SHAPING ECONOMIC DYNAMICS: GOVERNMENTAL INFLUENCE ON AI INTEGRATION AND JOB DYNAMICS

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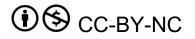The Netherlands

ABSTRACT,

This thesis explores the complex economic impacts of AI integration in the European manufacturing sector, paying particular attention to the impact of policy papers and government directives. It investigates how the adoption of AI technologies has shaped the landscape of job creation and displacement as a result of these policy tools. The thesis explores theoretical frameworks and goes beyond empirical findings to offer insights into broader theoretical discussions surrounding AI-driven economic transformations. Additionally, the research delves into the proactive approaches utilized by policymakers to effectively manage workforce shifts and promote sustainable employment in accordance with inclusive economic growth.

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1. INTRODUCTION

In recent years, the global workforce has experienced significant transformations due to the rapid advancement of artificial intelligence (AI). AI's potential to revolutionize job structure and enhance productivity has become a critical focus of academic and policy discussions (Autor, 2015; Brynjolfsson & McAfee, 2014). While AI promises greater efficiency and innovative capabilities, it also raises concerns about job displacement and the restructuring of labour markets (Frey & Osborne, 2017).

Given how deeply embedded AI is across various industries, it is especially important to understand how it affects employment dynamics. In Europe, where manufacturing is a fundamental economic activity, the integration of AI could lead to profound changes. AI technologies have the potential to significantly alter labour-intensive manufacturing sector by streamlining operations and lowering the need for manual labour (Bessen, 2019). This study focuses on how AI is transforming employment dynamics within the European manufacturing sector, emphasizing the need for policymakers and companies to navigate these changes effectively.

The relationship between AI and economic policy is being increasingly carefully examined by scholars and policymakers. Research indicates that AI adoption in manufacturing can lead to both job creation and job displacement, depending on how technologies are implemented and managed (Acemoglu & Restrepo, 2018) That being said, on the one hand, there exists a potential for greater productivity, enhanced efficiency, and new developments, while conversely there are worries that it could result in job losses or fundamentally change the way things are done within the economy. Investigating these dynamics is crucial for developing policies that promote AI integration while minimizing adverse effects on the workforce.

Given the rapid pace of AI development and its potential to reshape the entire labor market, conducting such analysis of its impacts is imperative. While there is excitement regarding AI's ability to transform work processes and open up new opportunities, there is the need for careful consideration of challenges such as job displacement and ethical concerns (West, 2018). This study aims to contribute to this discussion by providing a detailed examination of AI's ongoing and future impact on employment in the European manufacturing sector.

1.1 Problem Statement

The previous section emphasizes how AI will have a dual impact, recognizing that it will likely lead to changes in work and job displacement as well as to potential gains in productivity and innovation, known as augmentation. The growing use of AI technologies in manufacturing has made it necessary to investigate how employment dynamics are impacted by this integration and to come up with a proactive policy solution to reduce negative effects while promoting inclusive economic growth. Other than that, AI has an impact on many different aspects of the economy in addition to production and employment. It affects supply chains, market dynamics and the general competitiveness of the industry. Through its implementation, businesses can analyze large amounts of data, streamline decision-making and create innovative goods and services (Grünbichler, 2023). Yet the broad use of AI also brings up several legal and ethical issues. Thus, an in-depth understanding of the diverse ways that AI may potentially influence the European economy must be carefully considered.

1.2 Research Questions

1. How could policy papers and governmental directives influence the economic ramifications of job displacement and creation resulting from the integration of AI technologies within the manufacturing sector of the European market?

2. How can policymakers proactively address workforce transitions to promote sustainable employment and inclusive economic growth?

1.3 Contributions

The aim of this thesis is to dig deep into how technological advancement of artificial intelligence and governmental policies proposed specifically for its use regulation affect the European market economy. Particularly, it will explore how policies and directives impact the job labor whenever AI is integrated in manufacturing. By studying these documents closely, the research hopes to uncover the two particular ways these AI-based policies shape the job scene in this specific sector, encompassing both job displacement and creation. Another point to be made will be seeking to identify successful strategies and lessons learned from companies that have effectively adapted to workforce changes triggered by AI, as part of the previously mentioned, augmentation process.

The study will then move on to a comprehensive understanding on how policymakers can proactively address workforce transitions to promote sustainable employment and inclusive economic growth. Considering the limited impact of a student researcher, the study will use insights from several countries' policy framework to offer suggestions to decision-makers. The thesis seeks to provide well-informed recommendations for policy enhancements through a thorough examination of current policies and national reports and their effects on job creation and displacement, as a result of AI integration, taking into account the recognizable challenges and opportunities present in the European working landscape. This is achieved through employing a systematic qualitative content analysis of policy documents from two EU countries, Germany and France, and one non-EU country, the UK. This selection aims for a comparative analysis of different regulatory environments and their impact on AI integration and labor market dynamics. Germany and France, as EU member states, provide insights into how EU policies and directives are implemented at the national level, while the UK, post-Brexit, offers a distinct perspective on AI regulation and workforce transition strategies outside the EU framework, before the EU AI Act has been approved, that is. Institutional theory, on the other hand, focuses the vital role of normative, regulatory, and cognitive structures in organizational behavior and provides insights into how policy frameworks influence workforce changes. (Scott, 2004) By integrating these theories, the thesis offers a sophisticated perspective of how AI adoption influences job dynamics.

