lowering the need for human engagement in repetitious tasks, AI-driven automated operations might simplify procedures and maybe improve output (Ozturk, 2024).

Encouragement of trade across the EU depends critically on digital financial services. Thanks to developments in fintech digital banking and blockchain-enabled smart contracts among other things international monetary transactions have grown more secure and efficient. Emerging as practical substitutes for international transactions, cryptocurrencies and central bank digital currencies (CBDCs) let businesses run free from traditional banks acting as middlemen. These changes the European Union is using will improve financial equity, lower transaction costs, and increase accessibility (Kumari & Devi, 2022).

Despite these benefits, digitizing EU international trade still presents major difficulties. Precaution must come first. Consumers as well as businesses depend on commerce. As internet transactions rise, cyberattacks and data breaches are multiplying. Cybercrime, which targets private trade data, intellectual property, and financial activities, implementing appropriate security mechanisms even more challenging. The Network and Information Security (NIS) Directive and the Cybersecurity Act of the EU strengthen bloc defence against cyberattacks. Companies face the costs of their security initiatives. Furthermore, cyberattacks are getting more complex and call for regular security measure updates; the EU needs to work with other states to lessen the consequences of these risks. Following rules set by every member country provides great difficulty as well. Notwithstanding the EU's attempts to create a single digital marketplace, businesses running across several countries have extra difficulties because of the different laws, tax

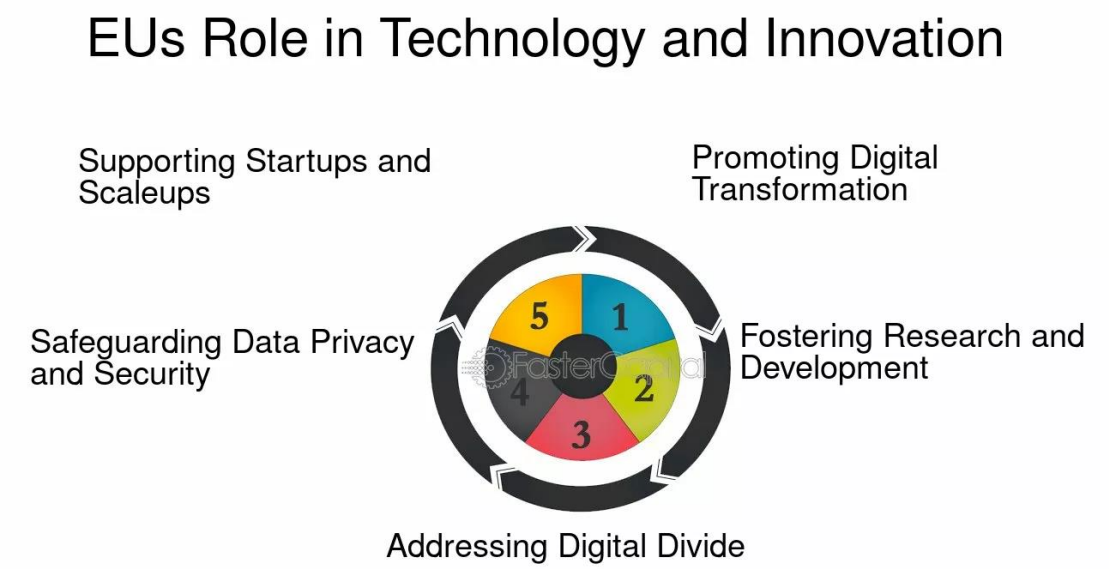
systems, and data protection regulations of every nation. The adoption of the General Data Protection Regulation (GDPR) emphasizes the need for consistent data governance practices. Still, there is a general agreement among member states on the GDPR's interpretation and application that is elusive. These legal differences undermine the effectiveness of digital trade, so the EU needs constant regulatory evaluations. Using uniform digital commerce rules among all EU members, companies can save money, and government efforts can be minimized (European Economic and Social Committee et al., 2018).

A further obstacle to fair involvement in digital trade is the variation in digital capacities among EU members. Unlike Germany and the Netherlands, which have made investments in their digital infrastructure, Eastern and Southern European nations are behind. The difference puts businesses in areas with less technological development at a competitive disadvantage, therefore impeding their capacity to seize the possibilities presented by digital currency transactions. To offset this, the European Union (EU) developed and backed Digital Europe and the Recovery and Resilience Facility. Still, these strategies seldom always yield the expected results. To properly address this, specific funding must be set aside for education, the improvement of digital infrastructure, and the assistance of underdeveloped areas in reaching higher digital integration. Further challenges impeding digital trade within the EU are the reliance on outside technology suppliers and the absence of digital sovereignty. The dependency on big American and Chinese IT companies for cloud computing, digital payment systems, and e-commerce platforms raises serious issues on strategic autonomy, data security, and market competitiveness. The EU's search for native digital solutions is best shown by the Digital Markets Act and the Gaia-X cloud project. The aim is to remove this reliance and create a digital space where the EU may compete. Only cooperative efforts among EU members and significant research and innovation expenditure will allow one to achieve digital sovereignty (Alcidi et al., 2023).

One important issue to consider is how digitalization affects employment prospects in companies. The invasion of technology and artificial intelligence (AI) on routine jobs is causing job displacement and requiring retraining for individuals. Digital trade generates new job opportunities in fields such as data analytics, cybersecurity, and digital marketing;

but it calls for large expenditures in training and education. The Digital Education Action Plan the EU started aims to provide workers with the necessary knowledge and tools needed to thrive in the modern digital economy. Governments and businesses must work together to provide chances for retraining and ongoing education for those who have been without jobs. Business done online presents ethical as well as technological issues. Many challenges need careful management and supervision. Data privacy, artificial intelligence discrimination, and the possible use of online trading platforms are among the concerns. Reacting to these and related issues, the European Union (EU) developed laws including the Artificial Intelligence Act, aimed at defining moral guidelines for AI applications. Digital commerce cannot grow sustainably without both sides upholding the highest values of integrity, openness, and fairness (Jain & Nottingham University Business School, 2021).

Figure 4: EUs Role in Technology and Innovation



Source: *EUs Role in Technology and Innovation*. (n.d.). https://fastercapital.com/topics/how-to-calculate-the-irr-of-an-expansion-project-and-what-does-it-mean.html

4 Practical Part

4.1 Case Studies of Digital Trade Implementation in the EU

4.1.1 Digital Trade and SMEs: Overcoming Barriers

One major concern is the staff's poor knowledge of efficient use of technology. According to a survey, about 27% of SMEs avoided using modern technology mostly due to inadequate digital competencies. Small businesses fail to properly adopt and apply digital solutions because of inadequate knowledge, therefore reducing their competitiveness in the online market. Another major problem is the utter absence of digital infrastructure. Lack of internet access makes many small businesses to handle digital transactions. In impoverished or rural areas especially, this is true. The infrastructure shortfall can prevent small and medium-sized businesses from fully using e-commerce and other digital channels, therefore limiting their capacity to interact with a larger audience. Moreover, financial constraints are of great importance. Small and medium-sized businesses (SMEs) lack the required skills and technologies due to financial limitations. Technological developments could improve business operations and increase competitiveness; however, some companies find it difficult to apply and benefit from them because of inadequate resources(Dufourcq et al., n.d.).

