

TOWARDS A DIGITAL ECONOMY IN THE EUROPEAN UNION: THE DIGITAL
TRANSFORMATION IN SWEDEN OVER THE PAST DECADE

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Abstract

This dissertation examines Sweden's digital transformation during the period 2013-2023, contextualising it within the broader European Union (EU) path toward a digital economy. During this period, the EU has enacted ambitious strategies, for instance the Digital Single Market and the Digital Compass 2030, aimed at fostering competitiveness, innovation, and inclusivity. Sweden has consistently ranked among Europe's digital frontrunners, partly as a result of its advanced infrastructure, innovation ecosystem, and digital literacy. The study addresses two research questions: (1) How has the ICT sector evolved in Sweden over the period 2013-2023, and what were the key factors behind this transformation? and (2) What are the key drivers and barriers in Sweden in adopting digital technologies, and how do these compare to those in other European countries?

The research undertook a mixed-method approach using both qualitative and quantitative analysis. Also, it draws comparison with Denmark and the Netherlands to highlight both similarities and differences in their digital transformation trajectories. This study finds that Sweden's progress has been shaped by decentralised governance, strong public-private collaboration, and proactive digital policies, while challenges remain in addressing regional disparities, inclusivity gaps, and emerging technologies readiness. Moreover, the findings show that while these countries adopted distinct approaches, they nonetheless share common drivers and face comparable barriers to digital adoption. The study contributes to understanding how national contexts shape digital transformation and offers insights for EU digital policy and governance.

Dedicated to my four daughters

Charmelle, Christina, Charlotte, and Caitlyn

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Abbreviations

AI – Artificial Intelligence

AWS – Amazon Web Services

BEREC – Body of European Regulators for Electronic Communications

CEF – Connecting Europe Facility

DESI – Digital Economy and Society Index

EIF – European Investment Fund

EU – European Union

GDP – Gross Domestic Product

ICT – Information and Communication Technology

ITU – International Telecommunication Union

IUC – Industrial Development Centres in Sweden

MIS – Management Information Systems

NGA – Next Generation Access (networks)

OECD – Organisation for Economic Co-operation and Development

PTS – Post and Telecom Authority (Sweden)

QCA – Qualitative Comparative Analysis

RIA – Information System Authority (Estonia)

R&D – Research and Development

SEK – Swedish Krona (currency)

SMEs – Small and Medium-sized Enterprises

SMP – Significant Market Power

UNECE – United Nations Economic Commission for Europe

1. Introduction

The twenty-first century has been characterised by rapid digitalisation, reshaping economic systems, organisational practices, and social interactions. Information and Communication Technology (ICT) has become a key driver of innovation and competitiveness, fundamentally altering market structures and governance processes (Kumar et al., 2021; Brynjolfsson & McAfee, 2014). Countries across the world are looking at how best to leverage these digital tools to drive digital development while managing the socioeconomic implications. This shift has been particularly the case the European Union (EU), where digitalisation has become central to the economic and policy strategies aimed at boosting competitiveness, promoting sustainable innovation, whilst ensuring social inclusion and cohesion across all member states.

Digital transformation long has been considered as an important pillar of the EU's growth agenda. Furthermore, the launch of policies such as the Digital Single Market (2015) and the Digital Compass 2030 are coherent with the EU's ambitious goals for universal connectivity, advanced digital skills, and the adoption of emerging technologies (European Commission, 2015). However, progress among member states is still uneven resulting due to differences in infrastructure, governance models, and even societal readiness (Heyman et al., 2021).

Sweden has consistently over the years ranked as one of the EU's digital frontrunners, due to its infrastructure, innovation ecosystem, and levels of digital literacy (OECD, 2020b). Its approach, characterised by decentralised governance, robust public-private partnerships, and inclusive policy frameworks, makes it a particularly valuable case study. However, challenges persist, such as regional divides, inclusivity gaps, and emerging uncertainties due to artificial intelligence and cybersecurity (Fischl et al., 2020; Aboulkacim et al., 2025).

The aim of this research is to look into these changes by closely evaluating Sweden's digital transformation over the period 2013-2023. The selected period has had the implementation of significant EU and national digital strategies. Moreover, during this period significant contextual events such as the COVID-19 pandemic has accelerated digital adoption but also exposed gaps in digital preparedness. This research, by selecting Sweden as the primary case study, seeks to examine how a digitally advanced nation responds to evolving opportunities and challenges. Sweden's choice as a case study would present an investigation of its digital transformation not only because of its leading status but also because of the internal diversity and contradictions that characterize its digital landscape.

To be able to evaluate further, the study is centred around two central research questions. The first question in this research is: How has the ICT sector evolved in Sweden over the period 2013-2023, and what were the key factors behind this transformation? Furthermore, the second question is: What are the key drivers and barriers in Sweden in adopting digital technologies, and how do these compare to those in other European countries? These questions are anchored in an ambition to combine a detailed, context-rich account of Sweden's digital development with a broader comparative perspective. The analysis pays special attention to three dimensions of digital transformation identified in the literature: economic, organisational, and societal. By doing so, it not only maps digital progress but also questions the institutional, behavioural, and cultural mechanisms that enable or constrain it.

The methodology employed by this research is of a mixed methods approach reinforced by comparative elements. It draws on secondary data, such as policy documents, statistical databases (such as DESI and OECD indicators), academic research, and official reports from relevant institutions such as the European Commission, the OECD, Sweden's Agency for Digital Government (DIGG), and Vinnova (Swedish innovation agency).

The period under investigation witnessed a rapid digital adoption across all sectors, driven by necessity and opportunity alike. Hence, they offer a context in which to be able to analyse both structural changes and policy shifts. This period also allows the study to look into longitudinal patterns rather than just isolated events, providing a deeper understanding of how digital transformation unfolds over time.

While the aim of this study is not to generalise across all EU member states, it uses the comparative element to place Sweden's experience within a broader context. This involves examining similarities and discrepancies with other EU member states, as well as investigating on EU-wide patterns and priorities. The Swedish case study hence is not only the focal point for a detailed analysis but uses it as a platform for a broader evaluation on digital policy, governance, and innovation in the European Union.

The structure of this study is organised as follows. Chapter 2 details the literature review, by looking at the theoretical and empirical studies on digital transformation, including its economic, organisational, and societal aspects, with particular attention to ICT development in Sweden and EU digital strategies. Thereafter, Chapter 3 explains the methodology, by outlining the design, and detailing the approach used to investigate Sweden's digital transformation. Subsequently, Chapter 4 and Chapter 5 explain the findings on Sweden's digital transformation

between the period 2013 and 2023, while providing a comparative analysis with Denmark and the Netherlands. Finally, Chapter 6 concludes the study by summarising the key findings, discussing their policy implications.

Hence, by combining case-specific insights with comparative analysis, and by analysing policy evaluation with socio-technical dynamics, it provides an understanding of how digital change is shaped by, and in turn shapes, national contexts. The findings are intended to inform both scholarly debates and practical decision-making, offering guidance to policymakers, researchers, and stakeholders interested in fostering inclusive, effective, and future-ready digital societies.

2. Literature Review

2.1 Introduction

A new era of global development has emerged due to the development of advanced technologies. Social life and economic relationships are fundamentally changing and restructuring due to the large-scale use of digital and information communication solutions (Kumar et al., 2021).

It is hard to imagine life today in Western society without modern technology. The twentieth century has seen an increase in high-tech computers, mobile phones, text messaging, the Internet, and the World Wide Web (O'Regan, 2016). The software used now is so widespread that it has become an essential part of televisions, airplanes, automobiles, and mobile communications (O'Regan, 2016). The pace at which we are experiencing technology change has been remarkable.

The European Union (EU) has made digital transformation a central priority in its economic and political agenda, recognizing its critical role in boosting innovation, improving competitiveness, and addressing societal challenges. However, the pace by which digital transformation is happening within member states differs. Considerable differences also exist in the use of digital tools and technologies, between different industries as well as between firms within the same industry (Heyman et al., 2021).

The purpose of this research is to analyse Sweden's digital transformation in the past decade compared to the rest of the EU. This chapter will start with a discussion on the development of the Information and Communication Technology and how it has evolved. Digitalisation aims to transform how businesses, governments, and societies function; hence, will discuss the causes and effects of digital transformation. Thereafter, there will be a discussion on the Information and Communication Technology (ICT) sector development in Sweden and the Digital Transformation in the European Union.

2.2 Historical Development of Information and Communication Technology

Information and Communication Technology (ICT) has been a transformational player in economic development, driving productivity, innovation, and globalisation. The evolution of ICT has been crucial in altering the dynamics of markets, reducing information asymmetry, and enabling new business models that have driven competitive advantages across industries.

The earliest forms of ICT, going as far back as the telegraph (1830s) and the telephone (1876), revolutionised communication by reducing transaction costs and allowing for real-time information exchange. Economic theories, such as transaction cost economics, highlight the impact these technologies have in reducing information asymmetry and thereby enhancing market efficiency (Coase, 2012). The rapid diffusion of these technologies led to increased market integration and the rise of global trade networks, promoting industrialisation and economic expansion. The telegraph facilitated the emergence of financial markets by enabling quicker dissemination of stock prices and financial information, thereby influencing economic decision-making (Kavesh et al, 1978). Studies by Du Boff (1980) and Malone et al (1987) show how the telegraph revolutionised financial markets by allowing real-time price dissemination, while at the same time, the telephone further enhanced coordination efficiency in business transactions, reducing reliance on intermediaries and improving overall market efficiency.

The introduction of radio (1920s) and television (1930s) further extended ICT's economic role by creating mass media markets. These innovations facilitated consumer culture, advertising markets, and as a result created a shift toward information-based economies (Schumpeter, 2010). Mass communication did not just influence consumer behaviour but also played a significant role in influencing public opinion, political campaigns, and social movements, contributing to the broader economic landscape (Gentzkow and Shapiro, 2006). As a result of these advancements the advertising industry flourished, brought about mass consumerism and the proliferation of branded products, which had a central impact on economic growth and corporate revenues.

The arrival of computers, starting with mainframes (1940s) and personal computers (1970s), laid the foundation for modern ICT. Solow's productivity paradox had questioned why the rapid technological advancements in computing did not immediately result into quantifiable productivity growth (Triplett, 1999). Later research carried out by Brynjolfsson and Hitt (1996) showed that ICT-driven productivity gains were delayed due to the need for complementary investments in human capital and organizational change. The rise of automation and data processing during this era led to increased efficiency in industrial production, banking, and government services, providing the groundwork for the knowledge-based economy (David, 1990).

Furthermore, the widespread adoption of computers in business applications streamlined operations, reduced labour costs, and improved decision-making through data analysis. Oliner

and Sichel (2000) found that ICT was a major driver of labour productivity growth, particularly in the late 1990s, as businesses increasingly integrated digital tools. The finance industry saw significant efficiency improvements as computerized trading systems emerged, influencing global financial markets (Bresnahan and Trajtenberg, 1995).

The rise of the internet in the 1990s marked a turning point in ICT history. The value of digital networks increased as more users joined, that led to the dominance of firms like Microsoft, Google, and Amazon (Katz and Shapiro, 1985). The advancement of e-commerce, digital payments, and online marketplaces led to an extraordinary increase in cross-border trade and economic interdependence, powering the globalisation process and the integration of emerging markets (Goldfarb and Tucker, 2019).

Additionally, the Internet enabled the rise of service-orientated economies. Industries such as software development, online banking, and digital entertainment became key economic drivers. Internet-based platforms played a significant role in labour market transformations, such as the rise of remote work and the gig economy, necessitating policy responses addressing taxation, labour rights, and social security (Autor, 2015).

The rise of artificial intelligence, blockchain, and cloud computing is reshaping economic models. Theories of digital platforms explain how multi-sided markets, such as e-commerce and fintech, create new economic opportunities while at the same time, they raise concerns about market power and regulation (Rochet and Tirole, 2003). The increasing role of big data analytics, machine learning, and the Internet of Things (IoT) is expected to further fuel economic growth by improving supply chains, improving decision-making processes, and enhancing automation. However, concerns regarding cybersecurity, data privacy, and digital monopolies require careful economic and policy considerations (Zuboff, 2019).

The potential for decentralization using blockchain technology, mainly in financial systems and supply chain management, presents opportunities for reducing fraud and improving transparency (Nakamoto, 2008). Meanwhile, AI and automation raise questions about labour displacement and workforce reskilling, highlighting the need for adaptive education policies and social safety nets (Acemoglu and Restrepo, 2018).

From the telegraph to AI-driven economies, ICT has consistently influenced economic structures, driving efficiency, innovation, and globalization. Future research should be conducted on regulatory challenges, digital inequality, and the long-term economic impact of emerging ICT innovations. As economies become more and more digital, policies tackling

areas such as cybersecurity, data governance, and fair competition will play a fundamental role in determining the next phases of economic development.

2.3 Digital Transformation

Digital transformation has become a fundamental driver of economic growth and innovation, which as a result is reshaping industries and redefining business models. The adoption of digital technologies enhances operational efficiency, enables innovation, and fosters competitiveness. The digital economy, characterized by the integration of digital technologies across all sectors, is a key driver of economic growth.

2.3.1 Defining Digital Transformation

Several definitions exist which define the concept of Digital Transformation (DT). The term DT is mainly used by the private sector (Mergel, Edelmann and Haug, 2019). Peng and Tao (2022) argue that there is no definite meaning of DT within academic circles. On the other hand, Dethine, Enjolras, and Monticolo (2020, p. 20) attempt to provide a simplistic definition of DT, that is, *“as a key term to express organizational changes influenced by digital technologies.”* However, they still recognise that there is no clear definition that has been widely accepted.

Furthermore, Fitzgerald et al (2014) interpreted DT as the use of digital technology to achieve major business transformation. Moreover, Reis et al (2018) believe that significant business transformation results from the use and adaptation of new digital technologies leading to an effect in all aspects of users’ lives. Another definition is by Vial (2019, p. 118) who defines DT as *“a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies.”*

Building on the work of Vial (2019), Mikalef and Parmiggiani (2022) developed a conceptual framework to define the process for DT to happen as depicted in Figure 2.1. The framework is based on *“digital business strategy, organisational change management and IT capabilities”* and have identified four key areas for DT to occur which are:

1. Antecedents – these include elements that shape and trigger DT (Matt, Hess and Benlian, 2015). These could have either a direct relationship in forming the actions an organization must take to change their business strategies and operations or act as

intermediate conditions which influence the way DT is implemented (Mikalef and Parmiggiani, 2022)

2. Leveraging Digital Technologies – This process involves different levels of planning and implementing new solutions (Mikalef and Parmiggiani, 2022). This involves developing strategies to determine how this transformation will take place (Hess et al, 2016).
3. Value Generation – As different emerging technologies mature; they cause a shift in the forms and scale of value generation from DT. While before digital technologies were implemented to enhance tasks and processes, now they are creating opportunities for organizations which before were deemed impossible to achieve (Mikalef and Parmiggiani, 2022)
4. Performance – The degree to which DT results in concrete performance outcomes for organizations (Mikalef and Parmiggiani, 2022)

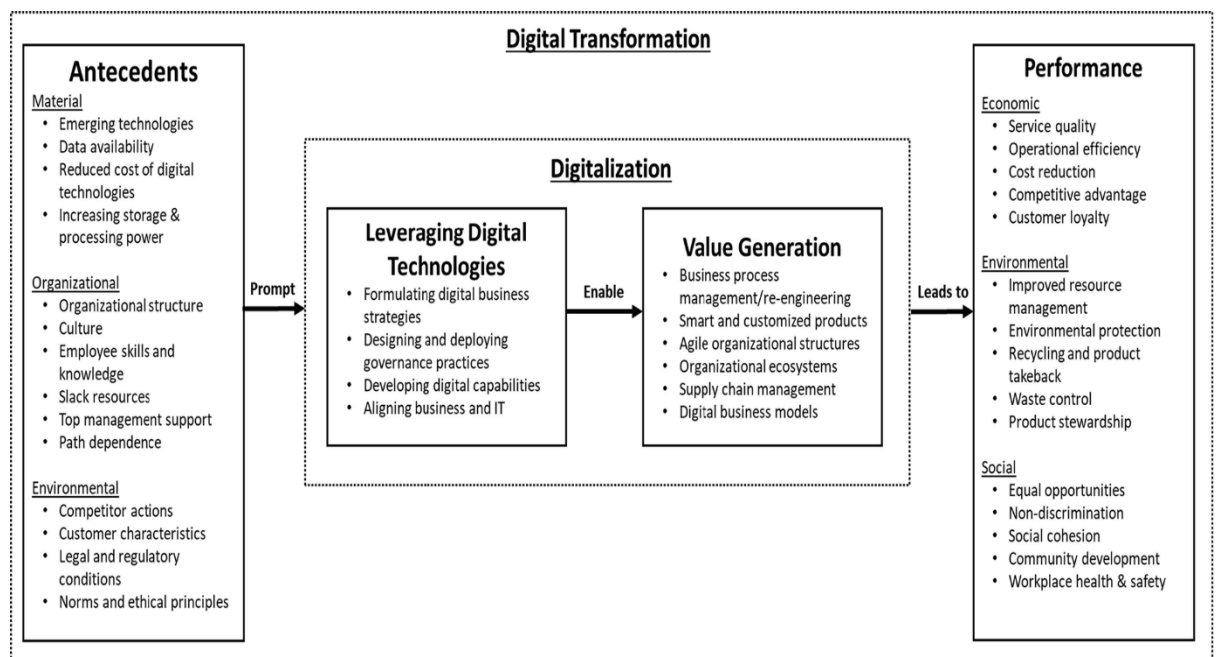


Figure 2.1: Digital Transformation Source: Mikalef and Parmiggiani (2022, p. 47)

The definition provided by Mikalef and Parmiggiani (2022) is the one used for this study as it provides a holistic meaning whereby DT is not just merely about technology adoption but formulates how businesses and economies operate in the digital era.

2.3.2 Aspects of Digital Transformation

The development of emerging technologies such as artificial intelligence, blockchain, cloud computing, and the Internet of Things (IoT) has resulted in a significant reduction in the cost

of digital adoption, whilst increasing data storage and processing power (Brynjolfsson and McAfee, 2014). The availability of large datasets enables businesses to use data analytics as leverage for strategic decision-making, whilst improving efficiency and competitiveness (Varian, 2018). Economic research shows that digital technologies reduce transaction costs, increase market efficiency, and facilitate global trade (Goldfarb and Tucker, 2019). Additionally, investment in digital infrastructure creates new economic opportunities whilst enhancing productivity across industries (Qiang et al., 2009).

2.3.2.1 Economic Aspects on Digital Transformation

Digitalization contributes to GDP growth by increasing efficiency, fostering entrepreneurship, and enabling new economic opportunities (Goldfarb and Tucker, 2019).