Furthermore, with the recent adoption of the EU AI Act, this thesis serves as a timely analysis of how national strategies must adapt to comply with new regulations. The examination of the EU AI Act's implications for job dynamics and economic growth presents valuable insights for both policymakers and industry stakeholders. This alignment promotes public trust and international cooperation by ensuring that AI technologies are developed and implemented responsibly (European Commission, 2024)

1.3.1 Practical Relevance

Given the significant challenges facing manufacturing businesses, policymakers, and the society in the context of AI integration, the research question seems to be considered practically relevant. AI is starting to have a more noticeable effect on the work dynamics and employment as it grows into multiple industries and sectors. The research can influence business strategy and most of all it will inform policy development by offering evidence-based insights and practical recommendations. The results can then be used by policymakers to create focused interventions that support that inclusive economic growth. Its aim is to ensure that the benefits of technological advancement are distributed fairly across society while simultaneously improving the competitiveness of the European manufacturing sector in the global AI-driven economy by facilitating informed decision-making at both the organizational and policy levels. To conclude, in the long run, the following study exists to improve the AI-driven economy's ability to compete globally, while encouraging productivity and job creation.

1.3.2 Theoretical Relevance

Research can be greatly aided with the use of theories, particularly when it comes to studying complex phenomena of economic effects of integrating AI into European market's manufacturing sector. Theories that will be further discussed in detail in the next section offer an organized framework for comprehending and analyzing empirical data, making it easier to find patterns and causal mechanisms that drive the phenomena of interest. Through taking advantage of established theories from various disciplines, including political science and economics, it allows for guidance on the appropriate methodologies for data collection and analysis.

2. THEORETICAL FRAMEWORK / LITERATURE REVIEW

Theoretical relevance in the context of the provided research question is essential when it comes to understanding the crucial processes and drivers of job displacement and creation. Such frameworks offer a foundation for interpreting research results and organizing empirical data. The theories that will be used throughout the thesis are the following:

1. Dual Economy Theory: Illustrates the differences in employment, wages and productivity between the traditional and modern sectors. The theory frequently shows up in the manufacturing sector as a separation between high-tech, modern manufacturing processes and traditional, low-skilled manufacturing activities. Certain inequalities may arise in the labor market between unskilled workers in the traditional assembly line production and skilled workers in more advanced manufacturing (such as robotics or 3D printing). By lowering the need for low-skilled labor for routine tasks and raising the demand for highly skilled workers being able to operate and maintain the automated systems, the integration of AI technologies in manufacturing has a potential to worsen these dualities (Bessen, 2016), providing a relevant viewpoint to the study.

2. Institutional Theory: Revolving around understanding the impact of institutional structures and policy frameworks on workforce transitions, such frameworks that address institutional change provide insight into how policymakers can create and carry out measures that support fair economic growth, ease workforce transitions and with that essentially expand sustainable employment. The theory illustrates the ways institutional transformation helps with fostering economic growth and makes it easier for society to adjust to new technological developments. That makes policymakers then better support, the previously mentioned, workforce transitions and advance sustainable employment by identifying opportunities for transforming institutional frameworks as of now through understanding the dynamics of institutional change. This could include adjusting laws governing the labor market and strengthening social security systems as a result to encourage the development of new job opportunities in AI-related industries.

The European market's growing adoption of AI technologies has caused a great deal of interest in understanding its economic implications particularly in regard to workforce transitions and sustainable economic growth. The objective of this literature review is to provide a perspective on the complex relationship between the integration of AI technology, workforce dynamics, and economic outcomes by combining important theoretical perspectives and empirical studies.

2.1 Policy Frameworks and Technological Change

The trajectory of technological change in the European market's manufacturing sector is significantly influenced by the policy frameworks. According to the literature proactive policies that support the adoption of AI technologies may have a big impact on both the creation and displacement of jobs. Mazzucato's (2018) research, for instance, highlights the significance of public funding for research and development as a catalyst for technological advancement and economic expansion. Additionally, it has been discovered that policy measures like tax incentives for R&D investment and innovation grants encourage innovation and the spread of AI technologies within manufacturing companies (Hausmann, 2014).