Greece has especially helped small businesses with their online strategy. For the Greek Recovery and Resilience Plan, helping small businesses accounts for more than 20% of the funding. These costs are meant to cover investments stopped due to the COVID-19 outbreak and distribute extra money to private sector projects aiming at improving production and competitiveness. Along with the European Union and its executive body, Greece has made changes to simplify regulatory compliance for SMEs to help the digital transformation of small and medium-sized companies (*Greece's Recovery and Resilience Plan*, n.d.). Their main objectives have been helping Finnish SMEs create original ideas, become digital leaders, and raise environmental consciousness. Under the Recovery and Resilience Plan, Finnish companies could seek money to fund digital transformation, creative ideas, or sustainable projects. These projects aim to improve the online market competitiveness of small businesses in Finland (*Finland's Recovery and Resilience Plan*, n.d.). Ireland has passed laws meant to support small businesses in change adaptation and ease government operations. General business operations account for 27% of the Irish Recovery and Resilience Plan; helping small and medium-sized businesses (SMEs)

receives 11%. Small and medium-sized businesses (SMEs) are the main targets of the investments to reduce their environmental impact and enable their shift to the digital economy. Ireland has also changed policies to improve digital transformation and regulatory compliance for smaller businesses (*Ireland's Recovery and Resilience Plan*, n.d.). An intriguing effort aiming at accelerating the digitization of small businesses is the Portuguese Digital Toolkit Program. Using the program developed under the country's Recovery and Resilience Plan, small businesses can get the required tools and financial help to fully apply digital technologies. With large financial resources allocated to this program, Portugal hopes to enable the migration of its small and medium-sized businesses to digital operations. This will improve their market exposure and manufacturing capability as well (*Portugal's Recovery and Resilience Plan*, n.d.).

First of great importance is funding technological education and training. Customized training courses teaching employees of SMEs on maximizing digital resources could help them. This approach can increase creativity as well as production. The development of successful training programs could be facilitated by cooperation between trade companies and educational institutions. Particularly in emerging countries, governments and companies must work together to upgrade digital infrastructure. Sluggish and inconsistent internet connections make it difficult for SMEs to engage in online sales. Implementing measures to support and finance the expansion of broadband will help more small businesses to have access to the digital economy. This will help the infrastructure gap to be closed. The development of financial solutions catered to their needs is crucial to helping small businesses overcome their financial challenges. The approach meant to inspire people to move to digital platforms depends on incentives such as tax discounts, low-interest loans, and supplementary goods. Encourage small businesses to start digital initiatives by helping with loan and grant application processes (Pawenang et al., 2024).

Small and medium-sized businesses are more likely to apply digital solutions to maximize legal and administrative processes. Small businesses can flourish in an ideal atmosphere provided rules and policies supporting digital commerce are developed. Small businesses engaging in the rule-making process are more likely to produce accepted rules, therefore supporting their goals for digitalization. To help other small businesses move to digital channels, we have compiled a collection of best practices and success stories.

Platforms allowing connections and information sharing among small businesses help to promote creative ideas and long-lasting cultural growth. To share important information, government agencies, and business companies regularly plan seminars, conferences, and meetings. Small businesses in the EU may find the shift to digital trade difficult; but experience shows that these obstacles may be overcome with cooperation and supporting laws. Small and medium-sized businesses can flourish in the digital age by improving skills and tools, getting financial help, simplifying rules, and enabling information flow (Hojnik & Huđek, 2023).

4.1.2 Digital Platforms and Trade Facilitation

The Single Window Environment for Customs in the European Union is a noteworthy case study. This digital platform's seamless link between companies and regulatory authorities has changed the trading process. Through a single gateway, the solution streamlines the submission of all necessary documentation, therefore lowering administrative load and retail waiting times. Combining EDI with customs-clearing processes guarantees UCC compliance. At first, Belgium and the Netherlands accepted it. Trade efficiency has so increased significantly at important ports such as Rotterdam and Antwerp. The Single Window Environment helps customs agents from cooperating countries to work more quickly. This lessens the possibility of trade document discrepancies, thus lowering the risk of fraud (*The EU Single Window Environment for Customs*, n.d.).

The spread of Internet commerce within the European Union has been further accelerated by the explosion of electronic invoicing and procurement systems. The Pan-European Public Procurement Online (PEPPOL) network has made electronic billing standard in both public and private sectors. There are Italy, Sweden, and Denmark among the members. This technology guarantees adherence to EU rules, quick transaction execution, and system compatibility across borders. Especially helping small and medium-sized businesses (SMEs) engaged in worldwide trade, the broad adoption of e-invoicing lowers processing times and expenses. By lowering tax evasion and supporting fiscal transparency, e-invoicing has improved EU financial control and simultaneously streamlined procurement (*Pan-European Public Procurement On-Line (PEPPOL)*, n.d.). By promoting electronic goods transportation information (RFI), the Digital Transport and

Logistics Forum (DTLF) has enabled digital trading in the logistics industry. By letting businesses use digital solutions in place of paper-based transportation documentation, this program has optimized supply chain management. Pioneers in electronic foreign trade information (RFI), Germany, and France have cooperated on electronic consignment notes (e-CMR) to maximize logistics, lower carbon emissions, and guarantee conformity to EU transportation requirements. Furthermore, these technical developments allow real-time shipment tracking, therefore improving supply chain visibility and lowering the incidence of goods theft or loss (*Digital Transport and Logistics Forum (DTLF)*, n.d.).

Investing in artificial intelligence and big data analytics, the European Union is improving digital platforms and enabling trade. AI-powered risk assessment technologies let customs officials more quickly spot problems and possible fraud at checkpoints. AI-driven risk analysis has been applied by Spain to its customs processes to improve compliance monitoring and speed clearance times. Companies could use machine learning to project future trade trends to maximize the advantages of their supply chain approach with predictive analytics.

The explosion of digital channels has greatly improved global online trade. Establishing similar rules for all online markets, the European Digital Commerce Framework safeguards customer personal data, forbids undesired access, and guarantees financial transaction security. By enforcing more rigorous norms, the Digital Markets Act (DMA) and the Digital Services Act (DSA) have improved fairness and competition in Internet trade. Platforms like Allegro and Shopify, which use EU-wide harmonization efforts to enable cross-border trading, have greatly expanded the digital trade sectors in Poland and Ireland. Effective cross-border transactions have been enabled by developments in digital payments including accelerated SEPA transfers and blockchain-based smart contracts. Nowadays, businesses as well as customers have improved security during online transactions (*e-Commerce Rules in the EU*, 2025).