The increasingly adoption of digital business models contributes to economic growth by generating new revenue streams, optimizing supply chain processes, and reducing transaction costs (Amit et al., 2001). Digitalization allows organizations to take advantage of digital technologies, resulting into business model innovation and value generation. The conceptual framework presented by Mikalef and Parmiggiani (2022) states that leveraging digital technologies facilitates the development of new business strategies, improved governance, and enhanced digital capabilities. This process enables firms to increase their operational efficiency and competitiveness (Weill and Woerner, 2018).

An important component of the digitalization's economic effect is the shift towards platform-based business models. The rise of digital platforms such as Amazon, Alibaba, and Uber has significantly transformed traditional economic transactions by facilitating network effects and enabling multi-sided market interactions, hence reshaping competition and value creation in the digital economy (Parker et al., 2016).

Digitalization also plays a crucial role in reshaping financial markets. The rapid increase of financial technology (fintech) solutions has significantly enhanced accessibility to banking services, fostering greater financial inclusion in developing economies (Demirgüç-Kunt et al., 2018). The economic effect of digital transformation goes beyond traditional markets. It also influences emerging areas such as decentralized finance (DeFi), which challenges traditional banking and financial systems (Agrawal et al., 2019). Furthermore, digital financial services increase economic stability by improving access to credit, enabling faster cross-border transactions, and reducing inefficiencies within financial systems (Carbó-Valverde et al., 2020). The implementation of digital payment systems, blockchain technology, and

decentralized finance (DeFi) models has significantly reduced transaction costs and improved financial transparency.

Supply chain digitalization is another important economic effect of digital transformation. Businesses that integrate digital supply chain management solutions results in reduction in lead times, improvement in inventory management, whilst enhance resilience against market disruptions (Büyüközkan and Göçer, 2018). The adoption of blockchain technology in supply chains has improved traceability, reduced fraud, and increased efficiency in global trade (Treiblmaier, 2018). Furthermore, AI and IoT-enabled logistics systems to have enhanced demand forecasting, which minimized production waste and optimized resource allocation (Ivanov and Dolgui, 2020).

Digitalization has transformed labour markets by introducing automation, reshaping employment structures, and expanding the gig economy. Automation has improved efficiency but also displaced routine-based jobs (Acemoglu & Restrepo, 2018). Labor market transformations driven by digitalization have led to both opportunities and challenges. The gig economy, facilitated by digital platforms such as Upwork and Fiverr, has provided workers with flexible employment options but also raised concerns about job security, income inequality, and labour rights (Schwellnus et al., 2019). The need for workforce reskilling and education reform has become a policy priority to ensure economic resilience in an increasingly digitalized world (Bessen, 2019).

Digital transformation has led to automation in multiple industries, reducing reliance on manual labour and increasing output efficiency (Brynjolfsson and Hitt, 2000). The usage of artificial intelligence and machine learning in predictive analytics has enhanced decision-making processes, contributing to the competitive advantage in digital economies (Bresnahan and Trajtenberg, 1995). Furthermore, businesses adopting digital transformation benefit from enhanced scalability, which allows them to expand their market reach and penetrate international markets at lower costs (Kenney and Zysman, 2016).

The concept of an ecosystem has by time replaced that of industry to describe the emergence of groups of actors formed through the convergence of multiple industries. These groups rely on multilateral complementarities for their existence but operate without hierarchical control over their members (Malherbe and Simon, 2021). Digital platforms improve efficiency by reducing information asymmetry, facilitating smooth coordination among stakeholders, and driving innovation within interconnected digital ecosystems (Cusumano et al., 2019).

Economies with higher levels of digital adoption benefit from increased entrepreneurship, greater investment in innovation, and enhanced adaptability within labour markets (Zhu et al, 2014; Autor et al, 2015).

Digital transformation has great impact on economic structures and market dynamics. The rise of digital platforms disrupted traditional industries, created new business models while altered employment structures (Schwellnus et al., 2019). Digital transformation enhanced competitive advantage by permitting firms to optimize their operations and respond dynamically to market changes (Bharadwaj et al., 2013). However, concerns about digital monopolies and market concentration require policy interventions to safeguard fair competition (Rochet & Goldfarb and Tucker, 2019).

2.3.2.2 Organizational Aspects on Digital Transformation

Organizational dynamics greatly influence the extent and success of digital transformation. Companies with strong leadership, an innovative culture, and employee digital literacy are more likely to achieve successful digital adoption (Westerman et al., 2014). Furthermore, studies suggest that firms with flexible organizational structures can more effectively implement digital strategies, benefiting from economies of scale and network effects (Fitzgerald et al., 2014).

The alignment of business strategies with digital transformation initiatives increases operational efficiency and customer engagement (Bharadwaj et al., 2013). Furthermore, digital capabilities and investments in workforce reskilling are essential for sustaining transformation efforts (Bughin and Woetzel, 2019). The integration of digital leadership and knowledge management is crucial in sustaining digital transformation initiatives and driving organizational agility (Sambamurthy et al., 2003).

External influences such as competition, regulatory policies, and consumer expectations play a significant role in driving digital transformation. Porter and Heppelmann (2014) argue that firms that operate within highly competitive market in order to maintain their market position have to adopt digital technologies and innovate. Regulatory frameworks governing data privacy, cybersecurity, and digital transactions create the legal environment required for digital transformation (Vial, 2019). Studies have emphasized that government incentives for digital adoption, such as tax reliefs for technological investment and funding for digital innovation, greatly influence the rate of digitalization (Mergel et al., 2019). Digital inclusion policies, such

as broadband expansion initiatives and digital literacy programs, are critical for ensuring equitable participation in the digital economy (OECD, 2021).

2.3.2.3 Societal Aspects on Digital Transformation

Digital transformation influences as well social structures by remodelling employment patterns, workplace dynamics, and digital inclusion. The gig economy, enabled by digital platforms, has created new employment opportunities but also raised concerns about job security and fair wages (Schwellnus et al., 2019)

Digital transformation can contribute to social cohesion by improving access to education, healthcare, and financial services using digital platforms (Nambisan et al., 2017). The extent to which government and institutions facilitate digital access matter to reduce social inequalities. The role of government policies in fostering a favourable digital ecosystem further shapes the trajectory of digital transformation (Mazzucato, 2018).

Digital transformation has significant economic, organizational, and societal implications. The adoption of digital technologies enhances market efficiency, reshapes labour markets, and fosters economic growth. Organizations must align leadership, culture, and digital capabilities to achieve successful digital transformation. At the same time, governments and policymakers must ensure inclusive digital access in order to mitigate inequalities and promote a fair digital economy. Balancing technological innovation with ethical and sustainability considerations will be essential for the continued positive impact of digital transformation.

2.4 ICT Sector Development in Sweden

Sweden has consistently ranked as one of the leading countries in ICT. Its digital infrastructure, governmental frameworks, and an innovation-driven economy have all contributed to its current digital landscape. Sweden's ICT industry has had a significant impact on employment, productivity, and global competitiveness, all of which are contributors to the country's economic growth (Edquist and Henrekson, 2017). Moreover, Sweden has made use of technology innovations to promote social progress and economic sustainability (Kallifatides and Lerpold, 2016).

2.4.1 Historical Developments of the ICT Sector in Sweden

The roots of Sweden's ICT sector trace back to 1948 with the formation of the Swedish Board for Computing Machinery (Matematikmaskinnämnden). The aim of this government-backed

body to organize and advance Swedish efforts in building computing technology (Carlsson, 2005).

In the 1970s, the government made considerable investments in telecommunications and computing technology (Gruber, 2005). During this period, the Swedish government recognized the strategic importance of digitalization and allocated resources for building robust telecommunication networks. Early developments included the establishment of Televerket (later rebranded as Telia), the state-owned telecommunications provider, which played a critical role in laying the foundation for nationwide ICT infrastructure (Lindmark et al., 2004).

Like other nations' early telephone development experience, Sweden's early telecommunications industry was dominated by a state-governed monopoly (Lorentzon, 2003, 2007). Monopoly remained a dominant aspect of the Swedish ICT scene before the early 1990s, when the industry began to liberalise quickly. (Yu, 2022).

Sweden's telecommunications industry was considered as one of the most liberalised in 1993 (Karlsson, 1998). This shift enabled innovation and market efficiency, allowing many players to contribute to Sweden's digital development (Masood, 2012). By the 1990s, Sweden was one of the earliest adopters of broadband internet which was supported by government initiatives to expand fiber-optic networks. Furthermore, policies advancing digital literacy ensured that Swedish citizens were prepared to accept emerging digital technologies (Lindmark et al., 2004).

In 1994, Sweden established its first ICT Commission (Hall and Lofgren, 2004). This was initially chaired by the then former Prime Minister Carl Bildt and its mandate included advising on strategic decisions in the IT sector, encouraging developments in the public sector, and addressing legal issues related to IT. The commission played a fundamental role in shaping Sweden's IT policies and promoting the adoption of information technology across various sectors (Lorentzon, 2007).

When the Global System for Mobile Communications (GSM) standards were developed, the Swedish corporation Ericsson emerged as a leader in mobile communications technology, solidifying Sweden's position in the worldwide telecom industry (Giertz et al., 2015). It was during this period that investment in research and development (R&D) encouraged an innovation ecosystem for businesses. This has continued to benefit Sweden's ICT sector to this day (Wijesinghe et al., 2021).

Sweden was among the first countries to establish e-governance platforms for its people to access public services online (OECD, 2020a). Sweden started the "Government e-Link" project in 1997 with the goal of facilitating safe electronic information sharing between public entities, members of the public, and entrepreneurs. This initiative marked the early days of eGovernment in Sweden (Lofgren, 2007). This laid the foundation for generating new business models and establishing Sweden's position as a leader in digital services (OECD, 2019a).

Sweden took advantage of its ICT foundations to market broadband distribution through public-private partnerships. In 1998, tax incentives were introduced for PC purchases through an employee buy program. Workers could purchase tax-deductible personal computers from their companies. Households and enterprises that linked to broadband networks were also eligible for tax breaks (Shim et al, 2006; Magnusson and Hermelin, 2019).

During this time, digital entrepreneurship boomed, and businesses such as Skype and Spotify became leading providers of software and content. The infrastructural investment and tax advantages within the Stockholm region attracted tech startups, venture capital investors, and global technology companies (Zetterberg and Bjorner, 2019).

Using blockchain, artificial intelligence (AI), and 5G technologies to advance its ICT infrastructure, the 2010s marked Sweden's transition into a data-driven economy. The Swedish telecommunications giant Ericsson played a leading role in global 5G innovation, solidifying Sweden's position as a leader in next-generation digital infrastructure (Vinnova, 2018; Pauwels and Skoglund, 2022). Sweden also led fintech advancements, such as the e-krona project making it one of the world's first central bank digital currency (CBDC) initiatives (Arvidsson, 2019).

Despite Sweden's acknowledged digital progress, certain socioeconomic challenges persist. The digital divide within Swedish society persists, particularly among elderly populations, rural communities, and low-income groups, where digital literacy and access to high-speed broadband lag behind urban communities (Fischl et al., 2020; Alexopoulou and Åström, 2022; Gültekin, 2023). Furthermore, the lack of inclusivity of digital public services has been criticised due to a lack of user-friendly design or failure to account for the needs of individuals (OECD, 2019b; Aboulkacim et al, 2025).

2.4.2 Economic Aspects of ICT Development in Sweden

Sweden has established itself as a global leader in the development and application of ICT. Its commitment to promote digital innovation, combined with strategic public policies and a highly skilled workforce, has enabled it to shift effectively into a knowledge-based digital economy. Automation and machine learning technologies have made businesses more efficient, making Sweden a leader in the digital economy (Acemoglu & Restrepo, 2018b).

With ICT-driven sectors making up a sizeable portion of the Sweden's economy, investment in broadband and digital services have had a direct impact on Sweden's GDP growth (Pashkevich et al, 2017; Equist and Henrekson, 2018). Manufacturing, finance, and healthcare are some examples of the sectors that have seen an increase in operational efficiencies as a result of the adoption of digital business models (OECD, 2020a).

Since the mid-1990s, Sweden's economic growth has been greatly impacted by the ICT sector (Edquist and Henrekson, 2018). The economic output and workforce productivity are correlated with investments in digital infrastructure (Andersson and Ådahl, 2005). Sweden has become a leading digital economy due to the increased industrial efficiency generated by the deployment of automation and machine learning (Averstad et al, 2018).

ICT development has also contributed to Sweden's trade competitiveness. The country's exports in digital services, including software development and cloud computing, have increased over the years, contributing directly to GDP growth (Belenyesi, 2015). Digitalization has been an important factor in Sweden's transition from a post-industrial economy, reducing the use of traditional manufacturing (OECD, 2018). Additionally, the presence of Knowledge-Intensive Business Services (KIBS) (Dobrai and Farkas, 2009) have increased because of digital transformation, boosting Sweden's competitiveness internationally (Nambisan et al., 2017).

Meanwhile, Sweden's labour market also was reshaped because of the growth of the ICT sector. As a result, the demand for routine-based jobs has decreased while new job opportunities in fields such as software development, artificial intelligence, and cybersecurity were created (Adermon and Gustavsson, 2015; Pashkevich et al, 2017). Although the gig economy has provided workers with flexible employment options, it has raised concerns about job security and income inequalities because of digital platforms like Upwork and Toptal (Anxo, 2021). Moreover, productivity also increased as a result of the shift towards automation and AI-driven

processes. However, to be able to reduce the digital skill gaps, worker reskilling programs were required (OECD, 2020b).

Policies encouraging lifelong learning and vocational training in ICT sectors are two proactive ways how Sweden has responded to address these developments in the labour market. The objectives of government programs such as digital literacy initiatives and public-private education partnerships is to provide the workforce with skills they required to prosper in a digital economy (OECD, 2018). Furthermore, among the key elements behind digital growth and competitiveness are free education and university admission, affordable healthcare, and reliable pension plans (Hall and Lofgren, 2018). As a result, specialised academic programs and training courses, to enable a shift towards the digital economy, have increased in response to the increase in demand for Science, Technology, Engineering, and Mathematics (STEM) professionals (Nambisan et al., 2017).

Furthermore, the ICT sector has contributed to increased labour mobility, enabling professionals to work remotely and participate in the global digital economy. Remote working and digital freelancing have reduced geographical constraints, allowing Swedish professionals to interact in international markets (Vilhelmson and Thulin, 2016).

Sweden's labour policies have also adapted to the gig economy by implementing regulatory measures in order to ensure fair wages and social protection for freelance workers (Schwellnus et al., 2019). The role of trade unions has evolved, advocating for digital worker rights and emphasizing fair employment standards in digital labour markets (OECD, 2020b).

The gig economy in Sweden, while it offers flexible work opportunities, presents several serious drawbacks that undermine job quality and worker security. One major issue is labour oversupply, especially in sectors like food delivery, leading to increased competition and reduced earnings (Weidenstedt et al., 2023). Many gig workers, particularly migrants, perceive their roles as temporary and precarious, providing little incentives for advancement or integration into the traditional labour market (Newlands, 2022). Moreover, gig work often lacks access to social protection, such as pensions, unemployment insurance, and paid leave, as a result of classifying these the workers as independent contractors (GigLab Sverige, 2021). Finally, while some view gig work as a stepping stone, evidence suggests it is often less valued than traditional employment, especially for vulnerable groups such as youth and migrants (Adermon and Hensvik, 2020).

Sweden has benefitted from high levels of venture capital investment, a competent workforce supporting the digital economy, and a robust institutional framework (Henrekson & Johansson, 2010). Sweden's startup environment is driven by a consistent supply of highly skilled engineers and computer scientists resulting from the country's top-tier technical universities, including Chalmers University of Technology and KTH Royal Institute of Technology (Jacobsson, 2002; Jacob et al, 2003).

Furthermore, Sweden's ICT ecosystem promotes innovation and entrepreneurship, making it a global hub for digital startups. The startup ecosystem particularly in Stockholm, has produced global unicorns such as Spotify, Skype, and King Digital Entertainment, solidifying Sweden's reputation as an innovation hub (Ketels et al, 2020). Furthermore, it has enabled the rise of successful digital startups, including fintech firms like Klarna and health tech companies such as Kry, which are recognised internationally.

Sweden's regulatory environment has played a critical role in enabling digital entrepreneurship by implementing policies that encourage technological experimentation while safeguarding consumer protection (OECD, 2020a). The availability of government funding programs, incubators, and accelerators has provided startups with the required financial and strategic support to expand their businesses.

Sweden's digital infrastructure, made up of high-speed broadband and 5G connectivity, has enabled the expansion of innovative business models such as AI-driven platforms, blockchain solutions, and digital marketplaces (Schwellnus et al., 2019). Moreover, digital startups in Sweden have higher survival rates because of the country's pro-innovation policies and greater access to funding in comparison to other European countries (OECD, 2018).

Notwithstanding Sweden's success in fostering ICT-based entrepreneurship, challenges still exist. While access to capital is fairly strong, expanding beyond the Nordic region can prove to be difficult due to competition from larger digital economies such as the United States and China (Nambisan et al., 2017).

Sweden's ICT sector has been a driving force in its digital economy, facilitating innovation, economic growth, and social transformation. Government policies, strong digital infrastructure, and a commitment to technological advancement have positioned Sweden as a model for digital economies worldwide. However, emerging challenges such as cybersecurity risks, sustainability concerns, and digital inclusion must be addressed to ensure the long-term resilience of Sweden's ICT sector. Future research should explore the role of digital policies in

fostering economic competitiveness and the potential impact of new technologies such as quantum computing on Sweden's digital economy.

2.5 The EU's policy and Digital Transformation

The European Union (EU) has been at the forefront of digital transformation. by implementing policies and initiatives that foster the development of a digital economy. The objective of the EU's digital transformation agenda is to enhance economic competitiveness, support digital innovation, while creating a more inclusive and sustainable digital economy.

The EU's trajectory of digital transformation has been a multi-decade process influenced by technological advancements, economic policies, and regulatory frameworks. The region has progressively developed a digital infrastructure that has made it possible for the EU to become one of the world's leading digital economies.

In 1984, the European Economic Commission (EEC) established the European Strategic Programme of Information Technology Research and Development (ESPRIT). This program's goal was to give the European IT sector the technological foundation it needs to stay competitive in global IT markets of the 1990s (Smeaton, 1987). The program influenced the European IT landscape by promoting collaboration and driving technological innovation (Lichtenberg, 1996) which can be considered the foundation of digital transformation in the EU.