The literature also emphasizes how policy frameworks can be used to address the distributional effects of technological change. The integration of AI presents challenges concerning job, displacement, and inequality, even though it has the potential to increase productivity and create new economic opportunities. For lessening the negative impacts of AI-induced job displacement and foster inclusive economic growth, policy interventions including skill development programs, job training initiatives as well as income support mechanisms have been suggested (Autor & Salomons, 2018)

2.2 Strategies for Proactive Workforce Transition

Investing into human capital is crucial to giving European workers the tools they need to succeed in the digital economy. Education and training initiatives that build skills necessary for AI-based industries should be given top priority in proactive workforce transition strategies. To create training programs that combine cutting-edge technologies and digital skills, European government should work with academic institutions and industry stakeholders (Moch & Oberdieck, 2024). Initiatives for the ongoing learning can also enable employees to adjust to shifting job needs and maintain their competitiveness in the

labor market. Europe can eventually create skilled workers that can drive innovation through investing in human capital. Apart from that adopting these technologies has a crucial part in permitting proactive workforce transitions in Europe. The main goal of strategies should be to help companies and their employees develop a technologically competent culture. Through promoting awareness campaigns, offering incentives for adopting AI technologies and offering technical assistance, European policymakers can help support technology acceptance (European Commission, 2024). That way, Europe may find itself in a more positive atmosphere through the effective implementation of artificial intelligence, resulting in an increased economic growth and productivity.

3. METHODOLOGY

The study takes a multidisciplinary approach, including ideas from the literature on technology adoption, labor studies and economics. It examines the effects of AI integration on job displacement, creation, and distribution of income across manufacturing industries within Europe using empirical data and analytical techniques. The study had, therefore, a primary focus on qualitative approaches.

3.1 Data Collection

To examine the impact of policy papers and governmental directives on the economic implications of AI integration in the European manufacturing sector, as well as to investigate proactive workforce transition management strategies, the study uses two main methods of data collection: document analysis and case studies.

Policy papers, government directives, industry reports and other relevant documents have all been subjected to a careful examination and interpretation during the document analysis process. This approach made it possible to identify important trends and insights about legislative changes, technological developments, and policy interventions in the manufacturing industry. Following the document analysis, a systematic approach has been used, including the identification of relevant documents from governmental departments and international organizations. This is followed with a qualitative content analysis method, like thematic analysis and categorization. As a result of that, the study then identifies the mechanisms through which policy interventions have an impact on economic outcomes, such as the previously mentioned job displacement, creation and overall industry competitiveness.

The second data collection method to be used throughout the study are case studies, which offer an in-depth look of actual occurrences in a particular setting, enabling the analysis of complex relationships and dynamics. The application and effects of policy interventions linked to AI integration and workforce transitions within European manufacturing firms is examined through this specific data collection method. Given factors including policy contexts, analyzing the difference of economic regions and diversity in AI adoption rates, case studies of several countries have been chosen. To give a thorough grasp of policy dynamics across various regulatory environment and economic landscapes the goal is to specifically investigate at least two EU member countries and one that is a non-EU country.

It is critical to keep in mind that logistical and resource limitations make it impractical to conduct original case studies. Therefore, in this situation, it becomes essential to rely on pre-existing case studies because they provide insightful information from a variety of contexts that would not be available otherwise. Dealing with this process ethically involves assessing each case study's reliability and applicability critically and making sure the original author's work is properly cited and attributed. To adhere to academic standards of integrity and show respect for the intellectual contributions of earlier researchers, transparency in source citation is, therefore, a crucial aspect. Furthermore, such pre-existing case studies function as fundamental components for the theory development and its enhancement. By combining the results of previous studies, it made it possible to validate and expand upon the pre-existing theoretical framework, leading to fresh insights.

Complementary Nature:
The two methods are complementary, as they offer varying viewpoints and depths of analysis. While case studies provide a more in-depth insights into the implementation and results of policies within contexts, document analysis provides a broader understanding of policy frameworks and regulatory environments. The idea is to provide a solid grasp of the impact of policy frameworks on the economic effects of AI integration and provide policymakers with useful strategies for addressing workforce transitions and promote a sustainable employment by integrating data from both methods.

3.1.1 Requirements

To ensure the validity and reliability of the research findings, a number of crucial requirements needed to be met, given the qualitative content analysis research study.

First and foremost, it must be essential to have access to a wide variety of relatable policy papers, governmental directives and industry reports regarding the integration of AI. These documents, offering insightful information about the regulatory environment and various policy frameworks that affect job displacement and creation within the sector, are the main source of data for the following analysis. It is therefore essential to have the access and the ability to analyze a comprehensive set of these documents to capture the full image of AI-based policies and interventions affecting job dynamics.

Furthermore, it must be crucial to recognize the amount of time and resources that needed to be put into the research and whether they are available to perform a thorough analysis of the data that will be gathered. The process itself of qualitative content analysis is known to be quite time-extensive requiring specific attention to detail as well as a systematic approach to the interpretation of the data. A sufficient number of resources, including access to relevant literature and support from academic advisors are critical for conducting a comprehensive analysis.