Using digital identity systems has simplified trading throughout the EU. The European Digital Identity (EUDI) Wallet will let companies and people engaged in cross-border economic activity use safe and uniform digital IDs. This pilot initiative in Finland and Austria aims to maximize security for online transactions and streamline verifying

procedures. Against many forms of identity theft and online fraud, blockchain and AI-based distributed identity verification systems are proving successful (*EU Digital Identity Wallet Pilot Implementation*, n.d.).

4.1.3 Blockchain and AI in Digital Trade

Artificial intelligence and blockchain technologies have changed the European Union's digital trade. Using these tools has produced more efficient, safer, and more transparent trade. Blockchain technology combined with artificial intelligence is changing worldwide cooperation. These days, companies can independently check data, spot fraud, and track real-time activity. Analyzing case studies of digital trade adoption in Europe exposes the revolutionary possibilities of blockchain and artificial intelligence in business, therefore minimizing waste and guaranteeing regulatory compliance (Verbeek et al., 2021).

The European Blockchain Services Infrastructure (EBSI) was created by the European Commission to facilitate dependable and safe document sharing amongst members of the EU. EBSI uses blockchain technology to validate trade-related documentation, therefore lowering fraud and guaranteeing traceability. By use of artificial intelligence algorithms, this technology guarantees that stakeholders obtain only verified and certified information, therefore enhancing data validation techniques. For online companies, this has greatly simplified customs clearance and regulatory compliance, therefore relieving staff effort. EBSI is also working to improve the interoperability between public and private blockchain systems. A more coherent digital trade inside the EU will follow from this (*European Blockchain Services Infrastructure*, n.d.). Developed jointly by IBM and Maersk, TradeLens technology has been applied by various EU nations to improve trade procedures. On a distributed digital ledger, this blockchain-based technology permits real-time recording of transaction and shipment data. TradeLens's AI-integrated predictive analytics could let supply chain managers act ahead of time, therefore minimizing delays and optimizing goods route efficiency. Reduced waste from EU foreign shipping and a more flexible and stronger corporate ecosystem follow from this. Using communication and cooperation among customs agencies, shipping companies, and ports, TradeLens improves trade efficiency and lowers costs (Maersk, 2024).

One major European logistics centre is the Port of Rotterdam. Using artificial intelligence and blockchain technology, they simplified the tracking of goods and completing trade documentation. Thanks to its partnerships with digital enterprises, the port can now predict cargo bottlenecks and improve container movements using an artificial intelligence data-driven approach. Blockchain technology guarantees unchangeable and always available shipping records. Reduced friction and more confidence among all the participants follow from this. As so, the digital revolution has improved the competitiveness and efficiency of world commercial ports. Port authorities are considering applying real-time logistics plan changes inspired by data produced by artificial intelligence. This would reduce fuel usage and emissions, so improving environmental sustainability, and help to ease traffic congestion (*First Blockchain Container Shipped to Rotterdam*, n.d.).

One-way blockchain and artificial intelligence are revolutionizing the sector is through the automation of customs operations. Artificial intelligence-driven blockchain technology is helping to enable electronic submission and verification of customs declarations. This speeds up the clearing procedure and lowers the possibility of dishonest business operations. Several EU countries are using artificial intelligence-driven anomaly detection in customs data to spot questionable financial activities and possible tax fraud. As such, real traders will find it easier to manage documentation, and compliance procedures will be strengthened. These developments are encouraging; however, major development is required before blockchain, and artificial intelligence are applied widely in European digital trade. The implementation process is further complicated by issues with interoperability, data protection, and inadequate cooperation among agencies. The growing functionality of blockchain networks and the running of artificial intelligence-powered systems depend on constant technical development. Using government, corporate, and technological company coordination, initiatives like the Digital Europe Program seek to solve these challenges. Another goal of standardizing activities is the flawless integration of blockchain systems among several EU countries (*First Blockchain Container Shipped to Rotterdam*, n.d.).

4.2 Expert Insights on Digitalization in EU Trade

Digital technology has been included in trade strategies under European Union (EU) leadership in recent years. As such, its presence in foreign markets has greatly changed. Consultations with experts in the field and EU companies doing business abroad have helped us to better understand how digitization influences EU trade (Elliott, 2024). Digitalization is the top priority for the European Union as its main approach to improve its competitiveness in world trade. About thirty million European Union jobs depend on international trade, said Ian Talbot, head of the Eurochambres International Trade Committee. "Access to the world's growth hubs will become increasingly important for European businesses as almost 90% of global economic growth is expected to occur outside of Europe in the next years." 2022 (*Interview With Eurochambres International Trade Committee Chair, Ian Talbot - Eurochambres*, 2022). These circumstances clearly show how necessary digital technologies are to enter new markets and maximize processes. The explosion of e-commerce has allowed European Union (EU) companies especially small and medium-sized firms (SMEs) to extend their customer bases outside conventional geographic limits. This lowers dependability on middlemen and processing costs (Reuters, 2024).

Most EU digital commerce consists of artificial intelligence (AI) and newly developed technologies. According to a European Parliament study, "artificial intelligence is utilized by both digital and non-digital sectors, yet its application greatly differs among countries, including within the EU." Therefore, while some EU nations are fast using artificial intelligence to boost innovation and production, others may have to speed up their adoption to stay competitive. Including artificial intelligence in supply chain management, customer service, and data analytics has improved company productivity and made it possible to provide more tailored customer experiences. As so, they have set themselves out in worldwide markets(Trade.gov.pl, 2025).

While digitization has many advantages, it also has significant negative effects, especially about data management and legal procedures. "The European Union advocates for a rights-driven approach, establishing regulations to safeguard individual rights and promote a fair, people-centred digital marketplace"(*The European Union's Digital Trade Rules: Undermining European Policy to Rein in Big Tech – CEPR*, 2025). Protecting

consumer rights could mean strict policies that stifle innovation and slow down company expansion. Following complex compliance rules can provide serious difficulties for companies, therefore restricting their flexibility in the always-changing digital market(*The Battle for the Soul of the Digital Economy –An Interview With Anu Bradford on Digital Empires - Groupe D'études Géopolitiques*, 2023).

The digital trade restrictions established by the European Union have a major influence on worldwide companies. The European Centre for International Political Economics (ECIPE) claims that using digital services from other nations, especially the United States, increases Europe's competitiveness and productivity growth, so offering a strategic economic advantage(European Parliamentary Research Service, 2024).

This involvement emphasizes the need to be receptive to foreign ideas and technologies to keep and improve competitiveness. Therefore, companies in the EU must adjust to the reality that restrictions on digital trade vary depending on the market. For this, both agility and initiative are crucial(*Openness as Strength: The Win-Win in EU-US Digital Services Trade*, 2024).

In the next years, a growing share of EU trade is probably going to happen online. In sustainable production and consumption, supply security, and building resilience and readiness for any future crisis, the digital sector is more important in its enabling role. From this angle, digital technology would both improve efficiency and strengthen the resilience of EU trade policies, therefore serving both a dual use. More flexible, open, and customer-centric solutions are expected from the expected transformation of conventional business processes using digital technology(Epic, 2020).