Recognizing early on the importance of the role that digital technologies have in modernizing an economy, the EU launched initiatives and policies aimed at developing its ICT infrastructure. The Bangemann Report in 1994 was one of the earliest efforts to outline a digital strategy for the region, highlighting the need for extensive adoption of digital networks and internet services (European Commission, 1994).

The Lisbon Strategy (2000) was a major policy which outlined the EU's ambitions to become "the most competitive and dynamic knowledge-based economy in the world" (European Council, 2000). This laid the groundwork for innovation, research, and education, which are all important enablers of a digital economy. Indirectly, it aimed for digitalisation by funding R&D, improving ICT infrastructure and digital literacy. The Sapir Report (2004) critically evaluated the Lisbon Strategy, highlighting its inconsistencies and poor efficacy in attaining its objectives, especially in sectors crucial for fostering long-term digital growth (Sapir et al., 2004).

The eEurope 2002 Action Plan was another important milestone during this period. Its goal was to make digital services available to everyone in the EU by enhancing internet access, encouraging e-commerce, and promoting digital literacy (Codagnone and Wimmer, 2007). By 2002, for example, about 40% of people in the EU had access to the internet, and there was a substantial increase in homes that had access to a personal computer demonstrating progress in achieving the plan's digital inclusion goals (European Commission, 2003).

The 2010s represented a period of rapid acceleration in digital policy implementation. The Digital Agenda for Europe (DAE) was part of the Europe 2020 strategy. Its goals were to address the fragmentation with digital markets, make broadband access better, and boost investment in digital infrastructure (European Commission, 2010). This agenda helped move cross-border digital services forward and create a more unified Digital Single Market (DSM) (Schmidt and Krimmer, 2022).

During this period, significant regulatory measures were introduced, such as the General Data Protection Regulation (GDPR) in 2016. It established a global benchmark for data protection and privacy laws (Hoofnagle et al, 2019). Furthermore, the launch of Horizon 2020, a funding program for research and innovation, funded projects in AI, big data, and cybersecurity (European Union, 2013). By the end of the program, more than 35% of the funding went to projects that were focused on digital innovation, such as creating the next generation of internet technologies, smart infrastructures, and advanced computer systems (European Commission, 2024b).

The Connectivity Package (2016) further strengthened Europe's digital infrastructure by promoting investments in high-speed broadband and 5G networks (European Court of Auditors, 2022). In 2018, the Coordinated Plan on Artificial Intelligence (AI) was released. Its purpose aim, to expedite AI investment, execute AI programs and strategies, and harmonise AI policy to avoid fragmentation within Europe (European Commission, 2025d). By the end of the decade, digitalization had become a core component of the EU's economic and industrial strategies (Mura and Donath, 2023).

The 2020s have marked a new era in digital transformation, with the EU undertaking bold measures to assert its digital leadership internationally (Metakides, 2021). The 2030 Digital Compass, launched in 2021, outlines the EU's objective for full digitalisation by the end of the decade, establishing benchmarks for digital infrastructure, digital competencies, and the

advancement of a digital economy through sustainability and innovation (European Commission, 2021a).

The NextGenerationEU recovery plan, launched in response to the economic disruptions caused by COVID-19, allocated substantial funds to digital projects, particularly in areas such as AI, cloud computing, and green digital transformation (European Commission (e), n.d.). The plan highlighted the importance of cybersecurity and digital resilience, leading to the implementation of more stringent data governance regulations. A 2025 special report by the European Court of Auditors reported that even though the Recovery and Resilience Facility (RRF) allocated over 20% of national recovery plans to digital initiatives, it identified significant deficiencies in strategic focus. Furthermore, the report also highlighted inadequate alignment between RRF indicators and broader EU digital objectives (European Court of Auditors, 2025).

The Artificial Intelligence Act, a significant regulation enacted in recent years, aims to regulate AI applications while promoting innovation in the industry (Nizza, 2024). Additionally, the EU's Digital Markets Act (DMA) and Digital Services Act (DSA), both implemented in 2022, seek to ensure fair competition and accountability among major technology companies operating within Europe (Eckardt, 2024)

The EU has intensified efforts to reduce dependence on foreign technology suppliers through the European Chips Act, which advocates for domestic semiconductor manufacturing, hence ensuring supply chain security and technological autonomy (De Laval, 2023). In the future, Europe's digital transformation plan will probably emphasise the enhancement of blockchain, quantum computing, and decentralised finance (DeFi) to maintain its competitive advantage in the global digital economy.

2.6 Conclusion

This chapter has provided an overview of the notion of digital transformation, its historical development, and its economic, organisational, and societal impacts. The discourse has underscored the significance of ICT in transforming industries, enhancing productivity, and fostering innovation. The integration of digital tools has not only transformed businesses but also impacted labour markets, governance frameworks, and consumer behaviours (Brynjolfsson and McAfee, 2014; Goldfarb and Tucker, 2019).

Sweden's ICT sector exemplifies how strategic investments in digital infrastructure, innovation-oriented policies, and public-private collaborations can foster a robust digital economy. The country's progress in AI, 5G, fintech, and e-governance highlights the importance of a proactive strategy for digitalisation (Henrekson and Johansson, 2010). However, challenges including labour reskilling (Acemoglu and Restrepo, 2018a), cybersecurity threats (Zuboff, 2019), and digital disparity (Hilbert, 2016) remain critical factors for maintaining sustained growth.

Similarly, the European Union has positioned digital transformation as a core element of its economic strategy. Through policies such as the Digital Single Market (European Commission, 2015), GDPR (Goldfarb and Tucker, 2019), and AI regulations (McAfee and Brynjolfsson, 2017), the EU has sought to balance innovation with ethical considerations and consumer protections. However, challenges remain in maintaining strategic focus to achieve the EU's broader digital objectives (European Court of Auditors, 2025)

Looking ahead, continued investments in emerging technologies such as blockchain, quantum computing, and green digital solutions will be essential for ensuring a competitive and sustainable digital economy (Kenney and Zysman, 2016). Policymakers, businesses, and stakeholders should seek to work together to address regulatory challenges (European Commission, 2022), promote digital inclusion (Hilbert, 2016), and leverage technological advancements for economic and social progress (Bughin and Woetzel, 2019).

3. Methodology

3.1 Introduction

This chapter outlines the methodology used to conduct the research for this dissertation. This study adopts a case study design, incorporating both comparative and mixed-method components in order to analyse Sweden's digital transformation within the EU context. The chapter begins by explaining the motivation for choosing this research design and why it is applicable to the research aims. Thereafter, the chapter details how each research question is addressed methodologically. Finally, it shall explain the other considerations and reflects on the limitations of the study.

3.2 Assessing Sweden's Digital Transformation Trajectory

The reason for choosing Sweden is that it has consistently been recognized as one of the EU's leading digital frontrunners. Sweden's early and sustained investment in digital infrastructure, widespread internet connectivity, and commitment to innovation policies makes it a compelling example for examining national-level digital transformation inside the EU framework. By evaluating Sweden's digital transformation, this study aims to understand the key economic, organisational, and societal factors that have enabled its advanced digital capabilities and to uncover challenges that still exist, such as regional disparities in digital access and emerging questions around AI readiness.

Another reason for selecting Sweden is that it is often seen as a benchmark in the ICT sector. Therefore, placing Sweden's trajectory alongside other EU member states enables the study to assess how Sweden's drivers and barriers align or differ from those observed in other EU economies, providing insights into patterns and lessons that may inform digital policy and governance across Europe. The comparative perspective will be explored in more detail in subsequent sections, emphasising how national contexts influence the pathways and outcomes of digital transformation.

Although Sweden is often seen as a benchmark for digital development, it still faces common challenges shared by other countries, such as balancing technological growth with inclusivity and sustainability.

3.3 Research Design

3.3.1 Case Study

A case study is a research method whereby an in-depth investigation is conducted on a single unit of analysis, for example, an individual country (Yin, 2014). Hence, it enables researchers to develop a comprehensive understanding of complex phenomena, taking into account their specific context. By collecting extensive data utilizing qualitative methods, researchers can examine and uncover characteristics that are unique within the context of the single case (Creswell, 2013).

Hence, by using this methodology, the study can contribute to inform how Sweden's institutional arrangements, governance capacity, and societal readiness interact to shape its digital transformation trajectory. This research design enables a comprehensive examination of Sweden's national strategies, policy frameworks, societal aspects, and technological advancements. By concentrating on a single, well-defined context, the study provides an account of the strategies and conditions that support sustained digital leadership, which may inform policy development both within Sweden and across other EU member states.

3.3.2 Comparative Analysis

Comparative analysis enables researchers to uncover deeper insights by examining diverse contexts side by side (Esser & Vliegenthart, 2017). It helps to highlight structural and policy-related differences in digital transformations approaches and outcomes. Such an approach also assists in highlighting similarities and identifying differences across cases (Rihoux & Lobe, 2009), hence providing a clearer understanding of how digital transformation unfolds in difference governance and policy context. Furthermore, it plays a role in informing policy, as it identifies best practices and context-specific strategies that contribute to successful outcomes in fields such as education, healthcare, and digital governance (Azarian, 2011). As a result, comparative analysis integrates well with mixed-method designs, enhancing the robustness and depth of findings through triangulation and configurational logic (Berg-Schlosser et al., 2009).

The comparative analysis included in this study allows for the identification of patterns of similarity and divergence between Sweden and other EU digital leaders. This analysis extends beyond merely describing Sweden's progress, it examines the country's national experience in comparison to similar nations, such as Denmark and The Netherlands, which share high digital maturity but have made different policy choices. Furthermore, it shall contrast the analysis with countries that continue to face challenges. As a result, this comparative dimension provides

insights on how different institutional arrangements, governance strategies, and societal contexts significantly influence the pathways of digital transformation within the EU.

3.4 Research Approach

Qualitative research, as defined by McLeod (2015), is centred on descriptive and contextual information. In this study, qualitative methods are used in order to analyse national policy strategies, institutional reports, and thematic priorities shaping Sweden's digital transformation. This involves critically analysing the language, framing, and policy objectives within these documents to understand how digital transformation is conceptualised, prioritised, and implemented over time. The aim is not only to summarise content, but to uncover policy intentions, and shifts in strategic direction that inform Sweden's approach to digitalisation. The documents analysed include government strategy documents, European Commission communications, OECD reviews, and sector-specific analyses. This approach enables a detailed evaluation of the economic, organisational, and societal aspects that influence Sweden's status as a digital leader, giving depth and context complementing the numerical analysis (Bryman and Burgess, 1994).

Quantitative research is a method that focuses on measuring and analysing data. It integrates the methodologies and standards of the natural sciences and positivism, reflecting a perspective of social reality as an external, objective phenomenon (Bryman, 2016). The quantitative data that is used to track Sweden's measurable performance are benchmark indicators. The data used is obtained from the Eurostat statistics, European Commission reports, Statistica Business, and OECD digital economy metrics. The analysis will enable the study to represent key trends in areas like broadband coverage, digital skills, e-government uptake, and business technology adoption. As a result, these indicators complement the descriptive analysis by benchmarking Sweden's progress against EU averages and comparable countries which are Finland, Denmark, and Estonia.

Mixed methods research involves the integration of qualitative and quantitative research methodologies by a researcher to provide comprehensive understanding of complex research questions, taking advantage of the strengths of both forms of data collection and analysis (Johnson et al., 2007). Rossman and Wilson (1985) identified three reasons for the integration of quantitative and qualitative research. Mixed methods research involves the integration of qualitative and quantitative research methodologies by a researcher to provide comprehensive understanding of complex research questions, taking advantage of the strengths of both forms

of data collection and analysis (Johnson et al., 2007). Rossman and Wilson (1985) identified three reasons for the integration of quantitative and qualitative research. Combining different methods allows researchers to cross-check findings using triangulation, hence strengthening the credibility of the analysis by allowing patterns identified in one source to be examined through others. Secondly, combinations are employed to facilitate or enhance analysis in order to yield more comprehensive data. Lastly, combining different types of data can lead to new insights, particularly when quantitative indicators (such as DESI rankings) and qualitative assessments (such as policy critiques or case examples) seem to diverge. Rather than treating these inconsistencies as contradictions, this study shall use them to examine deeper the structural and contextual factors shaping Sweden's digital transformation.

The timeframe selected for this study spans from 2013 to 2023, encompassing a decade of key policy initiatives and technological advancements relevant to Sweden's digital transformation. The chosen period is motivated by the fact that digital transformation has gained traction in the EU and globally during this period. Also, it includes the implementation of significant initiatives such as the Digital Single Market strategy (2015) and the Digital Compass 2030. This period further includes the COVID-19 pandemic, which served as a catalyst for digital policy shifts, infrastructure upgrades, and new digital public services.

3.5 Research Questions

In this research, two key questions are analysed. Each question addresses crucial aspects of Sweden's trajectory in digital transformation. These are:

Question 1: How has the ICT sector evolved in Sweden over the period 2013-2023, and what were the key factors behind this transformation?

Question 2: What are the key drivers and barriers in Sweden in adopting digital technologies, and how do these compare to those in other European countries?

3.5.1 Answering Research Question 1

The study employs a mixed-methods strategy to address the first research question, based on the aspects identified in the literature review that are the economic, organisational, and societal dimensions. This approach combines quantitative trend analysis with qualitative document analysis to develop an in-depth understanding of how Sweden's ICT sector has progressed and what factors have driven this evolution.

The study uses longitudinal data extracted from the Digital Economy and Society Index (DESI) covering the period 2013 to 2023. The reason is that the DESI provides key figures on integration of digital technology by businesses. These are all important indicators for evaluating the structural growth of Sweden’s ICT sector. Furthermore, in order to support the analysis, datasets from Eurostat and the OECD Digital Economy Outlook will be used, such as ICT contributions to GDP, sectoral employment, and productivity gains.

Additionally, to examine the factors behind these trends, a qualitative analysis is conducted. Key national strategy papers such as the National Digital Strategy, Future Challenges for Sweden Report, National Approach to Artificial Intelligence, and EU-level policy communications are systematically reviewed. Themes related to investment in digital infrastructure, government-led innovation initiatives, public-private partnerships, and workforce digital skill development are coded and analysed in light of the economic and organisational drivers identified in the literature, as shown in Table 3.1 below. By triangulating statistical trends with narrative policy insights, this method produces a nuanced account of Sweden’s ICT trajectory over the past decade.

Table 3.1: Data-Framework Matrix for Research Question 1 — Sweden’s ICT Sector Evolution

<u>Source / Report</u>	<u>Economic Aspect</u>	<u>Organisational Aspect</u>	<u>Societal Aspect</u>
DESI Index (2014–2024)	ICT sector performance, GDP contribution	Institutional readiness indicators	Digital inclusion, human capital
OECD Reviews of Digital Transformation	Competitiveness, productivity	Public sector governance reforms	Social impacts of digital services
Future Challenges for Sweden Report	Macroeconomic context and future challenges	Policy frameworks for organisational transformation	Social risks and policy needs
National Approach to Artificial Intelligence	AI's economic value creation	National AI governance readiness	Ethical AI, citizen trust

3.5.2 Answering Research Question 2

Building upon the findings for research question 1 in order to answer the second question, a structured comparative component is included. This involves combining Sweden's national profile with cross-country benchmarking to assess similarities and divergences with other EU member states. The focus in answering this question will place Sweden's factors and barriers into a comparative European context. It will critically assess whether Sweden's digital journey is unique, typical, or instructive in the broader EU context.

The comparative analysis uses DESI sub-indicators and related datasets to benchmark Sweden against other EU member states. Comparative tables and charts will be formulated to show Sweden's position in comparison to other EU member states. Furthermore, these comparisons are combined with a qualitative analysis of country-specific policy documents and relevant sections from EU reports such as the Digital Decade Country Report (2024) and OECD Digital Government Reviews.

Countries will be grouped based on their digital maturity, using the EU average as a benchmark. Sources included are EU-wide reports, cross-country benchmarks, and national policy documents that facilitate comparisons of Sweden's digital performance, drivers, and barriers with those of other EU member states.

Furthermore, barriers and enablers identified for Sweden, such as regional divides, gaps in digital skills among certain demographics, or regulatory challenges in emerging technologies, are analysed in light of similar issues faced by other EU countries as part of a larger digital ecosystem. This enables the study to put Sweden's national challenges in context with European patterns, reflecting insights from the literature on organisational capacity and societal readiness.

3.6 Other Considerations

This research relies exclusively on secondary data and does not involve the collection of any primary data from human participants. Hence, certain measures were taken to ensure the integrity of the research. An ethics clearance form was submitted and approved in accordance with the university's research ethics procedures.

When selecting data, care was taken that it was only from credible sources such as the European Commission, OECD, Eurostat, and Statistica Business. All data and documents were cited and referenced to maintain academic transparency. Furthermore, efforts were also made to interpret

the data accurately and to present findings in a balanced manner by mentioning any limitations or underlying assumptions.

3.7 Research Limitations

Throughout the course of this research, several limitations have been identified that impacted the scope and depth of the study.

While the comparative component of this research strengthens its relevance beyond Sweden, it is broad in scope. The comparative evaluation uses aggregate data from publicly available EU and OECD reports, which help identify general patterns however it does not fully analyse the specific contexts of each country. A more extensive comparative study could provide further insights into how organisational and societal aspects vary across different EU member states.

Another limitation is that digital transformation due to its nature, is rapidly changing which results in technologies, policies, and societal responses continuously evolving. As a result, the impact of some of the most recent developments, such as advancements in AI regulation, new cybersecurity frameworks, or updated EU digital targets, may not yet be fully captured in the data evaluated.

While a single-country case study enables an in-depth examination of Sweden's trajectory, its conclusions cannot be generalised to other contexts. To put context on the case study and provide more information this study includes comparative references and putting Sweden's experience within the general European policy landscape. Future research could build on this foundation by collecting primary data, such as interviews with policymakers and industry stakeholders, to validate and expand on the conclusions presented here.

Despite these limitations, the methodological choices and rigorous data sourcing ensure that the research offers a credible, well-contextualised analysis of Sweden's digital transformation.

3.8 Conclusion

This chapter outlined the methodological approach adopted to investigate Sweden's digital transformation, combining a single case study design with comparative elements and a mixed-methods strategy. The methodology extracts both qualitative and quantitative secondary data from reliable sources such as the European Commission, the OECD, and national Swedish policy reports. Furthermore, the approach is structured around clearly defined research questions and is aligned with the conceptual framework developed in the literature review.

The case study approach ensures that a detailed evaluation of Sweden's digital transformation is conducted. This was achieved by this study using a mixed method approach. Moreover, by including a comparative element, the study provides a contextual understanding of how Sweden's trajectory aligns with or diverges from European patterns. Furthermore, this methodological design also supports a triangulated analysis of digital drivers and barriers, hence strengthening the study's analytical aspect.