Last point to be made is related to addressing ethical considerations regarding data handling and citation of sources for ensuring the credibility of the research findings. This directly refers to the analysis of pre-existing case studies and the right way of utilizing its data. Through meeting these requirements, an insightful analysis of policy interventions and their impact on job dynamics in the European manufacturing sector has been thoroughly measured.

3.1.2 Procedural Steps

In conducting the analysis of the impact of policy interventions on job dynamics through the qualitative content analysis, several procedural steps had to be followed for a systematic approach of the research:

Step 1: Data Collection and Document Selection

The first step involved identifying and collecting a comprehensive set of policy papers, official governmental directives, and industry reports related to AI integration in the European market economy. These documents served as the primary sources of data for the analysis, offering deep insights into the regulatory landscape and how different countries perceive the regulation of AI technologies and their impact on job dynamics. The selected documents included **EU AI Act, Germany's National AI Strategy, AI in the Administrative Work of Employment, France's National AI Strategy Phase 1 & 2, AI: Our Ambition for France, UK's National AI Strategy and Pro-Innovation Approach.** The selection criteria for these documents ensured they provided rich data on regulatory frameworks, job dynamics and economic impacts of AI.

Step 2: Qualitative Methods and Thematic Analysis

Following the establishment of the data collection stage, the next procedural step involved qualitative methods like thematic analysis, specifically implemented through a coding scheme created in Excel.

1. Initial Coding:
   - A preliminary reading of each document was conducted to identify major themes and patterns
   - Key focus areas were defined as AI Regulation Framework, Job Displacement, Job Creation, and Economic and Market Dynamics
   - Each document was systematically reviewed, and relevant text fragments were highlighted. The information was then documented in an Excel spreadsheet, where each row represented a unique piece of information

2. Development of a Coding Scheme
   - The Excel sheet was organized into columns representing:
     - **Document Source**: The origin of the document (e.g. EU AI Act, Germany, France, UK)
     - **Text Fragment**: Direct quotes from the documents
     - **Primary Code**: The main theme (e.g. AI Regulation Framework, Job Displacement, Job Creation, Economic and Market Dynamics
     - **Sub-code:** More detailed sub-categories within primary themes

3. Iterative Review and Refinements:
   - The coding scheme was iteratively refined through multiple rounds of analysis:
     - **Cross-Document Comparison:** Comparing codes across different documents to identify commonalities
     - **Consistency Checks:** Ensuring similar themes were coded consistently across all documents

Step 3: Synthesis, Integration with theoretical Frameworks, and Practical Recommendations

The final procedural step involved synthesizing the findings in relation to the research objectives and theoretical frameworks. This included:

1. Synthesis of Findings:
   - Identifying patterns and trends within and across documents
   - Assessing the implications of these patterns

2. Integration with Theoretical Frameworks:
   - **Dual Economy Theory:** Understanding how policies shape job dynamics in traditional and modern economic sectors
   - **Institutional Theory:** Analyzing how organizational behavior is influenced by regulatory structures

3. Practical Recommendations:
   - Drawing conclusions about the impact of the expected legislative actions on job dynamics
   - Offering practical recommendations for policymakers to enhance existing policies or develop new initiatives that prioritize sustainable employment and inclusive economic growth

3.1.3 Expected Outcomes

One of the expected outcomes of the research is finding the best practices and learning from policy initiatives that have successfully handled workforce transitions within the work environment. Policymakers are expected to learn numerous things from showcasing effective approaches on how to balance advancing technology, like AI integration, with the needs of inclusive economic growth and the sustainable employment. Other than that, it is anticipated that the research will offer policymakers with evidence-based recommendations, potentially including investments in education and training initiatives with the idea of not only increasing technological innovation but also adopting social protection measures to make it easier for employees to undergo through phases of transition.

3.1.4 Limitations of Qualitative Content Analysis (QCA)

One of the main limitations, that may be encountered in the data collection process can be subjectivity, since the perceptions during the data collection process may be influenced by personal biases, when providing specific recommendations. Being aware of this subjectivity is crucial to ensure an objective an unbiased analysis and that the interpretations are grounded in the data and not personal preconceptions. Additionally, the scope of the qualitative content analysis may be limited through a selection of documents and the exclusion of certain sources. It will therefore be essential to be transparent about the document selection process and to disclose any potential biases that may arise from this inclusion or exclusion of the specific documents. Most importantly, limitations regarding the access to any confidential documents may restrict the comprehensiveness of the analysis, which shows the

importance of maximizing a wide range of data sources that are available within ethical boundaries.