CEOs and employees claim that the growth of EU trade depends critically on digitization. Although they have also brought new problems that need good management, especially related to data governance and regulatory compliance, technological developments have enabled various chances for improvement and expansion. The European Union (EU) must embrace digital change while juggling innovation with strong control if it is to maintain its competitive advantage in the global market.

4.3 Data Analysis of Digital Trade Trends in the EU

4.3.1 Growth of E-Commerce and Digital Exports

Studies on digital trade patterns show that the EU economy is much influenced by online buying and digital exports. The European digital market has grown noticeably. From 2019 to 2024, cross-border e-commerce is expected to have an annual growth rate of 12.7%, much higher than the about 3.2% increase rate of traditional trade channels. This gap represents the basic change in the way European businesses engage with international markets.

According to the Digital Economy and Society Index (DESI) from the European Commission, almost 71% of EU businesses participate in digital commerce to some degree; 43% indicate interest in cross-border digital trade. Member states have different participation rates; lower rates are found in the southern and eastern parts. Top in digital export integration are Finland (61%), Sweden (68%), and Denmark (64%), all Nordic countries (*The Digital Economy and Society Index (DESI)*, n.d.). Modern digital goods differ greatly from those of only five years ago. Services accounted for 52% of the whole value of digital trade inside the European Union in 2019. They currently make 64%. This change emphasizes Europe's export industry and the growing relevance of software products, digital information, and cloud-based solutions. With a cumulative annual growth rate (CAGR) of 17.3%, business-to-business digital services have seen notable expansion according to Eurostat. Digital commodity exports keep increasing, but their annual growth rate has slowed to 8.9% which makes them more difficult. Among the vertical markets benefiting from specialized digital tools and platforms were manufacturing, banking, and healthcare; these sectors were also among the fastest growing. Thanks to their experience, European Union digital producers have effectively raised their revenues despite global competition (International Monetary Fund et al., 2023).

Examining payment data from the European Central Bank revealed an interesting relationship between the increase in digital exports and the use of digital payment systems. Countries with high rates of digital payments often did well on digital exports. This highlights how important a solid local digital infrastructure is to enable cross-border digital trade. The drop in the EU's digital exports and the rise in digital exports to other countries generate several strategic questions. Digital trade within the EU grew by 14.2% annually;

digital exports to non-EU nations grew by 10.8%. While outside markets are still vital for development, this disparity shows that the Digital Single Market projects have effectively removed barriers to cross-border EU digital trade. Comprising 21% of all EU digital exports, my geographical distribution study shows that the United States is the main non-EU destination for these exports. The next three countries in terms of importance are the UK (17%), Japan (9%), and the developing countries of Southeast Asia (13% together). With an average annual growth rate of 6.3%, the very low rate of digital exports to China suggests that continually breaking through the Chinese market has proved difficult (*Digital Economy Report 2024*, 2024).

Cross-border digital purchases will rise by 34% in 2020; annual growth is expected to keep in double digits until 2023. This unambiguously shows that during the epidemic business-to-- consumer e-commerce experienced notable expansion. The European E-commerce Association claims that from 38% in 2019 to 59% of EU customers now make at least one purchase from digital suppliers in other EU countries every three months. Digital exportation: the process For SMEs there is both a success story and a problem. Though small businesses' digital goods exports from 2019 have increased by 28%, they account for barely 22% of all exports. Exports made possible by platforms show how SMEs may use existing markets and intermediaries, therefore highlighting the benefits of platforms and warning against too much reliance. Small and medium-sized businesses (SMEs) generate sixty-four percent of the value of these digital exports(Cassetti et al., 2023).

After additional limitations were put in place, digital goods have evolved drastically. Standardized compliance systems in the Digital Markets Act and the Digital Services Act help companies running across more than 18 EU nations to save more than 18% of their expenses. Trade association statistics show that the significant expenses of regulatory compliance limit the competitive potential of smaller businesses, therefore causing them disadvantages. Although it will depend more on people with certain skills, the future of growth seems bright. According to my sectoral data research, the European Union's digital exports in AI-enabled services are rising annually at 27%; in data analytics solutions, they are rising annually at 23%; and in specialized digital content production, they are rising annually at 19%. The great technical knowledge and large initial capital

investment these fast-growing businesses demand should draw attention to even more the differences between successful and failed digital exporters(*EU Digital Markets Act and Digital Services Act Explained | Topics | European Parliament*, n.d.).

4.3.2 Industry-Specific Digitalization Trends

Industry 4.0 technologies are drastically changing supply chains and production techniques. In this sector, a significant digital change has happened. According to the Digital Economy and Society Index (DESI) from the European Commission, almost 65% of EU industrial companies will have included advanced digital technologies in their operations by 2023. Technologies covered here are cloud computing, artificial intelligence (AI), and the Internet of Things (IoT). Since 2020, cross-border trade among EU companies has increased by 23% thanks to the digital merging of smart factories and digital twins. This has streamlined manufacturing scheduling and demand forecasts (*The Digital Economy and Society Index (DESI)*, n.d.). Digital changes are underway in the insurance and banking sectors. Regulatory actions like the Digital Finance Package help new ideas to blossom. From 2021 to 2023 the number of financial services crossing national boundaries increased by 31%. Simultaneously, European Banking Authority data shows that 47% increase in online banking transactions within the EU. It has been quite helpful to standardize APIs for open banking projects. Apart from improving national competitiveness, they have opened fresh revenue sources for fintech startups. The revised Payment Services Directive (PSD2) enables safer and more effective data exchange between service providers, hence increasing digital financial transactions (*Digital Finance Package*, n.d.).

Retail is an interesting field in which digital disturbance has changed consumer behaviour. Within the European Union, online sales jumped from 12% in 2019 to today over 19%. Clearly becoming more important is online buying. Accelerated development is shown by an estimated 36% increase in international e-commerce transactions between 2020 and 2023. The importance of digital markets has grown recently as e-commerce sites including Zalando, Otto, and Allegro shave aggressively proliferated throughout Europe. The Digital Services Act has defined platform responsibilities and improved consumer protection in overseas transactions, therefore organizing this dynamic terrain (Eurostat, 2025).

The variation of member countries impedes the digitizing of healthcare. Since 2020, telemedicine cases have astonishingly grown by 215%. The European Observatory on Health Systems and Policies notes. Data security issues and legislative fragmentation make delivering international digital health services challenging. The European Health Data Space initiative intends to improve digital health commerce to handle these challenges in the next five years. This can have a prospective economic worth of €11 billion. Among others, Denmark, Finland, and Estonia were early leaders in combining their healthcare systems to show how this may improve service delivery across national boundaries (Special report 25/2024: Digitalisation of healthcare, n.d.). Though the agricultural industry is usually reluctant to adopt new technologies, precision farming has lately gained great popularity. The European Agricultural Fund for Rural Development estimates that around forty percent of European Union farms use different kinds of digital technologies. The size and location of the farm determine this amount greatly. By removing geographical barriers and allowing direct relationships between consumers and providers, online farm markets have improved the efficiency of agricultural trading. Using this technology increased production by the Netherlands and other pioneers in integrated digital agriculture by 17% (*Digitalisation of the Energy Systems*, n.d.).

