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**Digitalization and Internationalization: An  
Analysis of the Impact of Digital Technologies  
on Export Management Practices**

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## **ABSTRACT**

This thesis examines the impact of digital technologies on international trade. It explores various tech tools and their applications, such as e-commerce, blockchain, big data, artificial intelligence, Internet of Things, along with the associated challenges and concerns.

Additionally, it investigates how companies can utilize digital technologies to enhance their competitiveness, with a focus on small and medium-sized enterprises (SMEs). The case study of Savino Solution SpA, recognized as one of Italy's top 100 companies by Forbes, provides practical insights into this phenomenon.

Moreover, the research delves into the concept of digital trade and its potential to reduce trade costs.

The thesis explores how the COVID-19 pandemic has accelerated digitalization, emphasizing its profound impact on trade dynamics.

Furthermore, the thesis analyses the changing geo-economic scenarios influenced by the war in Ukraine and the emergence of friend-shoring policies. These developments have reshaped global trade patterns, prompting companies to reassess strategies and adapt to new geopolitical realities.

Through a comprehensive analysis of digital technologies, their impact on international trade, and the evolving geo-economic landscape, this thesis provides a deeper understanding of the opportunities and challenges faced by companies in the digital age. It offers valuable insights for businesses seeking to navigate and leverage the transformative power of digitalization in trade.

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# INTRODUCTION

By technological advancements, reducing trade costs and revolutionizing various aspects of our lives have been made possible throughout history. Starting from major inventions such as steamships and railways during first industrial revolution in early 1800s, through telegraph to introduction of containerization in 1950's and finally to emergence of internet, these innovations have had a great impact on communication methods as well as consumption patterns.

In recent years the internet has integrated into every aspect of our daily life including social interaction and entertainment besides work, reducing the costs associated with obtaining and exchanging information. This has had a significant impact on our economies resulting in a fundamental alteration in the methods of communication, consumption and production. Furthermore, it has brought substantial changes to global commerce impacting both what is traded and how transactions are conducted including the individuals who participate.

The global economy has been influenced by distinct phases or "waves" of global integration, each driven by advancements in transportation and communication technologies that reduced trade costs across a wider range of economic activities. These developments led to increasingly extensive and interconnected national economies, necessitating the establishment of new forms of international trade cooperation, rules and institutions to solidify and support these structural trends. The critical interaction between technology-induced structural changes in the global economy and the capacity of the world trading system to effectively navigate these changes and adaptations, has largely determined the progression or regression of global integration over the past two centuries. The commencing of the Industrial Revolution represented a significant milestone in world trade, initiating a period of immense transformation. With the advent of this revolution and the accompanying advancements in technology, transport and communication costs experienced a remarkable decrease. This initiated a vast expansion of trade, capital flows and technological exchanges, propelling an era of economic integration commonly known as "the first age of globalization". The revolutionary progress in transport and communication technologies revolutionized the way national economies engaged in trade and attracted investments, differing from previous approaches. The initial phase of globalization, known as the first age of globalization,

was built on uncomplicated yet fragile foundations, that suffered a fatal blow with the advent of the First World War. Due to disruptions in trade as a result of war, there has been significant consequences including collapse of gold standards along with implementation of broad-sweeping economic controls. Extremist political movements emerged as a result of economic instability, which further fuelled existing political uncertainty leading to break down in collective security. A race for re-armament started which caused the outbreak of Second World War. A lack of recognition of fundamental changes during post-war era, played a role in preventing successful rebuilding of global economy after war. However, it was evident that accomplishing a return to the pre-war golden age of open and stable commerce wasn't easily attainable. The global economy underwent a process of reintegration in response to disruptions caused by First and Second world war. Advancements in transportation and communication technologies, along with reduced trade costs, have contributed to making the reintegration process easier as it has been done before. Incorporating containerization as part of technological improvements played a crucial role in substantially lowering transport charges associated with goods traded through ocean shipping. The contribution towards a notable decrease in rail transport costs, has been made by several factors such as electrification implementation along with advancements in rail design and the introduction of high-speed trains as well as intermodal freight systems and other innovations. Additionally, the speedy development of various communication technologies like satellites and fibre optics together with other advanced telecommunication techniques, has brought an important reduction in the cost related to communicating. As a consequence, we observed an increase in the internationalization of production and distribution processes.

The emergence of global information networks along with advancements in telecommunications and computing, has been responsible for propelling a new wave of technology advancements that resulted in a significant transformation within the global economy. The expenses associated with trading commodities have reduced over time and there is a likelihood of a similar reduction in information trade costs during this era. The possibility exists that these developments will cause a faster process of global integration. The movement of information-based products across borders is getting revolutionized by the digital economy. Digitalization is quickly propagating vital components like technology information and ideas which contribute to economic development. As digitalization expands significantly for certain goods like

entertainment, it may cause a decline in trading activities on others, such as workplaces without employees relocating or an increase in 3D printing.

Various innovative technologies utilizing the internet's power are paving way for a new era and the effects on both international trade and its associated costs could be significant. Amongst these transformative technologies there are Artificial Intelligence (AI), the Internet of Things (IoT), Blockchain and 3D Printing. Such technologies can completely transform how we see exchange between parties that participate in it.

We are embarking on a new era through the convergence of computers and data analytics in an unprecedented way. Tracking products and avoiding equipment failures have become feasible thanks to the exceptional development of the Internet of Things (IoT) and with the help of Artificial Intelligence (AI), computers or computer-controlled Robots which can undertake tasks related to humans like guiding warehouse-based Robots and improving product packaging processes. The manufacturing industry is undergoing a profound transformation with 3D printing technology that creates physical objects from three-dimensional digital models and enables customized goods production near consumers. Additionally, it aids in offering personalized products according to individual preferences and behaviour. Blockchain technology can enhance supply chain transparency as well as expedite trade digitization while automating contractual transactions. These advancements hold great promise for reducing trade costs and fundamentally transforming international trade in the near future.

The ongoing transition from analog to digital technologies, has radically transformed the world within a matter of just a few decades and made it unrecognizable compared to earlier technological revolutions that unfolded over generations. To understand how digital technologies will influence global trade in the future, studying the extent of these changes is essential. To optimize trade benefits for everyone involved through seizing technological opportunities and addressing resultant challenges necessitates having a comprehensive understanding.

Having a digital divide is one of the main obstacles encountered in the realm of digital economy. The disparity between developed and developing nations continues through limited access to broadband services as well as differences in infrastructure quality that affect the availability of e-commerce platforms due to varying regulatory frameworks. Additionally, notable divides are seen within countries, like discrepancies with regards

to internet access rates when comparing men and women, distinct levels of digital literacy among smaller or larger firms and differences concerning the influence that digitization has on different skill classifications. With the advent of labour-saving technologies and automation taking over many low-skill jobs, it has become imperative that companies hire more highly skilled personnel to keep pace with these changes.

Digital technology usage varies greatly among different sectors. It is common for service-focused enterprises to depend heavily on digital technology, unlike for manufacturing-focused ones. Industrial robot usage is higher among high tech enterprises in comparison to their counterparts in the low tech and service sectors.

Whether it is geographical or linguistic or regulatory in nature, the significance of distance can potentially be diminished by emerging technologies. They enable more efficient product searches, assist in quality verification and reputation assessment and facilitate the alignment of consumer preferences with available products. Certain applications of artificial intelligence (AI) can particularly benefit the trade of goods. For instance, they can optimize route planning and enable autonomous driving, reducing logistics costs by tracking cargo and shipments. Smart robots can optimize storage and inventory management and the integration of 3D printing can decrease reliance on transport and logistics services. These technological advancements lower trade costs by reducing transportation and storage expenses, as well as shortening delivery times and enhancing logistical reliability. As transportation and storage costs make up a significant portion of overall trade costs, their reduction can have a substantial impact on trade flows. Trade costs associated with customs procedures continue to hinder trade, particularly in the manufacturing sector. However, basic electronic systems have already made strides in reducing the time required for customs compliance and Blockchain and AI hold promise for further reductions. Their greatest potential lies in time-sensitive goods flows, such as those related to global value chains (GVC) or perishable products. In manufacturing, information and transaction costs play a vital role, accounting for approximately 7% of total trade costs. Online platforms address obstacles like information scarcity and lack of trust in cross-border transactions. The potential for simplified verification as well as certification procedures, exists with the usage of the Internet of Things (IoT) along with Blockchain. At the same time, communication across different languages can also be made simpler by using real-time translation services on online platforms. Facilitation of trade is further supported by innovations in cross-border



payments and financial services. E-commerce platforms that utilize Blockchain technologies have the potential to bypass conventional payment systems and thus decrease transaction costs related to cross-border trade.

Trade costs, including logistics expenses, transaction costs and complex customs procedures, tend to have a more significant impact on micro, small and medium-sized enterprises (MSMEs) and are notably higher in developing countries. The introduction of innovations in cross-border payment systems has particularly benefited MSMEs and developing countries. Therefore, new technologies have the potential to disproportionately facilitate trade for these entities and nations, offering significant opportunities. Besides that new technologies possess the ability to significantly influence what is being traded and by whom it's being traded as well as how it's being conducted, digital technologies are causing changes to the composition of trade in different categories of services and goods while also redefining intellectual property rights. An expanding range of services can now be purchased online and digitally supplied across borders due to technological advancements which has put service sectors at the forefront of this revolution. With digital technology allowing for new types of service to replace traded goods and facilitating traditional service trading, it has reinforced how significant services are within overall trading landscapes. Moreover, breakthroughs in remote-controlled robotics including telesurgery have opened up new possibilities for service trading and hold great potential to cause major shifts within international trade.

In the wake of the unprecedented COVID-19 pandemic, the world witnessed a seismic shift in the landscape of global commerce. The virus, which brought nations to a standstill, paradoxically accelerated a digital trade revolution that had been quietly brewing for years. As the world continues to adapt and innovate, the digital trade revolution promises to be a cornerstone of our post-pandemic reality. It's a revolution driven not only by necessity but by the boundless human capacity for ingenuity and adaptability. It's the commencing of to a new era of commerce, where the only constant is change and the opportunities are as vast as the digital horizon.

Finally, the war in Ukraine, a geopolitical crisis with far-reaching consequences, has sent shockwaves through international markets and supply chains. Its impact extends well beyond the borders of Eastern Europe, triggering a ripple effect that has disrupted global trade, energy markets and diplomatic relations. As the conflict continues to evolve, its economic implications are both intricate and far-reaching, demanding a closer

examination. Consequently, the emergence of Reshoring, Nearshoring and Friendshoring policies has challenged traditional paradigms of global economic cooperation. In an era where protectionism and nationalism are on the rise, countries are reevaluating their trade relationships, alliances and strategies.

## **Chapter I:**

# **THE POWER OF DIGITAL INNOVATIONS: EXPLORING TOOLS AND THEIR APPLICATIONS**

The emergence of the internet marks a crucial moment in human history, igniting a digital revolution that has forever altered the way we live, work and interact. The internet, initially conceived as a means of communication among researchers and academics, has evolved into a global phenomenon, giving rise to an array of digital tools and applications that continue to reshape our world.

In recent years, the fusion of the internet with emerging technologies has propelled digital innovations even further. The Internet of Things (IoT) has connected everyday objects to the internet, enabling smart homes, cities and industries. Artificial intelligence (AI) has empowered machines to learn, adapt and make decisions, revolutionizing sectors ranging from healthcare to finance. Other technologies include Blockchain, alongside with commonly used commercial technology like E-commerce, leading to the phenomenon of digital transformation or digital revolution.

In the ever-evolving landscape of business, technology emerges as a formidable ally, created to transform the way we operate and to introduce us in a new era of innovation. These technological advancements hold the power to not only reshape the execution of activities within a company but also have a profound influence over its structure, compelling a reimagining of existing business models. This ripple effect extends far beyond individual enterprises, permeating entire sectors and revolutionizing global value chains. From the adoption of cutting-edge software, IT solutions and CRM tools to a radical overhaul of established processes, digital transformation takes on many forms. It's a journey that empowers organizations to embrace change and harness the immense potential of technology.

The power of technology is reshaping the very foundations of business, opening doors to uncharted possibilities and propelling us into a future where innovation knows no bounds.

Nonetheless, digital transformation poses a complex journey for companies, as it necessitates specific resources and expertise that are often challenging to acquire.

## **1.1 E-Commerce, E-Marketing and E-Business**

In this era of innovation, businesses of all sizes are no longer bound by geographical constraints. Thanks to cutting-edge digital solutions, they can now seamlessly participate in both domestic and international trade. Embracing new solutions opens up a world of possibilities, enhancing market access for customers and suppliers while simultaneously slashing the costs associated with conducting global transactions.

If companies want to facilitate their digital export efforts, then need to consider that there are three primary categories of tool available: e-commerce solutions, e-marketing platforms and e-business software. The utilization of digital platforms for buying or selling goods or services is part of the first category. The main objective of the second category is to utilize digital technologies for marketing and promotional purposes. In conclusion, the third category entails using digital tools to improve both production processes and internal organizational structures within an enterprise. These interconnected realms define the modern business ecosystem, each playing a vital role in shaping the way companies operate, engage customers and drive innovation.

### *1.1.1 E-Commerce*

In the ever-evolving world of E-Commerce, a universally accepted definition is yet to be established, posing challenges for conducting cross-country analyses on digital trade. Instead, there are several working definitions of E-Commerce, leading to potential variations in estimations of its value and growth rates. For instance, the World Trade Organization (WTO) defines E-Commerce as “The production, advertising, sale and distribution of products via telecommunication networks”<sup>1</sup>.

The Organisation for Economic Co-operation and Development (OECD) defines E-Commerce as “The sale or purchase of goods or services, conducted over computer networks specifically designed for the purpose of receiving or placing of order. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted online”<sup>2</sup>.

The United Nations Conference on Trade and Development (UNCTAD) defines E-Commerce as “Purchases and sales conducted over computer networks, using multiple

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<sup>1</sup> WTO, News - *Study from WTO secretariat highlights potential trade gains from electronic commerce* - PRESS/96.

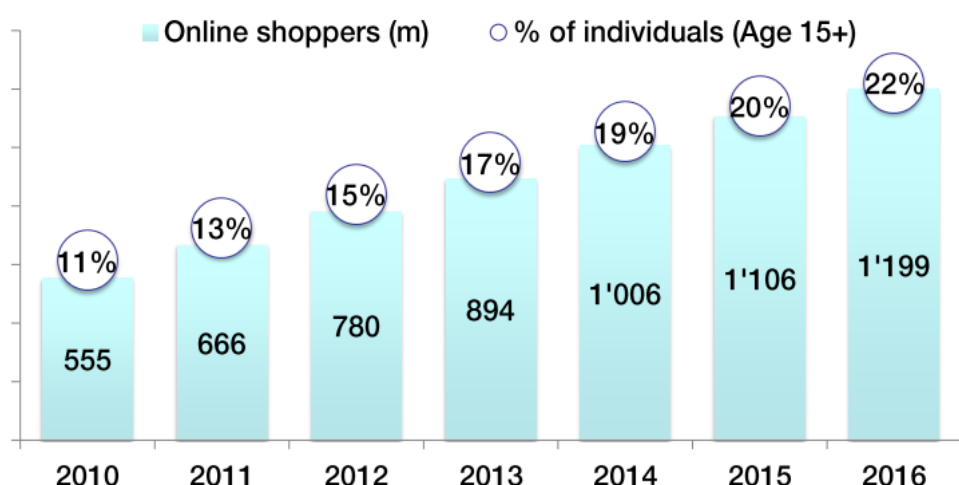
<sup>2</sup> OECD. *Understanding E-Commerce*. OECD iLibrary.

formats and devices, including the web and electronic data interchange, using personal computers, laptops, tablets and mobile phones of varying levels of sophistication. E-Commerce can involve physical goods as well as intangible (digital) products and services that can be delivered digitally”<sup>3</sup>.

The measurement of E-commerce's impact continues to present challenges. According to UNCTAD's report on global E-commerce transactions, they were valued at \$25.3 trillion in 2015. The total revenue generated from B2B E-commerce sales amounted to 4\$ trillion while B2C transactions generate 9\$ trillion.<sup>4</sup>

The evidence of E-commerce growth can be seen through the increasing number of individuals who shop online worldwide. There was a remarkable growth in E-commerce as the number of online shoppers drastically increased from under six hundred million to roughly one point two billion between the years of 2010 and 2016.<sup>5</sup>

Figure 1: Global Online Shoppers



Source: UNCTAD

The trend among exporters is to enter foreign markets incorporating cross-border E-commerce activity, which refers to selling goods or services using online platforms or stores across national borders on a global level. E-commerce tools and platforms are necessary for conducting business and facilitating transactions with customers worldwide. The cornerstone of cross-border E-commerce is its fundamental idea that by

<sup>3</sup> Information economy report 2015. (2015). *In Information economy report*. United Nations Publications.

<sup>4</sup> UNCTAD, 2017, *Information Economy Report 2017: Digitalization, Trade and Development*, UNCTAD.

<sup>5</sup> UNCTAD, 2017, *B2B E-COMMERCE INDEX 2017*, UNCTAD.

using the internet we are able to analyse foreign markets better than ever before. This helps reduce perceived distances between these markets which in turn speeds up market entry process while improving internationalization capabilities and enhancing customer relationship management.

More and more exporters are incorporating cross-border E-Commerce into their strategies for entering foreign markets. Some exporters, particularly small and medium-sized enterprises (SMEs), opt to utilize third-party platforms like Amazon or Alibaba instead of developing their own E-Commerce websites. These platforms provide a wide range of services to exporters and are experiencing rapid growth. However, relying on third-party platforms may weaken the connection between a firm's internal export capabilities and its performance in cross-border E-Commerce. Exporters may face significant challenges in establishing and maintaining their own E-Commerce websites, requiring substantial efforts and capabilities. However, the adoption and performance of cross-border E-Commerce can be accelerated by utilizing the aforementioned third-party E-Commerce platforms. These platforms offer a range of services that enable exporters, including advanced technological tools for customer data analysis, which can help closing the gap between their home country and target markets. Moreover, well-established platforms like Amazon provide convenient payment and logistics services, greatly simplifying the management of cross-border E-Commerce for SMEs.

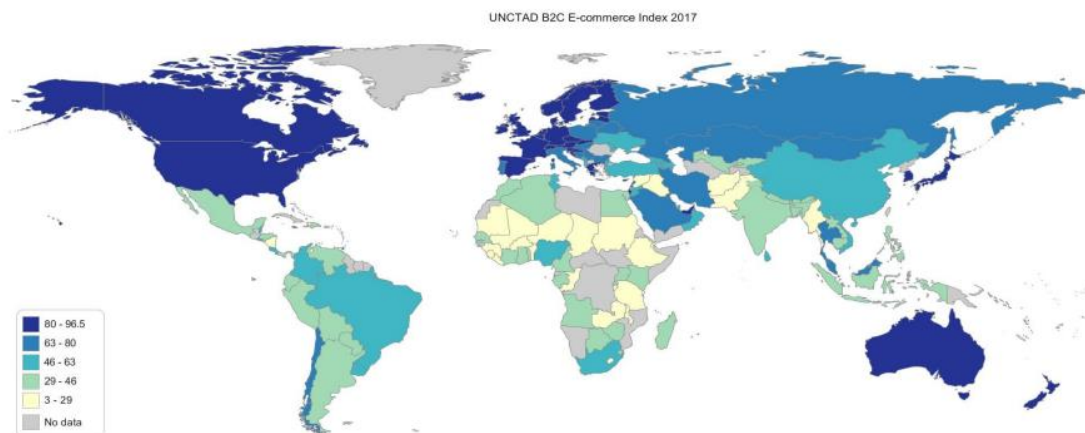
Official data suggests that there is a rapid growth in cross-border E-Commerce. Recent estimates from the United Nations Conference on Trade and Development (UNCTAD, 2020) indicate that revenue from cross-border business-to-consumer (B2C) E-Commerce reached \$404 billion in 2018. The ongoing coronavirus crisis has further contributed to the expansion of this sector. In certain countries, cross-border E-Commerce plays a significant role. In 2019, cross-border E-Commerce accounted for 7% of all Italian exports of B2C products (ICE-ITA, 2020). This trend can be attributed to the large number of small and medium-sized enterprises (SMEs) in Italy, with 99.9% of firms falling into the SME category and 94.9% classified as microenterprises. For these businesses, cross-border E-Commerce serves as an accelerated pathway to accessing foreign markets. Some analyses even suggest that cross-border E-Commerce is the most effective means of entering specific export markets, such as China.

As per the Italian Trade Agency (ITA-ICE), the majority of Italian B2C cross-border E-Commerce exports are comprised of food and beverage goods, along with fashion goods, making up approximately 77% of the total. Platforms such as Amazon, eBay, Eataly and Alibaba play a significant role in this domain, as they account for over 90% of Italian B2C E-Commerce, as reported by the Italian Trade Agency.<sup>6</sup>

The rise of E-Commerce technologies has significantly transformed the business models that numerous companies previously relied on for achieving success. In a similar way, globalization has also had a profound effect on firms' operational methods and overall performance.

However, according to the UNCTAD Business-to-Consumer E-Commerce Index 2017, there is a significant disparity in E-Commerce adoption. In the majority of the least developed nations, the percentage of the population engaged in online shopping is 2% or lower, while in numerous developed countries, it ranges from 60 to 80%. This highlights the substantial divide in E-Commerce participation across different regions.<sup>7</sup>

Figure 2: E-Commerce divide: E-Commerce Readiness



Source: UNCTAD

In order for companies to efficiently adapt and respond to the demands of the market, they need a resilient E-commerce infrastructure tailored to the export industry. This infrastructure not only paves the way for seamless E-commerce export sales but also streamlines the provision of online technical support to foreign distributors and subsidiaries, offering a dynamic support system that transforms challenges into

<sup>6</sup> ICE-ITA, 2020.

<sup>7</sup> UNCTAD, 2017, *UNCTAD B2C [Business-to-Consumer] E-Commerce Index 2017*, UNCTAD.

opportunities. When equipped with a well-developed E-commerce infrastructure, exporters can take full advantage of E-commerce technologies and effectively respond strategically to conventional market drivers. On the contrary, exporters have restrictions on their strategic decisions and their proficiency to accommodate environmental circumstances produced by customary market drivers. An export market with a poorly developed E-Commerce infrastructure makes this particularly true.

### *1.1.2 E-Marketing*

The emergence of E-Marketing has caused also marketing to undergo a profound transformation in today's digital age. The term E-marketing denotes the employment of digital platforms and techniques for promoting goods, services and brands strategically. The term can be interchanged with Electronic Marketing or Online Marketing. Success and growth of businesses are contributed by numerous benefits offered by this modern marketing approach.

One of its main advantages is its global reach: the internet enables businesses to surpass geographical limits and reach customers worldwide. New market opportunities have been created, enabling businesses to target customers in diverse regions without needing a physical presence or extensive resources. The interactions between businesses and their international counterparts, are impacted by E-Marketing. Concerns over losing control and confidential information make companies hesitant about using technological tools in these situations. Negative consequences on their competitive advantage may arise.

E-marketing can be described as a highly effective and affordable alternative. Traditional methods of advertisement like print advertisements or television commercials, tend to be more costly than digital advertisements and social media campaigns or email marketing. Optimizing marketing budgets and achieving a higher return on investment, is possible for businesses thanks to this cost advantage. Through data analytics and advanced targeting tools, businesses can deliver personalized and relevant content to their target audience. This targeted approach increases the effectiveness of marketing campaigns, improves customer engagement and enhances the chances of conversion.



Unlike traditional marketing methods, E-Marketing provides the advantage of real-time analytics and measurable results. Businesses can track and analyse various metrics such as website traffic, conversion rates, click-through rates and customer engagement levels. This data allows businesses to gain valuable insights into the effectiveness of their marketing strategies, make data-driven decisions and optimize their campaigns for better results.

Another benefit of E-Marketing is enhanced customer engagement. Through social media platforms, email marketing and interactive website features, businesses can engage directly with their customers. This direct communication allows businesses to gather feedback, address queries and build stronger relationships with customers. This interactive approach fosters customer loyalty, enhances brand reputation and increases customer satisfaction.

E-Marketing also offers flexibility and agility. Digital platforms allow for rapid content creation, modification and distribution, enabling businesses to respond quickly to market trends, customer preferences and competitor activities. This agility helps businesses stay relevant and competitive in dynamic market environments.

Furthermore, E-Marketing generates a wealth of data that can be leveraged to gain valuable insights. Businesses can analyse customer behaviour, preferences and market trends to refine their target audience, personalize their marketing messages and make informed business decisions. Data-driven insights empower businesses to optimize their marketing efforts and allocate resources more effectively.

### *1.1.3 E-Business*

The way organizations perform their tasks digitally has been revolutionized by E-business or Electronic Business. Different types of business procedures and transactions are supported by utilizing electronic technologies specifically through the internet. By utilizing digital platforms and tools, E-Business can exceed traditional brick-and-mortar models in terms of enhanced efficiency along with increased productivity and profitability.

In order to penetrate international markets and enhance the acquisition of information within them, it is crucial to consider all aspects covered by E-Business which impact the internal organization of a business. Included in this, is the utilization of video

conferencing alongside with shared databases or software and tools used for working remotely. Although these tools can assist in cross-cultural understanding to some extent, traditional forms of communication continue to be significant and important even during this era where technology plays a huge role. Establishing a common language that forms the basis for value-sharing, can help reduce uncertainty in relationships between different stakeholders by improving communication with the help of these tools. Alleviating cultural differences and mitigating conflicts arising from misunderstandings, are crucial roles played by E-business when it comes to international expansion while also bridging physical distances.

Automating routine tasks with the use of digital tools, enables businesses to improve inventory control and optimize supply chain management. By leveraging the power of enterprise resource planning (ERP) systems and cloud computing for data analytics, businesses can gain access to real-time information which allows them to make informed decisions. Operational efficiency can be increased which in turn allows businesses to quickly adapt to changing market dynamics.

The utilization of electronic documents and transactions can accelerate and enhance trade. By employing electronic messages, the need for manual data entry at each stage of the supply chain can be eliminated, while also creating opportunities for data reuse. There are multiple approaches to digitizing trade documents and transactions. One method involves capturing a visual figure of a paper document. Another option is to utilize an internet web portal where individual data elements can be inputted, known as a data-trader interface (DTI). Paperless transactions can also be conducted through computer-to-computer electronic messages in a standardized format between business partners, referred to as electronic data interchange (EDI). Typically, these systems provide an application programming interface (API) to facilitate interactions with the database.

Implementing electronic processes in international trade can yield notable environmental advantages, particularly because global supply chains often entail extensive printing, dispatching, processing, exchanging and ultimately discarding of large volumes of paper documents.

When considering methods to ensure E-Business, electronic signatures can play a role in ensuring the authenticity and integrity of data messages, including trade documents

exchanged between businesses. It is important to recognize that demonstrating the origin of a document is often considered the primary and most critical function of any type of signature. Various regulations regarding the validity of electronic signatures impact this function, as they aim to enhance the security of signed documents by protecting against errors and malicious attacks. Different technologies can be employed to offer trust services and their level of reliability may vary.

Companies can derive significant advantages from automated business models and processes, as they reduce costs associated with contract management, enforcement and the potential for document errors. Despite their name, smart contracts do not possess cognitive or AI capabilities and may not meet the legal definition of a contract. Instead, they convert contractual obligations, either entirely or partially, into computer code to enhance efficiency through automation. Smart contracts are essentially segments of computer code programmed to initiate and execute tasks automatically in response to external triggers.

The UN/CEFACT has created a comprehensive e-invoice data model that spans across industries and is based on the UN/CEFACT Supply Chain Reference Data Model. Given that invoices can be utilized for multiple operations and received by various stakeholders, it is crucial to adopt an international standard with precise semantic definitions. E-invoicing brings about improved efficiency, cost savings and reduces the risk of document fraud. Additionally, there are alternative e-invoicing standards available. Furthermore, UN/CEFACT has developed a range of standards for trade documents, encompassing packing lists, delivery notices, bills of lading and waybills, certificates and inspection reports, as well as dangerous goods and security declarations.

While the benefits of E-Business are evident, it is essential to address certain challenges and risks. Cybersecurity and data privacy are major concerns, as businesses must safeguard sensitive customer information and protect against cyber threats. Building trust and ensuring secure transactions are paramount for successful E-Business operations. Additionally, organizations must continuously adapt to technological advancements and evolving consumer preferences to remain competitive in the fast-paced digital landscape.

## **1.2 Blockchain, Big Data and Artificial Intelligence (AI)**

Today's rapidly evolving digital landscape has seen emerging technologies transform the way businesses operate and revolutionize various industries. Big data coupled with Blockchain technology and Artificial intelligence (AI) are among the groundbreaking technologies that have become game changers providing new opportunities to businesses worldwide.

By grasping the collective potential of Blockchain technology along with Big Data and AI, businesses can adapt to changing market trends to remain at the forefront of technological advancements.

### *1.2.1 Blockchain*

Blockchain is a commonly used reference for distributed ledger technology (DLT). Nonetheless from a technical point of view, Blockchain denotes just one variety of DLT which aggregates transactions into blocks and interlinks them sequentially. The maintenance of decentralized and distributed ledgers through an advanced cryptographic architecture like Blockchain, involves the use of continuously growing lists.

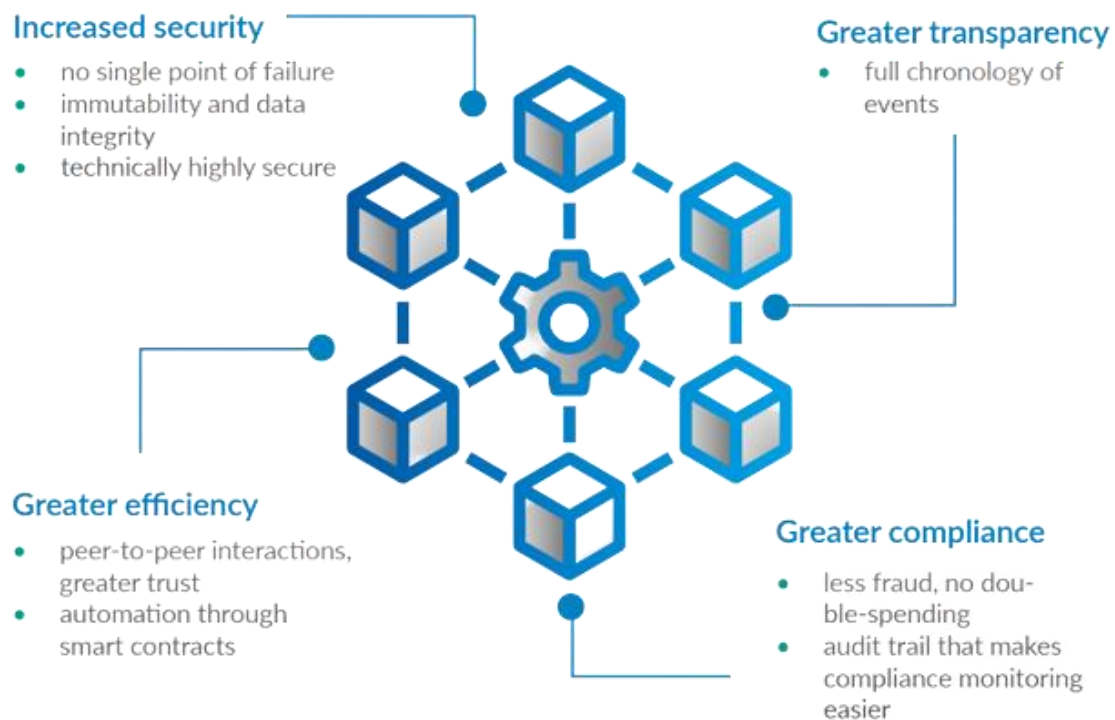
Its most notable attribute is the secure transportation of data among network members known as nodes, capturing any alterations or movements right away while securely storing them unchangeably for every participant to access. The distribution of data among network participants happens without the involvement of any centralized authority and the technology is inherently resistive against data modification thanks to interconnecting and timestamping all transactions or blocks added into the ledger. Collusion among most of its network is required to change any data on a Blockchain since it would mean altering all preceding records. However, the immutability offered by Blockchain and the interlinking of records makes it a highly valuable technology for tracking the complete chronology of events.