4. RESULTS

This section presents the findings from the qualitative content analysis of policy documents, governmental directives, and industry reports regarding the integration of AI in the workforce of Germany, France, and the UK. It is important to note that the analysed documents consist of concepts and considerations that took place years before up until 2024, and not official policy papers regulating AI, such as the recently approved EU AI Act. The results are categorized into four main subjects: AI regulation framework, job displacement, job creation, and economic and market dynamics, with each one of them being split into separate keywords. The exact base structure is presented in Appendix 7.1. It is also important to note that the results presented in this thesis document are a brief summary of the main findings derived from the actual analysis conducted using Excel. For a more in-depth understanding of certain areas, please refer to the Excel file in Appendix 7.2

4.1 AI Regulation Framework:

4.1.1 Germany
Germany AI strategy's main focus points are on improving research, strengthening AI competencies in higher education and fostering public-private partnerships to speed up the process of AI adoption. The government's determination to establish Germany as a global leader in AI innovation is demonstrated by this policy. The regulatory framework, on the other hand, prioritizes strongly the ethical use of AI, while adopting strict regulations designed to protect against misuse and protecting citizens' rights. Additionally, Germany collaborates with EU partners and international organisations to standardize AI regulations and promote ethical standards across the world. This comprehensive approach seeks to protect the interests of the public while fostering a robust environment for AI research. (The Federal Government, 2022)

4.1.2 France
France's AI strategy, outlined through the 'AI for Humanity' initiative, aims to position the country as a global leader in AI by emphasizing research excellence and ethical guidelines. The French regulatory framework focuses on transparency, accountability, and the protection of fundamental rights in AI applications. In terms of international cooperation. France actively participates in international AI ethics discussions at the EU, OECD and UNESCO levels, developing a unified approach to AI governance. This strategy deepens France's commitment to ethical AI development and international cooperation to establish global standards. (République française, 2018) (République française, 2018)

4.1.3 United Kingdom
AI is recognised by the UK Science and Technology Framework as a crucial technology, promoting a so-called pro-innovation approach to sustain global competitiveness. UK's regulatory framework prioritizes flexibility, avoiding any rigid restrictions to improve innovation, while maintaining safety and fairness within economy. Furthermore, to ensure compatibility and minimize cross-border conflicts, the UK collaborates with international partners to align the AI rules and support response AI development. This strategy shows how the UK wants to safeguard the public interest by balancing innovation with strict regulatory restrictions. (HM Government, 2021)

4.2 Job Displacement:

4.2.1 Germany
AI-driven automation is anticipated to significantly impact routine tasks in manufacturing, leading to a shift in job requirements. The reskilling of workers impacted by AI automation is one way the German labor market is getting ready for this shift. Policies that focus on social safety nets and training programs to lessen the negative consequences of job displacement are in place to assist workforce transitions. These measures are intended to minimize unemployment and economic disruption, while ensuring that workers can adjust to the new demands of the labor market. (The Federal Government, 2022)

4.2.2 France
For France, it is expected that the use of AI in manufacturing would replace certain occupations, especially those that involve repetitive tasks. To assist employees in adjusting to new tasks and roles created by AI technologies, France is funding reskilling initiatives. These efforts are focused on ensuring smooth workforce transitions through continuous learning and skill development to sustain the labour market stability. This type of proactive approach aims to strike a balance between the advantages of AI adoption and the need to protect workers from being replaced. (République française, 2018)

4.2.3 United Kingdom
In the UK manufacturing sector, AI automation is viewed as both a potential disruptor for existing jobs and a driver for efficiency. Proactive steps are taken in the UK labour market policy to minimize the adverse effects of AI on employment. The government supports training and reskilling programs to facilitate workforce transitions in response to AI advancements, making sure the workers are well equipped for the evolving job market. This strategy seeks to balance technological progress with social responsibility. (HM Government, 2021)

4.3 Job Creation:

4.3.1 Germany

AI is expected to generate new job opportunities in high-tech areas. These include AI research, development, and maintenance. Germany is investing in AI training programs to equip the workforce with the necessary skills for future jobs. The report also mentions that to create a pool of competent workers prepared to take on AI innovation, several education changes incorporating AI and digital skills into curriculum are being put into place. Once again, these initiatives ensure that the workforce is prepared for the new opportunities that AI technologies will bring forth. (The Federal Government, 2022) (Federal Ministry of Labour and Social Affairs, 2022)

4.3.2 France
AI technologies have been projected to create new job roles in AI development, data analysis, and cybersecurity. France is raising its emphasis through focused educational efforts on the development of AI-related capabilities. To guarantee that workers can fulfil the expectations of an AI-driven economy and to ensure long term employability and career advancements, these training programs are being designed. By developing a trained workforce, this proactive strategy's aim is to maximise the advantages of adopting AI. (République française, 2018)

4.3.3 United Kingdom

In the UK, AI is seen as a catalyst for job creation across several industries, with that including manufacturing, healthcare and finance. The UK government is advancing AI education to prepare the workforce for new opportunities. A crucial component of the UK's plan to benefit from AI's advantages and guarantee that its labor force is ready for the demands of the future labor market is investing in education and training programs. The goal of these initiatives is essentially to guarantee that AI-driven economic growth is inclusive and sustainable. (HM Government, 2021) (Department for Science, Innovation & Technology, 2023).