Smart grid technologies help the European Union shift to renewable energy sources and enable international energy trading. The following are some interesting commercial effects of digitalization in the energy industry: The European Network of Transmission System Operators for Electricity claims that 42% of all cross-border energy transactions are digital and automated ones. This improves grid efficiency and market stability. One creative idea would be blockchain-based energy trading systems. Pilot projects in Germany and Sweden show how successful P2P energy trading can be on a global level. Clearly visible in all spheres, digitization tendencies are not just increasing in frequency. Cross-sectoral integration in action is seen by the extension of data ecosystems to link hitherto separate value chains. Based on my results, these connections will become stronger in the next years and more complex regulatory actions outside of industry-specific rules will be needed. Representing a major progress, the Data Act and the Data Governance Act set standards for international and multidisciplinary data sharing (Ning & Yao, 2023).

4.3.3 Time Series Analysis of Digital Trade (2010–2024)

From 2010 to 2024, trade trends inside the European Union (EU) have undergone notable changes. This mostly results from the rapid advancement of digital technologies. This revolution not only alters the way conventional trade systems operate but also presents fresh opportunities and difficulties for research on Internet commerce. Examining the data from this period closely reveals some fascinating trends, patterns, and changes influencing the current EU digital commerce environment. As the new decade started, the European Union's digital trade was still in its infancy. It is difficult to overlook, nevertheless, the explosive increase in user numbers seen on e-commerce and digital platforms over the decade. The proportion of EU individuals (16–74) who made online purchases in 2024 climbed 72% from 60% in 2019. This development reflects consumers' increasing reliance on internet markets and their confidence ("Digital economy and society statistics - households and individuals," n.d.).

Realizing the advantages of digital platforms, more and more businesses began including online sales in their plans. This calculated action helped them increase their market share and operational efficiency. This change was facilitated by the explosion of fast internet and mobile connections, which led to simpler transactions and opened the path for online business. Developments in information and communication technology (ICT) are driving the rise in digital trade inside the European Union. Over the past decade, the information and communication technology industry has exceeded the GDP increase by a ratio of three in OECD countries. The European Union started to play a significant role in the worldwide digital economy, and this spectacular expansion made exports easier (*OECD Digital Economy Outlook 2024 (Volume 1)* 2024).

Another interesting change is the increasing application of artificial intelligence technologies by European companies. About 13.48% of EU companies claimed to deploy artificial intelligence by 2024. Digital trade has been accelerated by the simplification of procedures and improved product offers made possible by AI integration into corporate processes("Digital economy and society statistics - enterprises" 2025). Examining EU trade balances throughout this period helps one to grasp the complex shifts brought about by digital trade. Declining over €10 billion from the year before, the European Union sold goods to China valued at more than €213.3 billion in 2024. This collapse marks proof of the evolving character of trade policy and the challenge of prospering in the modern digital

age(Statista 2025). On the other hand, the European Union maintained strong commercial relations with the United States. Forecasts indicate that US exports to the EU will rise from 0.7% last year to $370.2 billion in 2024. The consistent expansion in the industry proves the dependability and long-term character of transatlantic digital commerce links(“European Union,” n.d.).

The fast growth of digital trade required comprehensive policies to handle newly arising issues. The rules the European Union passed in reaction aimed at data protection, fair competition, and computer security. Concerning data privacy, the GDPR established a global benchmark. This influences both in and outside of Europe the methods of internet trade. The European Union (EU) participated in talks and cooperated with other countries to establish digital trade agreements as part of its attempts to establish a safe and friendly environment for online business. These government programs increased consumer and industry confidence, hence fostering digital trade. Even with all the achievements, the EU's digital trade scene still presented several challenges. Concerns about data sovereignty, problems with member state digital infrastructure, and a lack of common rules hampered the integration of digital trade. Digital trade's worldwide character makes it more challenging to follow the regulations of several countries and move data across borders. To get over these challenges, the European Union (EU) will probably keep funding digital infrastructure, support creative ideas, and create easily understood and future-implementable rules. Using modern technologies like the Internet of Things (IoT) and blockchain opens fresh paths for cooperation and development as well as further differentiating digital transactions (Institut Jacques Delors 2025).

Table 2: Key Indicators of Digital Trade Growth in the EU (2010–2024)

Year	Individuals Purchasing Online (%)	Enterprises Selling Online (%)	ICT Sector Growth Rate (%)	Exports of Digital Services (€ Billion)	Enterprises Using AI (%)
2010	40	13	1.8	108	—
2012	45	15	2.1	120	—
2014	50	17	2.4	135	2.3
2016	55	18	3.1	155	3.5
2018	60	20	3.4	175	5.1
2020	65	22	4.0	200	8.6
2022	68	24	4.5	230	11.2
2024	72	26	5.0	260	13.5

Source: *Data based on Eurostat (2024), OECD (2024), and Statista estimates. AI usage not recorded prior to 2014.*

Between 2010 and 2024 EU digital trade underwent a tidal change. The European Union is leading the digital economy thanks in great part to changing customer behaviour, proactive legislative actions, and technology developments. The lessons the European Union learns as digital trade expands shed light on the inner dynamics of digital integration and the several elements influencing success in the modern digital era.

4.3.4 Impact of Digital Trade on Trade Balance

Particularly with major allies like China and the US, the expansion of digital trade has transformed EU corporate practices. Emphasizing the variations between companies that heavily rely on technology and those that do not, this part investigates how digital trade influences the trade balance of the EU in relevant spheres. The relationship between the EU and the US is built on significant commercial and financial interactions. The European Union contributed €503 billion to the US and got €347 billion in imports. Out of a total of 850 billion euros in goods trade, the EU boasts a 157-billion-euro edge in goods trade. In the service sector, things were somewhat different instead. The European Union's receipt of €427 billion and export of €319 billion generated a trade imbalance in services of €109 billion (“EU Trade Relations with United States” 2025).

Emphasizing digital services has helped the US to stay in a constant balance. In 2023 the US sent the EU services valued at $261.7 billion. The trade imbalance in services came out to be $71.2 billion net (“EU Trade Relations with China” 2025). This indicates that, particularly in more traditional industries like medicines and automotive manufacturing, the European Union (EU) has a surplus of goods but lacks enough digital services. As shown by this disparity, American businesses are quite competitive in technologically advanced sectors including ICT (information and communication technology) services (“International trade and production of high-tech products” 2024).

The trade policies of the European Union toward China presents an obvious image. With €223.6 billion going to China and €515.9 billion arriving from China, the European Union's overall goods traded value in 2023 was €739 billion. For the EU, this produced a trade deficit of €292 billion. The main reason for this mismatch is imports of high-tech products, particularly communication and electrical equipment. China will account for an amazing thirty-two percent of the high-tech imports into the European Union in 2023. China has constantly provided the European Union with more goods than it requires. China is the fourth-largest trade partner of the EU for services, so an extra €14.1 billion is justified in 2023. Particularly in technology-oriented companies, the great lack of products is significantly more concerning than this overabundance. For most of its high-tech products, the EU depends on Chinese imports even if it is still competitive in several service sectors(“EU Trade Relations With China” 2025).