Satoshi Nakamoto developed Blockchain in 2008 with the intention of creating a public transaction register that could be utilized for bitcoin. However, there has been a noteworthy rise in the number of projects implementing Blockchain technology for uses other than cryptocurrencies. Applications of it, have extended to different areas such as healthcare, education, identity management, voting systems, food traceability, transportation document authenticity, trade finance and even Customs processes.

Various industries have the potential to be transformed by the widespread implementation and investigation of Blockchain technology.

Several benefits exist when it comes to utilizing Blockchain technology for trade purposes. One major benefit includes heightened security measures because there is no singular point of failure unlike many other traditional systems. Greater transparency also exists, allowing officials or regulators to access into tracing all activities within the system while facilitating efficiency by permitting direct communication between parties involved thus promoting trust. Blockchain provides an extra level of compliance via verified/approved transaction processes ensuring a secure environment whereby fraudulent activity becomes increasingly difficult.

Figure 3: Benefits of Blockchain



Source: WTO report

Blockchain can be private or public. Their classification is based on how much control and access they provide. Public Blockchain is decentralized which means that everyone can have access to read and write data on the ledger; while private Blockchain is controlled by one organization. To participate in the network you can either have permissions or not have any at all. If you decide on having permissions there are specific requirements, but if not it is open for all. The combination of public and private

Blockchain elements in hybrid approaches is increasingly utilized to leverage both the security offered by public ones as well as the scalability provided by their counterparts.

The utilization of Blockchain technology within supply chains enhances efficiency by reducing intermediaries and manual tasks while simultaneously providing real-time data to all involved parties. This feature enhances both security measures as well as traceability and visibility throughout the entire supply chain.

One of the most notable features of Blockchain technology is its support for smart contracts which are computer programs programmed to carry out tasks automatically according to predetermined criteria. This automation is ideal for ensuring that transactions in processes, like duty payments, are carried out with great precision.

Due to the fact that they are distributed in nature and use cryptographic techniques, Blockchains have a high degree of resilience against cyber-attacks. The practical reality of hacking a Blockchain network makes it both highly challenging and economically inefficient.

The transformative power of Blockchain technology is evident in numerous sectors including export. An ideal solution for streamlining and securing the export process is to incorporate Blockchain technology, which offers a decentralized and transparent system for recording and verifying transactions. Exporters stand to benefit from using Blockchain technology which brings many advantages. The first advantage lies in its ability to provide enhanced traceability and provenance verification of goods through all stages of the supply chain. By utilizing Blockchain technology to document every aspect of exporting including manufacturing and delivery stages, it is possible to create an immutable and verifiable account of a product's journey. This compliance with regulations decreases the likelihood of fraudulent activities which in turn builds trust between exporters and importers and customers.

Trade finance and documentation processes can also be simplified with the use of Blockchain technology. Smart contracts, that operate as self-executing agreements on the Blockchain, can automate payment settlements while also reducing reliance on intermediaries and paperwork. Lowered transaction costs and accelerated cash flows can be achieved by expediting the overall export process.

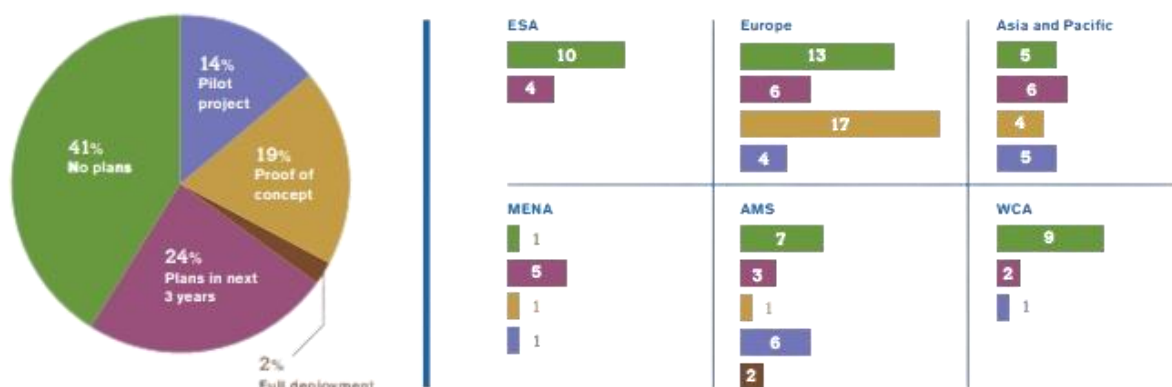
Besides that, employing Blockchain technology could lead to more efficient handling of customs procedures and border management. Additionally, export-related data, such as shipping documents or certificates of origin, can be securely accessed and verified by customs officials through the use of Blockchain's decentralized architecture. Minimizing paperwork and reducing border delays enhances the efficiency of cross-border trades with this new streamlined approach.

The tamper-proof character of Blockchain fortifies intellectual property protection for exporters. Blockchain provides a means for exporters to record patents, copyrights and trademarks, thereby establishing indisputable proof of ownership and enforcing their rights in international markets.

Furthermore, Blockchain technology makes it possible to create decentralized marketplaces for exporters which connect them directly with potential buyers and decrease their reliance on intermediaries. These peer-to-peer platforms allow for improved market access in addition to providing global visibility and wider customer base accessibility.

To assess how widely different disruptive technologies have been adopted and used in different ways, The World Customs Organization (WCO), in collaboration with the World Trade Organization (WTO), developed a survey<sup>8</sup> to provide a snapshot of the current situation.

Figure 4: Stage of adoption of Blockchain



Source: WTO – WCO

<sup>8</sup> The extent was measured using a set of 18 questions jointly developed by both organizations which have been submitted to 183 WCO members, of which 124 responded. The survey can be found in the 2021 WCO Annual Consolidated Survey (ACS).

19% of the respondents are exploring its potential through PoCs; 14% through pilot projects; and 24% are planning to do so within the next three years.

Survey participants highlighted an overall enhancement in trade process efficiency when employing Blockchain technology. They viewed accessing transactional data from a reliable source as a way to minimize processing time and enable immediate approval from customs authorities.

Respondents highlighted that Blockchain technology will facilitate improved transparency, immutability and accessibility of information, as well as enhance data quality. Additionally, Blockchain holds the potential to enable the sharing of pertinent information on border management procedures among relevant parties.

According to the respondents, the primary challenges in implementing Blockchain and DLT technology are attributed to a shortage of knowledge and skills, high costs, limited acceptance by other parties involved and the requirement for established best practices.

Figure 5: Main benefits (left) and obstacles (right) of Blockchain



Source: WTO – WCO



The majority of ongoing Blockchain projects have a shared objective of enhancing information exchange both domestically and internationally.

Figure 6: Project Areas



Source: WTO – WCO

Specifically, respondents aim to address challenges related to the e-commerce landscape by improving areas such as e-certification, the single window system and end-to-end connectivity within the supply chain. These efforts are expected to result in enhanced risk management, more targeted measures and overall improvements in trade facilitation. Other areas where the Blockchain technology has been adopted are the international exchange of information between businesses and institutions and projects for automated custom procedures.

The utilization of Blockchain, extends to various domains and one notable application is the "Made in Italy" initiative. This initiative leverages Blockchain technology to ensure the certification of high-quality Italian manufacturing products and facilitate their entry into the market. Through Blockchain, products undergo certification at multiple levels, including sustainability certification, verifying the use of materials from sustainable sources, chemical certification to ensure non-toxicity and confirmation of the Country of Origin (CoOs) of the goods.

Recognizing the potential of distributed ledger technologies (DLTs), the Italian Parliament passed a law that not only establishes a legal definition of DLTs but also acknowledges their complete legal validity and enforceability. This legislation aims to provide a solid legal framework for the utilization of Blockchain technology in various sectors, including the "Made in Italy" initiative.

The potential of Blockchain technology has attracted significant attention also from customs authorities who plan to explore it further through proof of concepts or pilot projects within a three-year timeframe.

Despite the substantial potential of Blockchain technology, there are still challenges that need to be addressed, such as adapting regulatory frameworks to changing technology and ensuring scalability and interoperability between different Blockchain platforms.

### *1.2.2 Big Data and Artificial Intelligence (AI)*

The development of intelligent systems that mimic human behaviour and thought processes, is the central concern of artificial intelligence (AI), which falls under the umbrella term of “computer science”. AI encompasses systems with the ability to adapt their behaviour by analysing, collecting and observing data without requiring explicit programming. Machine Learning, Deep Learning, Computer Vision and Natural Language Processing are just some of the various technologies that fall under this broad field. By incorporating intelligent capabilities, applications can be enhanced using these technologies either independently or in combination. Processing large amounts of data, accurately detecting and predicting patterns, are capabilities where AI surpasses humans.

The impact of AI touches almost every aspect of our lives, with the potential for driving significant economic and social advancements. Thanks to AI technologies, specifically machine learning, the rapid analysis and interpretation of large data volumes is possible. Identifying patterns and setting up decision-making foundations is something AI excel at and it can do it much faster than humans can.

Technology advances significantly with AI as its representation. The use of biological organisms as a model has enabled designers of information systems to give computer's human-like ability such as hearing, seeing, reasoning and learning. AI encompasses the usage of computerized mechanisms which demonstrate behaviours generally linked to human intelligence such as cognitive architecture simulating the way humans think, automated reasoning, learning system imitating their actions along with inference and optimization operations based on logic. Software agents that are intelligent behave rationally.

AI possesses the potential to improve numerous enterprise functions significantly. Companies can greatly improve their communication with each other's and customers

by implementing chatbots. Chatbots powered by AI engage with users through natural language in interactive applications. By utilizing chatbots, companies can improve the delivery of certain services while also saving costs. These chatbots can efficiently manage a high volume of user requests, analyse information and databases. Users receive applicable outcomes from them. With the help of automation for handling routine communication, addressing queries and offering recommendations, employees can concentrate more on high-valued tasks. Analysing extensive datasets using computer systems can help make better decisions.

The current predominant use of data analytics lies in managing risks through its application, despite being interdisciplinary and adaptable. Its main functions involve identifying fraudulent trade and making suggestions for HS codes to protect revenue via risk analysis.

A significant, lasting increase in economic growth could be generated by AI's potential. Expansion of the research community is crucial for economic growth's pace. Utilizing AI to generate new concepts, may enhance overall research effectiveness, surpassing even its own community's growth rate. In essence, AI accelerates research progress and leads to a faster rate of economic growth.

Optimizing supply chain management through the utilization of big data and AI in export is a major advantage. Exporters who analyse data on multiple fronts including transportation routes, inventory levels and production schedules, are able to spot inefficiencies thereby streamlining their overall operation. This helps guarantee prompt delivery of products. In addition to enhancing customer satisfaction, this also improves efficiency.

Facilitating market intelligence and customer segmentation is possible with big data and AI. Exporters can understand consumer preferences, purchasing habits and market trends by analysing customer data. The development of targeted marketing strategies, tailored product offerings for different markets and identification of new export opportunities, are all made possible through the leverage of this information.

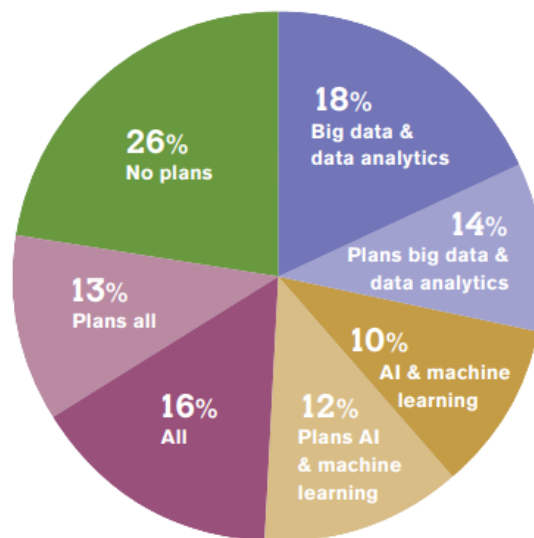
Big data and AI have become crucial components in effective risk management. By identifying potential risks through analysis of historical data, market trends and external

factors, exporters can proactively develop mitigation strategies. One aspect of this is to examine geopolitical risks, economic fluctuations and regulatory changes.

Big data and AI can also improve adherence to export regulations and compliance. Exporters can guarantee adherence to customs regulations, trade agreements and export control laws by merging information from different sources. To ensure adherence to all export regulations while detecting any potentially fraudulent activity during transaction screening requires the use of AI algorithms.

The survey created with the collaboration between the World Customs Organization (WCO) and the World Trade Organization (WTO) shows that roughly 50% of customs authorities currently utilize a combination of big data analytics, machine learning technologies and artificial intelligence (AI), while the remaining 50% have intentions to adopt them in the future. The majority of respondents recognize the distinct advantages offered by these technologies, with risk management and profiling, fraud detection and improved compliance being the most commonly cited benefits.

Figure 7: Stage of adoption of big data, data analytics, artificial intelligence and machine learning



Source: WTO – WCO

The primary advantages identified include enhanced risk management and profiling capabilities, improved fraud detection and compliance measures, more efficient customs audits and the ability to identify anomalies in the system.

By integrating advanced selection models, the interpretation of results can be conducted more efficiently. Predicting future trends, enhancing trade facilitation and improving revenue collection are also regarded as important objectives. However, fewer survey respondents noted advancements in container imaging and visual searches. Some participants highlighted a noteworthy enhancement in data quality when combining customs data with multiple commercial data sources.

The main obstacles mentioned in implementing Blockchain technology are a scarcity of expertise and high costs, a deficiency in established best practices, the presence of outdated legacy systems, limited adoption by other stakeholders and the absence of a government strategy. Respondents also highlighted challenges related to data governance, data quality, information organization, as well as roles and functions.

Figure 8: Main benefits (left) and obstacles (right) of big data, data analytics, artificial intelligence and machine learning



Source: WTO – WCO

Leveraging big data and machine learning effectively within large organizations can be intricate, typically necessitating a fundamental revision of how information is approached. By adopting a more expansive outlook, one can effectively develop both a strategy for utilizing data and effective mechanisms to oversee its governance and

management. Enhancing data quality and optimizing the value of extracted information are vital roles played by these mechanisms.

Today, the need for technical experts is high, including data architects, engineers, software developers and machine learning designers due to their exceptional skills. While it may prove challenging, locating people with these skillsets is necessary.

## **1.2 Internet of Things (IoT), Robotisation and Automation**

In recent years, the world has witnessed the remarkable rise of three technological forces: the Internet of Things (IoT), robotization and automation. These innovations are transforming industries, redefining daily life and creating a future where humans and machines collaborate seamlessly.

### *1.3.1 Internet of Things (IoT)*

The Internet of Things (IoT) is the integration of physical devices, vehicles, buildings and other objects embedded with electronics, software, sensors, actuators and network connectivity. The IoT can be described as a worldwide system that facilitates advanced services by connecting physical and virtual objects using existing and evolving information and communication technologies. In simpler terms, the idea behind the IoT is that everyday objects can be equipped with capabilities like identification, sensing, networking and processing. This enables them to communicate with each other, as well as with other devices and services over the internet, to accomplish various useful goals. This allows these objects to collect and exchange data, effectively transforming them into smart devices. The purpose of IoT is to enable communication and interpretation of information from the surrounding environment, making our lives more convenient and businesses more efficient and cost-effective.

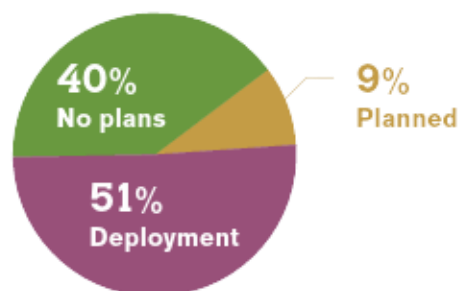
While connected machines like ATMs and airline check-in machines have been in use for some time, the IoT is now reinventing various devices and ordinary objects with digital sensing, computing and communication capabilities. It has incorporated a wide range of physical goods, such as home appliances, security cameras and garbage containers, into applications that utilize big data.

Internet of Things has surfaced as a significant driver for organizational change. This is leading to disturbance in every sector and multiple aspects of society. The quick expansion has greatly boosted its impact on the economy. Like consumers, enterprises, urban authorities, healthcare institutions and other bodies explore innovative methods to utilize the technology. Based on data from Statista, estimates suggest that before the end of 2025, the number of Internet of Things connected devices will exceed 30 billion globally. These figures amount to greater than four electronic devices for every person.

Internet of Things has had a crucial role in the advancement of internet retail. This has transformed how individuals buy products through the facilitation of multi-channel selling and quick dispatches. Organizations such as Google and Apple have utilized smart devices technology to give rapid delivery services. The innovation promises meticulous and prompt transportation of each object. Utilizing Web-connected gadgets and machinery, exemplified by the automated robots in Amazon's storage facilities, demonstrates how technology can greatly boost the proficiency of promptly dispatching merchandise.

Automated communication forms a fundamental part in the realm of the internet. This makes possible interaction among individuals, machines and networking devices. Internet of Things provides companies the opportunity to improve their productivity and effectiveness through enabling better preventive maintenance of machines and merchandise. Moreover, it offers chances for companies to present electronic products and offerings. The wider influence of the Internet of Things reaches organizations having the capability to improve the client satisfaction and efficiently handle their enterprises and complicated infrastructures.

Figure 9: Stage of adoption of IoT



Source: WTO – WCO

Customs authorities greatly benefit from the Internet of Things (IoT) by gaining access to a larger and more diverse set of data. This enhanced data capability enables improved risk management, increased efficiency in customs clearance procedures and better analytics. It also allows for effective monitoring of the integrity of transshipment cargo movement from entry to exit control points. Furthermore, the IoT facilitates the standardization of processes, benefiting traders in terms of streamlined operations and consistent procedures.

Figure 10: Main benefits (left) and obstacles (right) of IoT



Source: WTO – WCO

A considerable number of participants perceive the expense associated with implementing IoT solutions as a major hurdle. They also highlight challenges related to integrating IoT into existing processes and ensuring compatibility and interoperability among diverse systems. Another significant obstacle mentioned by respondents is the requirement for adequate knowledge to successfully introduce IoT. They express



concerns regarding a lack of expertise, absence of established best practices and the difficulty of managing unstructured data.

The implementation of IoT brings advantages such as enhanced risk management and improved analytics for its users. Nevertheless, one of the major hurdles is the integration of data collected from IoT devices into existing operating systems, along with the challenge of ensuring compatibility and interoperability among different IoT solutions. In many instances, the information gathered by smart devices is not shared with other relevant parties. However, those who do engage in data sharing often have multiple channels for sharing and primarily exchange information with other government agencies or customs authorities and occasionally with private sector entities.

### *1.3.2. Robotization and Automation*

Robotization entails incorporating robotic systems among the employees, substituting or aiding employees for particular assignments. The robots have been created to carry out repetitive or demanding physical assignments with exactness and dependability. One can locate within production facilities, production lines, logistics depots, as well as medical environments. Robotization not only boosts output but also lowers the possibility of inaccuracies and avoids workplace incidents.

In contrast, automation incorporates a larger perspective via the application of technology to improve and optimize operations. This process includes utilizing software, digital systems and sophisticated equipment to mechanize activities. This minimizes the demand for human interference. Automation can be seen across various sectors amongst the realm of transportation and logistics to sectors including customer service and finance. Mechanized systems process data input, conduct regular customer queries and control financial transactions with rapidity and exactness.

Robotization and Automation have started to be major developments within multiple fields. These sectors have altered the approach tasks are executed and are determining the course of labour in the future. The purpose is to utilize androids and computerized systems to perform activities conventionally carried out by individuals. The objective is to improve effectiveness, output and exactness.

The advantages of employing robotic technology and mechanization are diverse. Improved efficiency and result in productivity to reduced costs and greater yield.

Through assigning uninteresting and routine responsibilities to robotic devices and computerized systems, personnel can direct their efforts towards endeavours that are more complex, creative and strategic. This permits them to make use of their abilities and knowledge to propel invention and effectiveness. Furthermore, such technologies can optimize the precision and quality in the workplace and can generate better products as well as services.

Nevertheless, the increasing use of robots and mechanization also creates apprehensions concerning job redundancy and the prospect of occupation. Although these advancements generate fresh possibilities and employment positions in fields like robot upkeep and coding, particular repetitive assignments might become outdated. This additionally implies that there is going to be a requirement for people to gain new proficiencies and modify to the shifting employment market. Therefore, it is essential to give attention to acquiring new abilities and enhancing existing ones employees to conform to the shifting employment conditions.

The worldwide phenomenon of automation and digitalization in manufacturing is increasing. The Global Organization for Robotic Technology states that currently more than 2.4 million production robots being used in factories globally. Simultaneously, computer intelligence is being widely accepted in areas unrelated to technology.

A different form of mechanization is where machines' computing power replace human intellect and professional skills. The application of automation and artificial intelligence increases productivity and it results in an increased capital-requiring manufacturing procedure. This suggests that specific labour-intensive products, currently produced in financially challenged countries, can possibly be shifted to nations with ample financial resources. With the use of robots and artificial intelligence improve production more efficient in that regard, the fabrication process will probably undergo notable transformations.

Robotization and automation, while offering great benefits, also bring potential risks. These include job displacement, skills gap challenges, cybersecurity threats, ethical dilemmas, privacy concerns, economic disparities, overreliance on technology, social isolation risks, environmental impacts and regulatory complexities.

## **1.4 3D Printing, Virtual Reality and Drones**

### *1.4.1 3D Printing*

Additive manufacturing, commonly known as 3D printing, is the process of creating a three-dimensional solid object of virtually any shape using a digital model. By developing a digital file, the process of 3D printing take place with the use of a 3D printing machine and raw materials like plastic, metal, nylon or other suitable substances. It differs from traditional manufacturing techniques that typically involve the removal of material through cutting or drilling (subtractive processes). 3D printing, in contrast to traditional manufacturing methods, allows for make complex components in a single process, eliminating the need of many assembly operations that are usually necessary. This occurs through a process that builds the object layer by layer, starting from a digital model, allowing the creation of shapes that would be difficult, if not impossible, to achieve by traditional methods. As a result, the complexity of manufacturing operations can be significantly reduced.

Additive manufacturing is applied extensively within different sectors, like industry, healthcare, construction and consumer goods. Moreover, this is at the initial phase of utilization within the automobile and aviation fields. The advanced system is furthermore used in the realm of consumer electronics. Especially for producing cases including covers for handsets, tablets and other mobile devices.

One of the key advantages of 3D printing is its ability to facilitate customization in a cost-effective manner. Rather than requiring new production tools, moulds or expensive modifications to factories, customization can be achieved through the creation of a new design and adjustments to computer code. This makes the process more accessible and economical for tailored production.

Additive manufacturing, specifically 3D printing, has been hailed as a valuable asset for businesses operating in low-volume markets and engaged in customized and high-value production chains, such as aerospace and medical component manufacturing. It is anticipated that 3D printing will bring about a shift towards more digital and localized supply chains, resulting in reduced energy consumption, lower resource demands and decreased CO<sub>2</sub> emissions throughout the product life cycle.

3D printing can enable companies to decentralize manufacturing operations in the sense that they can bring production closer to end markets. Instead of manufacturing in one country and then shipping the finished product around the world, 3D printing allows companies to manufacture locally, close to their customers. This reduces transportation costs, delivery time and allows for greater agility in meeting specific customer needs. The traditional global value chain, in which manufacturing operations are divided and located in different locations around the world, allows for cost advantages, especially in terms of labour costs. However, the rise of 3D printing is providing companies with the ability to reconsider and in some cases overturn, this model.

3D printing can shift manufacturing from a model based on division of labour to one based on additive manufacturing. This means that instead of having numerous manufacturing processes taking place in multiple locations, many of these operations can be condensed into a single additive manufacturing process. This integration of manufacturing operations reduces the need for a large network of suppliers and trading partners, simplifying the value chain and allowing companies to have more control over their manufacturing operations.

Traditionally, developed countries have had an advantage in knowledge-intensive activities, such as research and development, due to their advanced technological infrastructure. On the other hand, developing countries have often played the role of physical producers, taking advantage of lower labour costs. The rise of 3D printing, however, has the potential to alter this traditional division of labour. No longer will labour be the sole determinant of the location of production. Instead, technical skills and knowledge of additive manufacturing processes become critical.

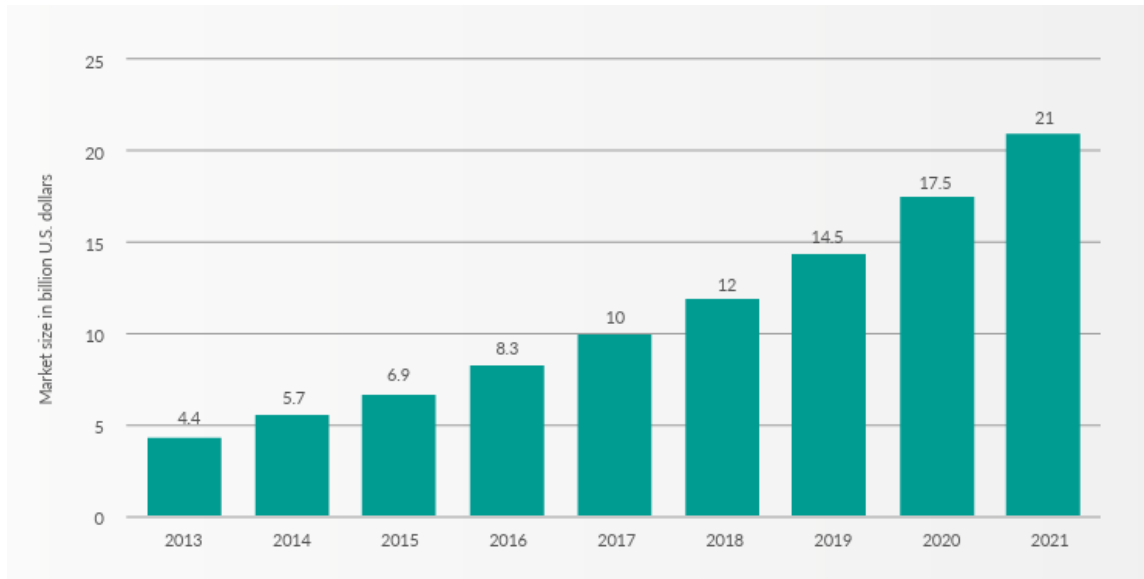
This shifts the balance toward skills and knowledge, favouring opportunities for developing countries to move up the value chain. This could accelerate the process of economic development and help reduce economic disparities global.

In recent times, large-scale 3D printers designed for enterprise use have progressed from being a promising technology to being at the forefront of technological advancements. This progress indicates that mainstream adoption of 3D printing is gaining momentum. The additive manufacturing industry is witnessing significant growth. During the year 2020, the worldwide market for the fabrication of objects using 3D technology was evaluated to have a value between a value ranging from 12.6 to 17.5 billion USD.

Forecasts suggest of this industry is set to grow with an annual increase rate with a growth of 17 % up until 2023.

With the advancement of 3D printers become more affordable and able to manufacture more intricate items, experts predict that the requirements of both consumers and producers will escalate.

Figure 11: 3D printing market size from 2013 to 2021



Source: Statista

However, the full realization of the potential of 3D printing requires overcoming several challenges. The material technology necessary for 3D printing is still in its early stages and the process of building complex objects is time-consuming. There are also regulatory considerations that need to be addressed before 3D printing can be more widely adopted in the consumer market. These issues include product warranties, liability attribution and intellectual property concerns. Additionally, although there has been a decline in recent years, the cost of printers, materials and scans remains relatively high, particularly for implementation in micro, small and medium-sized enterprises.

#### *1.4.2 Virtual Reality*

Virtual reality (VR), augmented reality (AR) and mixed reality (MR) are technologies that have the ability to create simulated environments or incorporate digital elements into the real world. These technologies have proven to be valuable tools for training purposes in customs operations. Virtual reality represents a fully immersive experience

at one end of the spectrum, while augmented reality involves the addition of digital artifacts to the physical world. Mixed reality combines both physical and digital elements by projecting digital artifacts into the physical environment. With mixed reality, these digital artifacts can interact with and coexist alongside physical objects, effectively merging the physical and digital worlds.

Various large organizations and enterprises are actively utilizing these technologies to create products that address a wide range of challenges and issues. While virtual reality has traditionally been associated with the gaming industry, it also presents groundbreaking applications in healthcare, product design and development and training, offering innovative approaches to various processes. Similarly, augmented reality and mixed reality products are being developed specifically for business applications. Prominent examples include Google Glass, a wearable device that combines augmented and virtual reality capabilities and HoloLens, a pair of smart glasses developed by Microsoft that enable mixed reality experiences.

#### *1.4.3 Drones*

A drone is an unmanned aircraft or ship that is guided by remote control or onboard computers. Drones are unmanned aircraft system (UAS), which consists of a UAV (unmanned aerial vehicle), a ground-based controller and a communication system. UAVs can operate with varying levels of autonomy, either under the control of a human operator or autonomously through onboard computers.

Before the pandemic, there has been a significant increase in global interest in utilizing drones for various commercial applications across different industries. Drones have already become an essential component of the international trade supply chain. However, successful and safe integration of drones requires active involvement and preparation from all market players to fully realize the benefits they offer. The traditional methods of physically delivering goods are constantly evolving in the trade environment. It is costly to deliver goods in remote areas with limited or no infrastructure and even in highly populated areas with existing infrastructure, delivery can be expensive.

Drones are being tested not only for domestic deliveries but also for cross-border shipments. Companies like Amazon and Alibaba have actively explored the use of

drones as a business opportunity. For instance, Amazon is working on developing safe and efficient methods to deliver packages to customers within 30 minutes or less.

### **1.5 Challenges and Concerns**

In this modern age, we are observing the quick rise and acceptance of revolutionary technologies that are transforming sectors and altering our lifestyles and careers. These digital solutions provide substantial chances for creativity, productivity and expansion. Nevertheless, these also introduce various difficulties and worries that require attention. Here is to make sure ethical and long-lasting application.

A significant worry involves the vast gathering of information and monitoring made possible by revolutionary technologies. Intelligent gadgets follows us during the day, identify our faces and detect us wherever we go. Our private lives are continuously subjected to perpetual scrutiny. The act of surveillant possibility exposes gateway to potential exploitation and encroachments on privacy. Both through government actions and businesses, this could lead to breaches of personal liberties and privileges.

Furthermore, the protection of our confidential data is vulnerable. Innovative advancements commonly use connected infrastructures along with the utilization of cloud storage. This dependence has the potential to make them susceptible to online assaults in addition to data leaks. If confidential data is obtained by unauthorized individuals, the consequences for personal data can lead to grave outcomes. Moreover, the application of AI and the analysis of large datasets may result in profiling and discrimination.

A different problem is found in the limited regulation and agreement regarding the gathering of information. Numerous innovative technologies collect personal information while individuals are not fully aware about the magnitude of the data collection or its utilization. Nevertheless, it is crucial for people to understand the probable threats and undertake actions to defend their confidentiality. The absence of openness and agreement undermines our power to make educated decisions regarding our personal information.