4.4 Economic and Market Dynamics:

4.4.1 Germany

Germany's use of AI is expected to boost economic growth by generating new business opportunities and increasing productivity. The country is investing in AI research and forming public-private partnerships to foster innovation. Germany is positioned to become a leader in technical developments by maintaining its competitiveness in the global market with a deliberate focus on AI. The goal here is to create a favourable environment that will support economic growth supported by AI. (Federal Ministry of Labour and Social Affairs, 2022)

4.4.2 France

AI is expected to boost France's economic growth through applying new technologies and business models. France is investing in AI innovation to stay competitive and lead in technological advancements. Several efforts are being made to ensure that the country remains a competitive player in the AI landscape, with use of its strong research base and innovative ecosystem. (Commision de l'intelligence artificielle, 2024)

4.4.3 United Kingdom

AI has the ability to greatly boost creativity and efficiency and through the investment in R&D and a legislative framework that supports it, the UK is fostering innovation in AI. One of the main goals of the UK's AI policy is to maintain competitiveness in the field, but also concentrate on attracting talent from across the world and developing efficient AI operations. Essentially the UK wants to become known as a leader in AI innovation worldwide. (Department for Science, Innovation & Technology, 2023)

5. DISCUSSION

The discussion provides an analysis of relevant AI integration policies and reports in Germany, France, and the UK, to further elaborate on the results, focusing on the economic impacts of job displacement and creation within European workforce in the manufacturing sector. It examines how these national strategies, which once used to be relevant and further adopted, align with the broader European regulatory frameworks, particularly the recently adopted EU AI Act. The discussion also integrates the Dual Economy Theory and Institutional Theory to interpret the impacts and strategic directions of these documents.

EU AI Act

The discussion begins with the EU AI Act, being the focal point of this analysis representing a significant regulatory development, with an aim to provide a comprehensive framework for AI governance across member states. This Act, approved recently in May 2024, sets out clear guidelines for AI systems, emphasizing risk management, transparency and accountability. The Act proposes that "This Regulation should be applied in accordance with the values of the Union enshrined in the Charter, facilitating the protection of natural persons, undertakings, democracy, the rule of law and environmental protection, while boosting innovation and employment and making the Union a leader in the uptake of trustworthy AI" (European Parliament, 2024). This specific fragment emphasizes the foundational principles that guide the EU AI Act. Through aligning AI regulation with the "values enshrined in the Union Charter; the Act seeks to balance the technological advancement with ethical considerations. Such alignment is considered crucial for fostering public trust in AI technologies, as it assures the citizens, and in most cases the workers, that their rights and safety are of utmost importance. Prioritizing innovation and employment reflect the AI's dual objectives of fostering economic growth and guaranteeing that advancements in technology are not actually substituting fundamental human rights.

The Act, then, further categorizes AI systems into different risk levels, with strict requirements for high-risk AI applications, including those in the manufacturing sector where "those rules should be consistent with the Charter, non-discriminatory and in line with the Union's international trade commitments." (European Parliament, 2024) This requirement for high-risk AI systems shows the Act's commitment to ensure the AI technologies remain safe and reliable. It is made clear how through keeping high standards of accuracy and robustness the Act's aim is to reduce risks associated with AI deployment. This point is particularly relevant for the manufacturing sector, where the integration of AI systems can significantly impact various production processes and the safety of the workers, making it crucial for the AI systems to meet these strict standards for minimizing any disruptions.

Building upon the international cooperation factor, given that "Certain Member States have already explored the adoption of national rules to ensure that AI is trustworthy and safe", it is still required that "in cooperation with the relevant stakeholders, the Commission and the Member States should facilitate the drawing up of voluntary codes of conduct" (European Parliament, 2024) This relatively high importance of cooperation, within the Act and information sharing between the European Commission and the Member States is essential to the Act' successful implementation since it guarantees the exchange of best practices and the consistent application of regulatory standards throughout the European Union. Through the proposed facilitation of cross-border operations, this cooperation may essentially improve the manufacturing sector's overall efficiency and competitiveness for European manufacturing companies.

The EU AI Act also mentions of the importance of human oversight and the protection of fundamental rights. To guarantee the safety and reliability of the high-risk AI systems "a Union legal framework laying down harmonised rules on AI is therefore needed to foster the development and meet high level of protection of public interests" (European Parliament, 2024) Through this establishment of harmonized rules for high-risk AI systems, the Act provides a clear regulatory framework that improves its legitimacy and public trust. Multinational corporations in the manufacturing industry especially will benefit from this harmonization as it lowers the complexity and expenses of complying to various national strategies. The Act's emphasis on safety regulations and fundamental rights shows

its dedication to ensuring that AI technologies are created and utilised properly.