The way the European Union and its primary trading partners trade is one instance of the intricate relationship between technologically advanced and conventional companies. Long-standing companies like the automobile and pharmaceutical industries cause a surplus of trade between the European Union and the United States. However, there is also a scarcity of digital services, which indicates that in fields where digital activity is abundant, the United States is leading the pack. The European Union faces a severe shortfall in commodities, particularly technology goods while enjoying a minor surplus in services trade with China. Reducing reliance on Chinese imports depends on the European Union improving its capacity for high-tech manufacturing. If it is to catch up, it must enhance its digital offerings to rival US ones. The long-term economic development of the European

Union in the digital age depends on the elimination of these issues as well as overall trade balance improvement (Alcidi et al. 2023).

The European Union should consider these issues if it wishes to improve internet commerce and create fair trade practices:

- European Union investment in digital infrastructure and creative concepts can increase bloc competitiveness in digital services. Should this prove successful, the service trade gap between the US and the EU might close.
- Investing in high-tech manufacturing will help us to close the goods trade imbalance by enabling us to buy less from China.
- If the European Union (EU) gave digital education and skills training a top priority, it might become more competitive internationally and help technologically driven companies by improving their access to qualified personnel.
- Using effective trade agreements eliminating digital trade restrictions, open markets and fair competition in digital services would be facilitated.

By leveraging its strengths in more conventional sectors, the European Union (EU) may raise its competitiveness in technologically oriented sectors. It might so aim for a more balanced trading relationship with China and the US. Digital trade significantly influences the trade balance when the EU deals with major nations like China and the US. While the European Union lacks digital services, the United States has an excess of conventional goods. As this shows, the European Union must raise its performance in this field. Nevertheless, the fundamental reason for the notable trade deficit with China is the value of high-tech goods imported by the EU. This emphasizes the critical need to improve the capacity of the European Union to generate technology products. To create a more stable and fair-trade image in the digital era, the European Union must undertake strategic investments and legislative adjustments to fix these issues.

Table 3: EU Digital Trade with the US and China

Partner	Category	EU Exports (Billion €/$)	EU Imports (Billion €/$)	Trade Balance (Billion €/$)
United States	Goods	€503.0	€347.0	+€156.0
United States	Digital Services	€319.0	€427.0	–€108.0
China	Goods	€223.6	€515.9	–€292.3
China	Digital Services	€49.1	€35.0	+€14.1

Source: *European Commission (2024a, 2024b); Eurostat (2023); Project DisCo (2024)*

4.4 Challenges and Policy Recommendations for Digital Trade in the EU

One of the main issues is the inconsistency in applying internet restrictions within the European Union. Though individual member states currently have distinct policies on data protection, consumer rights, and online transactions, the European Union could be striving toward a single digital market. Maintaining compliance becomes more challenging for businesses especially SMEs given the several requirements that must be satisfied. For example, the General Data Protection Regulation (GDPR) is applied differently in different member states since different members state it in different ways. The EU should unite its digital rules if it is to offer a consistent framework that promotes and supports world trade. The European Union should create a unified digital compliance authority to assist companies across several countries (*Data Protection and Online Privacy - Your Europe*, 2022).

Another major issue is a dearth of enough internet infrastructure in several EU members. Several European nations, particularly in the east and south, have poorer digital networks when compared to others. Among such nations are Germany and Sweden. Unlike the EU's goal of expansion that benefits everyone, this digital divide makes trading more challenging for underdeveloped areas. If we are to close this disparity, underprivileged areas especially require more money for internet infrastructure. Although the Digital

Europe Program of the European Union is commendable, more focused financing is necessary to ensure that everyone has equal access to modern technology like 5G and artificial intelligence. Public-private alliances could help to accelerate the construction of infrastructure (Negreiro & European Parliamentary Research Service, 2015). Cybersecurity also causes great concern for European online trade. As businesses rely more on digital technologies, cyberattacks, data breaches, and other unwelcome outcomes become more possible. These hazards not only impede trade but also erode public confidence in Internet services. I propose that member states and corporate sector participants cooperate more closely to strengthen the cybersecurity infrastructure of the European Union and minimize the effect of these threats. The European Union should also assist in cybersecurity education and training if it is committed to equipping its workforce to manage fresh cybersecurity threats. A pan-European cybersecurity license system should be developed to help unite security protocols and increase confidence in digital trade (Pestarino, 2024).

Another issue undermining the EU's digital supremacy is using technology invented elsewhere, particularly in China and the US. The EU runs a global risk by depending on foreign cloud services, artificial intelligence systems, and e-commerce platforms, therefore restricting its capacity to set digital trade rules on a global level. This is why I believe more money should flow into local businesses and that the digital economy of the European Union needs additional financing. Consistent political and financial support is needed for the European Alliance for Industrial Data and Edge Computing as well as for the European Cloud Initiative. The EU should use its regulatory authority to enable European enterprises to compete on an equal basis with multinational tech giants (Haeck, 2025). Further impeding digital trade in the EU are data transfer and localization regulations. While certain rules are required to safeguard data, they should not be so strict as to stifle creativity and the growth of data-driven companies. You must balance protecting your privacy with allowing data mobility, in my view. The European Union should look for international agreements allowing the cohabitation of data security policies with those of its trading partners. Blockchain technology is another area the European Union might investigate to determine if it might support global trade and data security (Haeck, 2025).

Furthermore impeding the goals of the European Union's digital trade is inequalities in digital literacy. Regarding digital tools and platforms, many companies especially

smaller ones are completely ignorant. This makes it more difficult for businesses to compete globally and undermines the European Union's ambitions toward increasing digital presence. By distributing employment training courses and digital literacy campaigns around the European Union, I believe it might help with this. Though it is a terrific start, the European Skills Agenda must be enlarged to meet the growing need for digital skills. Companies, colleges, and governments working together will help to ensure that employees are ready to flourish in the digital economy (Graham et al., 2017).

5 Results and Discussion

5.1 Role of Digitalization on International Trade in the EU

Digitizing hitherto paper-intensive processes has greatly simplified and accelerated trade activity. The Digital Single Market (DSM) project of the EU helps companies to engage in cross-border transactions, therefore promoting the development of stronger economic partnerships. Geo-blocking restrictions have been removed and digital payment systems standardized by the Payment Services Directive (PSD2). Consequently, the simplification of online transactions among members of different countries follows. Secure digital payments and automated customs clearance help small and medium-sized businesses (SMEs) to more successfully enter global markets. This has its basic root in the lowering of trade restrictions. One important technical development influencing trade inside the European Union is the spread of e-commerce. Between 2010 and 2023, the percentage of EU consumers making online transactions rose from 53% to 75%. As shown above, consumers are progressively choosing internet purchasing.