Online shopping has transformed the manner we acquire and exchange products and services. It presents difficulties concerning data protection and confidentiality. Due to

the growing number in the realm of digital exchanges, maintaining the protection of personal and monetary records is essential. Digital crime and deceptive practices present dangers to both companies and customers. Moreover, the digital gap causes differences in the opportunity to use online retail platforms. The constraint limits chances for individuals and groups who lack sufficient internet access or access to technology.

Distributed ledger technology gives transparency, protection and distributed governance. However, the capability to expand and deliver still pose significant difficulties. With the expansion of Blockchain networks grow, sustaining effectiveness and processing transactions on a large scale grows in complexity. The absence of uniform regulations and established frameworks for the integration of Blockchain leads to uncertainty. The usage of energy of specific Blockchain networks, specifically those that use proof-of-work consensus mechanisms, causes apprehension about sustainable practices and impact on the environment. Hence, it is essential to examine alternative agreement mechanisms that consume less energy and eco-friendly.

Analysing vast amounts of data gives valuable perspectives and possibilities for invention. However, obstacles emerge regarding the management of data, moral principles and confidentiality. Ownership of data, permission and regulatory structures must be implemented to secure appropriate and ethical utilization of massive data sets. The frameworks can assist in determining the data control, getting consent from individuals to use it and implementing guidelines for its correct administration. Making sure the precision, dependability and honesty from large data sets is vital to prevent prejudices and incorrect findings. Adherence to data protection regulations and stopping unauthorized data sharing or mishandling continue to be ongoing difficulties.

The fast progress of artificial intelligence offers both stimulating potentials and moral challenges. Prejudice in algorithmic decision-making, confidentiality concerns and potential unemployment are major worries. Promoting openness and responsibility within artificial intelligence systems and mathematical processes is crucial. Productive cooperation involving humans and AI technology, guaranteeing reliance and protection, also creates hurdles. Creating moral frameworks and rules for incorporating AI is of utmost importance to reduce these apprehensions.

The Internet of Things integrates multiple devices enabling seamless information exchange. However, it poses issues regarding the security and privacy aspects. The



interconnected of Internet of Things devices causes security risks and dangers. It necessitates effective security mechanisms to protect data and stop unauthorized entry. The absence of standardized protocols and compatibility between various IoT devices and platforms impedes smooth integration and streamlined communication. As a result, this presents obstacles in attaining a connected and intelligent ecosystem. Moreover, handling the enormous amount of information produced by Internet of Things devices while following privacy guidelines represents a complicated endeavour. This necessitates thorough deliberation and deployment of strong data handling systems and standards.

Automated processes and Robotics are altering the industry landscape and affecting the labour force. Although these technologies contribute to higher efficiency and productivity, fears of job redundancy and the effects on the social and economic aspects become apparent. Sufficient steps should be carried out to deal with potential layoffs. Moreover, it is important to offer chances for developing new competencies and upgrading existing ones the working population. Moral consequences, like responsibility, clear visibility and the possibility of algorithms making biased decisions, should also be thought about.

Additive manufacturing or 3D printing, gives unmatched options for tailoring as well as quick prototyping. However, obstacles associated with patents and copyrights and issues with illegal copying come up. With the increasing more accessible to duplicate tangible items, these problems increase more dominant. Developing quality assurance systems and professional benchmarks for additive manufacturing items is essential to guarantee security and dependability. Eco-conscious factors, such as waste materials and power usage, must be addressed to advocate for sustainable approaches in 3D additive fabrication. Such methods are able to decrease adverse effects regarding the natural surroundings and secure a future characterized by sustainability.

The ascent of 3D printing presents a complex set of challenges to the established division of labour within industries. The streamlined and customizable nature of 3D printing can lead to a significant displacement of jobs, particularly those cantered around labour-intensive manufacturing processes. Workers who have specialized in traditional assembly lines or manual tasks might find their roles obsolete, causing a notable shift in the employment landscape. Beyond job displacement, there's the concern of skill

obsolescence. The skill set required for successful 3D printing operations involves digital design, programming and machine operation, which could be vastly different from the skills that were once valued in the traditional manufacturing division of labour. This transition could leave many workers struggling to adapt and remain relevant in the changing job market. The intricate supply chains that have evolved around the division of labour might be disrupted. 3D printing's ability to consolidate manufacturing steps and produce intricate products in one location challenges the need for various suppliers and manufacturers. While this has the potential to streamline production, it also threatens the livelihoods of those who have specialized in producing particular components.

The potential reduction in demand for low-skilled labour is another challenge. As 3D printing technology automates many processes, the need for manual labour decreases, leading to the potential marginalization of workers in these roles. This phenomenon could exacerbate existing income inequality and pose challenges for those with fewer educational or training opportunities. The disruption of traditional roles and the division of labour can have social and psychological consequences.

To mitigate these negative effects, strategies such as reskilling and upskilling programs, fostering innovation in complementary industries and implementing thoughtful policies are vital to ensure a smooth transition and minimize the social and economic impact on individuals and communities.

Drones have great potential across different sectors, which involves delivering, observation and cultivation. Obstacles are present in guaranteeing the safety of their functioning and establishing proper guidelines. Concerns about privacy emerge from sky-based surveillance along with the collection of data. Incorporating unmanned aerial vehicles into current aviation traffic control systems, addressing airspace overcrowding and collaborating with piloted airplanes call for meticulous coordination and regulatory frameworks. Nevertheless, the obstacles can be tackled with meticulous organization and working together with all relevant individuals.

The availability of mobile networks and the Internet has ignited increased productivity and economic growth while generating employment opportunities. In the realm of development studies, numerous attempts have been made to estimate the number of jobs created as a result of digitalization. These studies consider both individuals directly employed in the digital sector and those who have indirectly benefited from the adoption

of digital technologies and services. While individuals with higher skills can enter the formal labour market, many discover opportunities for micro-entrepreneurship, particularly within extensive networks involved in distributing phone cards, operating internet cafes and providing mobile phone sales and repair services. Moreover, technological hubs are emerging and expanding in developing regions, fuelling digital innovation and the development of locally relevant content in diverse sectors such as healthcare, trade, culture and agriculture. This trend is notably observed in countries like Kenya, South Africa, Ghana, India, Colombia and Peru.

Digitalization possesses the potential to be a potent instrument for driving social transformation and promoting gender equality. Development experts have frequently advocated for investing in women's empowerment as a direct and effective means of fostering economic growth, peace and prosperity. Digital technologies and services contribute to empowerment by offering accurate information, a critical resource for informed decision-making. Furthermore, digitalization can play a pivotal role in dismantling gender-based segregation patterns by amplifying women's voices and facilitating the delivery of services and information to women facing mobility constraints or limited access to public spaces.

It is crucial to address these concerns through comprehensive privacy frameworks, responsible data practices and increased awareness among individuals. Balancing the benefits of disruptive technologies with the protection of our privacy is essential to ensure a future where innovation and privacy can coexist harmoniously.

## **Chapter II:**

### **HOW CAN COMPANIES USE DIGITAL TECHNOLOGIES TO BE MORE COMPETITIVE?**

In today's rapidly evolving business landscape, characterized by disruptive technologies and changing consumer expectations, companies must adapt and innovate to maintain a competitive edge. One powerful tool at their disposal is digital technology. Digital advancements have revolutionized industries, providing companies with transformative opportunities to reshape their operations, business models and customer interactions. By harnessing the potential of digital technologies, companies can not only survive but thrive in the market.

Digital transformation has become a strategic tool for organizations across many sectors. It involves a fundamental rethinking and redesign of traditional business processes, enabled by the integration of digital technologies throughout the entire value chain. Cloud computing, data analytics, artificial intelligence, automation and the Internet of Things (IoT) are among the key drivers of this transformation. These technologies empower companies to enhance their operational efficiency, improve decision-making, drive innovation and deliver superior customer experiences.

By embracing digital transformation, companies can streamline their internal operations, automating routine tasks and eliminating inefficiencies. This enables employees to focus on high-value activities, such as strategic planning, innovation and building meaningful customer relationships. Moreover, digital technologies provide access to real-time data and advanced analytics, allowing companies to gain valuable insights into their operations, markets and customers. Armed with these insights, companies can make data-driven decisions, develop targeted strategies and optimize their resource allocation for maximum impact.

Digital technologies also offer unprecedented opportunities for companies to enhance their customer experiences. By leveraging data analytics and advanced customer profiling, companies can gain a deep understanding of customer preferences, behaviours and needs. This knowledge allows for personalized interactions, tailored product offerings and targeted marketing campaigns. Through user-friendly websites, mobile

apps and seamless omnichannel experiences, companies can create convenient and engaging touchpoints for customers, fostering loyalty and differentiation in a highly competitive marketplace.

Furthermore, digital technologies enable companies to expand their reach and tap into new markets. With the rise of e-commerce and online marketplaces, companies can establish a robust online presence, attracting customers beyond their traditional geographical boundaries. By leveraging digital marketing strategies, search engine optimization and social media platforms, companies can reach and engage with a wider audience, driving brand awareness and customer acquisition.

Blockchain and distributed ledger technology (DLT) offer a tamper-proof and transparent record of supply chain transactions, ensuring traceability and accountability. By guaranteeing the origins and processing conditions of goods, such as fair-trade coffee or sustainable lumber, Blockchain and DLT contribute to sustainable and inclusive trade. They also streamline document verification, reduce fraud and facilitate secure and faster cross-border payments, mitigating payment risks associated with open account trade finance.

Artificial intelligence (AI) has the potential to provide valuable insights through predictive and prescriptive analytics, thanks to advances in computing power and access to big data. These insights can be applied to various trade scenarios, such as optimizing routing, predicting equipment maintenance needs and managing risks, including financial crime. AI is also used by customs authorities to allocate resources effectively and identify potential risks.

The Internet of Things (IoT) plays a central role in digital supply chain implementation. It relies on ubiquitous sensors that measure and transmit real-time data via the internet. These sensors capture quantitative measurements like temperature, humidity and location information in warehouses, supply depots and during transit. The collected data enables informed decision-making, troubleshooting, emergency alerts and predictive management, among other applications.

Digital technologies have become indispensable for companies seeking to enhance their competitiveness. By embracing digital transformation, companies can revolutionize their operations, gain insights from data, deliver personalized customer experiences and

extend their market reach. The ability to leverage digital technologies effectively has become a strategic differentiator, allowing companies to adapt to the changing business landscape, seize new opportunities and create sustainable competitive advantages.

Today, we can highlight seven trends that could redefine competition.

Figure 12: Seven trends that will redefine competition



Source: own elaboration

1. **New pressure on prices and margins:** The introduction of digital technologies has brought about a significant impact on prices. With near-perfect transparency, consumers can now effortlessly compare prices, service levels and product performance across various options, including digital retailers, brands and services, with just a few clicks or finger swipes. As a result, this phenomenon has the potential to turn products and services into commodities. The emergence of price-comparison websites that aggregate information from multiple vendors and enable easy comparison of prices and services is a clear indication of this trend.
2. **Competitors emerge from unexpected places:** Digital dynamics frequently erode traditional barriers to entry and factors that differentiate products. In sectors like

telecommunications or insurance, web-based service providers can now enter markets without the need to establish extensive distribution networks with physical offices and local agents. Digital platforms offer opportunities for new entrants. As a result, smaller companies, even though they may never attain significant scale, can still pose a considerable threat to established incumbents. For instance, in the retail industry, entrepreneurs are strategically targeting specific subcategories of products and offering significantly lower prices on smaller volumes, thereby compelling larger companies to follow suit and lower their prices to remain competitive.

3. Winner-takes-all dynamics: Digital enterprises bring about cost reductions in transactions and labour expenses, while also benefiting from increased economies of scale due to the aggregation of data. They experience improvements in the quality of digital talent and intellectual property as network effects come into play. The emergence of comparative advantage in these data-rich models can happen swiftly, rather than over the extended periods that most companies typically anticipate. Successful startups renowned for their digital expertise and engineer-friendly cultures attract the finest digital talent, creating a positive feedback loop. As a result, these effects will hasten the consolidation of industries where digital scale plays a crucial role, challenging traditional models that rely more heavily on capital and labour-intensive approaches.
4. Plug-and-play business models: With the influence of digital technologies, transaction costs decrease, leading to the fragmentation of value chains. This allows for the swift integration of third-party products and services, into the gaps within the value chain. For instance, Amazon provides businesses with logistics, online retail "storefronts" and IT services. Instead of investing resources to develop these functions to compete at high-performance levels, many businesses opt to seamlessly incorporate existing offerings into their value chains.
5. Growing talent mismatches: In digital businesses, software is progressively replacing human labour. Complex tasks are now being carried out by computers as well. Advanced machines are on the verge of assuming the responsibilities previously handled by numerous call-centre workers. As companies automate many frontline and middle-management jobs that involve synthesizing information for top-level executives, a growing number of knowledge roles

within these organizations will be affected by digitization. However, companies are encountering difficulties in finding the appropriate talent for areas that cannot be automated. These areas include digital skills such as those possessed by artificial intelligence programmers, data scientists and individuals who can lead digital strategies and creatively devise new business models.

6. **Converging global supply and demand:** Digital technologies transcend geographical borders and customer expectations for a seamless experience are compelling global companies to standardize their offerings. Customers now expect payment systems that function internationally, global distribution capabilities and a consistent customer experience regardless of their location. Similarly, in B2B markets, corporate buyers are exerting pressure on their suppliers to provide standardized services that are applicable across different countries and regions.
7. **Evolving business models:** Digitization is an ongoing and evolving process. For instance, in the music industry, the business model has evolved from selling tapes and CDs to digital formats like MP3s and now to subscription-based models exemplified by Spotify. Similarly, in transportation, digitization has emerged through the integration of mobile apps, sensors in vehicles and cloud-based data. Companies like Zipcar offer a service where members can pay to use vehicles on an hourly or daily basis, reflecting the shift in value.

## **2.1 Their adoption by SMEs**

SME stands for "Small and Medium-sized Enterprise." It refers to businesses that have a limited number of employees and relatively modest levels of revenue and assets compared to larger corporations. The specific criteria for categorizing a business as a SME may vary by country or industry, but generally, SMEs are considered to have fewer employees and lower financial resources than large enterprises.

Usually, small and medium-sized enterprises (SMEs) are known to exhibit greater organizational agility compared to large enterprises. This agility primarily stems from their smaller size, enabling quicker communication and a more flexible internal structure. SMEs can respond more promptly to market fluctuations. However, it is



widely recognized that SMEs face constraints due to their limited resources, particularly in terms of financial and human capital availability.

Digital technologies (DTs) have emerged as a potent driving force for reshaping economic systems and businesses. While companies of various sizes utilize these technologies, they hold particular significance for small and medium-sized enterprises (SMEs) due to their ability to overcome geographical distances and reduce certain trade barriers, which are common challenges faced by SMEs.

The role of digital technologies (DTs) in enabling access to global markets appears significant. However, their impact on the international expansion of small and medium-sized enterprises (SMEs) remains not sufficiently examined.

Recent research has highlighted that incorporating marketing technologies, such as e-commerce, can significantly support the international expansion of SMEs. These technologies enable SMEs to connect with a broader range of contacts, providing increased partnership possibilities and improved opportunities to access previously unexplored markets. Consequently, SMEs can now reach new groups of consumers who were previously not targeted or difficult to reach through traditional means.

Export facilitated by online channels, also known as digital export, leads to a substantial reduction in entry costs and diminished barriers to entry. This approach offers streamlined and swift sales and payment avenues, delivering significant advantages to SMEs seeking to expand internationally through digital technologies (DTs). Additionally, DTs appear to compensate for the lower physical presence of SMEs in foreign markets compared to multinational corporations or larger companies with foreign subsidiaries.

Some of the tools supporting digital export are: e-commerce, e-marketing and e-business. The first category involves leveraging digital platforms for buying and selling goods and services. The second primarily pertains to using digital technologies for marketing and promotional activities. Lastly, the third group encompasses utilizing digital tools to enhance production processes and internal corporate organization. E-commerce plays a vital role in minimizing geographical distances and entry barriers when expanding into international markets. It widens the sales channels available to SMEs, allowing them to effectively reach foreign markets and gather valuable data and

insights about their operations in various countries. By reducing costs and distances, SMEs can optimize their business models and enhance customer relationships, efficiently addressing their needs and demands. E-marketing also influences the way business relationships are established and maintained with foreign partners.

Blockchain, like artificial intelligence, boasts a myriad of applications and SMEs need to identify the most suitable use of this technology to gain a competitive edge in domestic and international markets. Embracing DTs enables SMEs to expand into foreign markets without relying on traditional, more expensive approaches.

Other digital technologies (DTs), including IoT, 3D printing and Blockchain, play a significant role in managing both domestic and international operations for businesses. The Internet of Things (IoT) is becoming increasingly prevalent and is widely used by SMEs to enhance the efficiency and organization of production systems in different countries. Similarly, 3D printing has the potential to revolutionize production and distribution models for SMEs, streamlining the internationalization process. By providing direct and rapid access to products, 3D printing allows for remote conception and design.

When appropriately integrated and organized, these technologies can significantly impact SME internationalization and global value chains. For instance, combining 3D printing with IoT can optimize the production process, leading to increased productivity and reduced waste, thereby positively affecting the company's financial performance.

Table 1: SME's DT's adoption impact - a recap

<b>E-commerce</b>	<b>E-business</b>	<b>Blockchain</b>	<b>Artificial Intelligence</b>	<b>IoT</b>	<b>3D printing</b>
Increases network of contacts	Creates common language	Improves and increases data processing	Increases organisational performance	Optimises product quality and efficiency control	Increases organisational performance

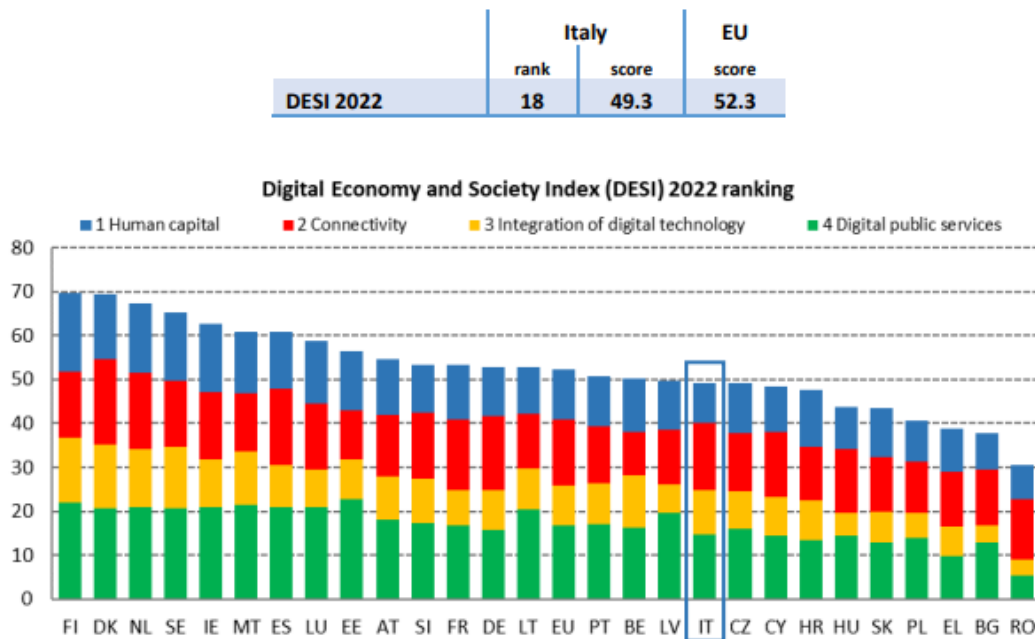
Reduces distances (both physical and cultural)	Increases information from international and domestic markets	Optimises coordination, integration and interaction of the value chain	Increases available information on international and domestic activities	Optimises coordination, integration and interaction of the value chain	Reduces barrier to entry in international markets
Reduces entry barrier	Reduces conflictual risks	Fast, clear and secured transactions	Optimises resources allocation	Optimises consumption and cost efficiency	Can be designed remotely
Increases sales channels	Reduces communication uncertainties	Traceability of goods	Automation of production processes	Improves partners relationships	Reduces CO2 emissions
Increases available information	Increases trust on the company	Optimises production	Help in decision making processes	Improves security in production facilities	Reduces cost of logistics and transportation
Data on procurement, delivery timing and stock	Reduces inter-organisational distance	Increases firms trust perception		Increases efficiency and organisation of production systems	Provides direct and fast access to the final product

Source: own elaboration

The European Commission has introduced the Digital Economy and Society Index (DESI) to monitor the progress of digitization in European Union countries. The DESI measures a range of indicators related to connectivity, digital skills, online services and the overall digital transformation of countries within the EU. According to DESI, Italian SMEs demonstrate a lower level of digital transformation compared to the European average, despite their efforts to implement digital technologies (DTs) during and after the pandemic.

In the 2022 edition of the Digital Economy and Society Index (DESI), Italy holds the 18th position out of 27 EU Member States. Despite being the third largest EU economy, Italy's advancement in digital transformation is critical for the EU to achieve the targets set for the 2030 Digital Decade.

Figure 13: Digital Economy and Society Index (DESI) – Italy



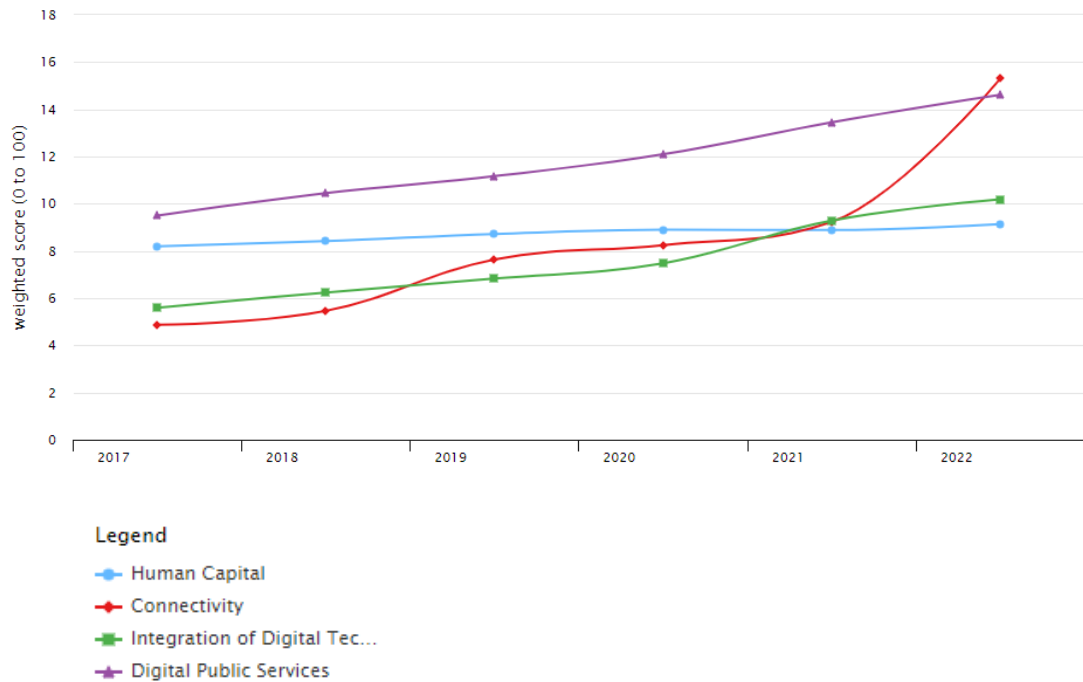
Source: EU

Notably, Italy is making significant progress, as evident from its DESI score improvement over the past five years. The country is catching up at a remarkable pace. Digital issues have gained political attention in recent times, with the establishment of a ministry dedicated to digital affairs and the implementation of various key strategies and policy measures.

Delays in comparison to other European nations are primarily observed in their web presence, big data analysis capabilities and the integration of advanced DTs (DESI, 2021). Consequently, around 63% of Italian SMEs continue to encounter challenges with their digital infrastructure, despite the allocation of funds by the public administration to boost digital investments.

Although Italy has improved its DESI ranking, reaching the 18th position and moving up five places from the previous year's performance, significant barriers to adopting DTs still persist. Notably, a lack of specialized human resources and skills appears to be a key obstacle, consistent with what is highlighted in the literature.

Figure 14: The evolution of DESI components - Italy



Source: EU

The most concerning aspect revealed by the DESI index is not merely the adoption of technology for online sales and purchases but also the ability of companies to utilize DTs to create, extrapolate and analyse big data. As mentioned earlier, leveraging this data offers the opportunity to optimize internal and external business processes, leading to better cost management and gaining competitive advantages that enable SMEs to compete in both domestic and international markets. Additionally, the Digital Agenda Observatory's recent study indicates a persistent digital divide between SMEs in Northern Italy and those in the South. Despite ranking among the top seven regions in DESI scores, Northern regions still lag about 18% behind other European regions in terms of the overall DESI index.

Among the enabling DTs most widely adopted by Italian SMEs, the primary focus is on tools that ensure web presence and online sales, specifically identified as e-commerce. Following this, other technologies, such as the Internet of Things, 3D printing, Blockchain and artificial intelligence, gain attention.

Blockchain technologies, which are becoming increasingly prevalent, require a substantial user adoption to achieve their intended outcomes. Globally, there are

approximately 370 initiatives developed by companies of various sizes in this domain. In Italy, companies fall into two main categories: those that remain sceptical and distant from adopting these technologies and those that are already experiencing the benefits. Certain Italian SMEs have embraced Blockchain technologies for their business operations, with 26 ongoing projects having international implications in this field (ibid). Consistent with academic research, the primary implementation of this technology aims to enhance transaction security and increase transparency across different stages of the company's production chain.

For what concerns AI projects, most companies indicate that they have incorporated this technology to enhance automation and safety within their manufacturing plants in both domestic and international markets. In this regard, Italy has experienced an even higher adoption rate compared to the European average. Notably, the market has expanded by over 27% from the previous year. However, there remains a significant digital divide in the adoption and implementation of artificial intelligence, especially concerning the size of the company. While approximately 60% of large companies have adopted at least one AI project or tool, this is only the case for 6% of SMEs.

Regarding the adoption of the Internet of Things (IoT), estimates indicate that since the pandemic, 44% of global companies have increased their investments in IoT. According to a study commissioned by Microsoft and conducted by the Hypothesis Group, 47% of manufacturing companies utilize IoT to improve quality and corporate compliance, while 45% employ IoT for industrial automation objectives.

In Italy, 95% of companies are aware of IoT tools and technologies, but only 58% have actually undertaken projects to adopt and implement these tools. Nevertheless, the digital gap between companies of different sizes remains as pronounced for IoT as for other technologies.

As for 3D printing, many Italian companies utilize this technology to expedite the introduction of new products to the market, thereby reducing the time to market. There are several dominant factors and motivations for adopting 3D printing, including enhancing the sustainability of production processes, the ability to produce specific parts based on consumer requests and the technology's capacity to easily adapt to fluctuations in market demand.

SMEs encounter various challenges during this digital transformation process, including limited financial and human resources, a lack of expertise, difficulties in adjusting business models and issues linked to specific institutional contexts. Consequently, many SMEs remain tied to traditional business models, hindering the adoption of new digital technologies. These technologies are often perceived as time-consuming, financially demanding and technologically complex.

Recognizing the significance of employing digital technologies becomes crucial in this context. SMEs require support not only in terms of financial assistance but also in technical knowledge. This support should focus on enhancing the infrastructure for data communication and analysis, as well as empowering the workforce with enhanced digital skills and knowledge.

Costs associated with market uncertainty are also a concern. Even the adoption of seemingly less cost-intensive technologies, such as online sales or e-commerce, requires significant organizational efforts by businesses to manage the influx of orders. Developing functional, rapid and user-friendly websites is essential. Venturing into foreign markets, even through e-commerce, necessitates the establishment of a stable and expanded network of contacts. Delivering products internationally can be more complex and incur higher costs and risks compared to the domestic market. Furthermore, after-sales services must be tailored to international customers, who may have diverse requests and expectations.

A comparison between SMEs and large companies highlights the privileged position of the latter concerning the aspects mentioned earlier. Large companies already possess an extensive network of contacts that they can rely on, coupled with more substantial resources to navigate the internationalization process and associated risks.

Barriers to adopting digital technologies stem from both internal and external factors. External factors, as identified in the literature, pertain to the environment in which SMEs operate, particularly policy measures, regulations and political stability. Internal factors primarily revolve around a general lack of awareness and expertise in the realm of digital technologies (DTs) and digital transformation. Managers play a significant role, particularly concerning their experiences with technology. The scarcity of human resources and skills continues to be a crucial and defining characteristic of SMEs.

Additionally, for manufacturing technologies, this common hurdle is compounded by the challenge of initially recognizing the potential value these technologies can offer.

Suppliers are the primary source of barriers encountered in the adoption of IoT technologies, particularly in an Italian context, as they tend to offer SMEs tools that are not well-suited to their specific needs. These IoT providers often develop technically sophisticated tools that, in practice, prove to be overly complex for daily use.

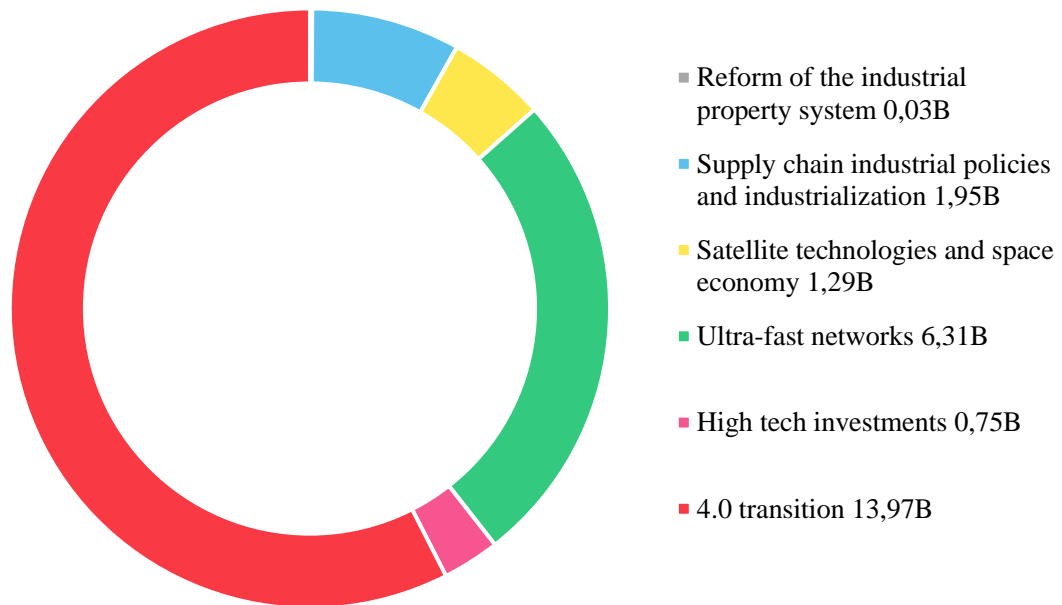
For SMEs considering the adoption of 3D printing, the most tangible barrier appears to be financial in nature. Implementing this technology requires substantial investment, as it goes beyond the mere purchase of appropriate machinery and raw materials for production. It necessitates a significant shift in internal organization to adapt and optimize production processes effectively.