That being said, the impact of the EU AI Act on job dynamics in the manufacturing sector appears to be significant. The Act encourages the development of AI applications that augment human capabilities rather than replace them, with an aim of mitigating job displacement. It also supports workforce transitions by promoting reskilling and upskilling initiatives, given the fact that "AI literacy should equip providers, deployers and affected persons with the necessary notions to make informed decisions regarding AI systems" (European Parliament, 2024) ensuring that workers are prepared for the changes brought about by AI integration. Nevertheless, despite these positive intentions, the implementation of AI augmentation strategies may face several challenges. Not all companies might have the resources to invest in the necessary training and upskilling programs mentioned in the Act. Particularly smaller businesses could find it difficult to keep up with the rapid pace at which AI is being integrated, which could result in job losses in these companies. These companies may face the danger of losing their current employees, who might not have the chance to transition to new roles, if they can't find the time or money to commit to the extensive reskilling. programmes (Lane & Saint-Martin, 2021) Additionally that focus on upskilling and reskilling might unintentionally increase the economic disparity between various industries and regions. This means that smaller businesses and those in less developed areas may fall behind in implementing these initiatives, resulting in creating unequal opportunities for workers throughout the EU (UK Department for Digital, Culture, Media and Sport, 2021). Larger businesses and those in more economically developed regions are surely better equipped to carry out these initiatives. This gap might lead to a workforce that is fragmented, with some industries and regions benefiting greatly from AI integration while others fall behind and the already existing economic disparities becoming worse (Eurofound, 2022).

After laying the foundational framework with the EU AI Act, it becomes essential to assess the differences between this comprehensive regulatory strategy and the national AI policies that were previously implemented in Germany, France, and the UK. These national strategies, which were created prior to the EU AI Act's official introduction, include information about the goals and approaches that each nation has for integrating AI into its various manufacturing sectors. It allows for a better understanding of the changes in policy focus and the possible effects on employment dynamics and economic growth in the European manufacturing environment through the analysis of these strategies in the context of the new EU laws.

National AI Strategy in Germany

The National Strategy for AI in Germany, AI in Administrative Work of Employment report and other related documents provide a detailed overview of Germany's approach to AI integration in the manufacturing sector.

With a consideration to ethical norms and global cooperation, the National Strategy for AI stresses the need of advancing research and public-private collaborations to speed up AI implementation. According to the strategy, "AI research has been established in Germany for a long time now and is well positioned," and emphasizes the need to "expand its research capacities if it is to keep up with international developments" (The Federal Government, 2020). The document also describes the government's initiatives such as "Industrie 4.0", which aims to incorporate AI into manufacturing processess in order to improve efficiency and innovation. This strategy also focuses on developing a robust AI ecosystem by investing in AI infrastructure, supporting small and medium-sized enterprises (SMEs) and promoting the adoption of AI across different industries. There was a particular fragment from Germany's strategy focusing on the fact that "Germany must expand its research capabilities if it is to keep up with international developments" (The Federal Government, 2020) This shows the country's strong foundation in AI research and the need to expand these capacities in order to maintain competitiveness. Building research capacity is essential to supporting innovation and ensuring that Germany can develop advanced AI technologies. Though, while the national strategy focuses mainly on expanding research, it lacks the binding regulatory framework that the EU AI Act provides, which is important to stay consistent and compliant across the EU. These initiatives are in line with the Dual Economy Theory, which suggests that economies function in two distinct sectors: a traditional, labour-intensive sector and a modern, technologically advanced one. The integration of AI in manufacturing primarily affects the modern sector, potentially widening the gap between the two sectors. Because of that, Germany's plan seeks to close this gap and guarantee that workers from the conventional industry may move into the contemporary one.

Apart from that, in order to provide workers with the skills necessary for AI-driven businesses, the strategy presents the importance of "initial and continuing education and training of workers' to equip them with the skills". (The Federal Government, 2020) It can be seen that this focus on education and training aligns closely with the EU AI Act's need to support innovation and employment. Germany's approach prioritizes workforce development in order to make sure that the workers are ready for the technologies changes brought about by AI. In contrast, the The EU AI Act, representing a more comprehensive and binding regulatory framework, helps in these initiatives, through offering a regulatory structure for a more reliable and safe AI, essentially enhancing the overall adoption of AI technologies in the nmanufacturing sector. One of its main goals covers creating a unified approach across member states, ensuring that AI technologies are developed and used in alignment with EU values and ethical standards. The Act addresses various sectors, that also being manufacturing, by setting specific requirements for high-risk AI systems. This framework is designed to improve innovation while protecting fundamental rights, aligning with the goals outlined in Germany's national documents but providing a more enforceable structure.