Lastly, while the limitations of relying on secondary data and general comparisons are acknowledged, the design ensures a strong basis for assessing Sweden's digital progress and identifying areas for future investigation.

4. Sweden's Digital Transformation 2013-2023

4.1 Introduction

This chapter presents research findings and analyses Sweden's digital transition from 2013 to 2023. Furthermore, it will examine the rise of the ICT sector in Sweden and analyse the key factors that have shaped this transformation within a broader policy, institutional, and societal context.

Specifically, the chapter will address the first research question, which is how the ICT sector has evolved in Sweden during the period 2013–2023, and identify the key factors behind this transformation. This chapter combines evidence from Sweden's strategic digital policy frameworks, economic development, institutional and corporate digitisation, and societal outcomes to address this question. This analysis expands upon the literature review that highlighted the economic, organisational, and societal aspects related to digital transformation and applies these insights to the context of Sweden.

This chapter will outline the strategic development of Sweden's digital agenda and the policy frameworks that have guided this transition. It will then analyse digitalisation in institutional and sectoral contexts in both private and the public sector. This will be followed by a discussion on the societal aspects, particularly in terms of access, skills, inclusion, and public trust. Thereafter, it will analyse the economic drivers of digitalisation with particular focus on infrastructure investment, the ICT sector's contribution to growth and the development of the innovation ecosystems. Finally, it shall conclude by summarising how Sweden's ICT sector has evolved and identifying the main factors that enabled the digital transformation.

4.2 Strategic Development of Sweden's Digital Agenda 2013-2023

4.2.1 Strategic Policy Frameworks

In 2011 the Swedish government launched The Digital Agenda for Sweden, which aimed to position the country as a leading digital nation by being the best in the world at exploiting the opportunities enabled by digitalisation. It was to achieve this by promoting access, participation, and innovation (Ministry of Climate and Enterprise, 2012). Sweden updated and expanded its digital strategy to reflect changing technological, economic, and societal conditions. Notably, the launch of the 'Digital Strategy for a Sustainable Digital Transformation' published in 2017 set five overarching goals (Ministry of Enterprise and Innovation, 2017):

1. Digital competence – the integration of coding in school curricula, promotion of lifelong learning programmes and targeted funding for ICT training in small and medium-sized enterprises,
2. Digital security – to strengthen cybersecurity frameworks, establish the Swedish Civil Contingencies Agency’s role in cyber resilience, and launch the national cybersecurity strategy in 2017,
3. Digital innovation – provide state support for public-private innovation programmes and funding from Vinnova¹ to connect academia, startups, and industry,
4. Digital leadership – placing municipalities and national agencies as leaders in implementation with the Agency for Digital Government coordinating the digital standards and progress,
5. Digital infrastructure - an enhancement of infrastructure for electronic communications essential for data transmission (Ministry of Enterprise and Innovation, 2017).

The Swedish government has adopted a decentralised approach to implementing these strategies, relying on multiple national agencies, municipalities, and private sector stakeholders instead of a top-down approach to conducting its digital initiatives (OECD, 2018). For example, the Agency for Digital Government (DIGG) has played a central coordinating role by supporting the development of digital public services and setting national standards (Agency for Digital Government, 2023). However, other stakeholders in this multi-actor environment set by the Swedish government are the Post and Telecom Authority (PTS), Vinnova, and the Swedish Association of Local Authorities and Regions (SALAR) (Ministry of Enterprise and Innovation, 2017)

Throughout this period, Sweden aimed to drive digital transformation through both technological advancement and inclusive governance. The policymakers’ aim was to ensure that digitalisation supports environmental sustainability, social welfare, and equality (Ministry of Enterprise and Innovation, 2017; European Commission, 2021b).

As a result, these strategic frameworks show how Sweden’s digital agenda addresses not only technology but also broader socio-political goals. By integrating sustainability, equality, and welfare objectives, Sweden's digital transformation positions itself as part of the Nordic

¹ Sweden’s Innovation Agency

governance tradition, where digital policy is both an economic driver and a tool for social cohesion (OECD, 2019a).

In comparison to more market-driven EU member states, Sweden's decentralised governance and strong municipal role creates resilience. The OECD (2019c, p. 11) defines a decentralised approach as:

“Decentralisation refers to the transfer of powers and responsibilities from the central government level to elected authorities at the subnational level (regional governments, municipalities, etc.) and that have some degree of autonomy. Decentralisation covers three distinct but interrelated dimensions: political, administrative and fiscal.”

Hence, it fosters local innovation and adaptability that in turn encourages organisational transformation. However, this approach can also slow uniform implementation as it creates inconsistencies in the pace and scope of implementation.

The evolution of Sweden's ICT sector has been shaped by the successive digital policy strategies, most particularly the 2017 Digital Strategy for a Sustainable Digital Transformation. These frameworks established the clear goals in skills, infrastructure, innovation, and governance, in conjunction with the decentralised implementation and alignment with EU benchmarks. Together, these measures laid the policy foundation for ICT growth, with decentralisation enabling local innovation. Thus, national strategies emerge as central factors behind Sweden's ICT transformation over the past decade.

4.2.2 Key Stakeholders: Government, Private Sector, and Agencies

Sweden's digital transformation has been influenced by a network of parties. The collaboration between government, public agencies, private enterprises, and civil society across various governance levels and sectors has been a crucial element of Sweden's strategy.

At governmental level, The Ministry of Infrastructure and later the Minister of Digital Development, under the Minister of Public Administration, have been instrumental in setting the strategic direction. They have been responsible for implementing national digital policies alongside the EU digital frameworks, including the Digital Compass 2030. Meanwhile, the government's role extends beyond policy formulation. It also includes facilitating public-private partnerships, allocating funding, and at the same time promoting ethical standards for emerging technologies such as AI (Government Offices of Sweden, n.d.).

The Agency for Digital Government (DIGG), established in 2018, has a coordinating role in developing and overseeing digital public services. DIGG oversees Ena, Sweden's digital infrastructure, which enables the digitalisation of state administration and streamlines daily life for citizens and enterprises. Furthermore, DIGG is one of Sweden's emergency response agencies within the Basic Data Supply industry. Their reports assist the government and public administration in making informed decisions (Agency for Digital Government, 2023).

Another important institution is Vinnova, Sweden's innovation agency. Their primary emphasis is on four domains: digital transformation, sustainable value chains, future-proof society, and innovative technologies and enterprises. Vinnova's role is to fund and support a wide range of research and development projects that focus on digital innovation. Many a time this has been achieved by way of a collaboration with universities, research institutes, and tech startups (Vinnova, n.d.) hence placing itself as a bridge between these actors.

The Swedish Post and Telecom Authority (PTS) regulates both electronic communication and postal services. Furthermore, it oversees spectrum allotment and broadband implementation. PTS additionally supports accessibility initiatives and guarantees the resilience of Sweden's digital infrastructure (Swedish Post and Telecom Authority, 2024).

Moreover, evaluating the private sector, Sweden's global technology firms, including Ericsson, Klarna, and Spotify, together with emerging AI and fintech startups, have significantly contributed to advancing digital innovation. The European Commission (2022) noted in the DESI of Sweden that enterprises have benefited from Sweden's vibrant startup environment, extensive venture capital networks, and elevated digital competencies throughout the workforce. Furthermore, major Swedish firms in sectors such as manufacturing, finance, and healthcare have significantly invested in the digitalisation of their processes, facilitating digital transformation (OECD, 2019a).

Lastly, municipalities and local governments have played a vital role in delivering digital services at the local level. They implemented national digital goals in areas such as education, social care, and healthcare (Swedish Association of Local Authorities and Regions, 2023). Hence these local-level digitalisation efforts, often supported by national funding and also guidance from DIGG, reflect Sweden's decentralised governance model and commitment to local innovation.

Sweden's multi-actor model approach highlights the organisational aspect of digital transformation by encompassing a wide range of resources and expertise. The setting up of

public agencies like DIGG ensures national coordination while innovation agencies such as Vinnova, they bridge the gap between policy, academia, and industry. Furthermore, the active participation of globally private sector actors, amplifies Sweden's economic competitiveness, while collaboration across sectors builds societal trust in digital services.

4.3 Digital Transformation across the Private and Public Sectors

4.3.1 Digitalization in Enterprises

Sweden ranks among the top EU member states with regards to enterprise digitalization. As highlighted in the literature review, the use of digital tools is an essential condition for firms to be able to thrive in a digital economy.

Digital tools streamline business operations, both internally within the company and those externally with customers and suppliers. Enterprise Resource Planning (ERP), customer relationship management, and supply chain management are various types of software used to measure to which extent businesses activities are going digital. In Sweden, these digital tools were used early on (OECD, 2018).

Swedish enterprises increasingly adopted these digital tools to improve their efficiency, productivity, and market reach. Common digital technologies used are cloud computing, e-invoicing, social media, and e-commerce platforms.

Figure 4.1 shows the integration of Digital Tool by Enterprises in Sweden 2013 - 2023. Cloud adoption increased from 33% in 2016 to 59% in 2020, ultimately reaching 69% in 2021. The percentage of Small and Medium Enterprises (SMEs) engaging in online sales rose from 30% in 2019 to 36% in 2022, while e-commerce accounted for 19% of enterprise turnover in 2021. As a result, in 2019, to mitigate the structural disparity between large enterprises and SMEs, the government allocated funds for:

- consultancy vouchers amounting to €10.7 million,
- management team skills funding amounting to €1.46 million, and
- targeted support for rural SMEs amounting to €5.4 million for the period 2019–2020 (European Commission, 2020a).

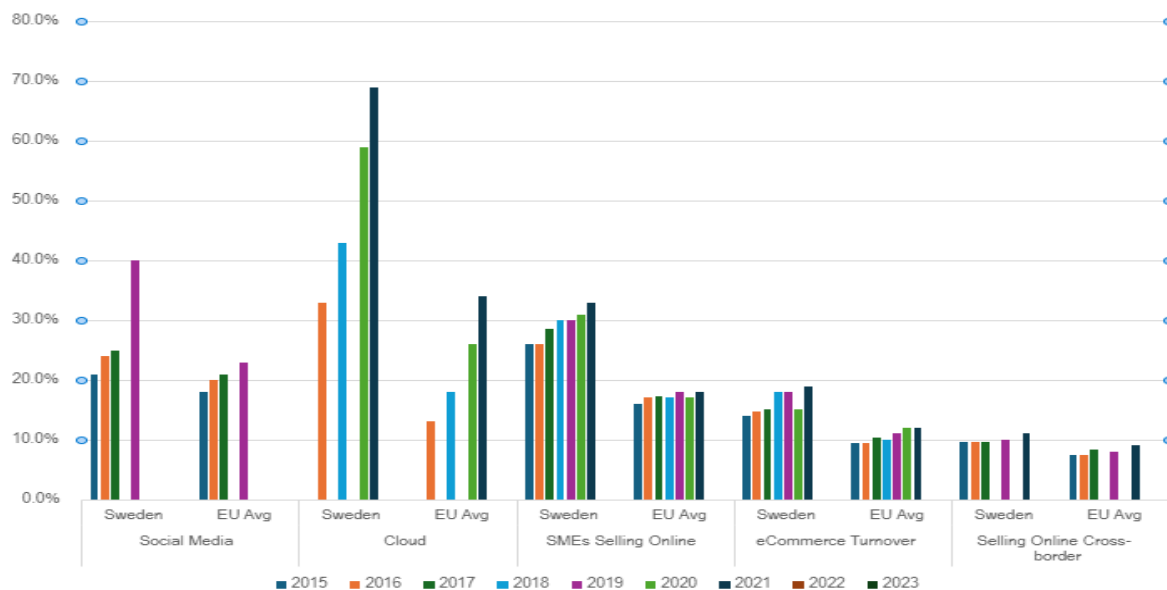


Figure 4.1: Integration of Digital Tool by Enterprises in Sweden 2013 – 2023 Source: European Commission

The Advanced Digitisation Program with an allocation of SEK 480 million for the period 2021–2024 has funded ninety-two projects involving 230 actors from universities, institutes, and companies, focusing on cloud infrastructure, AI, and automation standards. Regional digitisation coordinators operate throughout all twenty-one regions to ensure these opportunities reach areas beyond urban centres (European Commission, 2023a).

Government initiatives were implemented to facilitate this transition, especially for SMEs in the industrial and service sectors, which account for 99% of all businesses and over two-thirds of the workforce (European Investment Fund, 2024). Some initiatives launched were the Smart Industry Strategy 2030, DigiLyftet², and RobotLyftet³, which encouraged SMEs to adopt advanced technologies and automation.

Sweden’s enterprise digitalisation was enabled by targeted government support programmes, an ICT-literate workforce, and a policy environment that promoted the uptake of cloud and emerging technologies. These conditions created favourable foundations for enterprise digital transformation. The outcomes of these initiatives are evident in the diminishing digitalisation

² An initiative which has helped small and medium-sized industrial sector companies overcome the significant barriers to using digital technologies – a means to become more competitive and grow their operations.

³ A program launched by the Swedish government and the Swedish Agency for Economic and Regional Growth to enhance automation in Sweden's small and medium-sized industrial enterprises. Robolyftet offers financial assistance through automation grants, enabling enterprises to economically acquire external expertise (IUC Sweden, n.d.)

disparity between SMEs and large enterprises, as well as in Sweden's enhanced position as a frontrunner in digital business adoption, despite persistent challenges for smaller organisations.

4.3.2 Public Sector Digital Transformation

Sweden consistently ranked above the EU average in the implementation and uptake of digital public services between 2016 and 2022. The EU Digital Decade 2030 target is to have 100% public services digitalised (European Commission (b), n.d.).

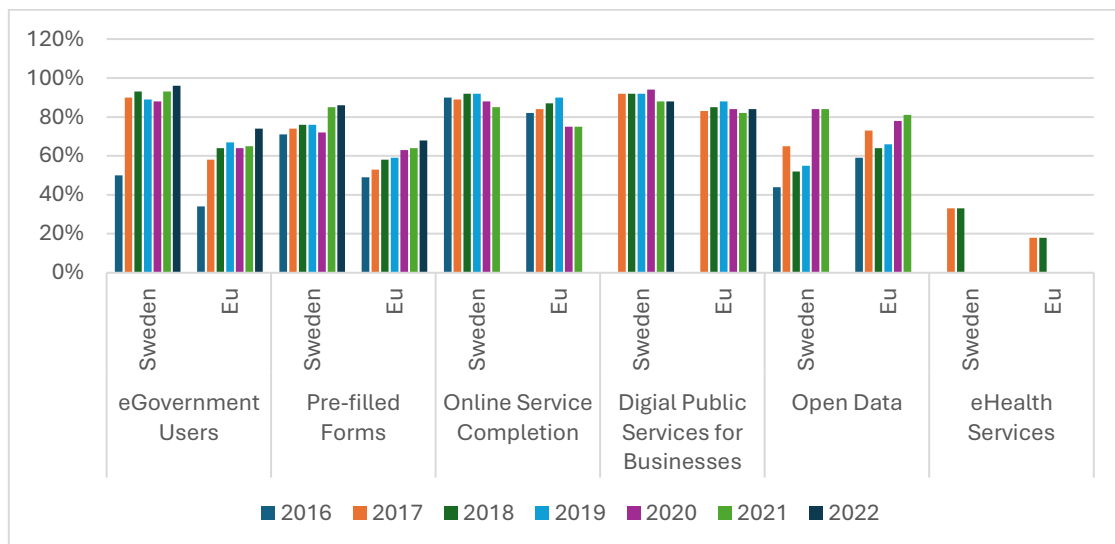


Figure 4.2: Digital Adoption by the Public Sector in Sweden 2013-2023 Source: European Commission

Figure 4.2 shows the digital adoption by the public sector in Sweden. Citizen interaction with e-government shows an increase from 86% in 2017 to 92% in 2019 and 96% in 2022, while the EU average in 2022 was 74%. Part of the reason for this consistent growth is due to long-term investment in national digital infrastructure, which has been mentioned above, and a user-driven approach to service design.

One of the early reforms was that of transferring the responsibility for public sector digitalisation to the Ministry of Finance in 2016. In 2017 The government established its ambition to establish a unified digital public administration. The emphasis is on five domains:

1. infrastructure – execution and advocacy of shared digital services.
2. digital literacy – enhancement of digital competencies and proficient utilisation of ICT.
3. innovation – fostering the utilisation of open data.
4. legal digital first – eliminating obstacles to enhance collaboration and digitisation within public administrations; and

5. establishing an agency with comprehensive oversight of digital governance. (European Commission, 2017)

Furthermore, in 2018 there was the establishment of DIGG in order to provide common infrastructure, secure e-identification (BankID), e-invoicing, and digital post (European Commission, 2019). As illustrated by Figure 4.2, service features also improved over time such as pre-filled forms rose from 78% in 2016 to 86% in 2022, and online service completion increased from 80% in 2016 to 88% in 2022. These advances significantly reduced administrative burdens for citizens and businesses.

In the health sector, the national 1177.se portal⁴, had its monthly visits grow from 3.2 million visits in January 2013 13.3 million visits in January 2020 (an increase of over 400%) (Hägglund et al, 2020). Moreover, Sweden ranks third in the EU for medical data exchange. BankID adoption has been key, increasing from 7.5 million users in 2017 (OECD, 2019a) to more than eight million users in 2023 (BankID, n.d.). As of 2023 this covers 99.4% of adults aged 18-67 which is near-universal usage (BankID, n.d.). The Vision eHealth 2025 launched in 2020 has guided the rapid digitalisation in the health sector. This decentralised governance model, which positions Sweden leadership in patient access to data, enables flexibility and local innovation.

Sweden's public sector innovation strategy is defined by user co-design, digital laboratories, and the 'once-only' principle, which stipulates that individuals and businesses are not required to resubmit information already submitted to public authorities (OECD, 2019a).

Sweden's constant growth in e-government and e-health uptake is the result of how continuous investment in digital infrastructure, and a user-centred service design brings about the reduction in transaction costs, improves administrative efficiency, and supports innovation-led growth. The integration of secure eIDs, interoperable platforms, and national portals indicates an advanced governance paradigm; yet decentralised municipal and healthcare systems continue to limit interoperability and generate regional disparities in service quality. The OECD (2019a) findings highlighted that although Sweden's governance culture fosters innovation and trust, it requires enhanced coordination to prevent fragmentation.

The results aligned with Sweden's 2017 Digital Strategy objective of attaining world-class digital leadership and aligned with the EU Digital Compass aim of 100% online delivery of essential public services by 2030. Although Sweden continuously surpassed the EU average in

⁴ Offers online access to personal health records, prescriptions, and appointment bookings

DESI e-government scores, inconsistent municipal implementation hindered the complete attainment of these policy objectives (OECD, 2019a).