SMEs face challenges in implementing DTs due to limited financial, human and technical resources. While DTs can optimize resource allocation, they require technical and professional expertise that is often lacking in the market. Additionally, SMEs encounter difficulties in assessing the potential value DTs can bring to their business organization and accessing credit. To successfully implement these technologies, significant investments are necessary, not only in acquiring the appropriate human skills and technical resources, such as specific software and hardware but also in reconfiguring the business model to align with the effective use of these tools.

Regulations and policies can either act as barriers or enablers in supporting SMEs' digital transformation. For example, in Italy, the National Recovery and Resilience Plan (PNRR), part of the European Union's Next Generation program, aims to foster growth by supporting SMEs in their digitalization, innovation and internationalization efforts. The Italian government has also recognized the shortage of human skills as a significant barrier for SMEs and introduced the Training 4.0 tax credit to encourage investment in developing these skills. These incentives have greatly strengthened the support for investing in human capital. The part of the PNRR about digitalization seems to have a well-defined direction, that of enhancing competitiveness, especially of enterprises. Of the three components of this mission, called Digitization, Innovation and Competitiveness of the Production System, is in fact the one that is largely in the majority, with 24.3 billion allocated out of 40.73B.



Figure 15: PNRR funds: Digitization, Innovation and Competitiveness of the Production System



Source: own elaboration

In the government's intentions, it is a continuation of the already existing Industry 4.0, the goal of which was and is the digital transformation of production processes, increased investment in intangible assets, with an extension of those eligible for tax relief.

Another area of intervention concerns ultrafast networks. The Government commits to bring 1 Gbps bandwidth and the 5G network where major private companies have no interest in operating because areas that are too sparsely populated. Other measures are specifically earmarked to cover a share of companies' investments in the space economy, while others are reserved for supply chain industrial policies and internationalization.

## 2.2 The Case of Savino Solution SpA – Forbes: 100 Italian Top



In an ever-evolving technological landscape, businesses and organizations worldwide strive to stay ahead of the curve to meet the challenges of the future. One such trailblazing entity making a mark in the industry is Savino Solution, a cutting-edge technology company committed to providing innovative solutions to complex problems.

The company, founded in 2009 as Seen Solution Srl and then since 2017 as Savino Solution Srl, provides consultancy and technology solutions for the compliant digitization of business processes. Savino Solution has grown to become a leading player in the realm of technology and digital transformation. The company specializes in digital automation trust, with a package of solutions designed for businesses and a service that aims to reengineer business processes through automation and compliance. In addition, with its Clinica Digitale Business Unit, it offers a compliant digitization service for any clinical process. Savino Solution obtained the first European patent on an innovative system, “SavinoChain©”, for data and document storage using Blockchain. In addition, it has launched next-generation technologies applied to digital compliance such as Symphosign, the multiplatform solution that allows electronic and graphometric signatures with legal value to be affixed to any digital document and from any device and SecurOrder, the first digital deal system platform designed in Italy to quickly manage digital orders in a legally secure manner.

Savino Solution's mission is to make the entire data flow related to document and process production of business and public administration compliant with Italian and EU regulations on digitization, thus safe from administrative sanctions and litigation risks. This is possible thanks to solid technical-legal know-how, as well as the technical and IT skills needed to implement the systems. Over the years, the company has applied the so-called "Savino Method," which aims to make companies' processes more agile, fast, efficient and digitized in accordance with the law.

At the core of Savino Solution's success lies its team of highly skilled professionals and experts from diverse backgrounds. Their collective knowledge and expertise span

various domains, including artificial intelligence, data analytics, machine learning, Internet of Things (IoT), cloud computing and more. This wealth of talent empowers Savino Solution to devise comprehensive and tailor-made solutions to cater to the unique needs of their clients.

Savino Solution operates with a strong focus on building lasting partnerships with its clients. They believe in understanding the unique challenges and requirements of each organization, tailoring solutions accordingly and ensuring that clients achieve tangible results. Their dedication to customer satisfaction has earned them a reputation for being a trusted and reliable technology partner across diverse industries, including finance, healthcare, manufacturing, retail and more.

Savino Solution digitizes companies according to its UNIQUE methodology, the Savino Method, which is based on 3 fundamental assets:

1. Digital re-engineering of company processes, before introducing technologies and/or solutions;
2. Certainty and Regulatory Security and the respective Compliance, thanks to their Digital Competence Centre;
3. Create Paperless, Digital and Secure Companies, where paper disappears from business processes, thanks to their proprietary technological solutions.

As part of my thesis examining the transformative potential of digital technologies, I had the opportunity to interview Mr. Nicola Savino, the CEO of Savino Solution SpA. With his remarkable knowledge and forward-thinking approach, Mr. Savino has driven Savino Solution to the top of its field. Mr. Nicola Savino's journey is one marked by a passion for technological advancement and a pioneering spirit. With digital change radically altering industries, I wanted to comprehend Savino Solution's function in leading firms through this transitional phase. The discussion delved into Mr. Savino's profound understanding of emerging technologies and how they are reshaping industries and society. Our conversation covered a wide array of digital technologies, including artificial intelligence, data analytics, Internet of Things (IoT), revealing how Savino Solution stays at the forefront of innovation and empowers businesses to embrace a technologically driven future. Throughout the interview, Mr. Savino's passion for technology and his visionary leadership provided invaluable perspectives on the role of digital technologies in shaping a sustainable and prosperous tomorrow.

I therefore report, here below, the interview, with questions posed to Mr. Savino and his answers for the topics discussed.

QUESTION 1:

1. *What digital technologies do you use most in your business? What benefits do you have from using these technologies?*

- a. *Blockchain, big data and AI*
- b. *IoT, Robotization and Automation*
- c. *3D printing, Virtual Reality and Drones*

ANSWER:

*In our business we use mainly the Blockchain technology. Without any doubt, this method has revolutionized the way data is stored and shared. It relies on a true network of computers, all of which must approve any updates or changes before they can be validated. In doing so, Blockchain technology reduces the dependency and vulnerability compared to a centralized data store.*

*Any document, whether of little or great importance, must be intact, unaltered and authentic to have legal value. In other words, it must be proven that it has not been tampered during its lifetime and the identity of the subscribers must be verified. This is not always easy to do, especially given the high risk of tampering by hackers and malicious parties. Blockchain makes it possible to ensure authenticity security and thus the legal value of the document. In this regard, policy debates are underway to effectively render legal value to documents signed with Blockchain technology.*

*We own a dedicated patent called “SavinoChain®”, which we use for data and document storage. We are the first Italian company to create a full-fledged, legally compliant digital preservation system by leveraging Blockchain for certification.*

*We can summarize all the advantages and benefits of using in various fields is sectors of certification in Blockchain like this:*

- *Secure, unchangeable, transparent and reliable transactions;*
- *Use in numerous sectors, such as education, employment, cryptocurrency, etc.;*
- *Increased speed and productivity to certify a document;*
- *Checking the validity of the certificate through the embedded unique QR code.*

## QUESTION 2:

2. Which are the biggest obstacles you face? Do you think that, in the future, digital technologies may pose a risk to users' privacy? - What do you think about the recent restriction imposed on ChatGPT, the chatbot that uses artificial intelligence?

## ANSWER:

*For the first question, the biggest difficulty is changing management. Corporate resources are afraid to deal with change. It is a cultural problem before it is a technological issue. Implementing new technologies often requires a significant shift in processes, workflows and even job roles. This can create uncertainty and anxiety among management teams who prefer to maintain the status quo, even if it means missing out on potential benefits. Also organizational culture plays a significant role in technology adoption. If the company culture does not promote innovation or a growth mindset, management may be less inclined to experiment with new technologies. Finally, past experiences with unsuccessful technology implementations can leave a lasting impact on management's willingness to try new solutions. Instances of wasted resources or failed projects may foster scepticism about future technology ventures.*

*For what concerns privacy, we can surely say that it has always been a companion in our lives, both personal and professional, because it protects us when we are at home with our loved ones and when we are in the office with our colleagues. Of course technologies can bring privacy issues. Unfortunately, the relationship between Compliance and Digital is a difficult one. Difficult because the regulations don't keep up with new technologies and very often they can't even understand the value of them or even try to regulate something that itself cannot be regulated.*

*For what concerns ChatGPT, in particular, three different violations are alleged against the chat bot: (a) collecting the personal data of billions of people to train its algorithms without informing them of this fact and, likely without having a proper legal basis for doing so; (b) collecting users' personal data in the course of conversations without informing them of the fate of this data; and (c) generating content, in response to queries, that sometimes attributed inaccurate and untrue facts and circumstances to people, thus proposing a distorted representation of their personal identity. ChatGPT, in addition to processing and collecting data, is a tool used by many to ask questions,*

*sometimes intimate ones or those that are strictly personal. There is a strong suspicion that there is wrongdoing. In this case undoubtedly the wrongdoing could have more serious consequences because in the context of a conversation one is inclined to share even more things that concern the intimate sphere.*

*A ban might address concerns related to data privacy and security. AI language models like ChatGPT require vast amounts of data to function effectively and there might be concerns about the handling and storage of sensitive information. Moreover, as said before, AI language models can generate highly convincing text, which may lead to an increased risk of spreading misinformation and fake news. Banning such technology could help control the dissemination of potentially harmful content. On the other side, banning AI language models could stifle innovation in various sectors, including natural language processing, customer support and language translation. These technologies have the potential to enhance productivity and efficiency in many industries. If other countries continue to use AI language models for various applications, Italy might face a competitive disadvantage in terms of technological advancement and business innovation. It is essential to find a balanced approach when regulating AI technologies. Instead of an outright ban, policymakers could consider implementing regulations to ensure ethical use, data privacy protection and transparency in AI models. Encouraging responsible AI development and fostering collaborations between the private sector, academia and government could lead to the responsible and beneficial deployment of AI technologies while addressing potential concerns.*

QUESTION 3:

3. *How do you think digital technologies will change the way companies handle the export management process in the future?*

ANSWER:

*Digital technologies are already revolutionizing the way companies handle the export management process and this trend is expected to continue and evolve in the future.*

*As companies embrace technology, they may encounter unprecedented ways of navigating the complexities of global trade. A significant alteration is expected in the realm of interpersonal connections. In today's interconnected world, digital tools facilitate smooth collaboration between organizations and their extended networks.*

*Blockchain technology will bring supply chain transparency like never before. Maintaining a detailed record of each supply chain transaction can guarantee the genuineness of products. This minimizes the chance of fakes items and adheres more strictly to global commerce rules. The purpose of Blockchain is also to optimize transaction costs and Lead Time of the entire supply chain, seeking to eliminate counterparty risk<sup>9</sup> and create a competitive advantage typical of network economies.*

*Smart contracts make it possible to transform any analog contract between actors/agents in the supply chain into an intelligent automaton, where each contractual execution occurs automatically. Digital compliance and regulatory tools will simplify the often-complex task of adhering to international trade regulations. Automation will help companies stay updated on changing rules and streamline compliance processes, reducing the risk of non-compliance.*

*For what concerns other technologies, E-commerce and online marketplaces will enable companies to bypass traditional distribution channels and reach international customers directly. This direct-to-consumer approach will open up new markets and opportunities without the need for a physical presence in foreign countries. AI-powered analytics will empower companies to predict demand patterns, optimize inventory levels and make data-driven decisions. The result will be an improved supply chain management process that reduces costs and improves operational agility. The Internet of Things (IoT) will*

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<sup>9</sup> Counterparty risk is the risk that the other party involved in a contractual agreement will not abide by the terms defined in the contract.

*revolutionize shipment tracking and monitoring. IoT devices will provide real-time information on the location and conditions of shipments, enabling better supply chain visibility and minimizing the risk of disruptions. Data analytics tools will offer valuable market insights, allowing companies to analyse trends, customer behaviour and competitor performance in different regions. Cloud-based solutions will empower export managers to access critical information from anywhere, facilitating a more agile and flexible export process. This scalability and cost-effectiveness will enable companies to adapt quickly to changing market demands.*

**QUESTION 4:**

4. *What digital technologies do you think are/will be most important in improving the efficiency and accuracy of the export management process in the future?*
- a. *Blockchain, big data and AI*
  - b. *IoT, Robotization and Automation*
  - c. *3D Printing, Virtual Reality and Drones*

**ANSWER:**

*Blockchain will be a critical technology for improving export management efficiency and accuracy due to its transparency, traceability, automation capabilities and enhanced security.*

*Its decentralized and immutable ledger enables real-time tracking of goods throughout the supply chain, fostering efficiency and reliability. Digital identities authenticate product origin and compliance, reducing counterfeit risks. Smart contracts automate export-related processes, streamlining documentation and cross-border payments, eliminating intermediaries and delays. Blockchain's cryptographic security ensures data integrity, safeguarding against cyberattacks and data breaches. Trustless collaboration among stakeholders promotes seamless cross-border operations. By embracing blockchain solutions, exporters can enhance the export process, ensuring accuracy, efficiency and confidence in the global marketplace.*



QUESTION 5:

5. *How do you think digital technologies will help make international trade more accessible to small and medium-sized enterprises (SMEs)?*

ANSWER:

*Digital technologies will empower small and medium-sized enterprises (SMEs) by making international trade more accessible and manageable.*

*Through e-commerce and online marketplaces, SMEs can reach a global audience without the need for physical presence abroad. Digital marketing tools enable targeted advertising and customer engagement in foreign markets, levelling the playing field against larger competitors. Cross-border payment solutions streamline transactions, reducing complexity and costs. Virtual communication tools facilitate remote collaboration and negotiations with international partners. Market research and data analytics provide valuable insights for SMEs to understand international markets and customer preferences better. Cloud computing and storage offer scalable and cost-effective solutions for data management and access. Digital tools assist with export compliance and documentation, ensuring adherence to international regulations. Tracking solutions improve supply chain visibility, ensuring timely delivery. Language translation and localization tools help SMEs adapt content for diverse global audiences. By embracing digital technologies, SMEs can overcome barriers and seize growth opportunities in the global economy.*

*Blockchain offers significant benefits to small and medium-sized enterprises (SMEs) engaged in international trade. It enhances supply chain transparency, allowing SMEs to track the movement of goods, ensure authenticity and comply with regulations. Blockchain-based smart contracts automate trade finance and payment processes, enabling faster and more secure cross-border transactions. SMEs can use blockchain's digital fingerprinting to protect their intellectual property rights and combat counterfeit products, safeguarding their brand reputation. With blockchain's decentralized approach, SMEs can foster trust and transparency in international trade, gaining a competitive edge in the global marketplace.*

Mr. Nicola Savino's interview offered fascinating perspectives on his innovative views. His thoughts on diverse digital technologies supplied useful knowledge. Through the exemplary leadership of their CEO, Savino Solution embodies a steadfast devotion to novelty and digital advancement. Mr. Savino's experiences and predictions for the future provided crucial perspectives. These perspectives highlighted the significance of digital advancements in shaping a prosperous and tech-driven tomorrow.

### **Chapter III:**

## **INTERNATIONAL TRADE IN THE DIGITAL AGE: THE DIGITAL TRADE**

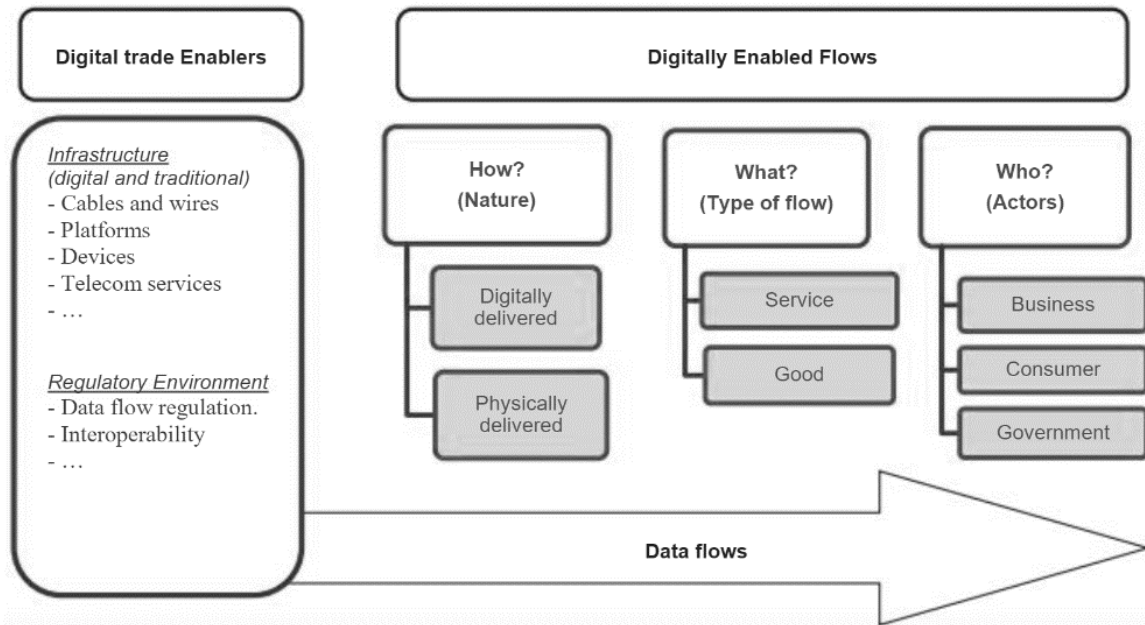
The process of digitalization has transformed both the methods and the nature of global trade. Alterations in the "how" of trade are evident through the rise of novel business models centred around data, reshaping the production and exchange of goods and services. For instance, the increasing utilization of digital intermediaries (platforms) for international trade exemplifies this change. Changes in the "what" of trade pertain to the advent of freshly delivered services facilitated by digital means, such as Internet banking and the emergence of combined goods and services that remain constantly connected, like 'smart' speakers.

Although a universally acknowledged definition of digital trade is lacking, there is an increasing consensus that it encompasses trade transactions involving goods and services conducted through digital means. These transactions can be delivered digitally or physically and involve consumers, businesses and governmental entities. In other words, while all types of digital trade rely on digital technologies, not all digital trade results in digital delivery. For example, digital trade includes digitally facilitated yet physically delivered trade in goods and services, like purchasing a book through an online marketplace or reserving accommodation via a matching application. This encompasses software, e-books, data or database services that are delivered digitally. It comprises goods and services that are enabled by digital means but are physically delivered, like buying a product on an online marketplace or reserving a hotel room through a matching service. Digital trade encompasses transactions between businesses within global value chains (GVCs) as well as transactions where consumers or businesses purchase from each other via online platforms. All these transactions are fundamentally supported by data, which serves as the vital force behind digital trade.

In the traditional scenario, a customer would hail a taxi and settle the payment with physical currency. In the digital realm, the customer is freed from waiting for a taxi or carrying cash. In fact, the app takes care of matching, payment and insurance coverage. While the fundamental service offered by the driver remains consistent in both offline and online situations, the online context has brought about a transformation in the

"what" of trade. A service that was previously non-tradable, like ride-hailing, has now become tradable. Additionally, the "how" of trade has evolved, incorporating an increased reliance on data and the integration of services (such as digitally provided payment and insurance services) to support the transportation service's provision.

Figure 16: A classification system for digital trade



Source: OECD

Digital trade is a multifaceted concept that encapsulates a dynamic array of commercial activities conducted over digital platforms and electronic networks. It fundamentally involves the online exchange of goods, services and information, facilitated by the internet and advanced technological infrastructure.

Central to the concept of digital trade is the movement of data. Data serves as both a production tool and a tradable asset. It also functions as the foundation for organizing global value chains (GVCs) and delivering services. Moreover, data indirectly supports physical trade by enabling the implementation of trade facilitation measures. It plays a crucial role in emerging service supply models like cloud computing, the Internet of Things (IoT) and additive manufacturing.

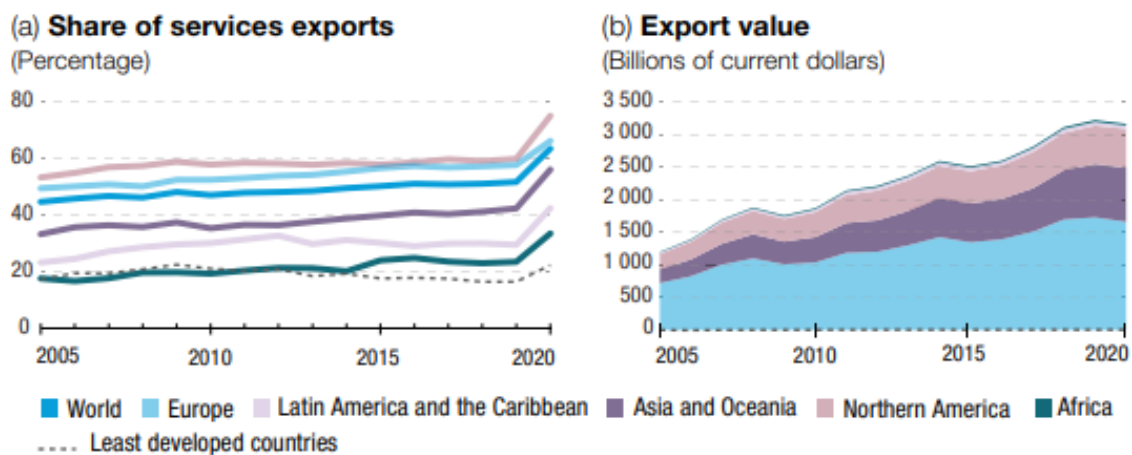
Unlike traditional trade, digital trade transcends geographical limitations, enabling transactions to occur seamlessly across borders and regions. At its core, digital trade encompasses a spectrum of activities. Online retail, a significant component, involves

consumers purchasing products through e-commerce websites, virtual marketplaces and online stores. These transactions are often characterized by the absence of face-to-face interactions, with orders being placed electronically and goods being delivered through various logistics mechanisms.

Digital trade extends beyond physical goods to encompass digital products and services. This includes the distribution of software, digital media and various types of digital content, such as music, movies, eBooks and software applications. Moreover, the provision of services like remote consulting, online education, software as a service (SaaS) and cloud computing falls under the umbrella of digital trade.

The growth and success of digital marketplaces demonstrate how digital trade can reduce communication, search and matching costs, sometimes even replacing traditional markets. This shift towards digital platforms reduces the need for physical stores, as customers can easily find products or services online. This advantage of digitalization also applies to the supply side, as it significantly lowers the entry barriers for firms producing, promoting and distributing digital media products such as music, films and television programs. The decreased costs associated with launching products have enabled new artists and producers to enter the market, while also motivating existing ones to introduce new products.

Figure 17: Exports of digitally deliverable services by region and country



Source: UNCTAD

The most substantial segment of digitally deliverable services is the category labelled as "other business services", with "telecommunications, computer and information services" coming next. While certain types of services are recognized as being capable of digital delivery (also termed as "potentially ICT-enabled"), the proportion of services that are genuinely conveyed digitally is not consistently differentiated.

The pandemic has underscored the significance of digital technologies in bolstering worldwide trade. In 2020, there was a 20% decline in global exports of services compared to 2019. However, exports of services that can be delivered remotely through information and communications technology (ICT) networks, like the Internet, displayed a notable level of resilience, experiencing only a 1.8% decrease despite the widespread economic upheaval caused by the pandemic. Consequently, the portion of global services exports represented by digitally deliverable services reached nearly 64%. These advancements have expedited an ongoing pattern, specifically, the rising significance of services trade involving digitally deliverable offerings. Between 2005 and 2019, international exports of services that can be provided digitally experienced an average annual nominal growth of 12%, reaching as high as 21% in the Asian region. The portion of digitally deliverable services within the entire global services exports had already risen from 45% in 2005 to 52% in 2019<sup>10</sup>.

The COVID-19 pandemic has acted as a compelling catalyst for both businesses and individuals to embrace digital tools. This push has contributed to a 6% upswing in global exports of Information and Communication Technology (ICT) services. The total value of exported ICT services worldwide reached \$676 billion in 2020. The heightened utilization of communication services, computer services and software were spurred by the lockdown measures imposed in numerous economies. As a result, the proportion of services that can be digitally delivered grew to nearly 64% of the overall services exports<sup>11</sup>.

However, despite these percentages increasing in all regions, the pandemic-accelerated digitalization raises the risk of widening digital disparities. This situation could lead to least developed countries (LDCs) falling even further behind.

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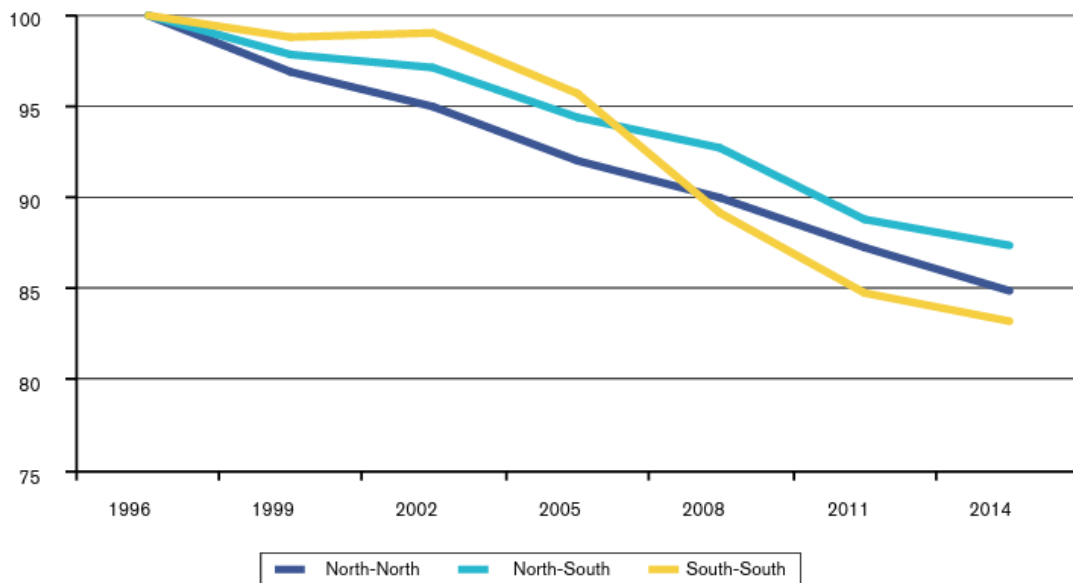
<sup>10</sup> UNCTAD, Digital trade: Opportunities and actions for developing countries.

<sup>11</sup> UNCTAD, Trade data for 2020 confirm growing importance of digital technologies during COVID-19

### 3.1 How can digital trade reduce trade costs?

The process of digitization has lowered the expenses associated with participating in worldwide trade, made it simpler to coordinate global value chains (GVCs), facilitated the spread of ideas and technologies and established connections between a larger number of businesses and consumers on a global scale. The reduction in logistics expenses facilitates the involvement of micro, small and medium-sized enterprises (MSMEs) in global trade. Smaller businesses typically engage in trade with smaller quantities compared to larger enterprises. This indicates that fixed trade costs, including logistics expenses, frequently constitute a more significant portion of the unit cost of their goods in comparison to their competitors exporting larger quantities.

Figure 18: overall trade costs reduction from 1996 to 2014



Source: World Bank

From Figure 18 we can see the trajectory of the reduction in trade costs for three trade directions from 1996 to 2014. The computation involves comparing international trade costs to domestic trade costs. A drop in this ratio indicates that global trade has expanded at a quicker pace than domestic trade, signifying increased globalization and reduced barriers to international commerce. On average, this decline reached approximately 15% between 1996 and 2014. This pattern held true for trade within developed nations ("North-North") and between developed and developing nations ("North-South"). Initially, trade costs among developing nations ("South-South")

experienced a slower decline at the outset of the period, but their reduction gained momentum after the mid-2000s, surpassing other categories.

Through the years, there has been a decrease in overall trade costs in both the manufacturing and services industries. Trade costs are higher for services, primarily because of their substantial variable costs.

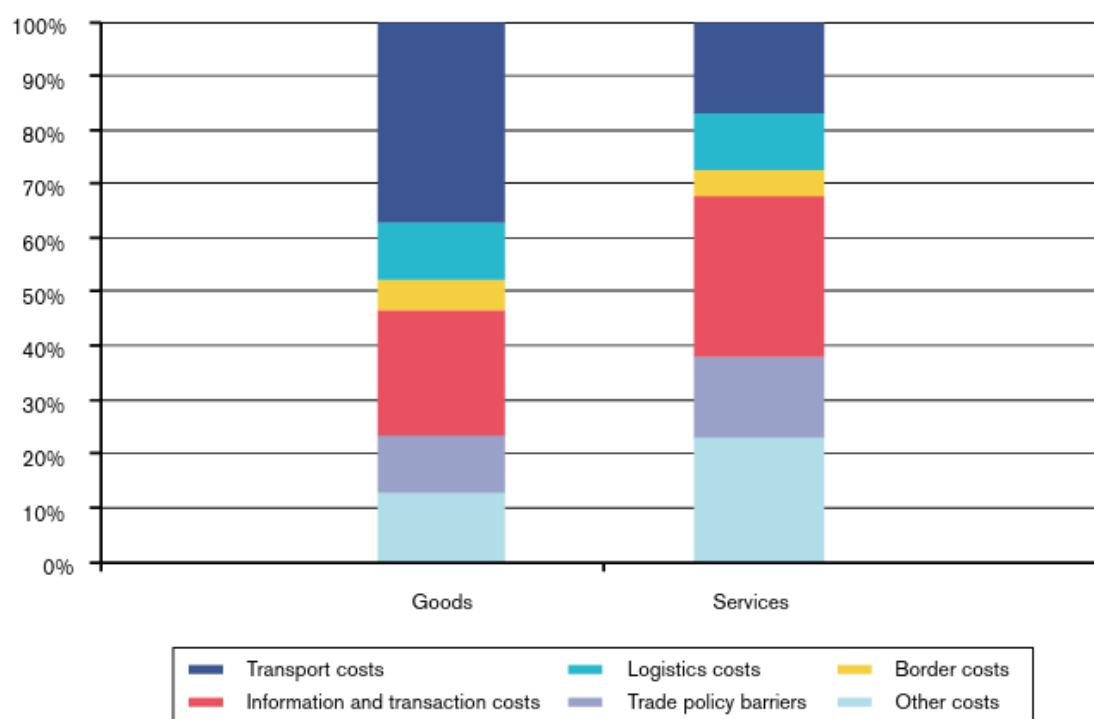
The expenses associated with trading goods and services can be divided into five distinct components. These include transportation costs, logistics costs, expenses linked to border crossings, costs related to information and transactions and barriers imposed by trade policies. The first three categories encompass the expenditures tied to delivering goods from suppliers to customers. This capture transport costs, cargo handling expenses, storage charges, port services and the costs incurred while adhering to customs procedures. Information and transaction costs capture the hurdles that companies must surmount when seeking trade partners, procuring information about regulations, preferences, technical prerequisites and ensuring contract enforcement. Gathering information about foreign country product standards, distribution networks and customer preferences involves significant costs and these expenses rise with cultural and language disparities. Additionally, transaction expenditures are elevated for international trade due to varying institutional structures and the necessity for cross-border financial transactions and converting currencies. The final classification captures policy actions that render entry into the domestic market more challenging for foreign enterprises. These actions comprise tariffs as well as non-tariff obstacles like technical regulations, product standards or licensing requirements.