The development of e-commerce sites such as Allegro, Zalando, and Amazon helps businesses to reach a larger global market. Digital trade agreements help to enable worldwide consumer access to digital goods and services using the EU-Japan Economic Partnership Agreement among others. The increase in digital payment options has helped online buying flourish. Thanks to fintech developments such as speedy SEPA payments and blockchain-enabled smart contracts, people today have more faith in the security of online transactions. Designed to thwart monopolistic behaviours and promote fair

competition within the digital economy, the Digital Services Act (DSA) and the Digital Markets Act (DMA)

SMEs' entrance into overseas markets is hampered by significant trade costs, limited resources, and legal restrictions. Linking buyers and sellers worldwide, digital commerce systems have helped to solve these problems. Small businesses can reach a global market via e-commerce sites like Alibaba and Shopify instead of paying large costs for physical stores. Using consumer data generated by artificial intelligence (AI), cloud-based services, and digital marketing tools, small and medium-sized businesses (SMEs) have improved their operations and outreach. Notwithstanding these benefits, small businesses in underdeveloped EU areas face difficulties resulting from the inconsistent digital infrastructure of the area.

To close current gaps, the EU's Digital Europe Program aims to improve broadband development, digital infrastructure, and technological competency. Before we can claim that any small business can profit entirely from digital trade, significant development is still to be made.

While digitalization has many benefits, one major drawback is the rise in hacking and consequent restrictions on global trade. Data managers of companies handling foreign data must follow the strict European Union data privacy standards, especially the General Data Protection Regulation (GDPR). Companies, especially those interacting with the EU without a physical presence, could find rising compliance costs related to rules meant to protect consumer data.

Through automation of chores and fraud reduction, blockchain technology and artificial intelligence are improving the integrity and openness of digital transactions. In three main areas demand forecasting, pricing optimization, and consumer behaviour analysis AI-driven solutions can benefit companies. By using AI-driven logistics solutions, the Port of Rotterdam has improved container management and reduced freight arriving delays. Horizon Europe projects of the European Union are providing financing for artificial intelligence and blockchain research. This emphasizes the need for these technologies for the digitization of business.

5.2 Recommendations

Below are the recommendations

1. Europe should quickly increase investment in high-speed internet, cloud computing, and security systems if it is to improve digital trade among its members.
2. Simplified rules, financial incentives, and programs to improve technical education might help small businesses participate in digital trading.
3. To enable cross-border digital trade and lower compliance costs, the European Union should try to standardize the laws of its members.
4. Blockchain and artificial intelligence combined into trading processes will greatly increase organizational security, openness, and efficiency.
5. Modern security policies should be demanded of every company. This will help to reduce the risks connected to Internet transactions.
6. Invest in Cybersecurity Education: Promoting comprehensive cybersecurity training programs can equip businesses, especially SMEs, with the skills necessary to protect against cyber threats, thereby boosting confidence in digital transactions.
7. Enhance Cross-Border Collaboration: Encourage partnerships between EU member states to foster knowledge sharing and best practices in digital trade, which can lead to innovative solutions and improved regulatory alignment.
8. Create a Digital Trade Support Fund: Establish a financial resource dedicated to supporting SMEs transition to digital trading. This fund could provide grants or low-interest loans for technology adoption and infrastructure upgrades.
9. Facilitate Public-Private Partnerships: Promote collaborations between government and private sector entities to drive innovation in digital solutions that streamline international trade, making it easier for businesses to navigate various regulatory environments.
10. Strengthen Digital Literacy Initiatives: Implement national campaigns aimed at improving digital literacy among consumers and businesses, ensuring that all stakeholders are comfortable and proficient with digital trade tools and practices.
11. Leverage Artificial Intelligence for Trade Facilitation: Support the integration of AI in customs processes and logistics management to streamline operations and reduce bottlenecks in trade flows.

12. Establish Clear Data Sharing Agreements: Advocate for standardized data sharing agreements to foster trust and facilitate cooperation between EU businesses and trading partners outside the EU, especially in data-intensive sectors.

5.3 Impact of Digital Trade on the EU Trade Balance

The nature of commercial contacts inside the European Union has altered with the emergence of electronic commerce. This is especially true of significant trading partners like China and the US. Digital and high-tech trade patterns differ greatly enough that the European Union finds it more difficult to compete in sectors mostly dependent on technology. Here we gather the information from Section 4.3.4 and investigate how digital trade can affect the trade balance and long-term EU economic situation.

The paths of trade the US and the EU follow differ. Regarding tangible products, the European Union boasts a significant excess. In 2023 imports valued €347 billion and exports to the US €502 billion. The goods trade balance thus reached €157 billion. The services industry differs, though. Purchasing goods for €319 billion and services from the US for €427 billion, the European Union is €109 billion in the red. This difference can be mostly ascribed to the United States' supremacy in domains such as software development, cloud computing, and information and communication technologies (ICT). Trade deficits came at $71.2 billion; U.S. service exports to the EU came at $261.7 billion. These figures indicate that in terms of digital services the European Union lags well behind other countries. Conversely, the EU shines in more conventional fields as the automotive and pharmaceutical sectors.

The trade pact between the EU and China shows clear goods trade deficits. China delivered the European Union commodities valued at €223.6 billion, but only €515.9 billion returned. The result of this was a shockingly €292 billion trade deficit. The value of high-tech products—especially those related to the communications and electronics industries—helps to explain this discrepancy. China imported almost thirty-two percent of the high-tech products imported by the European Union in 2023. This emphasizes how much for some kinds of high-tech goods the European Union depends on Chinese manufacturing. China's shortage of commodities cannot be offset by the tiny service advantage the European Union (EU) has over it (€14.1 billion in 2023). These developments have resulted

in a great paradox: the European Union is still fighting in conventional industrial sectors while fighting in high-value digital and technologically advanced fields. China rules the world market for high-tech goods thanks in great part to its profusion of manufacturing. On the other hand, the United States's exceptional digital capabilities have helped it to rank highest among services traded. Based on its appalling performance in these two areas, the trade policy of the European Union is obviously seriously defective.

To get above these obstacles, we must deliberately fund the tech sector, fresh ideas, and digital infrastructure. The EU must improve at creating and marketing digital services if it is to catch up to the US. To help us reduce our dependency on Chinese high-tech imports, we also need to increase output in vital industries including electronics, semiconductors, and communications equipment. These changes would strengthen economic sovereignty and assist to level the playing field in world trade. One must invest in staff development if one is to succeed in the digital sphere. Improved access to digital education and sophisticated technical skills will let EU companies—especially SMEs—participate more actively in worldwide digital value chains. Along with these projects, trade policy should give digital trade liberalization top attention.

Agreements supporting open markets reduce regulatory hurdles and guarantee fair competition in the digital sectors help to accomplish this. Finally, the present digital trade imbalances highlight more general issues with the economic framework of the EU. Though its industrial basis will always be a pillar, the Union must change to lead in the worldwide digital economy. The European Union (EU) can rebalance its trade ties with its important partners by investing in innovation, skills, and industry and having a say in trade policies oriented toward the future, so attaining a more stable and technologically integrated trade balance in the next years.