Sweden’s public sector digitalisation was enabled by strong policy reforms such as the 2017 Digital Strategy and Vision eHealth 2025, alongside decentralised but capable institutions and high citizen trust in digital services. These conditions created the environment for near-universal uptake of e-identification and rapid growth in e-health services, which stand out as outcomes of Sweden’s governance model. While these outcomes positioned Sweden as a frontrunner in digital public services, uneven municipal implementation and interoperability challenges continue to limit the full realisation of these policy ambitions.

4.4 Digital Literacy and Public Trust

4.4.1 Digital Access, Skills, and Literacy

In digital access Sweden ranks among the EU’s frontrunners, with connectivity being near-universal and the highest internet use rates in Europe.

Digital access has been well above the EU average. Table 4.1 illustrates the digital skills in Sweden and the EU as a percentage of population aged 16-74. The percentage of internet users increased from 89% in 2015 to 96% in 2022, while the EU average was 89% in 2022.

Digital Skills								
	Internet Users		Basic Digital Skills		Above basic digital Skills		At least basic software Skills	
	Sweden	EU	Sweden	EU	Sweden	EU	Sweden	EU
2015	89	76	72	55				
2016	91	79	69	56	39		70	
2017	95	81	77	57	46	31	78	60
2018	91	83						
2019	95	85	72	58	46	33	74	61
2020	95							
2021	95		67	54	36	26	77	66
2022	96	89						

Table 4.1: Digital access and skills in Sweden and EU (% of population aged 16-74) 2015-2022 Source: European Commission

The digital competency of Sweden's population aged 16-74 remains constantly elevated. Table 4.1 illustrates that the proportion of individuals aged 16–74 possessing at least basic digital competencies fluctuates between 67% and 77% from 2013 to 2023, surpassing the EU average of 54% in 2021. Among the Swedish population aged 16-74, over 70% demonstrate adequate software proficiency.

The results may stem from several factors, including government strategies such as National Digitalisation Strategy and Smart Industry Strategy. These initiatives have included digital literacy in educational institutions, encompassing coding and digital evaluation within the curriculum, promoted lifelong learning, and provided specific assistance for SMEs to enable upskilling training (European Commission, 2019). Moreover, initiatives like Digidelcentres⁵, Digitalidag⁶, and AI-focused short courses have addressed particular needs of the sector (European Commission, 2022).

Nonetheless, Sweden still faces challenges of shortage of ICT professionals particularly in advanced areas like AI, cybersecurity, and cloud services, alongside persistent skills shortage among older adults, rural residents, and migrants (European Commission, 2023a).

The Swedish digital skills development has been supported by a strong education and training base, lifelong learning initiatives, and a high share of tertiary-educated citizens, which together created favourable conditions for digital adoption. Businesses have benefitted from an ICT-literate workforce who can adopt and develop advanced technologies. These factors established favourable conditions for maintaining digital skills levels above the EU average. However, outcomes also reveal persistent divides across age and education groups, and ongoing shortages in advanced ICT specialists, which continue to constrain the country's digital transformation.

⁵ Approximately 30 local municipalities in Sweden possess a DigidelCenter. This is a physical venue where individuals can acquire knowledge and assistance regarding digital technologies. Citizens can receive personalised assistance to navigate challenges when engaging with routine internet services. They may also experiment—potentially for the first time—with equipment such as 3D printers, drones, and music editing software. DigidelCenters are situated next to accessible locations, such as public libraries, and are provided at no cost. Financial support is derived from multiple sources. Predominantly local municipalities and the Swedish Internet Infrastructure Foundation (European Commission (a), n.d.)

⁶ An annual event in Sweden, initiated in 2019, aimed at emphasising the potential and challenges associated with digitalisation. It seeks to motivate and empower all individuals to engage in digital growth through diverse activities and partnerships. The program unites enterprises, organisations, and individuals to advance digital competencies and inclusivity. As of January 2024, Digitalidag has integrated with the Swedish Post and Telecom Authority (PTS), augmenting its sustainability and scope (Santini, 2024)

4.4.2 Public Perceptions and Trust in Digital Services

The public's trust in Sweden's digital services arises from strong institutional credibility and a user-centred design approach (OECD, 2019a). Digital public service engagement reflects this confidence; in 2021, DESI data revealed that 93% of Swedish citizens interacted online with public authorities (European Commission, 2021b). This illustrates Sweden's leadership in digital engagement and the strength of its governance framework. In 2020, BankID was utilised by 98% of adults aged 18–67, demonstrating significant digital confidence by offering secure and dependable access to various services, including tax and healthcare portals such as 1177.se (BankID, n.d.).

Transparency and openness are fundamental principles in Sweden, embedded in the constitutional "offentlighetsprincipen" (public access to official documents) (Bergström, 2018). Sweden's digitalisation strategies explicitly embrace the constitutional principle of public access, ensuring that transparency extends into the digital domain (OECD, 2019a). Public dashboards that monitor government performance, like Statskontoret⁷, are examples of open data initiatives that reinforce confidence by enabling transparency and participation in digital services.

High trust in digital services reduces transaction costs and encourages higher uptake of e-government, paving the way for scalable innovation. For instance, pre-filled forms and once-only principles⁸ (European Commission, 2023b) reduces administrative burden. The secure log-in with BankID subsequently bolsters confidence in the digital domain. Moreover, Sweden's decentralised approach and multi-actor environment ensure that service development aligns with user needs and sustains satisfaction and engagement (OECD, 2019a).

Lastly, transparency and perceived reliability strengthen democratic legitimacy and civic empowerment (Government Offices of Sweden, 2016). By integrating secure identification and interoperable data systems, Swedish citizens were more confident about engaging with

⁷ The Swedish Agency for Public Management is the Government's organisation for analyses and evaluations of state and state-funded activities (The Swedish Agency for Public Management, n.d.).

⁸ The once-only principle (OOP) system enables both citizens and corporations to execute all their administrative activities throughout the EU more swiftly, simply, and efficiently. Citizens and enterprises will submit their data solely once to governmental authorities, which will safeguard, secure, and repurpose it (European Commission, 2020c).

government and health services more efficiently and transparently, which sustains institutional legitimacy in the digital era.

Nonetheless, challenges persist, particularly among the elderly, low-income groups, and those with limited digital skills who may distrust or struggle to use digital services effectively (The Swedish Internet Foundation, 2022). Added to this are growing concerns about privacy, data interoperability, and the ethical use of AI, which could erode trust if not addressed proactively (European Commission, 2024d).

Sweden's digital transformation has been facilitated by longstanding trust in government and institutions, robust digital infrastructure highlighted by systems like BankID, and compliance with GDPR rules. These conditions created a reliable environment for digital interaction, facilitating higher levels of e-service adoption among individuals and positioning Sweden at the forefront of the EU regarding digital trust, hence advancing Sweden's progress towards the 2030 targets. However, concerns over privacy among vulnerable groups show that trust, while it is strong, it remains fragile.

4.5 Economic and Structural Development of the ICT Sector

4.5.1 Investment in ICT Infrastructure

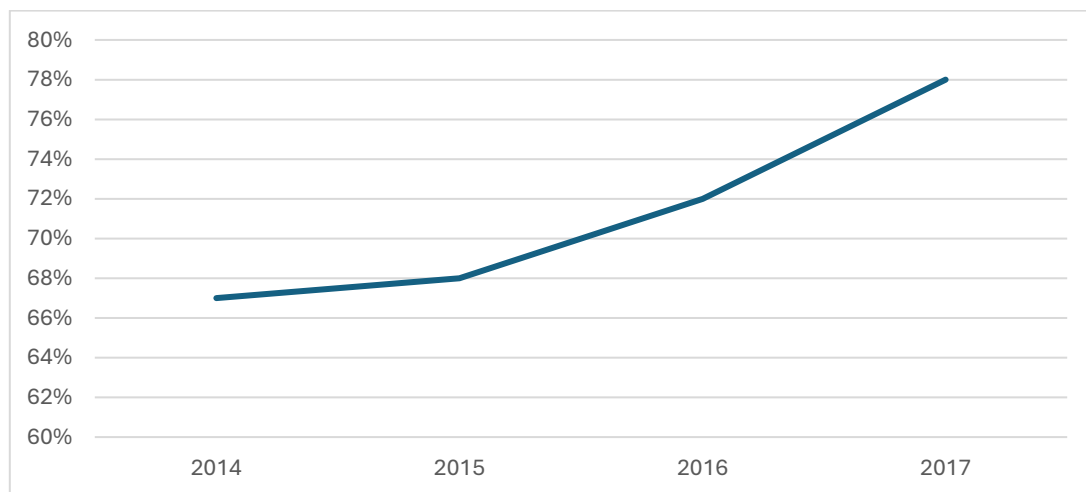


Figure 4.3: Fixed broadband adoption in Sweden 2014 – 2017 Source: European Commission (2018a)

In the period between 2013-2017, Sweden prioritised the expansion of fixed broadband infrastructure, focusing on fibre optic networks. As a result of this investment, the country experienced a steady increase in high-speed internet coverage. With fixed broadband accessible to 99% of residences in 2017, it has laid a robust foundation for societal digitisation. Figure

4.3 above shows the fixed broadband take-up as a percentage of households, and one can see an upward trend whereby the adoption of fixed broadband rose from 67% in 2014 to 78% in 2017. This is the result of Sweden’s 2009 and 2016 broadband strategies that had the ambitious goal that the country must have world-class broadband and be completely connected by 2025 (European Commission, 2018a).

The formal launch of next-generation network strategies led to an intensification of investment from 2018 onwards. Primarily, during the period 2018-2020 the focus shifted to the acceleration of the deployment of Fibre-to-the-Premises (FTTP) networks and the initiation of 5G pilot projects (European Commission, 2019).

Figure 4.4 shows the FTTP coverage as a percentage of households, and it can be observed that in just two years there was a significant intensification of 8%, where it increased from 72% in 2018 to 80% in 2020. This increase is the result of the national broadband strategy launched in 2016, which had the aim for 95% of all households and businesses to have access to at least 100 Mbps broadband by 2020. Furthermore, rural municipalities with limited market-driven investment saw the launch of public funding and regional broadband support schemes (European Commission, 2020a). The government during this period allocated SEK 850 million (\approx €80 million) to support regions lacking commercial viability in the broadband expansion. The DIGG played a pivotal role in coordinating national digital infrastructure efforts (OECD, 2019a).

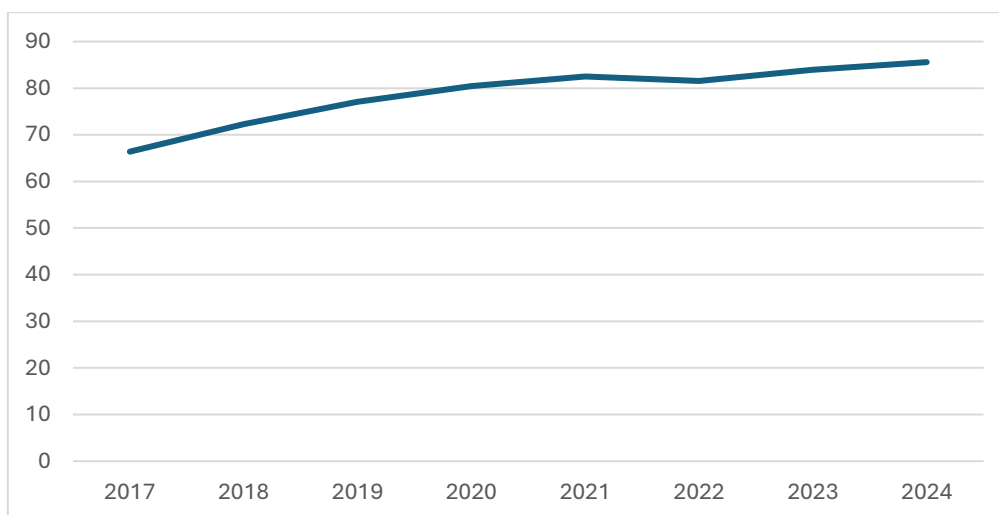


Figure 4.4: Fibre-to-the-Premises coverage in Sweden 2017-2023 Source: European Commission (2018-2023)

During this period, public investment played a crucial role. To support broadband infrastructure in underserved regions, Sweden allocated approximately SEK 4.45 million under the EU Rural Development Program (European Commission, 2023c). At the same time, the government, under Sweden's national strategy 'A Completely Connected Sweden by 2025', allocated SEK 150 million in 2020, SEK 200 million in 2021 and SEK 300 million in 2022 (Aconium GmbH, 2024). This shows commitment by the Swedish government, having doubled its allocation for investing in broadband in two years.

As mentioned above, public funding enabled a swift deployment compared to other EU member states. Between 2020 and 2022 alone, the PTS administered a cumulative total of SEK 2.9 billion in state aid funds (OECD, 2025).

During the period 2021 to 2023, Sweden moved towards a full-scale deployment of 5G networks with the target of reaching 99% of Swedish households to have fixed broadband access. By 2023 81.6% of Swedish households had fixed broadband access, with most of it delivered through fibre-optic connections. In parallel, the implementation of 5G infrastructure continued, focusing on urban centres and major corridors (European Commission, 2023a).

Sweden's systematic state investment strategy as early adopters in broadband and 5G is an example of how clear national objectives, in conjunction with public-private funding, can accelerate digital transformation. The early focus on fibre optics led to a solid foundation for the 5G deployment. These large-scale infrastructure investments have functioned as structural factors which contributed to Sweden's digitalisation, resulting in widespread connectivity. However, at the same time, the uneven rollout in rural areas has been an ongoing challenge, and as a result, it has slowed down the inclusiveness of transformation.

4.5.2 Digital Innovation Ecosystems

Favourable policy frameworks, advanced digital infrastructure, and a highly skilled labour force have led Sweden to develop one of Europe's most vibrant digital businesses and start-up ecosystems. As previously mentioned in Chapter 2, Stockholm has earned the reputation of being the unicorn factory of Europe, producing technology that is globally recognised, such as Spotify, Klarna, and Skype (Ketels et al., 2020).

In 2016, the government launched the Strategic Innovation Programs to drive innovation in Sweden by supporting collaboration between industry, startups, governments, and academia on emerging topics identified by the stakeholders themselves (European Commission, 2017). In

2017, Vinnova was responsible for sixteen innovation programs that were relevant for smart industries. One of the programmes is the Produktion 2030, a strategic research and innovation programme that aims to make Sweden the leader in investments in sustainable manufacturing by 2030. It is a public-private cooperation that brings together businesses, educational institutions, and research groups (European Commission, 2018b) By leveraging innovative expertise, robust relationships, and advanced technology, Produktion 2030 ensures Sweden's ongoing reputation as an attractive production hub (Produktion, 2025).

Sweden financed fifteen digital innovation hubs with approximately EUR 2.2 million in 2021 to support digitalisation on a regional level. These were provided with support by the Swedish Agency for Economic and Regional Growth and with the option to become part of the European network of Digital Innovation Hubs (European Commission, 2022). These initiatives and collaborations have resulted in Sweden being ranked first in the European Innovation Scoreboard and third in the Global Innovation Index (World Intellectual Property Organization, 2022).

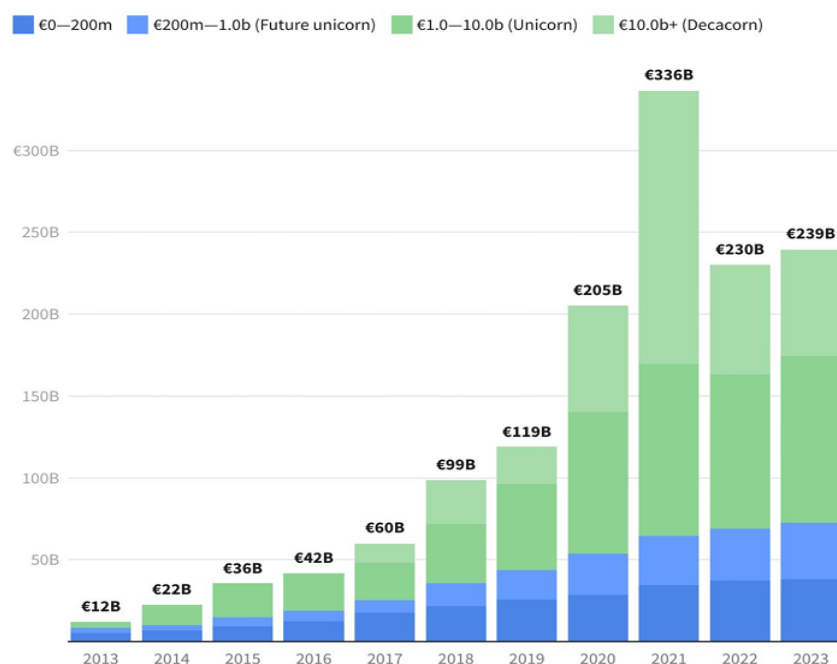


Figure 4.5 Swedish startup ecosystem value 2013-2023 Source: Dealroom.co (2024, p. 7)

Figure 4.5 represents the Swedish startup ecosystem value during the period 2013-2023 and the combined ecosystem value more than doubled from 2013 to 2023. It was only between 2021-2022 where the value of Swedish ecosystems has decreased by 28% due to a drop in the value of Swedish decacorns such as Klarna and Spotify (Dealroom, 2024). The Swedish Tech

Report 2023 found that Swedish startups were worth a combined Eur 239 billion, including forty-one unicorns.

The success of this ecosystem is partially attributed to capital support for start-ups, shown by Saminvest, a private equity investor established by the government in 2016 (Saminvest, n.d.). Additionally, to increase the number of unicorns, in 2022, Vinnova and Formas funded seventeen programmes aimed at facilitating strategic innovation initiatives. The aim is to enhance Sweden's competitiveness by collaboratively addressing strategically important issues. In September 2021, the government assigned Vinnova and the Swedish Agency for Economic and Regional Growth to devise strategies for research-intensive firms with prolonged development cycles to grow in Sweden (European Commission, 2023a).

Sweden's strong comparative advantage in digital industries, supported by an entrepreneurial ecosystem centred in Stockholm, innovation-friendly policies, and global integration, created favourable conditions for digital innovation. The outcomes of these conditions are visible in the ICT sector's substantial contribution to national GDP and in the growth of a thriving startup ecosystem that has produced internationally recognised firms such as Spotify and Klarna. Together, these outcomes have consolidated Sweden's position as a digital leader within Europe.

4.5.3 ICT Sector Contribution to GDP and Employment

The ICT sector in Sweden has a significant economic role. Sweden's capacity to adapt to the digital age has significantly contributed to recent economic performance. The ICT sector adds the most value to the economy of any OECD country. The country is also one of the top ten exporters of ICT services in the world (OECD, 2018).