Analysing Figure 19, here below, we can notice that transport costs constitute the largest proportion of the differences observed in total trade costs across countries. This disparity amounts to 37% for the movement of goods and 17% for services. Similarly, logistics costs exert an equally significant influence on both goods and services trade, contributing to 11% of the overall trade costs. Border-crossing expenses attributable to time delays make up around 5% to 6% of the total trade costs. Nevertheless, given the presence of additional administrative charges associated with customs adherence that we currently lack precise metrics for, these figures probably underestimate the overall significance of all border-related costs. For what concerns, information and transaction costs they occupy the second most prominent position following transport costs. This



significance is underscored by the fact that, in services, these costs emerge as the principal trade barriers, constituting 30% of the overall variation in trade costs. Trade policy barriers assume a greater role in services flows, constituting 15% of the total trade cost variance, in contrast to goods flows where they contribute 11%. The "Other costs" category that remains unexplained, represents trade barriers that are not captured by the variables incorporated in the analysis. These might include aspects like variations in preferences that are not explained by the selected variables utilized to approximate cultural and linguistic distinctions. This category also considers expenses associated with customs and regulatory adherence that surpass time-related delays at borders, including those not influenced by trade agreements.

Figure 19: trade costs breakdown – per cent



Source: WTO

The expenses related to transportation depend on the nature of the transported item, the geographical distance between nations and the trade-related infrastructure of the origin, destination and transit countries. These costs are not limited to the direct fee for relocating goods from their point of origin to their destination. A significant portion of these costs arises from time-related setbacks and uncertainties. This phenomenon is driven by the heightened significance of global supply chains, just-in-time inventory management and streamlined retailing practices. Numerous recent technological

advantages have had notable effects on the expenses associated with transportation and logistics. The widespread adoption of GPS (Global Positioning System) for navigation and route optimization has become increasingly common in recent times. Emerging technologies, like artificial intelligence (AI), have the potential to have a comparably widespread impact. Currently, AI applications include self-driving functionalities and real-time route planning. The optimization of cargo and shipment logistics can be achieved through the integration of vehicle telematics, robotization and artificial intelligence. The primary advantages come from enhanced cargo and shipment tracking, which amplifies operational effectiveness, facilitates real-time adaptations and enhances the security of logistics systems. The implementation of Internet of Things (IoT) sensors, for instance, has the potential to decrease the expenses associated with global trade by bolstering shipping and transport efficiency. Firstly, this technology reduces the quantity of goods lost during transit. Secondly, shipment tracking systems empower businesses to optimize routes and maximize the efficient utilization of shipping containers. Typically, shipping containers exhibit utilization rates of merely 20% due to businesses frequently dispatching goods to multiple destinations. Employing IoT technologies to monitor each container has the potential to enhance container utilization by a range of 10% to 25%, leading to a reduction in annual container-related expenditures.

An example of such technologies in use is the one we have from Maersk. In 2012, in response to intensifying competition, the Danish shipping company Maersk joined forces with Ericsson, a Swedish multinational network and telecommunications corporation. Their collaboration aimed to create a real-time remote container management (RCM) system for their fleet of refrigerated containers. Nearly 300,000 containers were equipped with remote container devices that transmit critical data on factors like temperature, power supply and location around the clock, all seven days of the week. This information is sent to Maersk's private data cloud and analysed in real-time at the company's headquarters. The system, which has been functional since mid-2015, empowers Maersk to continuously track and monitor the performance of containers from any location. The implementation of the RCM system has enabled Maersk to expedite the physical inspection procedures carried out before authorizing containers for export. Prior to the introduction of RCM, all containers had to undergo thorough and expensive inspections. By leveraging intelligent sensors, it becomes possible to accurately check the container's condition, helping in the determination of the

necessary inspection level prior to export clearance. When the container operates within expected parameters, a brief visual examination is sufficient before granting clearance for export.

The integration of advanced robotics and automation into warehousing, along with the unloading and packing of trailers and containers, leads additional cost savings and enhanced efficiency. When coupled with AI algorithms, these sophisticated robotic systems effectively reduce storage expenses and expedite the distribution process to end customers. Prominent e-commerce enterprises are already extensively employing AI and robotics to optimize their storage and distribution networks, strategize optimal delivery routes and maximize the utility of their storage facilities. Numerous startups are also in the process of developing autonomous robots that collaborate with human workers, overseeing inventory on shelves within warehouses, factories and distribution hubs. Customer activities on e-commerce platforms generate substantial data, which AI can harness to formulate predictive tools that enhance the ability to forecast consumer demand accurately. This, in turn, leads to more effective supply management by minimizing excess inventory and shortening delivery timelines.

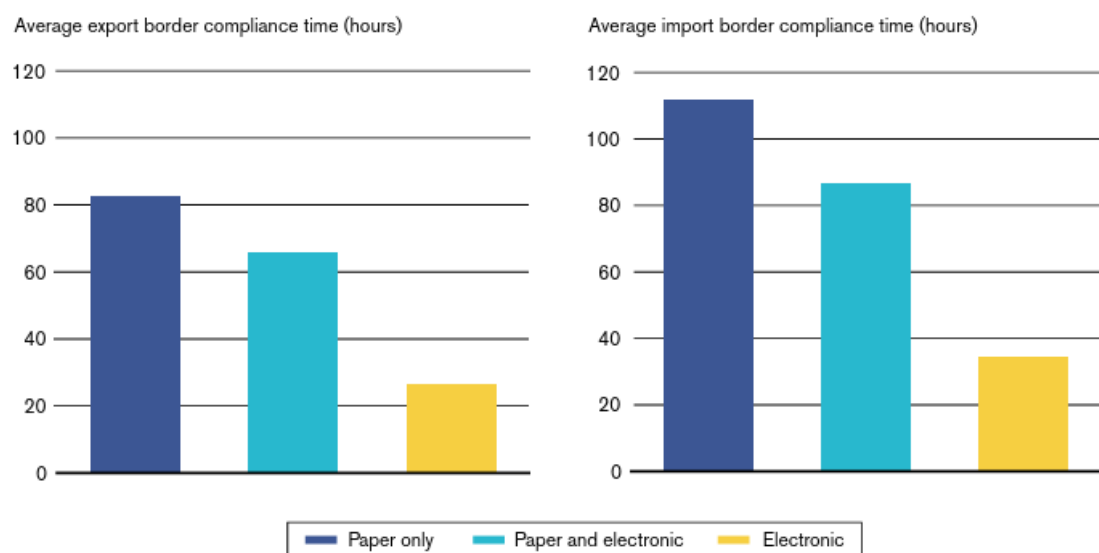
Additive manufacturing, commonly known as 3D printing, holds the capacity to significantly reduce transportation and logistics expenses. This reduction is achieved by minimizing the quantity of parts and components that require trade and by promoting decentralized production in proximity to consumers. It leads to the streamlining of the production process. Moreover, the technique enables intricate components to be fabricated as single entities, effectively reducing the number of production stages required. 3D printing promotes the adoption of decentralized production approaches. Reduced dependence on specific subcomponents and a diminished emphasis on labour costs simplify the process for companies to decentralize production, allowing them to establish closer proximity to consumers.

Cross-border trade is influenced by more than just transportation infrastructure and geographical separation. Border procedures and customs regulations also have a significant impact. Multilayered protocols and customs rules can create substantial barriers to the movement of goods. The time and resources invested in adhering to documentation requirements can pose great obstacles to trade than conventional barriers like tariffs. Artificial intelligence is being employed to assist enterprises in managing

regulatory compliance. For instance, AI-driven software can continually monitor and analyse alterations in regulations, providing recommendations to clients to ensure adherence. This is achieved by examining vast volumes of regulatory documents, saving both time and financial resources. For what concerns the implementation of distributed ledger technology, it could enhance the administration of single windows, rendering the process more efficient, transparent and secure. This technology has the potential to further streamline customs procedures by eliminating redundant steps, accelerating customs processes and clearances, reducing expenses and fraudulent activities, enhancing transparency and auditability and refining coordination among the various agencies, authorities and stakeholders engaged in cross-border trade. Additionally, the utilization of smart contracts permits the automation of specific processes, such as duty payments.

A World Bank's research identified substantial benefits for economies that have fully functional electronic customs clearance systems. When customs declarations can be submitted and processed online, the time devoted to border compliance decreases by over 70% for both imports and exports, as illustrated in Figure 20.

Figure 20: export and import compliance time - hours



Source: World Bank

This implies that even the adoption of basic technologies can significantly alleviate trade barriers, ultimately enhancing a nation's competitiveness.

Engaging in long-distance trade with foreign partners presents challenges. The process of obtaining information about potential buyers and sellers, their offerings and the quality of products becomes more intricate. Additionally, confirming reputations, validating information and enforcing contracts pose greater difficulties. Elevated trade expenses obstruct businesses from capitalizing on price disparities among various markets. Online platforms play a fundamental role in diminishing the expenses linked to pairing buyers with sellers, obtaining market insights and sharing information to potential consumers. Consequently, these platforms possess the capacity to not only enhance engagement in international trade beyond domestic trade but also furnish tools such as feedback and guarantees that enhance consumer confidence in online vendors. Traditionally, businesses have established their credibility by cultivating reputations through brand development. However, digital marketplaces are characterized by a multitude of small participants who often remain unfamiliar to potential customers. These marketplaces have alternative mechanisms to conventional brand-based reputations. One prevalent approach is the implementation of online ratings. New technologies present more effective and cost-efficient ways for establishing trust by means of certifying and verifying the origin of goods. Electronic systems for tracing within supply chains, like the Internet of Things (IoT) and distributed ledger technology (such as blockchain), introduce new methods for companies to validate the provenance and genuineness of their products.

Engaging in international selling and purchasing also necessitates international financial transactions. Currently, cross-border transactions are predominantly managed by banks using a method known as correspondent banking. This involves local banks executing transactions on behalf of another, as numerous banks lack a local presence. E-commerce platforms have established their own payment mechanisms tailored for cross-border e-commerce transactions. The development of these in-house payment systems serves to enhance the flow of goods and services within their platforms. This strategy bypasses the need for corresponding banking networks, leading to expedited processing times and the elimination of processing fees. Furthermore, an escalating number of startups are harnessing the potential of distributed ledger technology to significantly reduce the expenses associated with cross-border payments. This approach primarily targets the reduction of transaction fees, exchange rate charges and the costs associated with correspondent banking.

We need to highlight also that a growing proportion of cross-border transactions encounters no international trade expenses, except for those caused by regulatory factors. This includes internet-enabled services like web searches and communication services, as well as digital intermediary services such as distribution, travel and P2P transactions<sup>12</sup>.

Trade expenses have decreased in both developed and developing nations. Among these costs, transport expenses and information and transaction charges hold significant important role, making their reduction pivotal in further lowering overall trade costs. Moreover, reductions in logistics expenditures, trade policy impediments and border-crossing costs can also yield considerable advantages.

### **3.2 Physical Goods and Digitizable Goods**

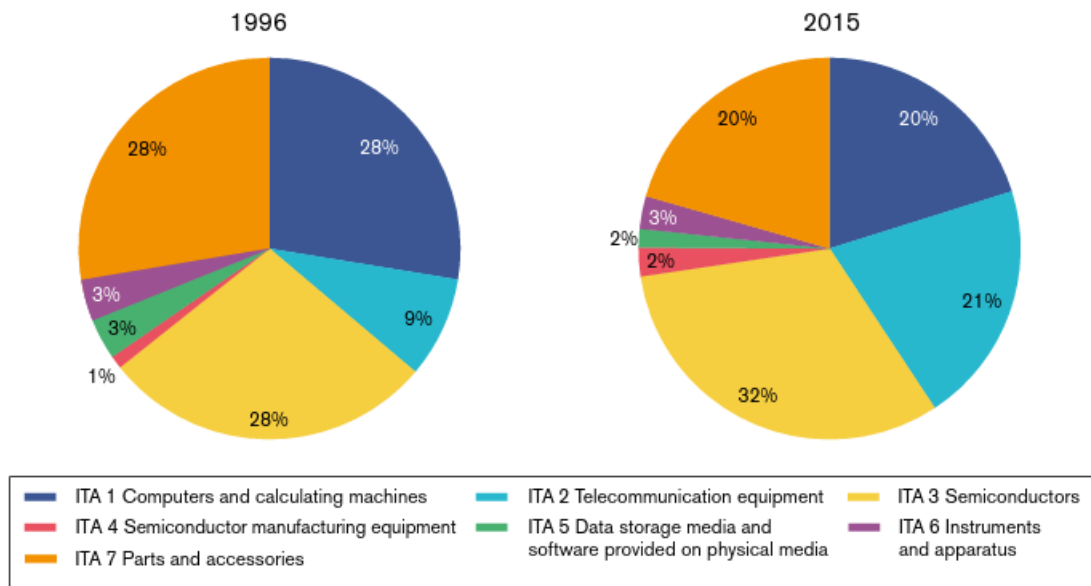
Emerging technologies have the capacity to revolutionize how and where goods are manufactured like electronics, auto components, machinery and medical devices. As digital technology becomes more relevant, there might be an increase in international trade for certain goods, while trade in other items could decrease or vanish over the next few decades. Significant shifts in the types of products being traded have occurred, driven in part by technological progress and changing consumer preferences. Figure 21 offers a comparison of the distribution of ITA products<sup>13</sup> between 1996 and 2015. In 1996, the main shares of IT product exports were held by "semiconductors" and "computers and calculating machines." Over the span of 20 years, "semiconductors" continued to dominate the trade share, while the portion attributed to "telecommunication equipment" rose from 9% in 1996 to 21% in 2015. This increase is largely attributed to the growing popularity of mobile phones, especially smartphones. The growth of trade in IT goods is expected to increase as digital technologies become more prevalent and new products are developed.

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<sup>12</sup> P2P transactions refer to direct exchanges of goods, services, or money between individuals without intermediaries like banks.

<sup>13</sup> "ITA products" are technology-related goods covered by the Information Technology Agreement (ITA), which eliminates tariffs and trade barriers on these items among participating WTO member countries.

Figure 21: World exports of ITA products, 1996-2015



Source: WTO

The growing adoption of digital technologies has the potential to foster trade in products that historically faced elevated expenses related to transportation, regulatory adherence and information and transactional processes. Goods that are time-sensitive, require extensive certification or involve complex contractual arrangements are some examples that stand to gain from decreased trade costs.

"Time-sensitive products" are goods that have a short shelf life or a limited window of usability. These products are often perishable or subject to rapid changes in demand and they require swift and efficient transportation and delivery to reach their intended destinations in optimal condition. Examples of time-sensitive products include perishable foods like fruits and vegetables, fast fashion items that are trendy for a short period, life-saving medical supplies that need immediate delivery and intermediate components used in manufacturing processes that must be delivered promptly to avoid production delays. The most time-sensitive sectors in manufacturing include office equipment, electric power machinery and photographic equipment. The increasing adoption of digital technologies empowers companies to effectively manage intricate supply chains and accelerate product delivery. While digitalization cannot physically shorten geographical distances between nations, advanced technologies like the Internet of Things (IoT) and Artificial Intelligence (AI) offer companies real-time visibility into intricate supply networks and the ability to synchronize global suppliers instantly.

Thanks to reduced transportation and logistics costs, trade in time-sensitive goods might experience growth in the future.

"Certification-intensive goods" likely refer to products that require extensive certification processes to ensure they meet specific standards or regulations. These goods often involve complex industries where safety, quality and compliance are crucial, such as medical devices or aerospace components. For food products or agricultural items certifications are often needed. They help ensure standards related to food safety. These standards also protect the health of animals or plants. Industrial products also require quality management standards. Basic and processed metals products belong to the industries that use these standards. Visual apparatus and electrical apparatus require the same standards. Even machinery or equipment falls under this category. Digital technologies address information asymmetries by enhancing the visibility of product features and procedures, thus promoting more effective market operations. This can subsequently lead to decreased expenses related to certifications. With the reduction in certification expenses brought about by digital innovations and the enhanced transparency in supply chains, there is a potential for increased commerce in products that typically involve substantial certification expenditures. The extent of the anticipated decrease in certification costs due to technology differs by industry: sectors that are anticipated to gain the most encompass luxury goods, consumer electronics and food items.

"Contact-intensive goods" are products or services that involve a lot of communication and interaction between the seller and the buyer. This interaction is necessary because these goods are often personalized, complex or require a tailored approach to meet the buyer's needs. Digital technologies have the potential to substantially cut down costs with the use of internet platforms that connect buyers and sellers and rating systems that counteract information imbalances. Those innovations are predicted to additionally decrease expenses linked to international transactions by eliminating the necessity for intermediaries to oversee and document transactions. This decrease in transaction costs could lead to increased trade for goods that demand specialized investments in relationships.

Finally, "digitizable goods" are physical products that can be converted into digital formats, allowing them to be stored, shared and accessed electronically. Digitizable or,



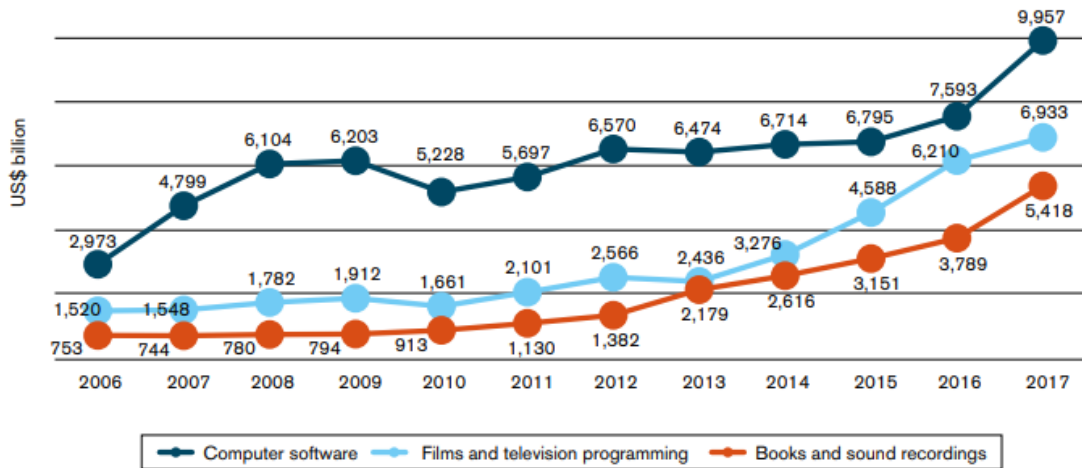
also, digital goods include items exclusively obtainable, transmitted and delivered via the internet. Consequently, they lack a physical presence and are considered intangible. For example, movies and music are now mainly exchanged in digital formats rather than being distributed through CDs, CD-ROMs or DVDs. Likewise, books are being traded as electronic books (e-books) and video games are being downloaded or played online. These goods primarily purpose is to meet consumers' needs and wants, aligning with the growing demand for convenience and ease of access in their everyday routines. Traditionally categorized digitizable items includes cinematographic films; traditionally printed materials like books, pamphlets, maps, newspapers, journals, periodicals, postcards and personalized greeting cards; video games; computer software; and recorded media such as music records, tapes and similar sound recordings. Digitization makes it easier to distribute and consume these goods using digital technology.

An exemplary instance of a digitizable good that illustrates the transformative power of digital technology is the evolution of music distribution. Historically, music enthusiasts would purchase physical formats like CDs, cassette tapes or vinyl records to enjoy their favourite tunes. These tangible items not only carried the music itself but also the artwork, liner notes and a tactile experience that many cherished. However, the advent of digital technology has revolutionized this landscape. Music is now readily available in digital formats that can be downloaded, streamed and stored on various electronic devices. This transition has reshaped the music industry, giving rise to online platforms and streaming services, such as Spotify or Apple Music, that provide instant access to an extensive catalogue of songs from various artists and genres. The convenience and accessibility brought about by digitization have fundamentally altered the way people interact with music. Music lovers can now curate personalized playlists, discover new artists with algorithmic recommendations and enjoy their favourite tracks on the go. This shift not only benefits consumers but also transforms the music industry's business model. Record labels, artists and distribution platforms have had to adapt to this digital paradigm, emphasizing online presence, engagement with fans through social media and innovative revenue streams like subscription-based streaming services.

The digital revolution has introduced a shift also in how books are consumed. E-books, which are digital versions of books that can be read on electronic devices like e-readers, tablets and smartphones, have gained significant traction. E-books offer a plethora of benefits that cater to the changing preferences of modern readers. They allow individuals

to carry an entire library with them, eliminating the need to carry bulky physical books. Moreover, e-books often provide features like adjustable fonts, built-in dictionaries and the ability to highlight text, making the reading experience more interactive and personalized. Accessibility has also improved with e-books, as readers can instantly purchase and download titles from online stores, such as Amazon or Apple Books, bypassing the wait time associated with physical book delivery.

Figure 22: US film, music and software exports



Source: US Bureau of Economic Analysis

The main differences between physical and digital goods are summarized in the table here below:

Table 2: Main differences between physical and digital goods

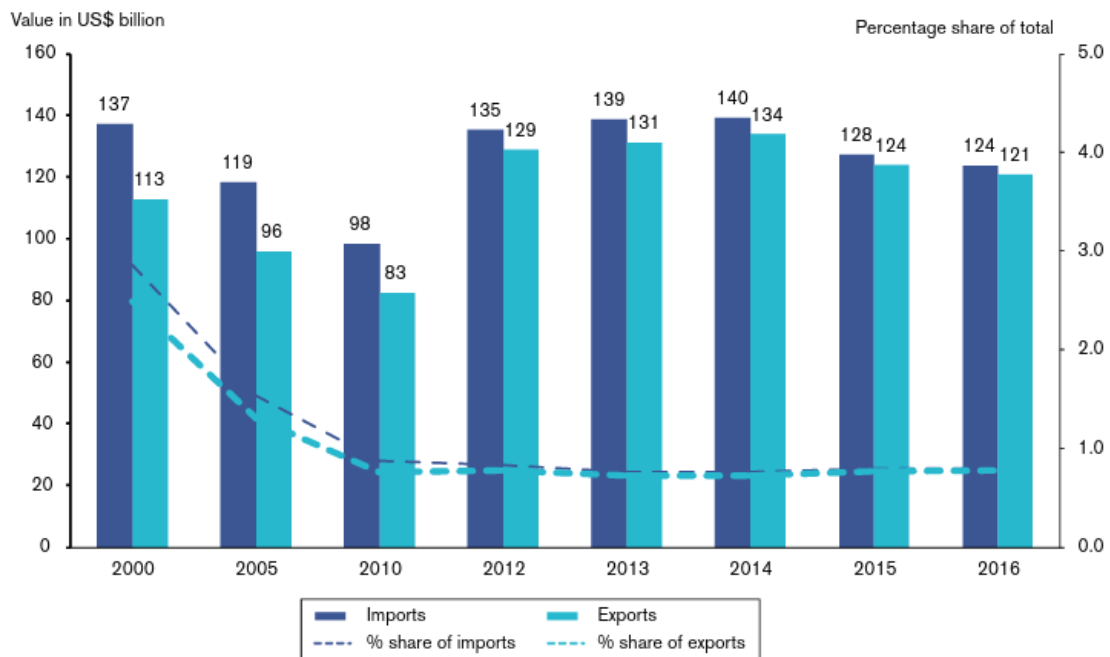
Digital Goods	Physical Goods
Sold, delivered and transferred online	Physically delivered
Requires digital space	Requires physical space
Online payment only	Both online and offline payment
No packing or labelling needed	Packing and labelling are essential
Instantly delivered	Delivery can take different modes and depends on the type of purchase (physical or online)

Source: My Own Elaboration

Digital goods often represent significant innovations compared to their physical counterparts. However people usually assign lower value to digital versions of the same goods. Regardless of whether value is determined through incentive-compatible pay-what-you-want scenarios, willingness to pay or purchase intention, people consistently value physical items more than their digital counterparts. This valuation disparity arises from the stronger capacity of physical goods to establish a personal connection (psychological ownership), leading to the higher value attributed to them.

The trade share involving these items has been gradually declining. Currently, digitizable goods' import value for WTO members, excluding intra-EU trade, accounts for approximately 0.8% of total imports. In contrast, in the year 2000, the import of digitizable goods constituted 2.86% of total imports.

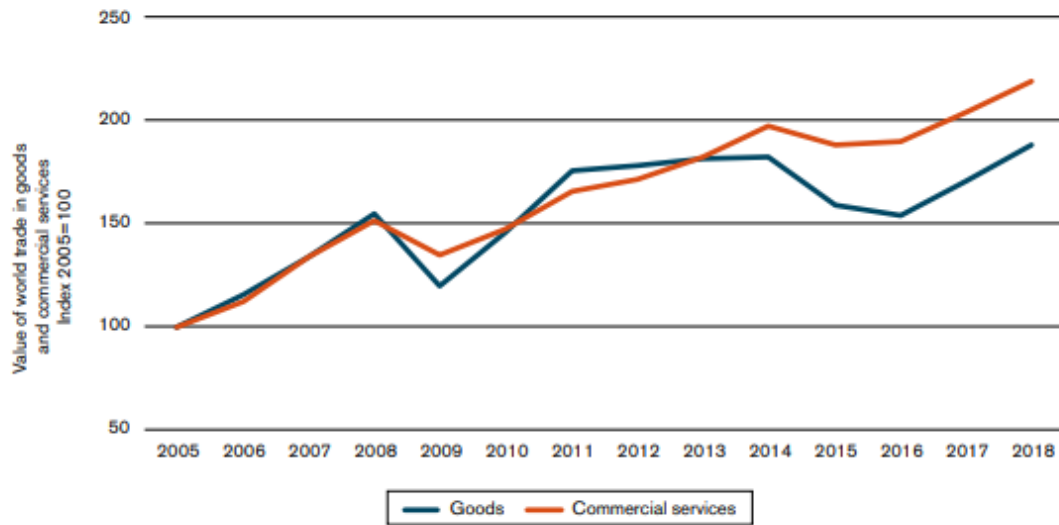
Figure 23: trade of digitizable goods, value and per cent share of total trade



Source: WTO

The decline in exports of goods that can be digitalized has been caused by the growth of trade of goods that can be converted into digital formats. The export of digitizable goods has been offset by the prospective expansion of trade in their digital equivalents. The digital downloads of these items, such as films, audio media and software can be considered as trade of services.

Figure 24: trade in goods has grown more slowly than trade in services.



Source: WTO

Forbes anticipates that digital goods will enhance brand-customer engagement, resulting in a projected growth of the digital commodities market to \$74 billion by 2025. The metaverse is predicted to have a significant impact on this trend for companies. Primarily, it can reshape the dynamics of the customer-brand interaction, while also enabling businesses to digitize their offerings. Experts say that the influence of the metaverse on digital commodities can be compared to the way social media impacts businesses. By 2026, it's estimated that around 25% of the global population will spend at least an hour daily within the metaverse. Furthermore, the industry itself is set to expand to \$678.8 billion by 2030. Businesses that embrace this trend now stand to tap into a new market in the years to come.

Digital technologies give rise to novel products, alter the attributes of conventional goods, decrease trading expenses and transform the mix of industries engaged in production. These changes impact trade trends by modifying the significance of the factors that underlie them.

### 3.3 Services and Servicification

A service is an intangible, non-physical offering provided by an individual or organization to meet a particular need or desire of a customer or client. Services can encompass a wide range of activities, such as consulting, healthcare, education, transportation, entertainment and more. Unlike physical goods, services are typically characterized by actions, processes or performances that provide value to the recipient. They are often consumed at the time of their delivery and are not stored or possessed in a tangible form. Services can vary greatly in terms of their nature, quality and complexity and they play a crucial role in modern economies, contributing significantly to economic growth and societal well-being. Services have already instigated profound transformations within national economies on a substantial scale. They play an indispensable role in the operation of our increasingly intricate and advanced industrial economies, encompassing areas ranging from logistics and finance to informatics. Moreover, the services sector itself stands as the most rapidly expanding segment of the economy, spanning domains such as business services, healthcare and entertainment. In terms of economic output, services contribute to more than two-thirds of the total output, supplying nearly two-thirds of employment opportunities in developing nations and four-fifths in developed ones and attracting over two-thirds of foreign direct investment. Currently, it appears that services are also causing a similar transformative effect on international trade. While they still represent only a fifth of cross-border trade, their growth rate outpaces all other sectors.

There are various methods through which services can be exchanged across international borders, collectively known as "modes of supply." The World Trade Organization's General Agreement on Trade in Services (GATS) categorizes services trade based on four modes of supply:

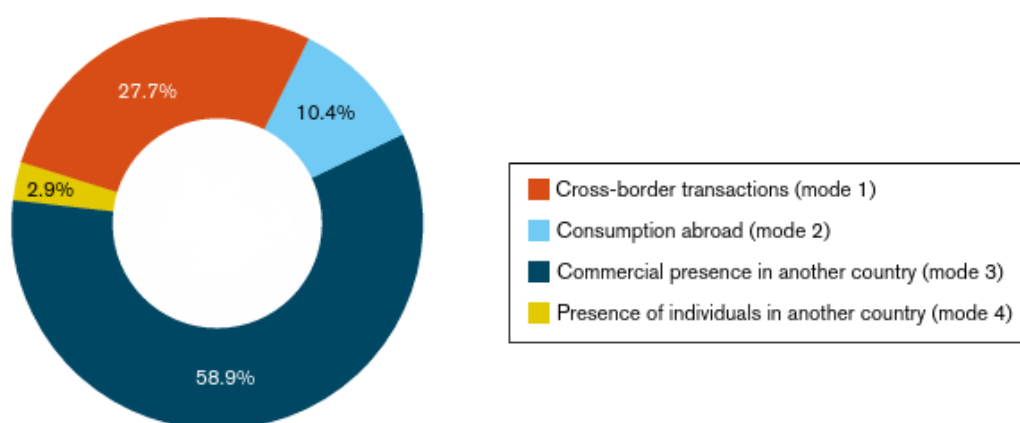
- Cross-border supply (mode 1): This involves the provision of services from the territory of one member (i.e., a WTO member) to the territory of another member. For example, this can occur through online channels, such as the internet.
- Consumption abroad (mode 2): In this mode, services are offered within the territory of one member to consumers from any other member. A common

example is tourism, where individuals from one country travel to another for various services.

- Commercial presence (mode 3): Here, services are delivered by a supplier from one member through establishing a commercial presence in the territory of another member. This often involves setting up controlled affiliates or branches in foreign countries to cater to the local market.
- Presence of natural persons (mode 4): In this mode, a supplier from one member offers services through the physical presence of individuals in the territory of another member. This can include professionals like consultants, architects or engineers temporarily relocating to provide their services.

Cross-border trade in services is perhaps the most recognizable form of international trade. Examples encompass consultancy services conducted over the phone or legal services offered in one country to clients located in other countries through electronic means like email or video conferencing. Consumption abroad involves scenarios like spending by tourists in foreign economies or students studying abroad. Commercial presence occurs when foreign-owned retailers or banks deliver services to local consumers. And, finally, the presence of natural persons entails instances where professionals like architects or engineers temporarily relocate to foreign territories to offer their services.

Figure 25: Presence of the different mode of service trade.



Source: WTO

Thanks to the advent of digitalization, the internet and cost-effective telecommunications, numerous service sectors that were previously considered non-tradable due to their reliance on in-person delivery at fixed locations have now

transitioned into highly tradable domains. This transformation is possible because these services can now be remotely delivered over extensive distances. Certain services like taxis and hotels have always been provided locally and necessitate a physical presence. However, even these sectors have witnessed significant transformations through new internet-based business models, exemplified by companies like Uber and Airbnb. On the other hand, services such as retailing, software development or outsourced business processes are currently undergoing "de-localization" and "globalization" to an extent and scale that may surpass even the most expansive multinational manufacturers of physical goods. Similar trends are evident in education sector, as witnessed by the proliferation of e-learning platforms like Moodle and Massive Open Online Courses (MOOCs). Likewise, in the entertainment sector, the widespread adoption of streaming services such as Netflix and Spotify reflect a similar trajectory. Digital technology is influencing trade in personal, cultural and recreational services. It is also having a significant impact on the provision of most services. For instance, in the tourism sector, activities like booking flights, hotels and tours increasingly occur online. Professional services, such as accounting, legal advice and medical consultations, are increasingly conducted through internet-based communications. The majority of communication services, including news delivery via digital networks, internet-based phone calls, email and voicemail, are now facilitated digitally. Moreover, in sectors where providing certain services across borders was traditionally deemed unfeasible, digital technology has paved the way for innovative delivery methods, such as Telehealth.