6 Conclusion

The spread of digital commerce within the European Union (EU) has changed trading across borders. This influences corporate operations, organizational connectedness, and world competitiveness. Digital technologies including e-commerce systems, blockchain, artificial intelligence, and big data analytics have revolutionized industry and market access. Concurrent with increasing potential for companies, especially small and medium firms, legislative challenges, cybersecurity risks, and uneven internet infrastructure have surfaced. To provide worldwide access to a safe, innovative, and transparent digital ecosystem for the sustainability of digital trade, EU institutions, businesses, and legislators must work together. Among its several advantages for businesses, the efficiency gains arising from automation and process optimization in digitalization are rather notable. Automated customs systems like the Import Control System 2 (ICS2) have made border crossings easier and less paper documentation is needed overall.

Blockchain technology's adoption into supply chains has improved security and openness, therefore lowered fraud and supporting moral corporate behaviour. By removing old obstacles, digitalization has enabled cross-border business for companies, hence quickening trade. The growth of online buying has significantly affected the direction of world trade. The Digital Single Market (DSM) project of the European Union aims to create a perfect digital environment for international trade. Online buying has grown thanks in part to the Payment Services Directive (PSD2) and the relaxation of geo-blocking limitations. Both consumers and companies are finding increasing favour for online buying.

This helps European businesses to reach global markets without paying significant additional infrastructure costs. Small and medium-sized businesses have mostly benefited from this development since it gives them a competitive edge in the worldwide economy.

Although technology offers many benefits necessary for business expansion, digitalization has also created major problems needing solutions. One important problem that still exists is the scattered character of EU rules. Companies with several sites have more challenges following digital tax rules, e-commerce policies, and data security standards. Notwithstanding efforts of the Digital Markets Act (DMA) and the Digital

Services Act (DSA) meant to support online trade, more work is needed to guarantee consistency in all EU rules. Policies functioning holistically would lead to improved predictability and easier cross-border trade.

One major issue regarding online transactions is their security. Dependent on digital platforms and cloud-based solutions, companies are more vulnerable to cyberattacks, data breaches, and online fraud. To improve the cybersecurity structure, the European Union has passed laws including the Network and Information Security Directive (NIS2). Companies must make investments in sensible security systems to reduce risk. In a digital trade environment, the priorities are protecting private business data and keeping client trust.

Fairtrade involvement is hampered by a constant problem with the digital gap among EU members. Among the most technologically sophisticated countries with good use of digitalization are Sweden, the Netherlands, and Germany.

Particularly in the southern and eastern parts of Europe, not all areas have the necessary digital infrastructure. Resources must be allocated for initiatives improving digital literacy, increasing internet access, and inspiring people to interact with technology to solve this problem. The European Union's Digital Europe Program and Recovery and Resilience Facility have helped these projects to be possible; still, more work is required to guarantee that everyone might benefit from digital trade.

Improving trade practices is impossible without blockchain technology and artificial intelligence integration. Using AI-powered solutions, companies may improve the accuracy of market trend estimates, automate procedures, and enable more informed decision-making. Demand forecasting, inventory planning, logistics, and supply chain route optimization among other tasks have been greatly streamlined by artificial intelligence. Blockchain technology has simultaneously improved company security by providing immutable transaction records, less documentation, and more confidence among corporate partners. Integrating the always-developing capabilities of these technologies into digital commerce platforms is crucial to keeping a competitive advantage in the global market.

Preserving the advantages of digital trade and overcoming its obstacles calls for a complete strategy. The improvement of its digital infrastructure must be given top priority in the European Union so that every member state has flawless access to digital tools, cloud computing, and fast internet. Improving cybersecurity rules and supporting best practices in digital risk management is crucial if we are to keep trade activities continuous. Legislators, businesses, and industry players must be constantly communicating to build a cohesive legislative framework that supports innovation in digital trade while safeguarding consumers and guaranteeing market fairness.

Digital trade policies of the European Union must give staff training and education top priority. Because of the growth of the digital economy, people with strong technological skills are more and more sought after in fields including artificial intelligence (AI), cybersecurity, and digital marketing. Giving staff members the necessary tools to succeed in a digital economy calls for cooperation across businesses, universities, and government agencies. Training initiatives, funding for research and development, and instructional activities will help to maintain the European Union's (EU) strong expansion in digital trade. International cooperation greatly shapes the direction of digital trade going forward.

Since digital trade crosses national boundaries, the European Union (EU) must work with other countries to provide uniform rules for data governance, security, and digital taxes. Including digital commerce policies in trade agreements helps to promote global trade and get over legal barriers. Work with global organizations like the OECD and the WTO to build an inclusive and fair online economy.

At last, technology has changed EU trade with other nations, giving companies great chances for global competition, innovation, and growth. The shift to digital trade has created problems with infrastructure, cybersecurity, and laws that call for careful management.

The most recent trade data also show that the trade surplus or deficit of the EU is substantially influenced by digital trade. Although the European Union boasts more physical commodities than digital ones, it never really measures up in terms of digital

services. The technological competitiveness varies. The great majority of the European Union's big trade deficit with China is explained by computers and communication tools. These structural differences emphasize the EU's reliance on imported advanced digital goods and services. Additional money should be directed to digital innovation, skill development, and smart trade agreements fostering fair competitiveness in the digital economy to solve these discrepancies.

All our benefits have come from it facilitating market access, lower pricing, and more efficiency. Initiatives such as NIS2, DSM, and DMA show that the European Union gives digital transformation top priority. These initiatives show how dedicated the European Union is to create a strong digital trading environment. Digital trade will survive, nevertheless, only if infrastructure, regulatory cooperation, protection, and labour training are kept ongoing. The EU must have a proactive, open, forward-looking approach to show its leadership in digital trade. Customers and companies alike may be sure this will lead to ongoing economic growth and success.

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8.3 List of abbreviations

AI – Artificial Intelligence

B2B – Business-to-Business

B2C – Business-to-Consumer

CBDCs – Central Bank Digital Currencies

CJEU – Court of Justice of the European Union

DESI – Digital Economy and Society Index

DMA – Digital Markets Act

DSM – Digital Single Market

DSA – Digital Services Act

EBSI – European Blockchain Services Infrastructure

EC – European Commission

ECB – European Central Bank

ECJ – European Court of Justice

EIDAS – Electronic Identification, Authentication, and Trust Services

EU – European Union

FTAs – Free Trade Agreements

GDPR – General Data Protection Regulation

ICS2 – Import Control System 2

ICT – Information and Communication Technology

IoT – Internet of Things

ML – Machine Learning

NIS2 – Network and Information Security Directive 2

OECD – Organisation for Economic Co-operation and Development

PSD2 – Payment Services Directive 2

R&D – Research and Development

SEPA – Single Euro Payments Area

SMEs – Small and Medium-sized Enterprises

UCC – Union Customs Code

VAT – Value-Added Tax

WTO – World Trade Organization