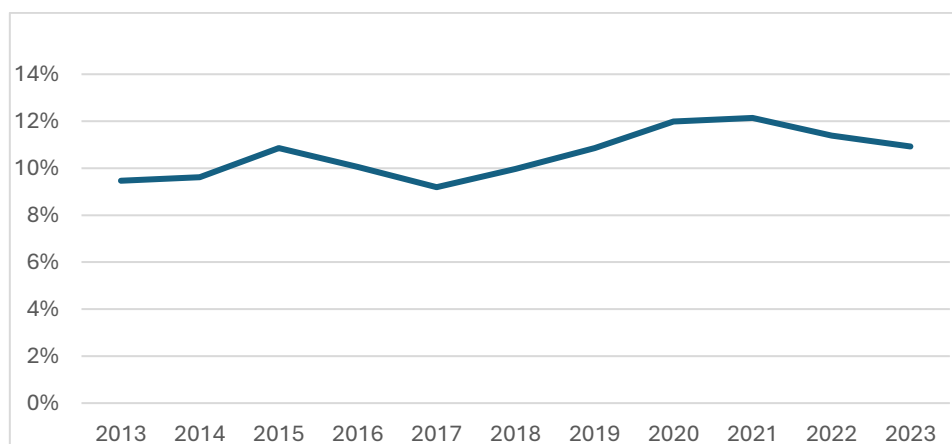


Figure 4.6: ICT sector value added in Sweden 2013-2023 Source: Statistica Business

The ICT sector has accounted for between 9%-12% of Sweden’s value added during the period 2013-2023. Figure 4.6 shows the ICT sector value added in Sweden for the period 2013-2023, and during the period 2020-2021, it was the highest at 12%. This surge can be attributed to the fact that during 2020-2021 the world was going through a pandemic, which was a major contributor to the digital transformation. This sustained value added of the ICT sector reflects Sweden’s robust digital ecosystem, which includes global technology firms like Ericsson, Spotify, and Klarna, alongside a thriving startup environment.

Figure 4.7 illustrates ICT specialists of the workforce. Consistently Sweden has ranked above EU average for the period 2013-2023. Furthermore, over the period, the percentage of the workforce in ICT roles continued to increase at a greater pace than the EU average.

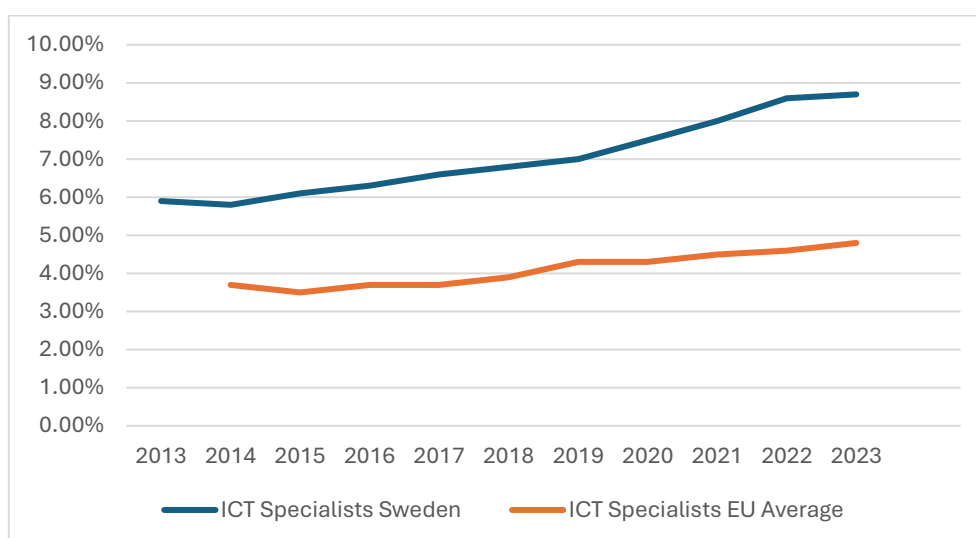


Figure 4.7: ICT Specialists of the Workforce 2013-2023 Source: European Commission

The OECD (2018) identifies the uptake of ICT at work as a key factor in developing digital skills. ICT uptake at work remains above average in Sweden, particularly in the use of digital tools like Customer Relation Management (CRM) software and cloud services. This significant ability in the workforce highlights Sweden's competitive advantage in advanced digital skills, reflecting both its strong labour market readiness and its capacity to sustain digital innovation.

The strong performance of Sweden’s ICT workforce and the country’s comparative advantage in digital skills have provided the conditions for sustained innovation and competitiveness. The outcome of these conditions is reflected in the ICT sector’s substantial and consistent

contribution to GDP and above-EU-average employment in ICT specialisations, confirming the sector's role as a key result of Sweden's broader digital transformation.

4.6 Conclusion

The aim of the chapter was to address the research question of how the ICT sector has evolved in Sweden over the period 2013-2023, and what the key factors behind this transformation were. The analysis of policy frameworks, economic performance, institutional practices, and the societal aspects have shown that Sweden's digital transformation has been both intentional and multi-dimensional, rooted in strong governance, sustained investment, and elevated levels of societal trust.

The first driver leading this digital transformation was Sweden's strategic policy frameworks, such as the 2017 'Digital Strategy for a Sustainable Digital Transformation', supported by decentralised governance through municipalities and agencies such as DIGG. These frameworks created flexibility and encouraged local innovation, though they also produced uneven implementation and regional disparities. A second factor was extensive investment in digital infrastructure, which provided near-universal broadband, FTTP, and 5G coverage. A third important driver was Sweden's comparative advantage in digital industries, rooted in an innovation-friendly ecosystem and global integration, which supported entrepreneurship and positioned Sweden to capitalise on digital opportunities. Finally, societal conditions such as high levels of trust in digital institutions and strong digital skills facilitated widespread adoption, although shortages of advanced ICT specialists and gaps among older adults, migrants, and rural residents constrained long-term sustainability.

Finally, the effects of these factors were evident across the private sector [ST1], the public sector, and the economy. Enterprises, particularly large firms, reached high adoption rates of cloud computing and big data, while SMEs advanced more slowly. In the public sector, e-services such as BankID and the health portal [1177.se](https://www.1177.se) achieved near-universal uptake, reflecting both institutional commitment and citizen trust, even if decentralisation produced challenges of interoperability and quality. The ICT sector expanded significantly, generating above-EU-average employment in ICT occupations and supporting a thriving startup ecosystem that produced several unicorns, positioning Sweden as one of Europe's most dynamic ICT hubs.

Therefore, the evolution of Sweden's ICT sector over the period 2013-2023 has been driven by a combination of strategic policy frameworks, infrastructure investment, decentralised and

capable institutions, comparative advantage in digital industries, and enabling societal trust, while being constrained by skills shortages and uneven regional progress.

5. Comparative Analysis of Digital Transformation in the European Union

5.1 Introduction

This chapter primarily addresses the second research question, that is, what Sweden's key drivers and barriers are in adopting digital technologies, and how do these compare to those in other European countries. The comparative analysis focuses on Sweden and other high-performing member states which are Denmark, and the Netherlands whilst also comparing with countries that continue to face challenges. By adopting a comparative perspective, the analysis seeks to determine whether Sweden's experience reflects any European patterns, diverges from them, or provides distinctive lessons for digital governance. This is because member states share a common policy environment partly originating from policies such as the Digital Single Market and the Digital Decade 2030, but their outcomes differ.

The chapter will start by comparing connectivity and infrastructure, and the integration of digital technologies in businesses. Thereafter, it will compare human capital and digital skills, and the digitalization of public services. Finally, the chapter will compare national digital strategies, governance models, and regulatory environments. To conduct the comparison, data from the DESI, International Communications Union (ITU), and European Investment Bank will be utilised. The data years differ across indicators due to variations in availability as illustrated in Appendix A.

5.2 Connectivity and Infrastructure

Connectivity is considered as one of the strongest determinants of digital competitiveness within the EU, as it enables advanced digital services, cloud adoption, and e-government. (Laitsou et al., 2020) Moreover, 76% of Europeans think that better connectivity is necessary for improving their lives and economic prospects with almost 30% of them requesting to strengthen the availability to high-speed internet (Connect Europe, 2024).

While member states have made progress in broadband rollout, significant disparities exist in relation to next-generation access and the pace by which 5G is being deployed.

Table 5.1 depicts broadband coverage across EU member states, as a percentage of households with access to gigabit networks. As shown in the data, most of the frontrunners are in northern and western Europe including Sweden, Denmark, and the Netherlands which consistently outperform the EU average. On the other hand, southern and eastern states such as Greece, the Czechia, and Italy continue to experience barriers such as low public investment in relation to

network expansion, slowing progress toward the EU Digital Decade 2030 target of universal gigabit networks.

	2018	2019	2020	2021	2022	2023
Austria	6.27	13.80	39.26	45.37	54.83	67.62
Belgium	20.49	66.48	67.52	68.92	78.28	91.20
Bulgaria	6.66	65.24	75.24	81.39	85.61	88.61
Cyprus	4.73	10.14	26.19	41.43	60.00	77.07
Czechia	8.09	29.27	33.31	52.47	53.21	50.54
Germany	15.04	34.44	55.87	74.93	70.14	74.74
Denmark	13.57	92.96	93.84	94.90	96.28	97.19
Estonia	10.82	57.45	70.88	73.40	76.31	76.94
Greece	12.59	7.05	10.17	19.81	27.85	38.41
Spain	10.72	89.04	91.70	93.84	93.29	96.32
European Union	12.26	50.29	59.51	69.73	73.25	78.64
Finland	18.95	61.77	66.73	68.01	70.77	77.72
France	16.15	43.76	52.59	63.38	73.40	81.40
Croatia	10.33	43.22	46.51	52.28	61.48	67.79
Hungary	6.17	42.57	48.57	71.82	80.27	84.13
Ireland	20.26	35.37	65.72	71.68	72.20	78.53
Italy	7.09	29.97	33.73	44.16	53.71	59.62
Lithuania	13.67	61.02	67.05	78.23	78.02	78.06
Luxembourg	16.38	90.70	91.70	92.60	93.30	94.70
Latvia	7.71	58.29	59.76	62.51	62.73	67.98
Malta	24.4	100.00	100.00	100.00	100.00	100.00
Netherlands	22.01	88.61	89.76	90.64	97.84	98.33
Poland	7.89	60.31	64.56	69.97	70.73	81.09
Portugal	12.94	83.00	86.63	90.54	93.02	94.17
Romania	11.12	68.15	75.94	87.09	95.59	94.99
Sweden	9.52	77.12	80.50	82.55	81.62	88.46
Slovenia	10.21	63.79	65.58	72.44	75.52	78.51
Slovakia	9.35	45.49	50.21	66.69	71.31	69.12

Table 5.1 Broadband coverage in EU Member States (% of households with access to gigabit networks) Source: European Commission

Sweden’s case is similar to that of Denmark and the Netherlands, where early and sustained investment in fibre created the foundations for rapid 5G rollout (Haanpera et al, 2024; Telecom Infrastructure Partners, 2024). Sweden has consistently made progress between 2018 and 2023 from the start of the period it reports very high rates compared to other member states positioning it as a frontrunner among the EU. This is because, while other member states relied heavily on EU structural funds to reduce connectivity gaps (European Court of Auditors, 2018), Sweden’s investment has been mostly self-sustaining, the result of long-term policy stability, public–private collaboration, and the inclusion of municipalities (European Commission, 2025e). Denmark’s experience is similar to that of Sweden, where local authorities played a crucial role in accelerating fibre deployment (Mölleryd, 2015). Even the Netherlands, experienced a similar acceleration in fibre deployment as Sweden. This is partly due to the open access frameworks that as a result supported next-generation deployment incentives across liberalised markets (BEREC, 2012). Hence, Sweden’s experience can be seen to be in

alignment with other EU frontrunners in Northern Europe when it comes to connectivity leadership (FTTH Council Europe, 2024).

	2021	2022	2023
Austria	0.00	0.00	0.00
Belgium	0.64	3.29	4.57
Bulgaria	0.67	0.87	1.01
Cyprus	0.19	0.98	2.07
Czechia	0.91	1.42	2.95
Germany	3.01	4.57	5.45
Denmark	12.62	19.81	28.72
Estonia	0.05	0.10	0.17
Greece	0.00	0.00	0.00
Spain	0.02	15.17	20.34
European Union	10.05	14.94	18.47
Finland	2.38	3.19	4.02
France	33.62	43.17	51.57
Croatia	0.00	1.03	3.22
Hungary	26.19	32.60	37.19
Ireland	5.30	7.97	9.48
Italy	10.79	14.73	19.16
Lithuania	1.11	1.92	2.56
Luxembourg	4.40	6.83	9.86
Latvia	0.00	0.00	4.66
Malta	2.76	6.81	11.69
Netherlands	0.00	1.88	4.13
Poland	3.04	3.66	5.29
Portugal	2.32	5.15	9.07
Romania	20.61	26.11	30.45
Sweden	5.39	6.41	7.53
Slovenia	0.03	4.94	9.48
Slovakia	1.18	1.01	1.76

Table 5.2 Fixed Broadband subscription rate (% of households subscribing to gigabit internet) Source: European Commission

Yet, barriers remain. Table 5.2 shows the fixed broadband subscription rate as a percentage of households. Although Sweden has very high gigabit availability, household subscription rates lag behind, a challenge that can also be seen in other high-performing countries such as the Netherlands and Denmark. This reflects the persistent divide between infrastructure provision and actual adoption, a problem which is also highlighted by the OECD (2025) which mentions affordability, consumer trust, and digital literacy to be as important as coverage in achieving effective uptake. In the Netherlands, for example, the lack of competition at the infrastructure level and the granting of access to competitors has hurt the retail market. Even though the rate of fibre penetration is high, an effective "duopoly network market" shared by major telecom operators KPN and Ziggo has made consumers pay some of the highest prices in the EU for a fixed Internet connection (The European Consumer Organisation, 2024).

Figure 5.1 illustrates rural coverage across Europe in 2022. Denmark had 86% of rural broadband coverage which was one of the highest in 2022 (FTTH Council Europe, 2023). However, in Sweden (61%) and the Netherlands (58%) the rural broadband coverage is close

to the EU average of 56%. In Denmark to achieve such high rate of government the following action plans were implemented:

“The National Broadband Fund, which was established in 2016, and has been more strictly focused on less populated areas since 2018, offers grants for rolling-out broadband with at least 100/30 Mbps in areas which only have access to maximum 10/2 Mbps. For 2019 the fund had a volume of DKK 100 million (EUR13.5 million). In 2020, the DEA was planning a state aid scheme, establishing a more concise framework for financial grants from municipalities to support the local roll-out of digital infrastructure.” (FTTH Council Europe, 2022 p. 21)

Rank	EU27+UK	Rural FTTH/B coverage (2022)
1	Denmark	86%
2	Romania	83%
3	Latvia	77%
4	Spain	74%
5	Portugal	70%
6	Bulgaria	68%
7	Sweden	61%
8	Netherlands	58%
9	Ireland	57%
10	Luxembourg	54%
11	Slovenia	52%
12	Lithuania	49%
13	France	43%
14	Hungary	42%
15	Poland	41%
16	UK	35%
17	Italy	33%
18	Slovakia	25%
19	Cyprus	25%
20	Estonia	22%
21	Austria	20%
22	Finland	16%
23	Germany	13%
24	Croatia	8%
25	Czech Republic	8%
26	Belgium	1%
27	Greece	0%
28	Malta	0%

Figure 5.1 Rural Broadband Coverage, Source: FTTH Council Europe, 2022 p. 10

Starting conditions and investment capacity determine whether infrastructure acts as an enabler or a bottleneck. Sweden's trajectory has shown how early commitment and investment capacity can create long-term competitive advantages in relation to digital infrastructure. However, as with Denmark's and the Netherlands' trajectory, digital adoption does not depend only on infrastructure but also affordability, consumer trust, and digital literacy. Sweden's strong broadband and 5G infrastructure shows that high-quality connectivity is a key driver of digital

adoption, enabling these countries move towards the EU Digital Decade benchmarks. However, barriers such as disparities in rural coverage persist in Sweden and the Netherlands.

5.3 Integration of Digital Technologies in Business

A crucial driver of productivity, innovation, and competitiveness within the EU is the adoption of digital technologies in businesses. One of The EU Digital Decade 2030 targets is that by 2030, 75% of EU companies across Europe integrate Cloud, AI, or Big Data. Overall, in the EU there has been a steady progress however the EU average remains below the target with wide variations between frontrunners and slow- moving countries (European Commission, 2024b).

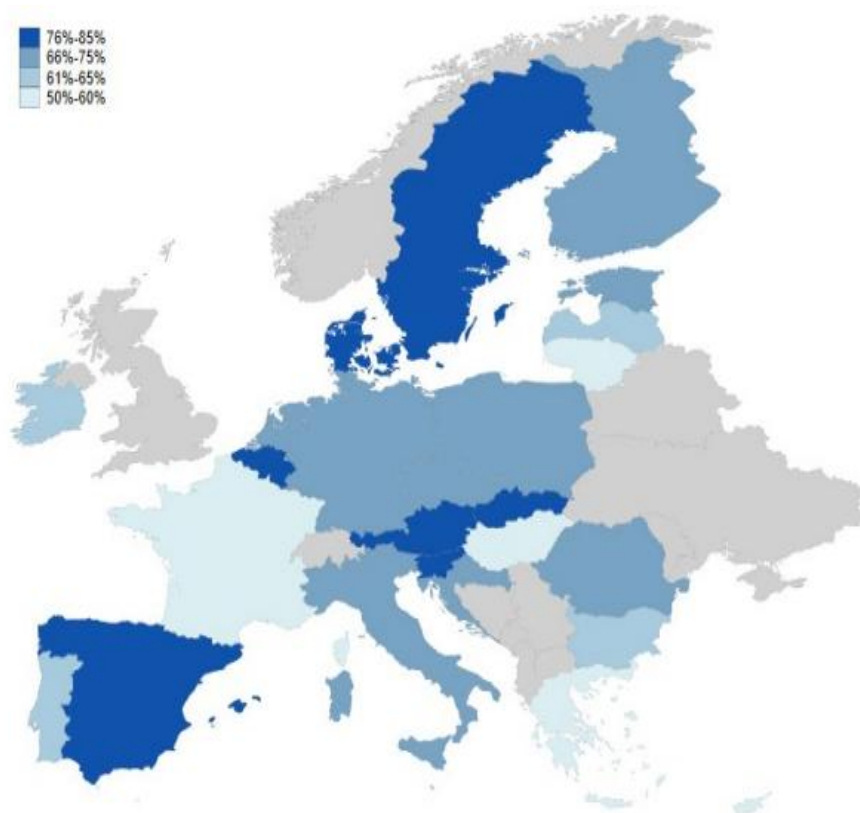


Figure 5.2 Use of advanced digital technologies (% of firms), by country Source: EIBIS, 2022 p. 4

One of the most widespread advanced technologies adopted among EU enterprises is cloud computing (European Commission, 2025b). Figure 5.2 shows the use of advanced technologies as a percentage of firms as of 2022. Sweden, the Netherlands, and Denmark are in the higher brackets and have consistently recorded higher adoption rates than the EU average. This is the result of mature ICT ecosystems and a robust demand from medium-to-large firms. In the Netherlands, a strong open-access environment and competition among major providers have

also supported widespread advanced technologies among firms (Authority for Consumers & Markets, 2023). By contrast, Greece, and France continue to lag, further highlighting the structural divergence (European Investment Bank, 2023).