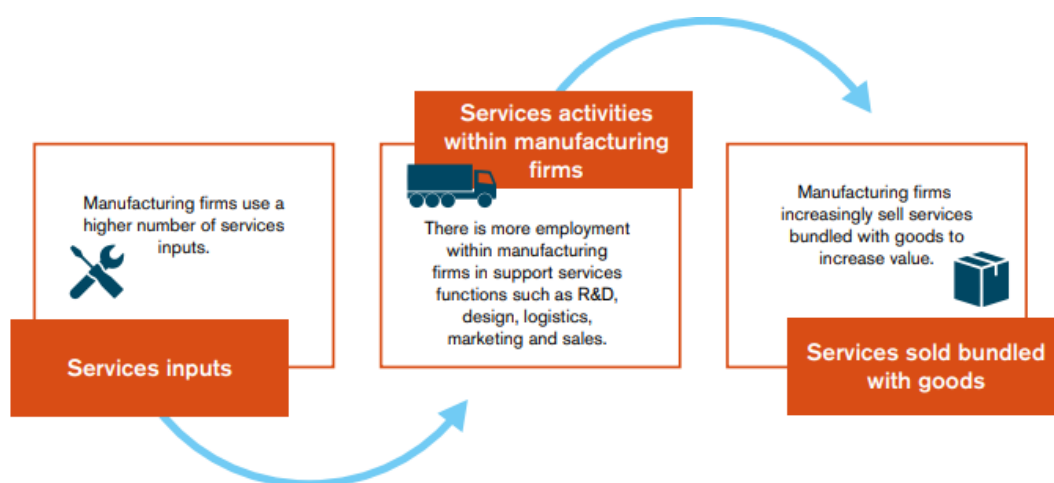
While digital technology's influence on these services continues to grow, quantifying this impact remains a challenging task. The fact that services trade has not fully harnessed its growth potential can be attributed, in part, to services industries still striving to fully embrace the myriad global business opportunities that technology has ushered in.

Services play an increasingly significant role in the Euro area's economy, service-related jobs comprised roughly two-thirds of the workforce, a proportion that escalated to three-quarters by 2019, just prior to the pandemic disruptions. During the same timeframe, the service sector's contribution to GDP climbed from 63% to 66%. However, it has remained stagnant since the Global Crisis. The disparity between the share of jobs and GDP can be attributed to the widely recognized fact that labour productivity tends to be lower in services compared to other sectors. This variance arises from the difference in

services' significance in consumer expenditure versus their contribution to the broader economy. Since the Euro area's net export of services represents only a small fraction of GDP, the distinction likely stems from the sale of many services to other end users, whose spending patterns are not reflected in the HICP (e.g., government or investment expenditure) or their utilization as inputs in the production of goods and services.

Services constitute a crucial element of the manufacturing sector. Beyond services procured as inputs, there are also service-related activities occurring within manufacturing enterprises. Increasingly, the manufacturing industry depends on services, whether in the form of inputs, internal operations or bundled offerings alongside physical goods. Services are reshaping how manufacturing companies create value. In the digital age, services form an integral part of a business ecosystem characterized by collaboration among customers, partners and contractors, serving as a linchpin for innovation and enhanced productivity. It's anticipated that digital technologies will assume a significant role in shaping the future of global value chains (GVCs) and services trade, influencing the character, intricacy and extent of value chains in the years to come.

Figure 25: The manufacturing sector increasingly relies on services



Source: WTO

What makes some services interesting is their potential to be combined with exported goods, a concept known as "servicification". These services can originate from foreign sources and serve either as inputs integrated into the manufacturing procedure or as post-export services accompanying the good. "Servicification" is a concept that describes a significant shift occurring in industries traditionally focused on producing physical



goods. This shift involves a growing emphasis on the provision of services alongside or sometimes even in place of, the manufacturing of tangible products. At its core, servicification involves companies recognizing the value of adding services to their product offerings. This can take various forms, such as providing maintenance, training, consulting or other related services that enhance the overall customer experience and value proposition. One of the key principles of servicification is a shift towards a more customer-centric approach. Companies engaging in servicification place a strong emphasis on understanding their customers' needs and preferences, aiming to provide comprehensive solutions that not only include products but also services tailored to meet those specific needs effectively. Customization is often a significant aspect of servicification, as services can be adapted and personalized to suit individual customer requirements. This flexibility allows businesses to address a broader range of customer needs. Furthermore, servicification extends the relationship between companies and customers beyond the initial product sale. Companies may offer a range of services throughout the entire lifecycle of a product, including installation, ongoing maintenance, software updates and even end-of-life services like disposal or recycling. This shift towards servicification is seen as a strategic move that can provide companies with a competitive advantage. By diversifying their offerings to include services, businesses can create additional revenue streams, foster stronger customer loyalty and set themselves apart from competitors.

Examples of servicification can be found across various industries. In the automotive sector, manufacturers offer services such as maintenance, financing and telematics to enhance the ownership experience. In the technology industry, companies provide software-as-a-service (SaaS) and cloud-based solutions, expanding their offerings beyond hardware. Even in traditional manufacturing sectors like agriculture, servicification is evident, with precision agriculture services combining machinery with data analytics and expert agronomic guidance.

Internet of Things (IoT), Cloud and Big Data are the three technologies that most enable the shift to new business models related to servicification. The increasing diffusion of sensors on individual machines and production lines, the possibility offered by the cloud to leverage "on demand" remote resources for data storage, processing and access, combined with analytics, which enable efficient and fast work on huge masses of data, structured and unstructured from varied sources, enable the process of service

transformation: fundamental, in fact, is the return information, that is coming from the users of the asset on the state of operation of the product, performance and operating conditions. It is from the analysis of these data, in fact, that useful information emerges for the elaboration of contracts related to the "exploitation" of the product from a pay-per-use, pay-per-availability, pay-per-performance perspective.

The integration of advanced technologies in manufacturing and supply chain management is opening up fresh avenues for services within the value chain. For instance, through remote monitoring of a digital replica of machinery, manufacturers can provide customers with services related to predictive maintenance planning. Notable examples include Rolls-Royce's international offering, the TotalCare program, facilitated by a data analytics centre in the UK, and John Deere's JDLink connection, enabling remote machinery diagnosis. These insights empower manufacturers to deliver crucial post-sales services across international borders. This development signifies an opportunity for increased participation in global value chains for less industrialized developing nations. Over the past few decades, business process outsourcing services have contributed to economic growth and job creation in countries like India and the Philippines. The anticipated expansion of advanced technology adoption in Africa and the Asia-Pacific region is expected to unlock similar opportunities for more developing countries in these areas. However, the full realization of these prospects hinges on the simultaneous expansion of IT education and digital infrastructure.

Moreover, in conjunction with technology, sustainability concerns can serve as a motivation for companies to introduce remote services. Previously, machinery requiring repair often had to be shipped back to the manufacturer's facility. Now, augmented reality (AR) or robotics can be employed to remotely assist technicians on-site, significantly reducing the carbon footprint associated with transporting machinery. Mercedes-Benz service technicians, for instance, utilize HoloLens2, developed by Microsoft, to visualize a 3D model of the engine remotely, annotate it and propose solutions. Overall, this enhances the efficiency of service technicians and minimizes travel associated with servicing.

To further expedite servicification, digital trade agreements can play a crucial role by addressing non-tariff barriers that hinder services trade. For example, under the Singapore-Australia Digital Economy Agreement, signed in August 2020, the two

countries are progressing towards mutual recognition of digital identities, adopting common e-invoicing frameworks and prohibiting regulations that mandate local data storage, among other provisions. Facilitating the transfer of data beyond national borders, in particular, would enable companies like John Deere and Rolls-Royce to offer remote data analytics and maintenance services.

The future of the manufacturing industry lies in a combination of digitization and servicification. This synergy enables companies to achieve a number of well-known strategic benefits. Companies that have invested in digital transformation have reported a number of important benefits, such as: reducing downtime by 30% to 50%, improving labour productivity by 15% to 30% and decreasing quality control-related costs by 10% to 20%. In addition to these tangible results, the long-term impacts on the entire value chain are even more significant, among them it is important to mention: increased flexibility in addressing customer demand, increased go-to-market speed and improved integration and collaboration in the supply chain. Servicification is, on the other hand, capable of opening up significant new business opportunities. Companies, therefore, can offer comprehensive solutions that include not only the physical product, but also "advanced" related services such as AI-based support, predictive maintenance and sophisticated analytics on actual production data.

One of the main benefits of servicification is the development of long-term relationships between manufacturer and customer. In the past, manufacturers were simply the supplier of the product. Now, they play an intrinsic role throughout the life of the product and beyond. Measurable benefits include an overall improvement in product performance through constant control and monitoring activities, as well as improved aftermarket service on products sold. For the supplier, servicification also means opening up its potential market to new customers who might not otherwise have been able to afford the purchase of a particular product or machinery, while from the user's point of view, the main benefit is not to "suffer" the obsolescence of machinery, but to be able to enjoy greater flexibility when changing and refurbishing. The benefits to the customer can be summarized as reduced costs associated with the purchase of products or durable goods that thus become commodities (which is why we talk about the commoditization process), better and constant after-sales service and timely product replacement in case of failure or breakage.

With the push of new technologies and digital business, many believe that servicification will increasingly take hold in Italy in more and more applications. The data seem to show that this business model mainly affects manufacturing companies that make finished products. Some categories of goods or products that cannot be considered commodities, such as luxury goods or experiential products, are to be excluded from the scope. Therefore, it will be durable goods that will have a future in this new market, that is all those products in which the service can have a value higher than the purchase cost. We are talking about products with a planned obsolescence, such as washing machines, coffee makers and household appliances in general, but also machine tools, which through rental are able to extend their life cycle becoming more convenient for companies and customers.

The push toward servicification also comes from the market. Europe believes that the servicification model is more in line with the ecological and digital transition targets set by the Next Generation EU and the Agenda 2030 sustainable development goals. For this reason, incentives and funding are aimed at greater business digitization. In addition, also at the European level, the figure of the servicification manager or facilitator of the logic of servicification and innovation within a company or organization, has been established and certified.

## **Chapter IV:**

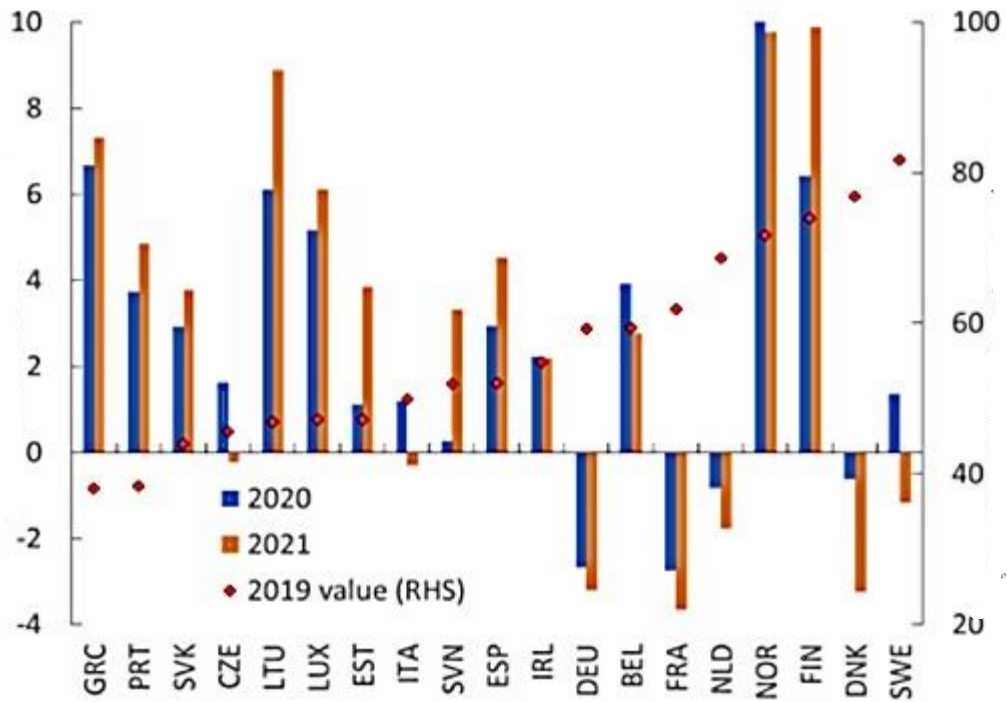
# **DIGITAL TRADE REVOLUTION: COVID-19'S INFLUENCE ON GLOBAL COMMERCE**

In February 2020, the first cases of Covid-19 emerged outside of China and, by mid-March, the World Health Organization (WHO) declared it a global pandemic. Stringent social distancing measures and travel restrictions were fully enforced in most countries throughout April and May. The progression of the crisis has been divergent across the regions worldwide. While many European and Asian countries began easing certain restrictions by June due to the positive outcomes of their lockdown efforts, countries in the Americas were still grappling with the most severe phase of the crisis. Global organizations such as the World Trade Organization (WTO), the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD) have made projections about how the global gross domestic product (GDP) and international trade would be impacted in 2020 due to the pandemic. Although there is no consensus on the exact figures, it is evident that there has been a significant slowdown in the global economy and trade. Nevertheless, the effects of the pandemic remain uncertain and vary across different parts of the world.

At the outset of the COVID-19 pandemic, both policymakers and scholars anticipated that the pandemic and the subsequent measures to control it, would speed up the adoption of digital technology. Many employees had to transition from office-based work to remote work and activities that required physical contact were restricted. Consequently, numerous companies had to adapt to remote work setup and enhance their online presence. This led to big changes in how companies operated, managed logistics and involved quick investments in information and communication technology (ICT). The COVID-19 pandemic increased digitalization, which enabled businesses to function remotely, may have supported employment and labour productivity. There were also expectations that it could lead to enhanced productivity for both companies and their employees in the long run. Therefore, during the lockdown, in a matter of weeks, digital became an essential tool for commerce survival. Some players developed their own eCommerce initiative while others, already present online, implemented actions to increase operational capacity and territorial coverage and improve service levels.

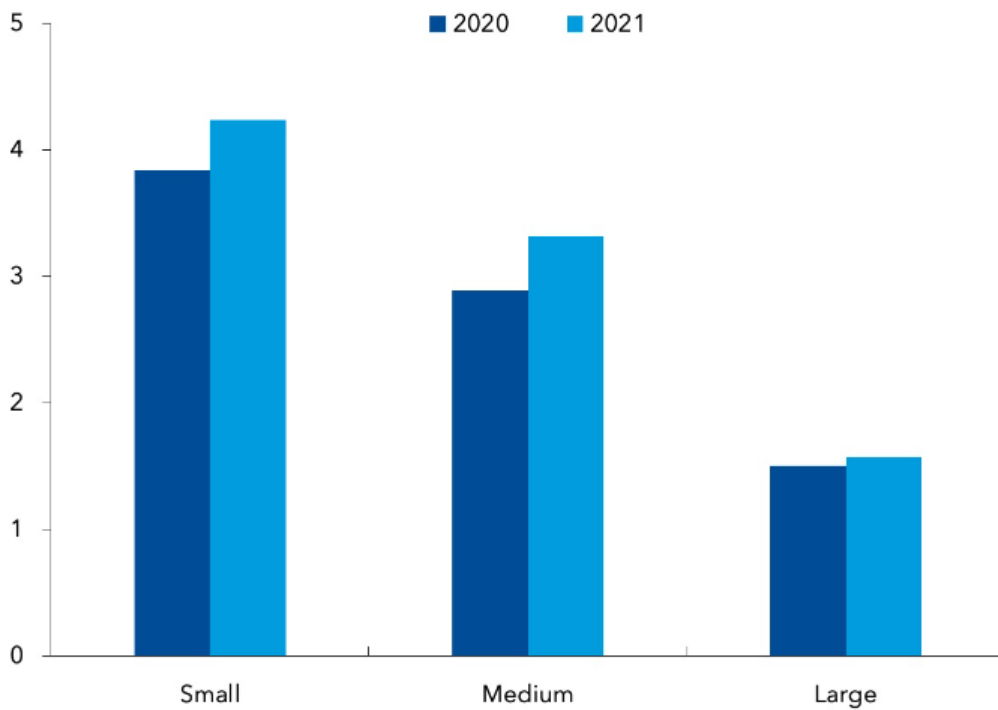
Prior to the COVID-19 crisis, significant variations in digitalization were evident among countries, sectors and companies. These differences appeared to be a potentially crucial factor in explaining variations in performance among nations. For instance, in Sweden, which was the most digitally advanced country in EU, 82% of workers had access to a computer with internet in 2019, while in Greece, the least digitally advanced country, only 38% of workers had such access. These disparities in digitalization couldn't be solely attributed to differences in the types of industries within each country. Even in sectors like food and accommodation, there was a substantial 38%-point difference in digitalization between Greece and Sweden. Furthermore, when considering various sectors and firms, it was evident that contact-intensive industries historically had the lowest levels of digitalization and smaller businesses were considerably less digitalized than medium and large enterprises. This trend was consistent across countries. The beginning of the COVID-19 crisis led to a boost in digitalization, particularly in countries, sectors and firms that had lower levels of digitalization prior to the crisis. Data indicates a notable acceleration in digitalization during the pandemic, surpassing pre-crisis trends. When examining different sectors and companies, a consistent pattern emerges: greater investments were made in entities that were less digitally advanced. Countries that had a lower level of digitalization to begin with, tended to witness more significant increases in digitalization during the pandemic. For example, Greece recorded a nearly 20% increase in digitalization, while, in contrast, highly digitalized economies like Denmark, France, Germany and The Netherlands saw a slight decrease in digitalization relative to the expected trend. An analysis of specific sectors indicates that the overall increase in digitalization within countries was primarily due to improvements within sectors, rather than shifts between sectors. In Portugal and Slovenia, where sectoral reallocation played a more substantial role, it accounted for approximately 20% of the increase in digitalization. These same patterns of catching up were also observed at both the firm and sector levels, with small businesses and contact-intensive sectors, such as food and accommodation and construction, experiencing the most significant increases in digitalization.

Figure 26: Digitalization by Country – EU statistics



Source: Eurostat, International Telecommunication Union

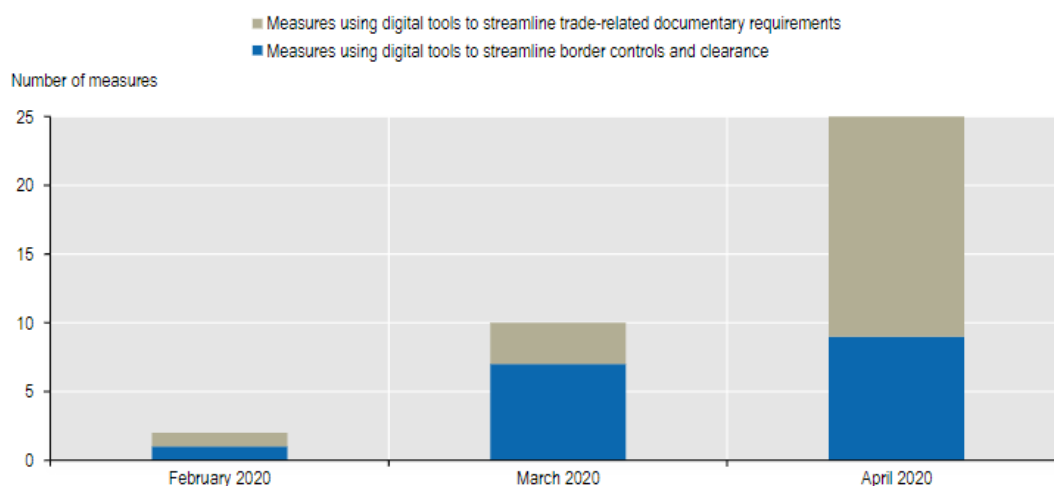
Figure 27: Digitalization by Firm Size – EU statistics



Source: Eurostat, International Telecommunication Union

To navigate the COVID-19 pandemic, logistics chains found success in striking a balance between rapid package delivery and adherence to new safety measures. To contain the virus's spread, staffing was temporarily reduced, while interactions between people were limited. Digital technologies significantly improved the flow of necessary goods like digitally ordered packages, medical supplies and food. By implementing disruptive technologies, border processes have been made more interactive and straightforward for merchants, quickening them while minimizing physical touchpoints. For instance, various mechanisms that reduce physical interactions, such as advance electronic document submissions, digital payment of trade-related taxes, digital certificates and signatures or round-the-clock automated processing of trade declarations, have been implemented. In response to the challenges posed by COVID-19, many economies have increasingly employed digital tools to streamline processes and documentation requirements at their borders. These trade facilitation measures include the establishment of dedicated COVID-19 online information portals, the acceptance of digital trade-related documents instead of physical copies (including sanitary and phytosanitary certificates) and an expansion in the number of procedures eligible for electronic pre-arrival processing.

Figure 28: usage of digital tools to streamline border processes during COVID-19



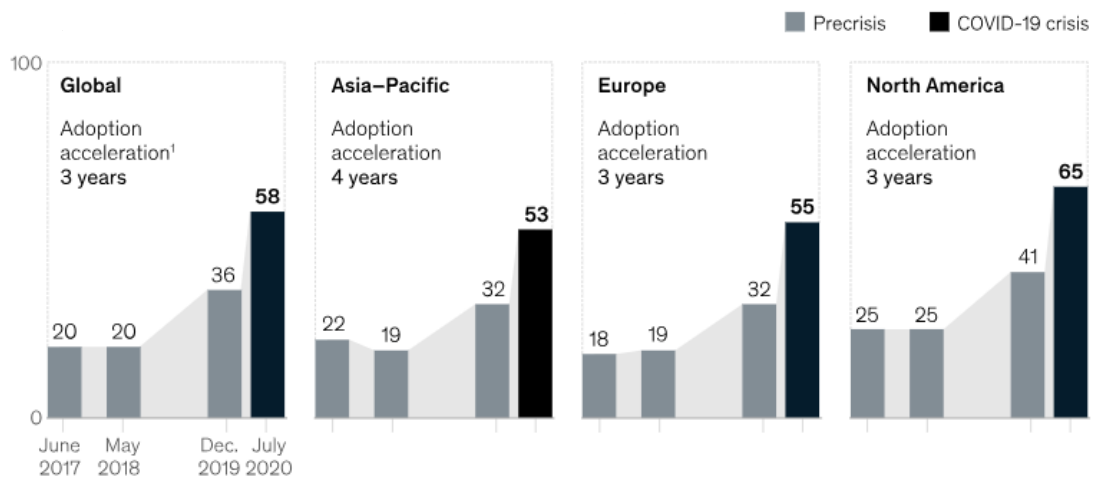
Source: OECD

These efforts complement the introduction of initiatives like "green lanes" or "corridors" to expedite the clearance of specific products.



The mandatory closure of brick-and-mortar retail stores revealed a wide range of opportunities for retailers. For instance, it provided them with a chance to enhance their communication and relationships with customers through digital channels and derive value from collecting customer feedback to enhance their services. Even the most resistant firms or individuals to change were persuaded about the necessity of overcoming barriers in implementing digital channels. This even led to the elimination of distinctions between various channels and the adoption of a unified commerce strategy, known as omnichannel. COVID-19 crisis has accelerated customer digital interactions by several years.

Figure 29: Average share of customer interactions that are digital - %



Source: McKinsey & Company

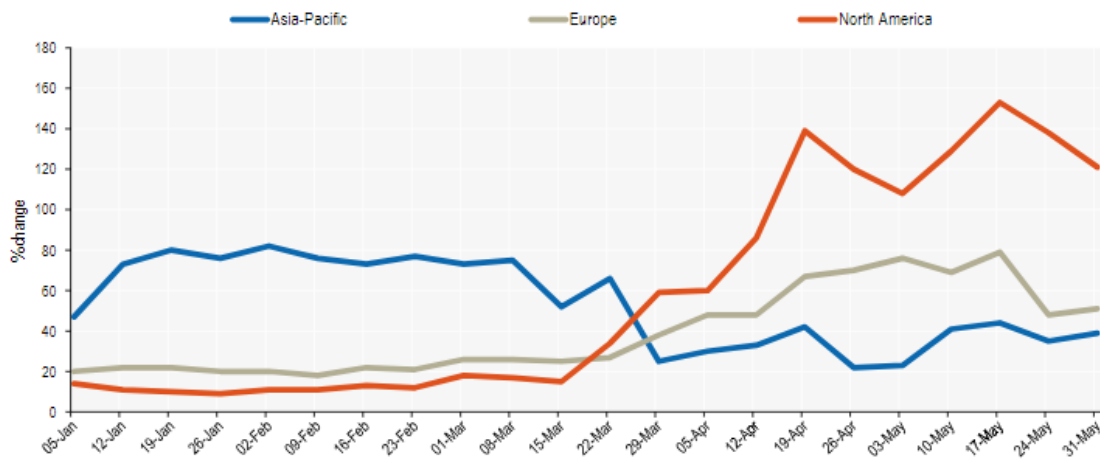
E-commerce played a pivotal role during the pandemic in addressing the constraints imposed by lockdowns and social distancing measures in response to Covid-19. Consumers were compelled to shift their focus towards e-commerce to fulfil many of their essential needs. Consequently, there was a significant surge in B2C (business-to-consumer) e-commerce sales. However, e-commerce retailers also encountered the same challenges that disrupted supply chains in traditional retail channels, such as delivery delays and order cancellations. Both private sector entities and governments took measures to assist in this regard. These measures included expanding network capacity, providing data services at discounted rates or for free, reducing the cost of digital transactions and enhancing logistics services. Throughout the pandemic, retailers' reactions were influenced by their pre-existing online presence and development of digital channels. Retailers catering to essential needs, who had not previously ventured

into online channels, began utilizing existing platforms during lockdowns, enabling them to enter the digital realm swiftly. Conversely, retailers already established in the digital sphere experienced an uptick in orders from new customers who opted to explore this channel. The COVID-19 pandemic has resulted in a significant surge in e-commerce orders across different regions. In Europe, there has been a 50% increase in online orders, while in the Asia-Pacific region, the increase has been even more substantial at 70%. In the United States, there has been a remarkable 120% year-on-year increase in e-commerce orders.

Store closures have prompted experimentation with new ways of selling and engaging with consumers, often based on integrating online and offline experiences. 48% of top retailers supported customers in choosing and purchasing products through messaging apps and social networks, 42% used the tool of video calling, to offer personalized advice and enable sales and 20% experimented with more sophisticated remote sales solutions, such as live stream shopping platforms.

This growth has benefited businesses of all sizes, including micro, small and medium enterprises (MSMEs), by allowing them to reach a broader customer base in various markets. Although most online orders are still delivered within the same country, there is growing evidence to suggest that cross-border parcel trade is expanding at a rate nearly double that of domestic parcel trade. 88% of Italy's top 50 retailers have consolidated their logistics infrastructure, opening new warehouses and using stores to support online, 77% have implemented technology investments, 70% have implemented organizational changes (e.g., retraining store staff to support online activities) and 48% have hired new staff dedicated to eCommerce operations. There are also those who have collaborated with external players to speed up delivery service (42%) and extend their online presence (36%).

Figure 30: Growth in goods orders through e-commerce - 2020



Source: OECD

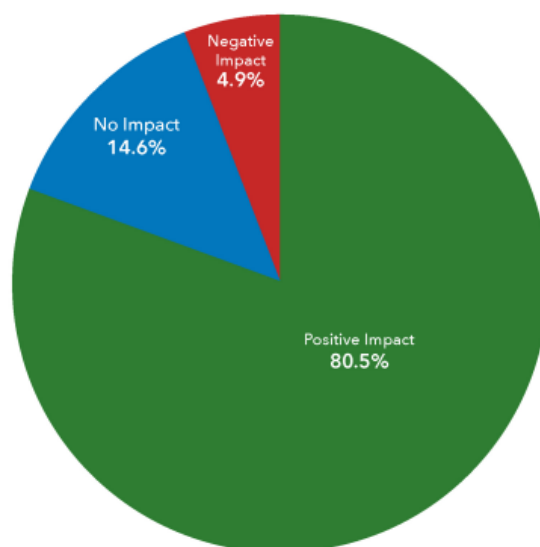
The pandemic brought to the forefront and exacerbated several issues that e-commerce faces, including price gouging, worries about product safety, deceptive practices, cybersecurity concerns and development-related challenges. Other challenges which e-commerce faced during the lockdown, are primarily due to the interconnection between the physical and digital worlds, especially in areas such as logistics management, which was also impacted by the pandemic. Investments in technology are anticipated to assist in addressing the challenges of the "new normal," and through innovation in this altered environment, recovery and growth.

The impact of the COVID-19 crisis on the global supply chain has caused worry about the future of business. Many industries still operate in isolated compartments, leading to inconsistencies in accounting that require reconciliation. As blockchain adoption increases, there is a growing trend towards the integration of supply chain, insurance and trading finance. Blockchain enables the documentation and data related to online transactions, such as purchase and sales orders, to be available and accessible as a single, trusted source for all involved trading partners, eliminating the need for intermediaries. As we look to the challenges posed by the COVID-19 crisis, blockchain has the potential to contribute to a more equitable and fair system of commerce that benefits both producers and consumers.

According to the supplementary survey conducted by WTO-TFG, in line with the findings of the ICC Global Survey on Trade Finance, the majority of companies have seen favourable outcomes for their Distributed Ledger Technology (DLT) plans and

activities due to the pandemic. With remote work becoming the norm in numerous countries, physical workforce presence has been limited, compelling businesses to swiftly develop digital solutions to maintain their operations. In many cases, the most effective approach involved has been expanding existing digital solutions. While COVID-19 may not have directly led to the immediate adoption of many DLT solutions, the progress achieved in implementing supporting technologies has clearly yielded positive results.

Figure 31: impact of COVID-19 pandemic on DLT plans and activities



Source: ICC Global Survey on Trade Finance

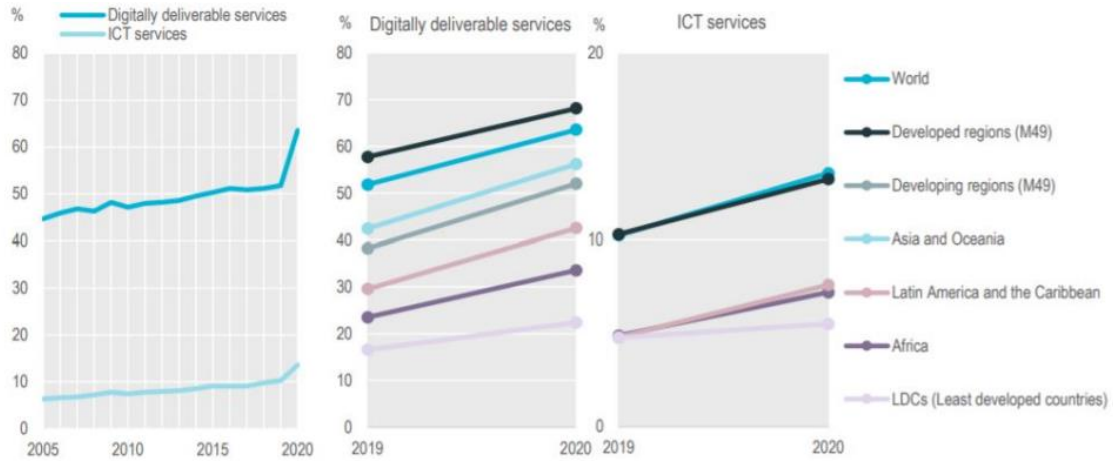
An innovative approach to enhance the customer purchasing process is through the utilization of virtual reality (VR) platforms. The impact of Covid-19 on customer behaviour, increasing their reliance on e-commerce, has made the adoption of disruptive technologies like virtual reality a potential source of competitive advantage. Customers now seek immersive shopping environments to be motivated to make purchases, especially during the Covid-19 pandemic when the priority for consumers was acquiring essential goods. Consumers aged 18 to 34 are more receptive to this experience, whereas older consumers with established habits tend to resist its adoption. Regardless of the customer segment, the primary concern revolves around the costs associated with this type of shopping experience, chiefly due to the need for additional devices like VR headsets. Conversely, the most influential factor driving the adoption of VR is convenience, as allowing consumers to engage in more immersive interactions with products enhances consumer trust, ultimately leading to increased sales.

In 2020, SMEs also made the long-awaited move to digital. With the health crisis, digital has first and foremost enabled them to keep consumer dialogue and sales active. An analysis of 312 Italian trade SMEs found that due to lockdown periods, 64% launched at least one new mode of contact and sales (such as messaging apps, phone, email). The benefits found – reaching a larger number of consumers and maintaining an active dialogue with loyal customers – prompted 84% of the sample to keep these modes active even when stores reopen. Since the lockdown, digital has made it easier for stores to adapt to government measures and new consumer needs. The most widely adopted solutions are systems for monitoring customer status (47% of the sample), entrance quotas (29%) and in-store social spacing compliance (28 %). SMEs have also worked on offering innovative payment methods, contactless and mobile (67 %) and developing omnichannel models (42%). Within these companies, size constraints remain: in fact, these are small businesses in which it is complex to find adequate investment capital and the right skills to develop innovative projects. However, the emergency has loosened some of the constraints to innovation (fear of uncertain returns, lack of awareness of existing solutions...) and prompted SMEs to think about offering new relationship models in the medium to long term.

In 2020, digital technologies emerged as a significant support system for global trade and economic activity. Even though total services exports experienced an unprecedented 20% decline (the largest drop since records began in 1990), the global exports of digitally deliverable services only fell by a modest 1.8%. This reflects an increasing reliance on digital methods for delivering services, enabling trade to continue despite the movement restrictions imposed due to the pandemic. With ICT (Information and Communication Technology) services exports on the rise and digitally deliverable services exports holding relatively steady in 2020, their combined share within the substantially reduced total services exports saw a substantial increase across all regions. Globally, the proportion of digitally deliverable services went from being below 52% of services exports in 2019 to nearly 64% in 2020, while ICT services grew from constituting 10% to nearly 14%, marking a noticeable acceleration of a long-term trend. However, it's worth noting that different regions experienced varying outcomes within this overarching trend. Although the export share of digitally deliverable services increased in all regions, the increase was particularly significant, with a 14%-point rise across developing regions. In contrast, the increase was more modest, at 10%-points, in

Africa and only 6%-points in Least Developed Countries. The export share of ICT services increased at a notably slower rate in LDCs compared to other regions, with just a 0.74%-point increase, in contrast to the global increase of 3.3%-points.

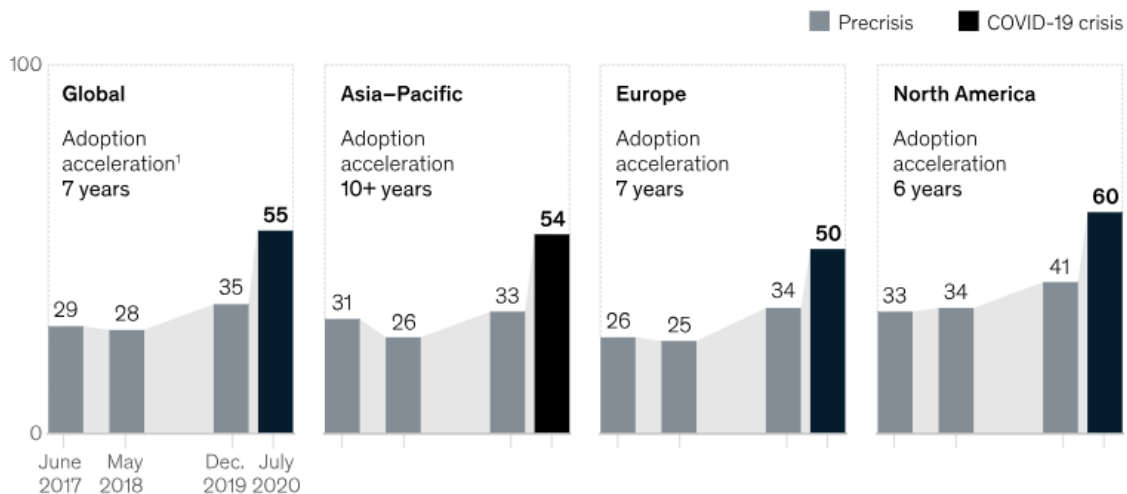
Figure 32: global ICT and digitally deliverable services exports - a percentage of total services exports



Source: UNCTAD

COVID-19 crisis has accelerated the exports of digital deliverable services by several years.

Figure 29: Average share of products and/or services which are partially or fully digitized - %

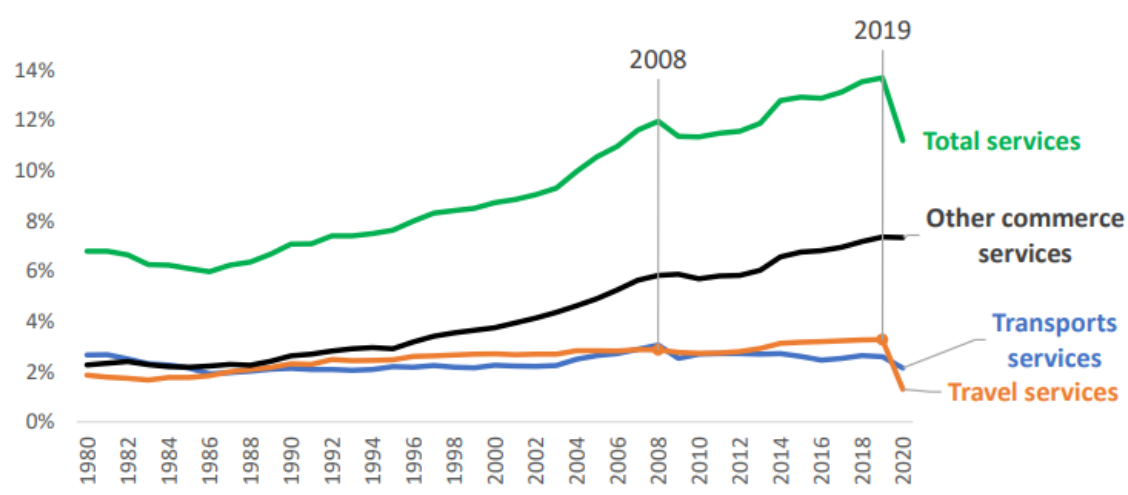


Source: McKinsey & Company

The trade in services experienced an unusual effect due to the 'great lockdown' brought about by the pandemic. In the years 2020 and 2021, there was a significant decline in

travel and transport services, while other categories of services, such as research and development services, professional and management consulting services, advertising, market research and public opinion polling services, as well as technical, trade-related and other business services, maintained their growth. This divergence in trends can be explained by the fact that travel primarily consists of international tourism and business travel, both of which were directly impacted by COVID-related restrictions and indirectly influenced by consumer reluctance to travel. The impact on the travel sector was so severe that it had a substantial negative impact on the overall services trade figures.

Figure 32: services growth during pandemic period - shares of world GDP in %



Source: WTO Trade Data

As stores have reopened, digital has become an enabler of a safer, easier and more autonomous experience and has fostered a deeper understanding of the customer. After the first lockdown, in fact, 40% of the sample of top retailers developed systems for remotely booking in-store visits and 28% adopted virtual queue management solutions. Much attention has also been paid to solutions that can ensure in-store social distancing, such as smart occupancy systems (implemented by 31% of the sample), which monitor and manage inbound and outbound flows in real time. In addition to these solutions, which are contingent and designed only to overcome the emergency, there are innovations intended to permanently overhaul certain processes. These are solutions aimed at ensuring greater customer autonomy in the purchasing and payment stages. During 2020, 14% of the top retailers invested in upgrading self-scanning and self-checkout systems and extended along the store network the use of innovative payment

solutions. 8% of the sample, on the other hand, focused on new digital kiosk features to automate the product search, purchase and payment stages. The desire to offer more autonomy in the store finds its greatest expression in the increasing experimentation with automated stores, where the smartphone is essential: it allows the customer to log in, make purchases and pick up orders online in total autonomy. Retailers have been working in parallel in the back end to deepen their knowledge of consumer habits and preferences and to create a single view of the customer, with the enhancement of CRM (19%) and business intelligence analytics (13%) solutions.

The healthcare emergency has profoundly altered consumer buying patterns and habits: retail is therefore required to undergo a structural transformation in order to recover efficiency on all processes and transfer it into high value-added activities for customers. Digital, in this context, can be a valuable ally. Indeed, it can support retailers in redesigning the point of sale from an omnichannel perspective and can ensure greater proximity, both physical and functional, to the consumer.

Internationally, the most responsive and innovative retailers have shown how the pandemic can accelerate the transition to a new meaning, a new value of the Retail service offered to customers: no longer a pure commercial intermediation, evaluated mainly in terms of "time (and cost) saving," but a "phygital" experience capable of offering authentic interactions with brands and their products. A retail omni-experience valued predominantly in terms of "time spending," the quality and depth of time spent by the customer on different channels and in different physical and virtual spaces.

It will be necessary to find new roles and skills that can lead the transformation and enable coordination mechanisms. At the same time, greater openness to the outside world and experimentation with new relationship models that encourage the development of ad hoc projects and the reduction of time to market is essential.



## **Chapter V:**

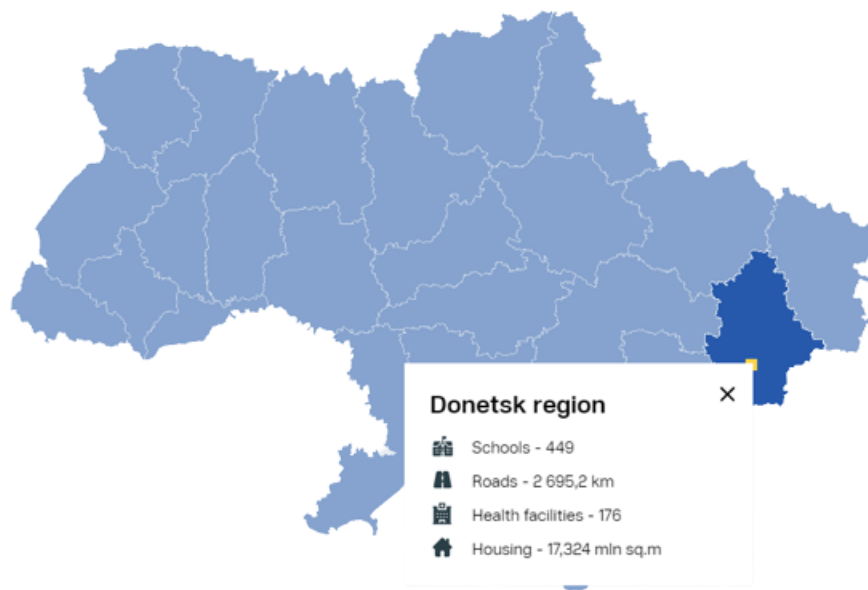
### **THE CHANGING GEO-ECONOMIC SCENARIOS: THE EFFECT OF THE WAR IN UKRAINE AND THE EMERGENCE OF NEW GLOBAL TRADE TRENDS**

The beginning of the war in Ukraine in 2022 marked a tragic and convoluted chapter in contemporary history. This conflict, which unfolded in the midst of a rapidly changing geopolitical landscape, was rooted in a combination of historical tensions, political turmoil and external influences. Ukraine's historical context played a pivotal role in setting the stage for this crisis. Throughout its history, the country was an important geopolitical hub, experiencing periods of sovereignty mixed with foreign oversight, notably by the Soviet Union. Independence was won by Ukraine when the Soviet Union dissolved in 1991, though building a prosperous government and market took time and effort. The war's origins can be traced back to deep-seated political divisions within Ukraine. The country was polarized between a pro-European, western-leaning faction and a pro-Russian, eastern-leaning one. This political polarization was further exacerbated by corrupt leadership and economic hardships.

In late 2013 and early 2014, Ukraine witnessed the Euromaidan movement, a series of protests primarily led by western Ukrainians who demanded democratic reforms, an end to corruption and closer ties with the European Union. These protests ultimately culminated in the ousting of then-President Viktor Yanukovich. The situation escalated dramatically when Russia occupied Crimea, a region with a substantial Russian-speaking population, in February 2014. Russia's annexation of Crimea triggered international disapproval and the first sanctions started to be applied. After the controversial annexation of Crimea, pro-Russian separatist movements sprouted up in eastern Ukraine especially in Donetsk and Luhansk. With military and intelligence Russian support, separationists declared independence and sought to either join Russia or form their own states. The Ukrainian government responded with military action. The ongoing conflict has led to a devastating aftermath in eastern Ukraine causing a vast loss of life, displacement of people and heavy destruction.

The outbreak of war in Ukraine has had also profound and far-reaching economic consequences, impacting not only Ukraine itself but also Russia and the broader global economy. One of the most striking economic outcomes of the conflict in Ukraine has been the contraction of Ukraine's economy. Since the conflict's beginning, the nation has faced a series of economic challenges, such as the destruction of vital infrastructure, the disruption of supply chains and a general atmosphere of instability.

Figure 33: Map of Damages: the Donetsk region – September 2023<sup>14</sup>

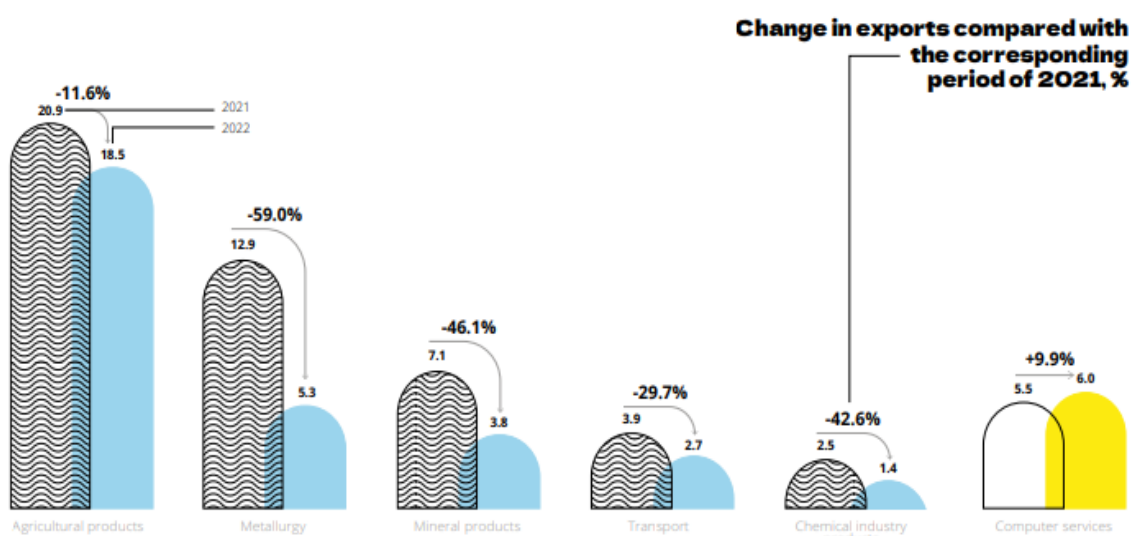


Source: Ukraine's Government

These issues have contributed to a notable decline in economic output. This economic contraction has had consequences especially for Ukrainian citizens, leading to reduced economic opportunities and strained livelihoods. The war has resulted also in the loss of productive capacity in key industries and regions. Manufacturing, mining and agriculture, all vital components of Ukraine's economy, have suffered due to damaged infrastructure and disrupted operations. The loss of productive capacity has not only impeded economic growth but it also made it difficult to take actions of rebuilding and recovering. Among the export-focused areas, only the IT industry has seen an increase in its export volume compared to the previous year, whereas others have experienced substantial declines.

<sup>14</sup> Interactive map can be found at <https://recovery.gov.ua/en>

Figure 34: Export volume for 10 months of 2021 compared to 2022 – USD billion



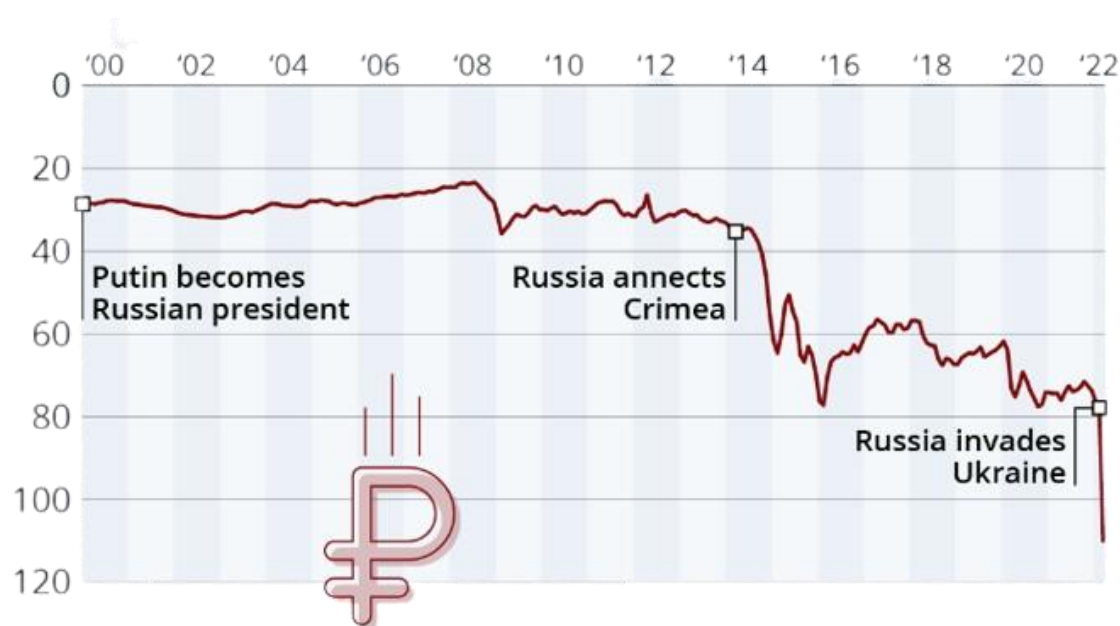
Source: NBU

Economic instability and geopolitical uncertainties have led to a substantial devaluation of the currency. This depreciation, in turn, has fuelled higher inflation rates, eroding the purchasing power of Ukrainians and raising the cost of imported goods. This has placed additional financial burdens on households already grappling with the economic fallout of the conflict. Energy security has become a pressing concern for Ukraine due to its historical reliance on Russian energy supplies, particularly natural gas. The war has heightened these concerns, prompting Ukraine to actively seek alternative energy sources to reduce its dependence on Russia and enhance its energy security. The conflict has also disrupted trade between Ukraine and Russia, historically significant economic partners. Political tensions and sanctions have hindered cross-border trade, affecting both economies and businesses reliant on bilateral trade relationships.

On the international stage, Western countries including the European Union and the United States, have imposed economic sanctions on Russia in response to its actions in Ukraine. These sanctions took various forms, targeting individuals, entities and key sectors of the Russian economy, affecting economic growth and Russia's access to international financial markets. They aim to exert economic and political pressure on Russia to change its behaviour and adhere to international norms and agreements. Among all the sanctions applied against Russia, the one which had the strongest impact,

was, probably, its disconnection from the SWIFT international payments system<sup>15</sup>. This has caused Russia interbank payment transactions to become significantly more complex and the country's ability to trade goods and exchange currencies to be reduced overwhelmingly, making only cash payment possible. But it is with the freezing of the Russian Central Bank's foreign exchange reserves that the West has hit Moscow the hardest. Indeed, since 2014, Russia has implemented economic policies aimed at increasing the size of its reserves and making them less dependent on the dollar. Moscow's goal was to have sufficient funds to support the Ruble in case of difficulties and illiquidity with which to help its banking system. Consequently to these and other restrictions, the Russian currency has been subject to an enormous devaluation. Before the start of the war in Ukraine, it took about 80 Rubles to buy one dollar. Now it takes about 100: a huge drop that signals a well-established fragility of the Russian currency. From 2014 until today, it has lost nearly a quarter of its value and continues to hit new lows. Trading on the Moscow Stock Exchange is still forbidden<sup>16</sup> and on foreign exchanges the collapse of Russian listed companies has been evident.

Figure 35: Valuation of the Russian Ruble against US Dollars – in ruble per US dollar<sup>17</sup>



Source: Statista

<sup>15</sup> The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is a cooperative organization based in Belgium that offers services related to the facilitation of financial transactions and the transfer of funds between specific global banks. Its primary role revolves around being the central communication network through which international payments are launched.

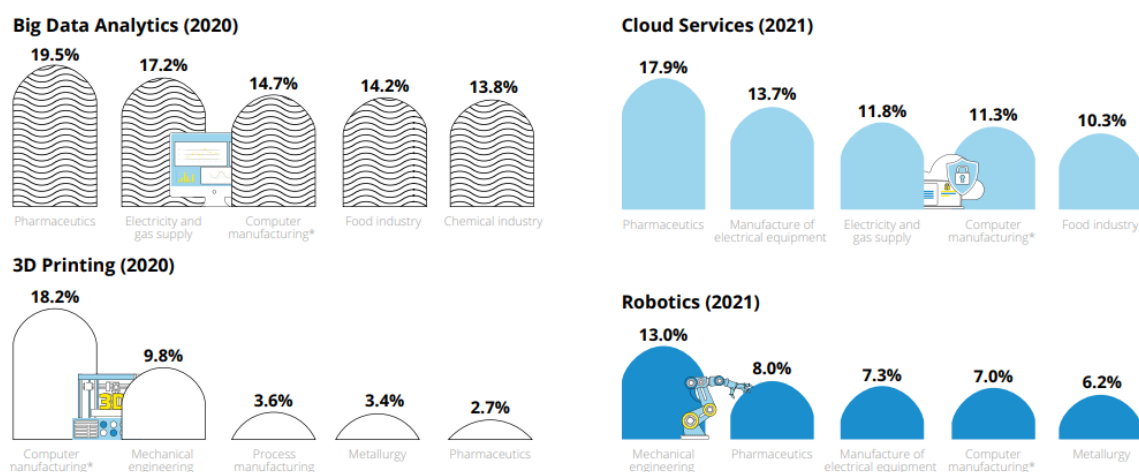
<sup>16</sup> As per the September 2023

<sup>17</sup> Scale inverted; monthly average rates as of March 2022

## 5.1 How Disruptive Technologies will Drive Ukraine's Recovery

With a reputation for being the birthplace and workplace for IT, scientific and innovation leaders, Ukraine has always been a hub for technology and innovation. Ukraine's modern technological advancements have their roots in the contributions of national pioneers. Ukraine saw significant technological advancements during the 19th century, but it was in the aftermath of both World Wars that the country experienced a substantial acceleration in progress. Before Russia's conflict, Ukraine's ICT industry achieved notable success, ranking with the world's leading IT service exporters. Rapid growth was achieved in the outsourcing, cybersecurity, AI, mobile apps, blockchain and e-government sectors. Across fields like banking, finance, agriculture, food production and energy, digital solutions saw wide adoption. Digital transformation holds great relevance for shaping a productive society, contributing to democratic participation, educational advancement and efficient public service provision. IT outsourcing firms in Ukraine have specialized in areas like cloud computing, artificial intelligence (AI) and big data. An increasing number of Ukrainian manufacturing firms are turning to technologies such as Big Data, 3D printing, cloud services and robotics. Leading the way in adopting these technologies are the pharmaceutical industry, mechanical engineering sector and machinery industry.

Figure 36: Share of manufacturing companies that used a particular disruptive technology - %

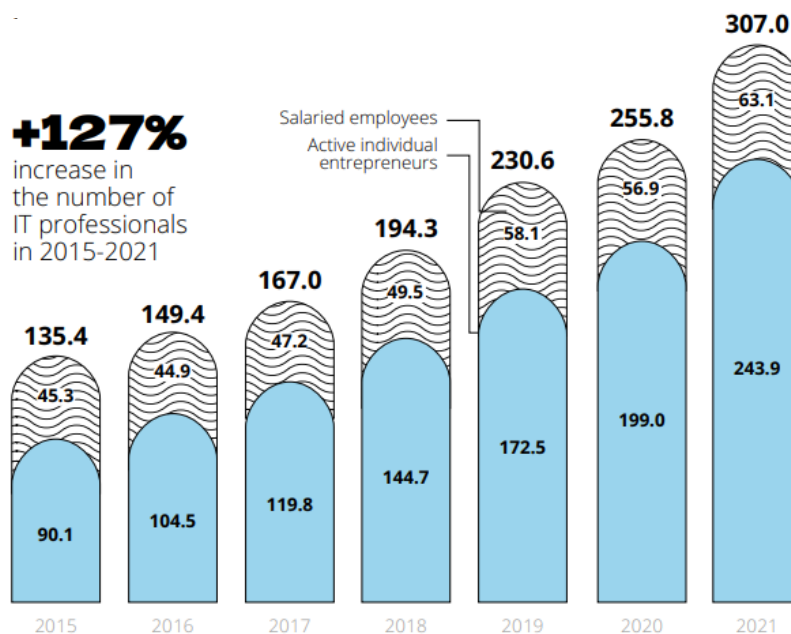


Source: State Statistics Service

In 2022, Ukraine secured the fourth spot globally in terms of the quantity of certified IT professionals. Since 2015, there has been a 127% increase in the number of IT professionals, primarily driven by the rising number of active individual entrepreneurs

(FOP). Capitalizing on the vitality of this sector, the Ukrainian government initiated the digitalization of certain governmental processes and services.

Figure 37: Number of IT talents in Ukraine – thousand people



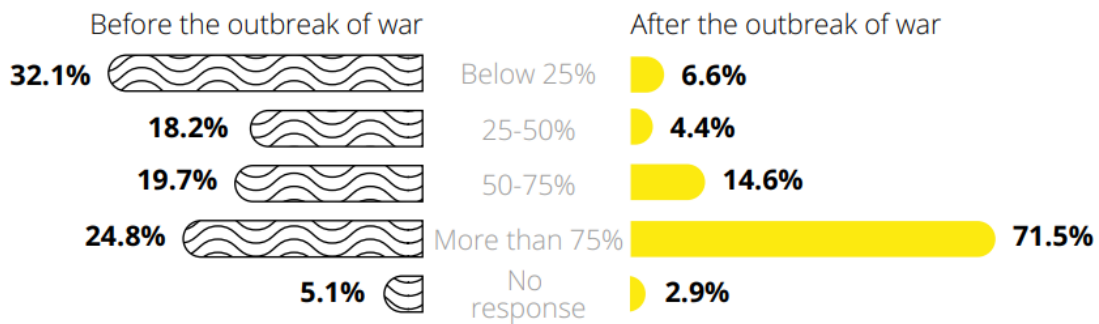
Source: State Statistics Service, Ministry of Education and Science

The invasion by Russia has presented significant challenges to Ukraine's digital sector, including the destruction of digital infrastructure, cyberattacks and the dissemination of disinformation and misinformation. Despite these obstacles, the Ukrainian IT industry underwent rapid transformation during the conflict, with the majority of companies successfully devising and implementing effective crisis management plans to ensure business continuity. These plans enabled swift transitions to flexible work arrangements, the expansion of domestic and international office locations and the installation of backup power generators in office facilities. Furthermore, companies adapted their infrastructure by migrating critical systems to the Cloud and diversifying their internet service providers by incorporating global satellite systems like Starlink, enabling tech specialists to operate continuously despite outages.. Additionally, IT professionals played an active role in supporting government and military endeavours, contributing to the emergence of a robust volunteer movement within Ukraine's tech community, known as the IT Army of Ukraine. The IT Army of Ukraine as formed with the help of IT experts from both Ukraine and other countries, united in their efforts to counter Russian cyber aggression. Over 200K IT professionals have joined in this army and they have

successfully targeted and disrupted over 14K Russian online resources. Employing a range of tools, the IT army disrupts Russian activities across various sectors, including government institutions, public services, manufacturing, infrastructure, banking, telecommunications and military operations (by spreading misinformation, hindering communication and obstructing military resupply efforts). Notably, 74% of IT companies have had at least one specialist join the Armed Forces and 95% have made contributions to support the IT army's mission.

However, a substantial number of IT professionals are moving to countries such as Poland and Germany in search of more secure job prospects. 64% of IT professionals were forced to relocate. However, 24% have already returned to their places of residence following the full-scale invasion. The approach to work has evolved significantly, with 71.5% of companies having over 75% of their employees working remotely since the onset of the full-scale war.

Figure 38: IT professionals who have switched to remote work



Source: survey by IT Ukraine Association and Top Lead

Despite these difficulties, the industry has displayed resilience and adjusted to the conditions of wartime.

Reconstructing Ukraine after the war will require a global financial commitment. The European Union (EU) has already played a significant role in bolstering the country's ongoing resilience. However, additional support will be essential in the medium to long term. This support aims to rebuild the foundations of a free and prosperous nation that aligns with European values and seamlessly integrates into the European and global economies while advancing its European aspirations. Since the commencement of Russia's aggressive war, the EU, its member states and European financial institutions, have cooperatively allocated approximately €53 billion in financial, humanitarian,

emergency, budgetary and military assistance. Out of this, €37.8 billion is designated to reinforce Ukraine's overall economic, social and financial resilience, which includes an extraordinary financial aid package of up to €18 billion slated for 2023. Moreover, approximately €15 billion in military aid has been made accessible through the European Peace Facility and directly from member states.

Figure 39: Team Europe financial, humanitarian and military support for Ukraine



Source: European Commission

As an immediate priority during the ongoing conflict, Ukraine must concentrate on ensuring that both businesses and citizens have access to the Internet, while also modernizing its communication and public service infrastructure. The adoption of teleworking software and practices is of utmost importance in this regard, as it can boost productivity for businesses and build the way for new digital business models to emerge. However, achieving this objective necessitates complementary investments in the skills of the workforce and improvements in managerial practices, with potential government assistance. Investments in digital technologies will have far-reaching positive effects throughout the entire reconstruction process, enhancing efficiency and reducing costs across various sectors. Digital transformation in Ukraine encompasses all aspects of the economy, allowing Ukrainians to conduct business from anywhere. Telecommunications systems will be among the first to be reinstated as Ukraine regains control of territories and the IT industry will play a crucial role in modernizing specific regions. When the digital sector receives funding, it will have a ripple effect on other sectors, enhancing their resilience. Ukraine is actively promoting cooperation in digital transformation and is prepared to share its expertise and solutions with the global community.



Ukraine should also place a strong focus on further strengthening its omni-channel approach and bolstering the resilience of the government as a platform ecosystem. This approach aims to ensure that citizens, including those displaced abroad, can access public services effectively. Omni-channel strategies are vital for guaranteeing that services can be accessed through various channels at any time. Nevertheless, efforts should also be made to provide face-to-face assistance to individuals who may otherwise face digital exclusion. This comprehensive approach heavily relies on establishing models that function as platforms, ensuring access to essential resources and tools crucial during times of crisis. Digitizing customs processes can automate clearance procedures, bolster risk management and validate processes for border control agencies and customs officials.