	2021	2023
Austria	8.83	10.79
Belgium	10.32	13.81
Bulgaria	3.29	3.62
Cyprus	2.59	4.67
Czechia	4.46	5.9
Germany	10.56	11.55
Denmark	23.89	15.17
Estonia	2.77	5.19
Greece	2.61	3.98
Spain	7.67	9.18
European Union	7.65	8.06
Finland	15.79	15.1
France	6.67	5.88
Croatia	8.74	7.89
Hungary	2.98	3.68
Ireland	7.88	8.01
Italy	6.17	5.05
Lithuania	4.45	4.86
Luxembourg	13	14.45
Latvia	3.72	4.53
Malta	10.16	13.17
Netherlands	13.1	14.1
Poland	2.86	3.67
Portugal	7.2	7.86
Romania	1.38	1.51
Sweden	9.92	10.37
Slovenia	11.73	11.37
Slovakia	5.19	7.04

Table 5.3 Enterprises adopting Artificial Intelligence technologies (% of enterprises) Source: European Commission

Table 5.3 represents enterprise AI adoption as a share of enterprises using at least one AI technology. Sweden, Denmark, and the Netherlands lead within the EU, supported by complementary drivers such as early digital strategies, active research–industry links, and targeted programmes for experimentation, skills, and standards (World Economic Forum, 2025). However, within the frontrunner cluster, that Sweden, Denmark, and the Netherlands form part of, there are still gaps between large firms and SMEs. This could be part of the reason why it would slow down the progress in meeting the Digital Decade target that of 90% of SMEs reach at least a basic level of digital intensity.

The Nordic model is characterised by early adoption and strong alignment between government and business strategies (OECD, 2024). In Sweden the high percentage of SMEs (OECD, 2018), and the dense link between universities and industries (Nikounejad et al., 2023), and the policy alignment with EU and AI frameworks (European Commission, 2020b; Jorge et al., 2022) support faster adoption of technology. The same applies for Denmark whereby, the ‘Digital

Hub Denmark’ which acts as a national platform connecting firms, researchers, and technology entrepreneurs to co-develop solutions (Digital Hub Denmark, n.d.), while initiatives such as ‘SME:Digital’ and the ‘National Strategy for Digitalisation’ were launched to directly target the persistent SME adoption gap (European Commission, 2024c). In the Netherlands, the AICoalition4NL is a public–private partnership of more than 400 participants. It includes the Netherlands AI Coalition (NL AIC) launched in 2019 and the AiNed programme launched in 2021. It is supported by €276 million from the National Growth Fund to finance research and development, skills development, and SME adoption (European Commission, 2021c). Hence, enterprise structure, ecosystem density, and EU-aligned policy instruments are the common drivers behind frontrunner performance (OECD, 2021).

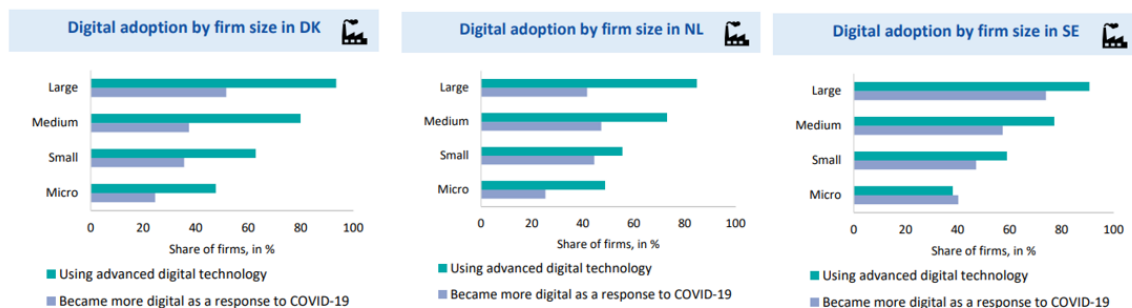


Figure 5.3 Digital Adoption by firm size Source: EIBIS, 2022 p. 48, 61, 68

Despite this, Sweden, Denmark, and the Netherlands still experience persistent challenges. It is more likely for larger firms and digitally intensive firms to adopt advanced technologies, primarily due to their greater resources, in-house expertise, and absorptive capacity, leaving SMEs at risk of lagging behind (OECD, 2021). Figure 5.3 illustrates the digital adoption by firm size for Denmark (DK), the Netherlands (NL), and Sweden (SE). It is shown that the size of the firm makes a difference in the digital adoption rate. In 2020 COVID-19 accelerated the pace of investment in technological solutions, as governments and organisations sought to maintain service delivery and resilience. In all three countries as a response to COVID-19 larger firms have been more able to adopt digital technologies at a faster rate than the small or medium enterprise (European Investment Bank, 2023)

Other barriers for SMEs which still exist are costs of adoption, skills shortages and the perceived risks of emerging technologies such as AI (Kergroach and Heritier, 2025). This ‘‘SME gap’’ can also be seen across Europe and even in top-performing states. and it represents a critical bottleneck in meeting the EU’s Digital Decade objective of 75% of EU companies using cloud, AI, or Big Data (Godlovitch and Bodin, 2022).

Sweden’s high rates of adoption of advanced technology aligns closely with Denmark and the Netherlands, reflecting strengths in the strong collaboration between businesses and research institutions and investment in digital infrastructure coherence. Yet, as in Denmark, and the Netherlands, the persistent SME adoption gap remains the central obstacle to meeting Digital Decade goals. For these high-performing countries, it could mean that diffusion gaps, rather than frontier innovation, are the main EU obstacle to reaching Digital Decade business targets.

5.4 Human Capital and Digital Skills

Human capital is another important aspect of digital transformation. Lacking human capital, infrastructure alone cannot bring out the benefits of digital transformation as there are less skills to use it effectively. Similarly to connectivity, progress across the EU has been uneven which has been acting as a barrier for competitiveness and inclusivity despite the EU’s Digital Decade Policy target of at least 80% of those aged 16-74 having at least basic digital skills by 2030.

	2021	2023
Austria	63.33	64.68
Belgium	54.23	59.39
Bulgaria	31.18	35.52
Cyprus	50.21	49.46
Czechia	59.69	69.11
Germany	48.92	52.22
Denmark	68.65	69.62
Estonia	56.37	62.61
European Union	53.92	55.56
Greece	52.48	52.4
Spain	64.16	66.18
Finland	79.18	81.99
France	61.96	59.67
Croatia	63.37	58.95
Hungary	49.09	58.89
Ireland	70.49	72.91
Italy	45.6	45.75
Lithuania	48.84	52.91
Luxembourg	63.79	60.14
Latvia	50.8	45.34
Malta	61.23	63.02
Netherlands	78.94	82.7
Poland	42.93	44.3
Portugal	55.31	55.97
Romania	27.82	27.73
Sweden	66.6	66.44
Slovenia	49.67	46.7
Slovakia	55.18	51.31

Table 5.4 Individuals with At least Basic digital skills (% of population aged 15-74) Source: European Commission (2021, 2023)

Table 5.4 shows the individuals with at least basic digital skills as a percentage of the population aged 15-74 for the years 2021 and 2023. Sweden consistently performs above the EU average in digital skills, a factor that has driven broad adoption of digital tools. Sweden’s performance reflects early integration of digital tools in education through the National

Digitalisation Strategy and a labour market characterised by high levels of digital readiness. Similarly, in the Netherlands and Denmark, they have recorded high levels of digital literacy. By contrast, member states in southern and eastern Europe such as Romania, Bulgaria, and Italy report significantly lower digital skills in 2021 and 2023. This reflects structural weaknesses in education systems and workforce training (AWS, 2024).

Sweden ranks among the highest in the EU, alongside Denmark, the Netherlands, and Finland in relation to ICT specialists as a share of total employment. Denmark to encourage more people to become ICT professionals it launched initiatives such as ‘SME:Digital’ and digital apprenticeship schemes (European Commission, 2024a), while the Netherlands has invested in large-scale programmes under the ‘Dutch Digitalisation Strategy’ and ‘AiNed’ programme to expand ICT capacity (European Commission, 2021c). Yet, despite this advantage, all three frontrunners face a persistent skills shortage, which is similar the experience of other frontrunners. One of the reasons, as reported by Eurostat (2022), is that ICT remains a fast-growing sector, where demand for specialists consistently exceeds supply. Moreover, competition for talent from outside the EU, mainly the United States and Asia, increases this challenge (Statistics Sweden, 2023).

Gender and inclusivity are two other aspects which are mentioned in the EU’s Digital Decade 2030. Table 5.7 illustrates female ICT specialists as a percentage of the total ICT specialists in the workforce. Across all members states a gender gap across the period 2017-2023 persists. Sweden has made comparatively more progress in narrowing this divide, reflecting targeted initiatives to promote women in STEM and ICT (Women in Tech Sweden, 2024). Denmark and the Netherlands have also launched gender-focused programmes for instance, Denmark has launched the ‘Women in Tech DK’ (Women in Tech DK, 2024) and the Netherlands’ has launched the ‘Diversity in Tech initiatives’ (United Nations Economic Commission for Europe, 2024) however the gender gap divide in ICT still persists. Moreover, Romania and Bulgaria are the two top high rates where they have a high percentage of ICT female specialists which even surpass Sweden, Denmark, and the Netherlands.

Sweden’s performance demonstrates how the importance of specialised skills simultaneously as a driver and a barrier. High levels of digital literacy and a strong ICT workforce encourage adoption and innovation. At the same time, persistent shortages of ICT professionals, alongside gender imbalances, highlight structural bottlenecks that even frontrunners face. Comparative research on Nordic and Northwestern states suggests that education systems with early digital

integration, strong public–private skills partnerships, and lifelong learning infrastructures (OECD, 2021; European Commission, 2024b) are critical for sustaining digital leadership. The EU’s Digital Decade target of 20 million ICT specialists by 2030 remains at risk. Sweden, Denmark, and the Netherlands must strengthen their efforts to broaden inclusion and scale skill formation.

5.5 Digital Public Services and e-Government

Digital public services represent a cornerstone of the EU’s vision for a Digital Decade, which targets that 100% of key public services for citizens and businesses be available online by 2030. Effective e-government is not only a driver of efficiency but also enhances transparency, accessibility, and trust in governance.

	2017	2018	2019	2020	2021	2022	2023
Austria	85.19	85.56	94.19	87.54	75.78	78.42	80.72
Belgium	74.22	74.34	76.12	71.11	72.19	81.45	82.33
Bulgaria	49.98	51.37	54.39	56.91	58.55	59.52	67.47
Cyprus	57.47	58.06	73.82	66.39	56.14	63.62	73.96
Czechia	68.24	70.02	72.19	70.60	75.37	76.17	76.33
Germany	71.43	71.35	72.25	72.21	75.74	78.44	75.83
Denmark	83.08	83.08	85.39	84.27	83.28	84.05	84.24
Estonia	90.32	91.33	92.01	91.36	92.10	94.04	95.83
Greece	61.33	62.40	63.35	53.91	52.35	64.60	75.92
European Union	72.01	73.13	76.90	74.93	74.63	77.03	79.44
Spain	71.35	67.45	71.55	82.48	87.07	86.19	84.18
Finland	89.61	89.83	89.94	86.75	89.83	91.62	90.61
France	80.21	83.79	88.60	73.40	69.42	71.29	72.09
Croatia	49.90	52.08	58.05	60.29	69.02	71.12	67.17
Hungary	45.62	49.64	55.98	54.34	64.40	67.87	73.36
Ireland	85.30	84.71	84.69	85.76	79.98	81.07	81.21
Italy	59.59	62.09	71.75	69.32	67.36	67.91	68.28
Lithuania	70.78	71.08	70.54	72.69	82.14	83.85	86.70
Luxembourg	75.31	81.98	84.99	90.28	93.43	94.78	94.78
Latvia	83.84	84.74	89.33	87.03	87.32	87.17	88.22
Malta	99.94	100.00	100.00	99.58	99.64	100.00	100.00
Netherlands	85.80	83.45	81.18	86.29	84.56	84.62	85.87
Poland	62.06	62.70	65.49	64.98	57.30	59.92	63.73
Portugal	79.33	82.07	82.50	84.77	78.90	77.83	81.54
Romania	45.56	49.62	53.90	44.37	44.24	47.58	52.18
Sweden	92.56	93.53	94.45	88.21	85.41	88.17	93.28
Slovenia	72.08	73.24	82.12	74.33	68.51	71.35	77.00
Slovakia	54.05	54.67	66.84	63.57	64.89	67.24	72.06

Table 5.5 Availability of digital public services for citizens (% of services fully online) Source: European Commission

According to DESI data, Sweden has consistently ranked among the leaders in digital public services, alongside Denmark and the Netherlands, as illustrated in Table 5.5 showing the share of key digital services online. The same is when it comes to availability of digital public services for businesses as shown in Table 5.6. Sweden’s high score is the result of early implementation of digital identity infrastructure and extensive investment in e-government

portals, which allow for the interaction between citizens, businesses, and the state (OECD, 2020b). Denmark’s Borger.dk portal and the Netherlands’ DigiD system are e-government cases where a coherent national framework and widespread adoption have created high levels of citizen trust and usage (European Commission, 2024d).

	2017	2018	2019	2020	2021	2022	2023
Austria	86.88	89.44	94.44	85.36	81.43	82.86	82.86
Belgium	83.42	83.32	93.33	85.33	81.01	87.56	91.59
Bulgaria	86.20	90.21	92.71	87.34	76.23	80.76	91.88
Cyprus	91.94	91.50	91.74	85.76	85.80	84.68	86.07
Czechia	82.49	81.50	81.50	75.75	80.75	83.75	83.75
Germany	86.83	82.18	92.18	87.59	79.86	80.67	78.58
Denmark	99.58	100.00	100.00	95.83	88.69	88.69	88.69
Estonia	94.12	95.00	100.00	97.50	97.50	98.75	98.75
Greece	58.20	60.11	62.61	54.06	47.60	73.70	86.20
Spain	94.69	93.25	93.25	93.63	93.63	91.00	91.00
European Union	83.08	84.60	87.72	84.40	81.71	83.73	85.42
Finland	82.67	87.33	92.33	92.50	92.50	100.00	100.00
France	83.17	84.40	92.27	91.40	80.14	79.31	79.31
Croatia	57.59	59.38	61.61	72.65	68.06	66.81	66.18
Hungary	69.42	75.78	80.78	76.25	73.75	76.25	74.86
Ireland	98.17	99.17	99.17	100.00	100.00	100.00	100.00
Italy	82.77	83.93	94.56	88.81	78.74	74.71	76.27
Lithuania	92.33	92.88	92.88	95.94	92.81	94.38	95.94
Luxembourg	83.21	90.63	98.96	96.67	96.67	96.67	96.67
Latvia	94.24	91.43	91.43	85.00	85.83	85.83	87.22
Malta	95.00	95.00	95.00	95.00	97.22	97.22	100.00
Netherlands	84.38	87.60	87.60	83.33	87.78	89.44	86.67
Poland	69.80	75.44	77.94	66.56	69.62	72.74	72.88
Portugal	90.00	90.00	90.00	85.83	81.94	81.94	81.94
Romania	52.42	54.73	54.74	49.29	42.27	44.61	50.03
Sweden	93.39	93.39	93.54	93.90	87.85	87.85	95.97
Slovenia	75.65	77.57	79.45	78.13	83.96	82.71	83.96
Slovakia	74.71	79.16	84.31	79.41	74.54	77.93	79.18

Table 5.6 Availability of digital public for businesses (% of services fully online) Source: European Commission

The three main factors of why countries such as Sweden, Denmark, and the Netherlands leaders in relation to digital public services are a combination of institutional trust, robust technological infrastructure, and policy coherence. Citizens are more willing to engage with digital government platforms when they perceive high standards of data security and reliable service delivery, conditions cultivated in Nordic and Northwestern states over the period 2013–2023 (OECD, 2020a; European Commission, 2024d). An important determinant has been the implementation and integration of national digital identity systems, such as BankID in Sweden, NemID/MitID in Denmark, and the DigiD system in the Netherlands. These frameworks not only enable secure access but also encourage trust, which would result to high levels of uptake and usage of e-government services (Netherlands Court of Audit, 2022; European Commission, 2025b).

Denmark is often seen as a model, where the Borger.dk portal and mandatory use of digital communication with authorities have ensured near-universal coverage. Similarly, the Netherlands has gradually expanded DigiD across all key public and health services, funded by investments under the Dutch Digitalisation Strategy. Sweden's BankID, covering more than 95% of the adult population, shows how state-private partnership can foster adoption (European Commission, 2024a). Hence, strong digital identity ecosystems, aligned with citizen trust, are central drivers of digital public service success.

On the other hand, lagging member states face two main kinds of challenges, lower levels of institutional trust and fragmented digital infrastructure. Even when online services exist, concerns about data protection, bureaucratic inefficiencies, or lack of interoperability reduce citizen engagement (European Commission, 2024c). This shows that digital public service adoption is not just a matter of technology, but also of governance culture and institutional design.

Sweden's case highlight that trust, secure digital identity, and policy continuity are key drivers of citizen uptake of e-government services. Sweden's trajectory is very much the same as like other EU frontrunners such as the Netherlands and Denmark, where benchmarks on service availability and use are high. However, low trust and fragmented infrastructure remain as barriers in lagging member states, preventing EU achievement of Digital Decade public service goals.

5.6 Policy and Governance Comparisons

5.6.1 National Digital Strategies

National digital strategies are the key policy frameworks through which member states pursue digital transformation. At the EU level, the Digital Single Market and the Digital Decade 2030 establish common objectives, which are universal connectivity, high levels of digital skills, widespread adoption of advanced technologies, and fully digital public services (European Commission, 2021a). However, the implementation of strategies remains largely at national, which produces divergences in focus and outcomes.