Also small and medium-sized enterprises (SMEs) will have an important role in Ukraine's economic recovery, contributing not only to economic expansion but also to the generation of employment opportunities. To expedite and optimize this process, Ukrainian SMEs need to embrace digital technologies effectively. The primary strategies for aiding SMEs will involve assisting them in establishing an online presence, expanding their digital footprint and reaching broader audiences through digital platforms. Several support initiatives of this nature are already in place, including tech companies that provide SME owners with fundamental skills for establishing an online presence.









In order to encourage the return of highly skilled R&D professionals from overseas, the "Diia city tax" scheme has been recently introduced. This scheme ensures significantly reduced payroll taxes and social contributions and aims to support talent. It may be worth exploring whether additional measures can further incentivize the return of these skilled individuals, such as the possibility of implementing preferential visa arrangements for high-skilled workers in strategic industries. Additionally, providing specific subsidies for high-quality training programs could assist firms in adopting emerging technologies like Artificial Intelligence, Machine Learning and Blockchain, particularly for small and medium-sized enterprises (SMEs)..

The guiding principle of Ukraine's national recovery plan, approved by the National Recovery Council in June 2022, will be the "build back better" approach. For both the European Union (EU) and the international donor community, it is crucial to ensure that

the recovery process is carried out in an environmentally friendly, digitally advanced and inclusive manner. On June 15, 2023, the European Parliament emphasized that the restoration of damaged infrastructure and industrial capacity should align with the objectives of the European Green Deal. The goal is to promote a carbon-neutral and digitally driven economy while transforming Ukraine into a modern European welfare state and a competitive market economy. The Parliament also stressed that Ukraine's reconstruction and recovery efforts must firmly uphold principles such as social equity, inclusivity, gender equality, sustainability and environmental transformation. During the Ukraine Recovery Conference in London, President Zelenskyy positioned Ukraine as a future major supplier of green energy and green hydrogen to Europe. He highlighted that the shift towards green energy would naturally boost the development of sectors like environmentally friendly metallurgy and sustainable fertilizers. Furthermore, Ukraine possesses significant reserves of critical raw materials essential for the modern economy, such as lithium.

In response to the crisis, Ukraine's National Recovery Council is actively crafting a digitalization action plan, with a particular emphasis on enhancing infrastructure, public services and the digital economy. Ukraine's Vision for Recovery includes the concept of: "A Robust European Ukraine Attracts Global Investment." The focus of Ukraine's recovery efforts is to expedite sustainable economic expansion. The strategy outlines a set of national initiatives designed to attain pivotal outcomes.

Figure 40: Expected Results of Ukraine Recovery Plan

2023-2025		2026-2032	
 Number of projects	580	 Number of projects	270
 Funding	>350 bn USD	 Funding	>400 bn USD
 Economic Complexity Index	TOP-40 countries	 Economic Complexity Index	TOP-25 countries
 Human Capital Index	TOP-40 countries	 Human Capital Index	TOP-25 countries

Source: Ukraine's Government

## **5.2 Embracing Change: Unveiling the Latest Trends in Reshoring, Nearshoring and “Friend-shoring” and the Shared Economy**

In an era marked by geopolitical tensions, economic uncertainties and the ever-present possibility of unforeseen disruptions, businesses across the globe find themselves at a critical juncture. The complex interplay of wars, political difficulties and rapidly changing trade landscapes has compelled enterprises to rethink their strategies and adapt to the challenges of a world in constant flux. Global trade relations, economic dynamics and business strategies can all be impacted by wars and political conflicts. Supply chain disruptions are among the first noticeable results of fighting on an international scale. Logistical issues, transportation snags and destroyed critical infrastructure are typical problems faced by regions embroiled in conflict. The flow of goods and services is disrupted, resulting in delayed shipments and higher costs for companies dependent on these networks. Political troubles lead to the application of economic penalties. Sanctions were levied on Russia by Western countries in reaction to its acts in Crimea and Eastern Ukraine. Restrictions on trade and finance create economic tension between both parties. A tangled mix of laws and limits confront business owners in the areas affected. Since many battles happen in areas that have abundant amounts of energy reserves, including the Middle East or Eastern Europe, energy security becomes even more crucial. Today, we see how political instability in certain regions affects oil/gas prices by causing fluctuations. Price changes affect commerce because energy plays a vital role in how products move around and are made. Currency fluctuations are also a hallmark of politically turbulent times. Investors often shift their assets in response to geopolitical events, leading to currency depreciation or volatility. This, in turn, affects the cost of imports and exports, making it challenging for businesses to predict and manage their international trade operations.

In response to these challenges, businesses have developed strategies to safeguard their operations and adapt to the changing landscape. Amidst this backdrop, the concepts of reshoring, Nearshoring and the shared economy have emerged as pivotal responses to the tumultuous currents of global trade. These strategies not only reflect the evolving dynamics of international commerce but also embody the innovative resilience that defines modern business practices. From reshoring, which entails the return of manufacturing and production operations to home countries, to Nearshoring, a strategic relocation to nearby regions with more political stability and finally, to the shared

economy, a paradigm shift in resource utilization and consumption – each represents a distinct avenue through which businesses are navigating the intricate maze of today's trade environment.

### *5.2.1 Reshoring*

The term "reshoring" has gained prominence as a strategy employed by companies to reestablish their manufacturing and production operations within their home country. This stands in stark contrast to the more familiar practice of "Offshoring", where companies seek cost advantages by moving production to lower-wage countries. The motivations driving reshoring go beyond the conventional considerations of cost reduction. While Offshoring has long been a hallmark of globalization, reshoring is driven by a different set of imperatives.

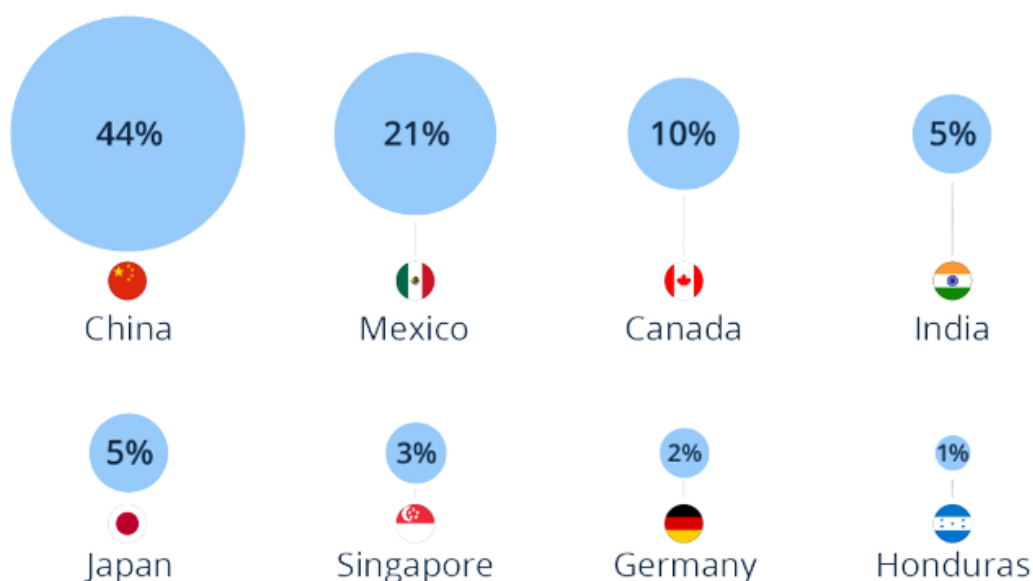
One of the foremost motivations for reshoring is to reduce dependency on distant and potentially unstable regions. Companies have come to recognize that offshore manufacturing, while economically attractive, can expose them to a range of risks. These risks include disruptions in global supply chains due to geopolitical conflicts, political uncertainties and logistical complexities inherent in long-distance operations. Another compelling reason for reshoring is the desire to maintain high standards of quality and consistency. When production is closer to home, companies can exercise greater control over the manufacturing process. They can ensure that products meet stringent quality and safety standards more consistently, reducing the risk of defects or regulatory issues that can arise when production is scattered across the globe. Reshoring often means tapping into a skilled and knowledgeable domestic workforce and, for industries that require specialized expertise, this can be a compelling advantage. Access to a pool of skilled labour can enhance innovation, product development and process improvement. The global COVID-19 pandemic served as a stark reminder of the vulnerabilities in global supply chains. It prompted many companies to reassess their strategies, with reshoring emerging as an attractive option for those seeking to mitigate the risks associated with supply chain disruptions. Having manufacturing operations nearby can facilitate a more agile response to unexpected challenges.

However, it's important to acknowledge that reshoring is not without its challenges. While reshoring is often motivated by factors such as the desire for greater control, improved quality or reduced supply chain risks, it is not always a guaranteed cost-saving

strategy. The main related challenge of reshoring is labour expenses. Many companies initially offshored their production to countries with lower labour costs. Returning production to a higher-cost home country can result in increased wages and related labour expenses. This can be a significant cost burden, especially in industries with labour-intensive manufacturing processes. Additionally, the cost of complying with local regulations and standards in the home country can be higher than in offshore locations with less stringent requirements. This can include environmental regulations, safety standards and labour laws. Furthermore, the process of transitioning from offshore to reshored production can be disruptive and costly. This includes moving equipment, retraining or hiring a local workforce and adapting to new logistics and supply chain arrangements. These transitional costs can impact a company's budget and require careful financial planning. Companies must carefully evaluate factors such as the cost of labour, regulatory compliance and the availability of infrastructure when making the decision to reshore.

Based on calculations provided by the Reshoring Initiative, it is estimated that the United States has seen the return of hundreds of thousands of manufacturing jobs in the past ten years, with China being the leading source country. As showed in the chart below, China, Mexico and Canada contributed to approximately 75% of the jobs that were brought back to the United States between 2010 and 2021.

Figure 41: Estimated share of Reshored US manufacturing jobs between 2010 and 2021



Source: Statista – Reshoring Initiative

There are many Italian companies which have initiated reshoring policies. These firms are mainly quality-centred businesses that needed to enhance the Made in Italy brand and position their products toward the high-end. For all other companies involved in the phenomenon, the return home was dictated by economic factors. These include fluctuations in the cost of oil, slow ship transport incompatible with the speed of the market, the continuing need for replacement and, lastly, the fact that inevitably, even in Asia and Eastern Europe, wages have taken to rise and with them the cost of labour, in the face of low skills. Until the early 2020s, Italy was, perhaps because of the weight and prestige of the Made in Italy brand, the country in Europe that had the most companies returning. The vast majority of Italian companies had returned from Asia and Eastern Europe, while fashion and electronics-electronics were the sectors most affected by the phenomenon. With the coronavirus, the need for a rethinking of reshoring strategies has emerged forcefully.

As the global business landscape continues to evolve, reshoring is poised to remain a prominent strategy for companies aiming to enhance control, quality and resilience. It signifies a fundamental shift in how businesses view their supply chains, placing greater emphasis on adaptability and risk management in the face of disruptions and uncertainties. Reshoring is not only a response to current challenges but also a strategy that is likely to shape the future of global manufacturing and trade.

### 5.2.2 *Nearshoring and “Friend-shoring”*

Nearshoring is a business strategy in which a company relocates its production, manufacturing or service operations to countries or regions that are geographically close to its home country. The primary objective of Nearshoring is to take advantage of cost efficiencies while maintaining geographic proximity, which offers advantages such as shorter supply chains, reduced transportation costs and improved coordination. Nearshoring is often chosen over Offshoring when businesses seek to balance cost savings with the benefits of geographic proximity to their core markets. Companies that have their production facilities scattered worldwide could find advantages in regionalizing their supply chains. The establishment of new factories in various geographic locations can also stimulate additional investments. Clients are increasingly prioritizing suppliers known for their flexibility, typically multinational corporations

with production centres in different regions, supported by commercial and managerial teams present in each market.

Nearshoring offers the advantage of geographic proximity to core markets. This means that companies can reduce transportation costs and logistics complexities by operating closer to their customers. This proximity not only helps in streamlining supply chains but also allows for quicker response times to market demands and changes, contributing to enhanced customer satisfaction. Additionally, Nearshoring often provides companies with access to a skilled and educated workforce. Many Nearshoring destinations boast strong educational systems and a well-trained labour force. This talent pool is invaluable, particularly for industries requiring specialized skills or knowledge. Access to skilled labour can drive innovation, research and development and improved product quality. Furthermore, Nearshoring can help businesses navigate regulatory and compliance issues more effectively. Proximity to home markets means a better understanding of local regulations, which can simplify compliance and reduce the risk of regulatory challenges. This can be particularly beneficial for industries with stringent regulatory requirements.

A potential downside of Nearshoring is that it doesn't always guarantee cost savings. Nearshoring aims to strike a balance between the benefits of geographic proximity to key markets and cost efficiency. However, several factors can contribute to cost escalation. For example, labour costs in Nearshoring destinations may not always be lower than offshore locations. While proximity can reduce transportation expenses, the savings achieved may be offset by comparatively higher wages and operational costs in the chosen Nearshoring country. Infrastructure challenges can also pose problems in some Nearshoring locations. Inadequate transportation networks, limited access to utilities or poor connectivity can hinder operational efficiency and necessitate unforeseen expenditures to address these deficiencies.

The trend of Nearshoring is still in its early stages but it is expected to remain relevant not only in the short term but also over the coming decades. This is because the process of reshaping supply chains is a time-consuming one that gradually impacts capital flows. Nearshoring is likely to benefit emerging sectors like healthcare, green energy, hardware and batteries as time goes on. As production bases become established in the regions, it is anticipated that this will lead to higher local incomes. This, in turn, could have

positive ripple effects on economies, impacting not only lending practices but also domestic consumption and the tourism sector.

The term "Friend-shoring" is used informally or within specific organizational contexts to describe a practice where a company relocates its production, manufacturing or service operations to countries or regions which are trusted and with which there is an existing "friendly" relationship. Such collaboration might be based on personal or professional relationships and is akin to forming strategic partnerships. However, "Friend-shoring" does not have a standardized or universally accepted definition or practice associated with it. Friend-shoring is based on a collaborative partnership model that includes countries sharing similar values to the United States concerning open markets and simultaneously upholding labour and environmental standards. The recent move by Europe to terminate economic relations with Russia has accelerated this process. It raises the possibility of a new trade block forming, comprising democratic nations that are striving for both economic cooperation and regulatory alignment.

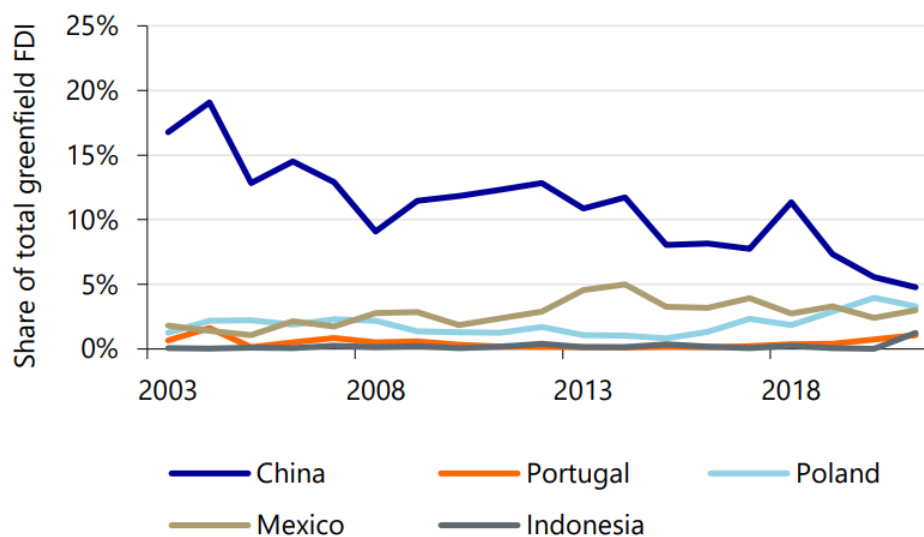
Evaluating the profitability of Friend-shoring requires a significant strategic shift that may entail a comprehensive overhaul of existing supply chain networks. This transformation will inevitably demand a substantial investment of both time and finances. More specifically, this shift would involve moving away from the straightforward concept of Offshoring and instead adopting a flexible combination of Nearshoring, Reshoring and Friend-shoring. Depending on the availability of production resources and locations, this hybrid approach would lead to a modular reconfiguration of different segments within the supply chain. To achieve this, it is crucial to assess the specific conditions at each stage of the supply chain from both a strategic and operational standpoint. This endeavour can only be successful through close collaboration between governments and corporations. The ultimate goal of establishing secure supply chains for critical goods and services would lead to a geopolitical restructuring of the world, creating distinct "North-North" and "South-South" supply chains. However, given the global distribution of resources, there are doubts about the viability of such a model.

The idea of embracing Friend-shoring brings supply chains into the realm of geopolitical competition and the global division between free-market democracies and those aligned with the authoritarian governments of China and Russia. A key driving force behind the



concept of Friend-shoring is the aspiration to attain more autonomy from suppliers who possess autocratic tendencies and pose risks of political manipulation and economic pressure. The United States aims to diminish its reliance on authoritarian regimes, particularly China, for essential goods such as rare earths, electronics including semiconductors and other products with military applications. In order to achieve this objective, it is actively pursuing stronger partnerships with South Korea and Japan. In a similar vein, Europe is exploring strategies to disentangle itself from Russian providers of critical resources, notably in the areas of energy, grain and fertilizers. Data indicate a significant decline in China's portion of total new foreign investment, dropping from approximately 14% to a mere 5%. Simultaneously, the United States is witnessing an increase in imports from Vietnam and India when compared to imports from China.

Figure 42: China is losing attractiveness



Source: UNCTAD

However, it becomes problematic if all Western nations seeking reliable sources simultaneously turn their attention to countries in the Indo-Pacific region like Indonesia, Malaysia, Vietnam or within Europe's vicinity, including Bulgaria, Romania and Mediterranean nations. Simply relocating factories, jobs and investments *en masse* to these regions may not be a particularly promising strategy. While it would offer some level of geographic diversification in global supply chains, it may not inherently enhance their resilience to external disruptions. Many of the transportation routes would still be quite similar, vulnerable to significant disruptions from various events, such as tropical

storms, political blockades or congestion in vital passages like the Suez Canal. Additionally, this approach wouldn't entirely eliminate political risk factors affecting these newly diversified partners in Southeast Asia, nor would it address concerns related to China's regional dominance. Furthermore, a classification of particular states as "trustworthy" may not remain constant over time.

It is reasonable to expect that the principles of Friend-shoring and supply security will foster closer ties between regions and lead to a restructuring of logistical and operational hubs. As supply chains undergo this transformation, there is likely to be a resurgence in global competition for factors such as cost-effective labour, suitable production and transportation infrastructure and tax incentives. The more supply chains are influenced by geopolitical competition, the less their economic determinants will hold sway.

### *5.2.3 The Shared Economy*

The shared economy, often referred to as the sharing economy or collaborative consumption, represents a fundamental shift in how people access and utilize goods and services. At its core, this economic model challenges the traditional notion of ownership by promoting the idea of access over possession. Instead of buying and owning assets outright, individuals and businesses are increasingly turning to digital platforms and technology to share what they have with others. At the heart of the shared economy are online platforms and mobile applications that act as intermediaries, connecting providers of goods or services with consumers in need of them. These platforms facilitate peer-to-peer transactions, making it remarkably easy for people to share physical assets like cars, homes, bicycles, tools and even parking spaces. They also enable the sharing of services such as ridesharing, freelance work and accommodation rentals. What's intriguing about the shared economy is its potential to transform various aspects of daily life. For instance, ride-sharing services like Uber and Lyft have revolutionized urban transportation by allowing individuals to use their private vehicles to offer rides to others. Similarly, platforms like Airbnb have turned spare rooms or entire homes into income-generating opportunities for homeowners. This approach not only brings in additional income but also encourages more efficient use of resources, reducing waste and environmental impact. Moreover, the shared economy is seen as a driver of sustainability. By promoting the sharing of resources, it can help reduce overconsumption and minimize the environmental footprint associated with producing

and disposing of goods. For example, car-sharing services can reduce the number of vehicles on the road, which in turn can decrease emissions and alleviate traffic congestion in urban areas.

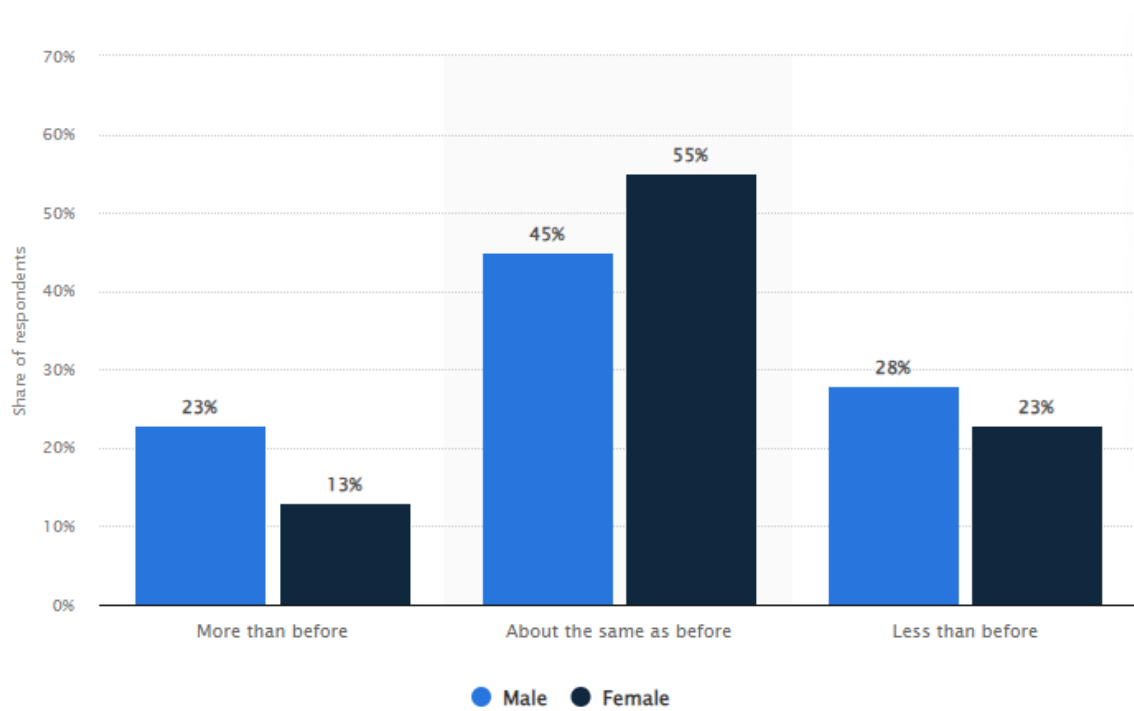
However, the shared economy is not without its challenges. Many shared economy services operate in sectors traditionally governed by regulations designed for established industries. This creates a regulatory grey area where platforms must navigate evolving rules and regulations. This uncertainty can lead to legal disputes, clashes with local authorities and the need for platforms to adapt quickly to changing legal requirements. Trust and reputation are central to the shared economy's functioning. Users rely heavily on reviews and ratings to make informed decisions. However, the authenticity of these reviews and the reliability of ratings can be compromised, leading to questions about the integrity of the platform. Moreover, in certain markets, oversaturation of shared economy providers can lead to intense competition. This competition can drive down prices and income for providers, making it challenging for participants to sustain viable livelihoods. Striking a balance between supply and demand is an ongoing challenge in such scenarios. Striking a balance between innovation and regulation is an ongoing debate in many regions.

The shared economy found itself at an intersection of significant global event: the COVID-19 pandemic. The emergence of COVID-19 brought about a profound shift in consumer behaviour. People were suddenly faced with lockdowns, travel restrictions and health concerns, which had a direct impact on the demand for shared economy services. Platforms offering ridesharing and accommodation-sharing services, like Uber and Airbnb, experienced a dramatic decline in users as individuals became less inclined to share spaces or engage in close physical contact. In response to these challenges, the shared economy demonstrated its adaptability. Some platforms diversified their services to cater to changing needs. For example, ride-sharing companies pivoted to offer food delivery services, recognizing the surging demand for contactless meal delivery. This diversification allowed them to tap into new markets, demonstrating how agility is a key trait of the shared economy.

The shared economy's response to the COVID-19 pandemic highlighted its adaptability and responsiveness to changing circumstances. This event has collectively reshaped how businesses and consumers interact with the shared economy and the world at large. In an

April 2020 survey conducted by Statista, it was found that 28% of male respondents expressed a significantly reduced likelihood of utilizing sharing economy services. This is primarily attributed to the substantial impact of the pandemic on sharing economy services, with social distancing measures having significantly diminished people's inclination to engage in such activities in the post-pandemic period.

Figure 43: Usage of sharing economy services after the containment of COVID-19 in the U.S. in 2020, by gender



Source: Statista

## CONCLUSIONS

The journey through these chapters underscores the imperative nature of digital technologies in shaping the contemporary business landscape. As we stand at the core of digital innovation and global trade, it is evident that embracing these changes and adapting to emerging trends will be pivotal for businesses and economies worldwide. In the ever-evolving field of international commerce, the fusion of digital innovations and strategic insights will be the compass guiding companies toward a more competitive and sustainable future.

Export management is a complex and intricate process that entails planning, organizing, directing and controlling an organization's exports. The process is often time-consuming and requires a significant amount of resources, including personnel, finance and technology and requires specific skills and careful planning to achieve business objectives. However, in recent years, digital technologies have become a critical element for the success of export management, as they allow companies to improve the efficiency of operations, reach new potential customers worldwide and make decisions based on the most accurate and up-to-date data. Moreover, they help providing companies with the tools they need to streamline their operations, gain new customers and remain competitive in an increasingly global marketplace. The adoption of digital technologies in export management requires long-term strategic planning, taking into account the specific needs of the company and its export objectives. Digital technologies can be used at every stage of the export process, from the research of markets and commercial partners and the analysis of market demand to logistics and post-sales service management. By leveraging data and advanced analytics tools, businesses can evaluate market patterns and create precise strategies tailored to specific geographic areas. Additionally, digital technologies enable the establishment and nurturing of international business relationships.

Online communication platforms and collaboration tools facilitate the swift and efficient sharing of information and data within companies, ensuring the seamless continuation of business operations. Furthermore, e-commerce platforms contribute to streamlining the ordering and payment procedures, minimizing obstacles and enhancing the ease of collaboration among business partners. In essence, digital technologies play a pivotal role in conducting market research and identifying potential business associates. For

instance, international e-commerce platforms enable companies to directly sell their products to a global consumer base, eliminating numerous costs and obstacles often associated with conventional distribution methods. Through the utilization of e-commerce platforms and various digital tools, customers can readily access product and service information and conduct online transactions with greater ease.

Furthermore, digital technologies can aid in the delivery of post-sales services, encompassing customer support and service, thereby streamlining processes and enhancing overall customer satisfaction. This extends to enhancements in the management of logistics and supply chains: by employing real-time tracking and monitoring tools, companies can oversee shipments, monitor inventory levels and optimize delivery routes, thereby mitigating delays and reducing costs. Additionally, digital technologies can optimize warehouse management by enhancing inventory tracking, optimization and automation.

Despite the advantages, there are numerous challenges associated with integrating digital technologies into the export management process. Specifically, many organizations face limitations in their IT infrastructure, making it challenging to embrace new technologies or undertake comprehensive digital transformation initiatives. Additionally, a significant skills gap exists within many organizations, with numerous employees lacking the necessary knowledge and experience to effectively utilize new digital tools. However, it is crucial to meticulously strategize the implementation of these techniques, requiring a deep understanding of the target market and the available technologies. Only through such careful planning, organizations can fully harness their investments and emerge as leaders in their respective sectors.

The digital revolution is reshaping the competitive landscape of industries around the world. The adoption of digital technologies has become a critical driver of competitiveness across various industries. Small and medium-sized enterprises, once seen as constrained by resource limitations, have now emerged as formidable contenders in the global marketplace, thanks to their strategic embrace of digital tools. These technologies have democratized the competitive landscape, levelling the playing field for businesses of all sizes. As evidenced by the success story of Savino Solution SpA, even traditional industries can reinvent themselves, thriving in the digital age by embracing innovation and staying attuned to market dynamics.

The digitalization of trade processes, from order placement to payment settlement, has not only expedited transactions but also significantly diminished the costs associated with international trade. Through streamlined and automated procedures, digital trade has ushered in an era of unprecedented efficiency, enabling companies to allocate resources more effectively and invest in further innovation and growth. The recognition of the distinction between physical and digital goods, illuminates the evolving nature of trade. Physical goods, while still vital, are now complemented and even eclipsed by the rise of digitizable goods. This shift challenges traditional notions of international trade and underscores the importance of adapting to the changing nature of goods in the digital age. As companies pivot towards providing services as a core component of their business models, digital technologies have played a fundamental role in this transformation. The expansion of services, made possible through digital platforms, has redefined the boundaries of what can be traded across borders. Service-oriented businesses can now reach a global audience with ease, expanding their market reach and tapping into previously untapped opportunities. This transition, often characterized by enhanced customer engagement and personalization, is a testament to the evolving dynamics of the global marketplace.

The COVID-19 pandemic has played a huge role in expediting the digital trade revolution. The global crisis acted as a catalyst, compelling businesses worldwide to adapt rapidly to a dynamically shifting environment. Lockdowns, travel restrictions and disruptions to traditional supply chains forced companies to seek digital solutions to maintain business continuity. Digital trade mechanisms, such as online marketplaces and digital payment systems, emerged as lifelines for businesses and consumers alike, ensuring the uninterrupted flow of goods and services. The crisis expedited the adoption of digital technologies, from e-commerce platforms to remote work solutions, enabling companies to pivot swiftly in response to changing consumer behaviours. Moreover, the pandemic underscored the critical importance of digital trade in maintaining economic resilience. Businesses that had already embraced digitalization found themselves better positioned. They could continue to engage with customers, manage supply chains and conduct transactions in a remote and contactless manner. The pandemic propelled digital trade into new sectors and industries, breaking down traditional barriers. Sectors that were previously less reliant on digital technologies were compelled to innovate rapidly. Healthcare, education and even traditional manufacturing sectors are an example of this

trend. It is evident that the COVID-19 pandemic has reshaped the narrative of global commerce. It has highlighted the indispensable role of digital technologies in ensuring business continuity and resilience. It has also illuminated the potential for digital trade to bridge gaps in a world where physical distance and disruption can no longer be ignored.

Also the war in Ukraine has been a big catalyst for change, not only for the country itself but also for the wider global economy. It has disrupted traditional supply chains, raised questions about energy security and compelled businesses to reevaluate their global strategies. Technologies will drive Ukraine's recovery and innovation and adaptability are key to the nation's economic resilience. Ukraine, like many nations, has recognized that its path to recovery lies in harnessing the power of digital technologies, automation and innovation. These disruptive technologies not only hold the potential to diversify its economy but also to reposition Ukraine as a competitive player on the global stage. The nation's journey toward recovery serves as a testament to the transformative impact of technological innovation in even the most challenging of circumstances. New global trends are emerging and, the powerful interplay between disruptive technologies, geopolitical events and economic strategies, will have huge impacts on our way to do business. Adaptability and innovation are key in response to complex problems. The lessons the World can learn from Ukraine's recovery and the recent trends, serve as a compass, guiding businesses and nations toward strategies that promote resilience, sustainability and competitiveness in an ever-changing world.



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