Sweden was among the first in Europe to adopt integrated digital strategies which incorporate infrastructure, innovation, and social inclusion. Its 'National Digital Strategy for the School Sector' (2017) promoted early digital skills (Gustafsson, 2024). Moreover, the 'Digital Development Strategy' (2019) set out a coordinated framework for municipalities, regions, and

agencies, emphasising interoperability, shared infrastructure, and citizen-centred digital services (Digital Skills and Jobs EU, 2023). These policies aligned closely with EU goals while maintaining a strong domestic emphasis on inclusivity and innovation ecosystems (OECD, 2018).

Denmark and the Netherlands show how coherent national strategies drive digital leadership in line with EU objectives. Denmark's Digital Strategy 2016–2020 laid the foundation for e-government with the implementation of two identity systems which are Borger.dk and the NemID/MitID. At the same time, the launch of the Digital Strategy 2022–2025 emphasised on ethical AI, cybersecurity, and citizen-centric services (European Commission, 2024c). The Netherlands, through its Dutch Digitalisation Strategy (2018, updated 2020), focused on infrastructure, innovation, and AI adoption, supported by the National Growth Fund to increase AI research and digital skills (The Dutch Research Council, n.d.). Together, these cases show how strategic clarity, trust, and investment capacity encourage high digital service provision and uptake.

Hence, national strategies can act as drivers when they are coherent, integrated, and aligned with EU objectives. Sweden, Denmark, and the Netherlands illustrate how strategic clarity and institutional capacity enable member states to effectively incorporate Digital Decade benchmarks into national action. On the other hand, when strategies are fragmented or there is lack alignment, they become barriers to achieving EU goals. This underlines that successful digital transformation is as much about governance culture, inclusivity, and long-term policy continuity as it is about infrastructure.

5.6.2 Centralised vs Decentralised Governance Models

The governance of digital transformation varies considerably across the EU. Some countries adopt a highly centralised framework, while others rely on decentralised or hybrid approaches. These institutional choices influence the coherence of digital policy, the pace of implementation, and the extent of alignment with EU-level objectives (OECD, 2014).

As defined by OECD (2020a) centralised models concentrate responsibility for steering and coordinating digital governance in a central authority, enabling common standards, cross-policy alignment, and faster implementation. However, the downside is the reduced flexibility for regional or municipal adaptation. Decentralised models, by contrast, distribute responsibility across multiple ministries, agencies, and levels of government (OECD, 2019c).

Although this encourages local responsiveness and experimentation it risks fragmentation and duplication if common standards are not enforced.

Centralised model is exemplified by Denmark. Denmark's Agency for Digital Government has the power to coordinate and set standards for digital initiatives across all ministries and sectors (Agency for Digital Government, n.d.). On the other hand, the Netherlands illustrates a hybrid approach that is, where ministries and local authorities retain significant implementation responsibilities, but central coordination has been strengthened through the Digital Government Act (2021) and the role of the Ministry of the Interior (OECD, 2023a). These approaches have constantly placed Denmark and the Netherlands at the top of EU benchmarking.

By contrast, Sweden follows a more decentralised governance model. DIGG was established in 2018 to provide national coordination, significant responsibility continues to rest with municipalities, regions, and sector-specific agencies. This reflects Sweden's governance tradition of municipal autonomy, in which central steering is deliberately balanced with strong local decision-making authority (OECD, 2018). While this model has allowed tailored solutions, it also generates variation in service quality and pace of adoption across regions.

Governance models shape adoption, that is, centralised coordination such as Denmark, drives coherence and faster implementation of EU benchmarks. On the other hand, fragmentation in decentralised systems could create barriers to standardisation. Sweden's decentralised model highlights both sides, that is, centralisation supports EU alignment, but municipal autonomy could slow adoption creating disparities. Hence, effective digital governance is not just about centralisation versus decentralisation, but also whether coordination of these mechanisms is strong enough to balance coherence with local flexibility.

5.6.3 Regulatory Environment and Innovation Support

Key enablers of digital transformation are a robust regulatory environment and a dynamic innovation ecosystem as they determine not only the pace of adoption but also the country's ability to align with EU priorities whilst remaining globally competitive (European Commission, 2021a). While the EU has introduced harmonising frameworks, such as the General Data Protection Regulation (GDPR), the Digital Markets Act (DMA) and Digital Services Act (DSA, 2022), and the Artificial Intelligence Act (2023), national implementation differs across the member states (European Commission, 2021a; European Commission, 2025a).

Sweden's journey highlights how a robust regulatory environment can act as a driver of adoption. The creation of the DIGG in 2018 established a coordinating authority responsible for adopting digital regulations, ensuring interoperability, and further supporting innovation. Moreover, Sweden was one of the early countries to include the GDPR framework in May 2018, aligning its national legislation on data protection and including strong safeguards that as a result enhanced citizens' trust in digital services.

Innovation-oriented initiatives such as regulatory sandboxes for fintech and GovTech pilots which are supported by Vinnova encouraged the experimentation in AI, big data, and e-health. This reinforces Sweden's comparative strength in trust-based regulation.

The same applies for Denmark and the Netherlands. Denmark was among the first to launch regulatory sandboxes in fintech and healthtech, coordinated by the Danish Financial Supervisory Authority and the Ministry of Health, encouraging rapid uptake of emerging technologies (OECD, 2023b). The Netherlands, through its 'Dutch Digitalisation Strategy' and the AiNed Programme, has combined regulatory frameworks with targeted investment in AI adoption, skills, and research (The Dutch Research Council, n.d.). Moreover, the Dutch government has also included sustainability and ethics into its digital innovation policies, particularly in the areas of data use and algorithmic transparency (OECD, 2019b). These cases show that frontrunners go beyond compliance, embedding innovation, rights, and trust into regulatory design.

Regulatory and innovation support frameworks act as drivers moreover when they put together EU-level harmonisation with national mechanisms. As a result, they build trust and stimulate experimentation. Sweden demonstrates how embedding regulation within a trust-based governance model, supported by innovation agencies such as DIGG and Vinnova, enhances both adoption and legitimacy. On the other hand, fragmented or compliance-driven regulatory approaches in some EU member states they act as barriers, resulting in limited the diffusion of advanced technologies. Overall, Sweden's case highlights that proactive regulation, when combined with trust and innovation ecosystems, can accelerate alignment with EU Digital Decade benchmarks.

5.7 Conclusion

This chapter has analysed Sweden's position in the EU's digital dimension in line with this study's conceptual framework. The analysis between Sweden and other EU member states such as Denmark and the Netherlands, addressed research question two that is the key drivers and

barriers in adopting digital technologies in Sweden, and how these compare to those in other European countries.

Sweden's strong digital infrastructure and advanced business adoption of cloud and big data show that the role of enterprise ecosystems and innovation support act as drivers. However, similar to Denmark and the Netherlands, the persistent SME adoption gap remains a barrier in achieving the EU Digital Decade benchmarks for business digitalisation.

Secondly, Sweden's strong digital skills base, trusted digital identity systems, and high levels of citizens uptake in e-government serve as drivers of adoption. However, shortages of ICT specialists, gender imbalances, and uneven inclusion of vulnerable groups highlight persistent barriers. These challenges are shared with Denmark and the Netherlands, resulting in the difficulty of meeting EU Digital Decade targets for universal digital inclusion and human capital development.

Thirdly, the design and governance of digital strategies, regulatory frameworks, and innovation policies emerged as critical determinants. Integrated national strategies, centralised or well-coordinated governance, and proactive regulatory environments acted as drivers by ensuring coherence and trust. On the contrary, fragmented strategies, decentralised governance without strong coordination, and compliance regulation acted as barriers, by slowing progress towards the EU goals. Sweden's decentralised governance model shows both the opportunities, such as the flexibility to address specific needs at municipal level, and challenges such as, disparities between urban and rural areas, of balancing central direction with local autonomy.

This comparative analysis has shown how Sweden's integrated strategies, robust infrastructure, trust-based regulation, and strong societal engagement can accelerate digital adoption and achieve the EU benchmarks. Ultimately, the lesson from Sweden and its peers is that Europe's digital future will depend not only on technological capacity but also on the ability to close persistent gaps in skills, adoption, and governance.

6. Conclusion

6.1 Introduction

The aim of this dissertation is to examine how Sweden's Information and Communication Technology (ICT) sector has evolved, the drivers and barriers shaping this transformation, and compare these findings to broader EU policy on digitalisation showing how Sweden's experience aligns with or diverges from EU-level objectives. The first research question analysed how the ICT sector in Sweden has evolved over the period 2013-2023 and identified the key factors behind this transformation. The second research question examined the main drivers and barriers to adopting digital technologies in Sweden and compared them with developments in other European countries.

6.2 Drivers of ICT transformation in Sweden

Over the period 2013-2023, Sweden's ICT sector has experienced a significant transformation, resulting in Sweden's position as one of Europe's digital leaders. Several features characterise this evolution. Firstly, Sweden has continually invested in advanced digital infrastructure by being an early adopter of new technology and many a time self-financing these investments. By 2020, 80% of Swedish households had access to high-speed broadband compared to the EU average of 50%. Sweden has set ambitious goals to attain universal gigabit connectivity by 2030, hence achieving the Digital Decade 2030 target. This infrastructure provided the foundation for both business and public-sector digitalisation.

Secondly, Sweden has completely embraced digital public services. E-government initiatives, including the development of e-identification and digital health services, facilitated widespread access to governmental services and enhanced efficiency in administrative processes. From 2016 to 2023, more than 90% of Swedes used digital public services, while the EU average was only 65%. Furthermore, the decentralised approach created the right environment for the rapid uptake of digital public services. Municipalities were able to tailor solutions according to their local needs, thus facilitating flexibility and fostered local innovation. For instance, the number of users on the 1177.se health site increased from 3.2 million in 2013 to 13.3 million in 2020 as some regions rapidly adopted telemedicine and e-prescriptions, while other regions progressed at a slower pace.

Another factor in this progression has been the start-up ecosystem, which encourages innovation in the private sector. Sweden boasts a dynamic start-up ecosystem, which has generated internationally acclaimed companies in areas such as fintech, gaming, and AI. The

robust regulatory framework, strong venture capital networks, and openness to innovation all contributed to this outcome. As a result, Stockholm has become a prominent European hub for digital entrepreneurs ranking among the highest in Europe in unicorns per capita, with further positive results in fintech and gaming.

Fourth, higher digital literacy levels among the general public contributed to adoption. Sweden's educational framework prioritises technology competencies, while vocational education has facilitated adaptation to emerging technologies. The acceptance of data-driven services has been enabled by the people's trust in institutions, setting Sweden apart from other member states where scepticism about digital government persists. For instance, 90% of Swedes have reported using digital government services, whereas in Southern and Eastern countries, this figure often falls below 50%.

Despite this success, the ICT sector has faced persistent challenges. In Sweden, rural and northern areas lag behind urban centres in connectivity and access to services, highlighting regional disparities. In 2022, only 61% of Swedish rural households had broadband compared to 86% of Denmark's rural households which is the highest in Europe. Meanwhile, challenges with inclusivity continue to persist, as older people, immigrants, and marginalised groups experience difficulty accessing and using digital tools. These disparities illustrate that leadership in digitalisation does not necessarily translate into comprehensive digital inclusion, particularly given persistent shortages of workers with the necessary digital skills. Furthermore, a divide remains between large corporations and smaller enterprises, as SMEs have embraced advanced digital technology more slowly. For instance, in 2021 only 36% of SMEs in Sweden used big data compared to 72% of larger firms.

Therefore, Sweden's digital transformation has been influenced by three main aspects which are robust and adaptable infrastructure, progressive and innovative legislation, and societal readiness. Nevertheless, Sweden still faces challenges in including skills disparities among different demographics, uneven regional development, and issues of inclusivity.

6.3 Drivers and Barriers to ICT Adoption in Sweden and European countries

The analysis of Sweden's drivers and barriers revealed both unique strengths and challenges that are shared with other EU member states.

Sweden's digital success has been underpinned by three key drivers.

1. **Decentralised governance and policy coherence:** Sweden's governance approach integrates central policy frameworks with considerable local authority. Municipalities and regions can adopt digital solutions tailored to their local needs while adhering to national and EU strategies. Thus, the combination of flexibility and coordination has been key driver in fostering innovation.
2. **Public–private partnerships:** The collaboration among governmental entities, enterprises, and academic institutions has significantly driven Sweden's digital transformation. Moreover, the private sector typically spearheaded the implementation of new technologies, while the state supported these initiatives. Thus, the implementation of new technology has been significantly facilitated by this environment.
3. **Innovation culture and societal trust:** Sweden's adaptability to innovation, enhanced institutional trust, and risk-taking attitude are the combination required for the rapid adoption of digital technology. Substantial startup venture capital availability and robust links between academia and industry further facilitated this.

These key drivers position Sweden alongside EU leaders, such as Denmark and the Netherlands. All three benefit from advanced digital infrastructure, high adoption rates among firms, and strong digital skills. In 2021, over 70% of firms in Sweden, Denmark, and The Netherlands adopted cloud computing, big data, or AI, compared to an EU average of 40%.

Southern and Eastern European countries have had a significantly different experience because of weaker governance structures, low institutional trust, and limited funding for innovation thus hindering digital adoption. For instance, in 2021 e-government usage remains below 50% in several Southern and Eastern countries, compared to Sweden's 90%.

At the same time, Sweden has faced barriers similar to those encountered across the EU.

1. **Skills shortages:** The demand for advanced ICT competencies has persistently exceeded the available supply. Despite Sweden's performance exceeding the EU average in digital competencies for instance, in 2020, ICT specialist vacancies in Sweden reached 8% of total ICT jobs, one of the highest rates in the EU, there are significant shortages in emerging digital fields. For instance, skills shortages are amplified by strong labour demand in emerging fields such as AI, cybersecurity, and data science.

2. **Cybersecurity and privacy concerns:** Cybersecurity risks carry greater weight in Sweden given the high reliance on digital identity systems and extensive e-government usage, such as BankID was used by 99.4% adults in 2023, making resilience a critical concern. Like other EU countries, Sweden has faced increasing challenges from cyberattacks. This results in the necessity of aligning innovation with rigorous regulatory safeguards underscores EU-wide discussions over the Digital Services Act and the AI Act.
3. **Inclusivity and regional divides:** While Sweden is highly advanced overall, inequalities persist. Rural areas have lower connectivity, and certain demographic groups remain digitally excluded. This reflects similar challenges across the EU, where the benefits of digitalisation often concentrate in metropolitan areas. For instance

The comparison analysis thus reveals both similarities and differences. Sweden's drivers which are its culture of innovation, government adaptability, and robust partnerships positioned Sweden as a digital leader. Yet its challenges although common across the EU, take on a particular significance in Sweden's highly digitalised context, highlighting skills shortages, cybersecurity risks, and inclusivity gaps. These findings illustrate that digital leaders also face challenges regarding inclusivity and sustainability, indicating that insights from Sweden should be applied cautiously, keeping in mind the specific needs and requirements at national level rather than assuming a uniform solution across the EU.

6.4 General Conclusion

This dissertation demonstrates that advanced infrastructure, innovative ecosystems, and a conducive legislative framework are attributed to Sweden's digital direction in the digital transformation trajectory. Sweden's scenario underscores the benefits of continuous investment, collaboration among institutions, and public trust in institutions.

Sweden's experience illustrates that leading in digital transformation does not eliminate underlying structural challenges. Persistent skill shortages, regional disparities, and inclusiveness gaps demonstrate that even frontrunners must continually address structural weaknesses in order to maintain their competitive edge. Moreover, Sweden's example illustrates the constraints of national initiatives within a global digital economy. Frameworks such the Digital Compass 2030, align national strategies through shared benchmarks for example connectivity, skills, and e-government. Hence, the results of leaders like Sweden,

Denmark, and the Netherlands contribute to raising the overall EU performance, while EU mechanisms ensure funding and structural support for members states that fall behind.

This study finds that digital transformation is both a technological and political process. It requires not just investment in infrastructure and skills but also governance models that are able to balance central coordination with local adaptability. Sweden's case illustrates that trust, inclusivity, and resilience will be as important as technological sophistication in ensuring that digitalisation results in economic growth, social cohesion, and resilience to future disruptions.

6.5 Limitations and Areas for Further Research

Like any research, this study faced limitations that should be acknowledged.

Primarily the research employed secondary data sources hence, restricted the ability to capture day-to-day experiences, local and regional policy dynamics, or contemporary shifts in the use of technology. Primary data, such as interviews or surveys, could have enriched the research by providing insights into how individuals, organisations, and policymakers experience and respond to digital transformation.

This dissertation adopted a selective comparative study, focusing mainly on Denmark and the Netherlands rather than all EU member states. This enabled an in-depth analysis of similarities and differences with Sweden. Future research could expand the scope to include more members states, offering additional insights into the diversity of digital transformation pathways across the EU.

Finally, causality remains difficult to establish. A simple cause-and-effect relationship cannot just determine the interaction between various factors such as governance structures and outcomes in innovation. The digital transformation is influenced by complex relationships across economic, social, and political aspects.

Future research could investigate the experiences of different social groups in Sweden in relation to digitisation, particularly examining the challenges encountered by the elderly, migrants, and low-income households. Moreover, future research could expand the comparative scope to include all EU member states. This would make it possible to map out the different digital transformation pathways. Such an approach could highlight the extent to which EU policies support cohesion across the EU member states. Moreover, additional research could contrast Sweden with global digital leaders like South Korea or Singapore to deepen insights into the institutional and cultural determinants influencing digital

transformation. Finally, research into how Sweden and also the EU are adapting to AI, quantum computing, and green digitalisation might explain the next phase of transformation.

The contribution of this dissertation is providing an understanding of the interplay between politics and governance of digital transformation in Europe by analysing Sweden's experience. Sweden's case study shows how being a leader in digital transformation is the result of a combination of strategic investment, adaptable governance, and a culture of innovation. Its comparative advantage lies in its strong public trust and a strong institutional capacity. Additionally, its challenges demonstrate that transformation is also an ongoing process.

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Appendix A

Table showing Years Available for Data used in Comparative Analysis

Table No.	Title / Description	Years of Data	Source
Table 5.1	Broadband coverage across EU member states (% of households with fixed broadband access)	2018-2023	European Commission
Table 5.2	Fixed broadband subscription rates (% of households)	2021-2023	European Commission
Table 5.3	Enterprise AI adoption (% of enterprises using at least one AI technology)	2021, 2023	European Commission
Table 5.4	Individuals with at least basic digital skills (% of population aged 16–74)	2021, 2023	European Commission
Table 5.5	Availability of digital public services for citizens	2017-2023	European Commission
Table 5.6	Availability of digital public services for businesses	2017-2023	European Commission