The AI in Administrative Work of Employment report provides further insights into the practical implications of AI on employment. Specifically, it states that "good data preparation is an essential and often time-consuming process of cleaning and qualifying the data for their further use" (Federal Ministry of Labour and Social Affairs, 2022) showing how important it is to prepare data carefully in order to guarantee the accuracy and reliability of AI systems. Therefore, by ensuring that data is prepared in a correct way, AI systems can function more effectively and deliver more accurate results, which is crucial for making informed decisions in administrative work. Another key aspect that was mentioned was the role of AI in addressing demographic challenges, where "AI systems can help staff in employment and social protection service offices carry out their work more efficiently, thereby reducing processing times" (Federal Ministry of Labour and Social Affairs, 2022) Now, this is particularly important since it will be difficult to sustain the welfare state's ability to function effectively when a large proportion of public sector workers retire. It is believed that AI

is to lessen these difficulties by increasing productivity and making up for the reduction of workforce.

Furthermore, the reports reflect Institutional Theory, which holds that organizational behaviour is shaped by the regulatory structures within which they operate. Germany's AI strategy and the EU AI Act itself illustrate institutional efforts to shape AI integration through the ethical guidelines and regulations, establishing a normative framework that protects fundamental rights and improves public trust in AI technologies.

National AI Strategy in France

France's AI national strategy began in 2018 with the launch of the "AI for Humanity" initiative, marking the first phase of France's comprehensive approach to AI development and regulation. This initial phase focused mainly on improving AI research, developing ethical guidelines and promoting AI education, given "in this area, France holds a recognized position, in particular because of the excellence of its mathematics and computer science school." (République Française, 2018) The strategy aimed to position France as a global leader in AI by leveraging its strong research base. The first phase also consisted of the need for regulatory frameworks to ensure ethical AI development and deployment, including recommendations for transparency and data protection considering the fact that "It is essential that they act responsibly, taking into consideration the socio-economic impacts of their activities." (République Française, 2018) By focusing on the principles of ethical AI development and research excellence, France seeks to create a robust AI ecosystem that essentially complies with the ethical standards outlined in the EU AI Act. By offering a consistent regulatory framework that guarantees AI technologies are studied and carried out responsibly throughout the EU, the standardised rules established by the Act strengthen these efforts even more.

The first phase then briefly mentions talent acquiry where it is required to "ensure that the best talents choose to establish themselves permanently in France and can, in turn, train the future generations of researchers and AI professionals in careers that are still largely to be imagined." (République Française, 2018) Again, it is clear how the focus on skill development is essential for managing the workforce transitions caused by the integration of AI. The EU AI Act complements these initiatives, creating a legal framework that promotes innovation but also ensuring that AI systems are safe and can be trusted. This dual focus on innovation and safety is key for creating new high-tech jobs and supporting the transition of workers from traditional sectors. Based on this, France's approach aligns strongly with the Dual Economy Theory similarly as Germany does, by attempting to bridge the gap between traditional and modern sectors through reskilling efforts and providing continuous learning. The strategy emphasizes the development of AI-related skills so that workers from traditional sectors can transition to high-tech roles created by AI integration. For example, France's focus on ethical AI development and public-private partnerships "aims to create a balanced economic structure where both sectors can benefit from AI advancements" (République Française, 2021)

The second phase of France's AI strategy, which started around 2020, built on the foundations laid in the first phase. It primarily included increased investments in AI research and development, with that expanded training programs for AI professional and further development of ethical AI guidelines. This phase presented specific measures to support AI integration in various sectors, including manufacturing. The French government emphasized the importance of continuous learning and reskilling to prepare the workforce for AI-driven

changes in the job market. The strategy highlighted the potential for AI to create new job opportunities while also taking into account the risks of job displacement. One text fragment pointed that out quite well emerging with the theme of workforce training, where "The adoption of AI within organizations and in different sectors of activity is hampered by the shortage of well-trained profiles, which could substantially harm French competitiveness and overall innovation in the country if training capacity was not being rapidly expanded" (République Française, 2021) This may become a critical challenge for France's AI strategy given the shortage of well-trained professionals, posing risk to French competitiveness and innovation, if not addressed swiftly. In order to be certain that the workforce possesses the skills required for the seamless AI integration, increasing the training capacity appears to be vital. The mentioned lack of skilled professionals may prevent AI technologies from being effectively adopted, which might eventually slow down the economic development and reduce innovation in the long term. Building upon that statement, without the sufficient training and reskilling programs, the adoption of AI might result in an increased job displacement as current workers may not have the necessary skills to transition into new AI-driven roles. This would surely worsen unemployment and widen the gap between the supply and demand for trained workers, which would have an adverse effect on the French economy.

At one point, France's AI strategy began to resemble the larger European regulatory framework more and more as it developed. By March 2024, the EU AI Act, which offered a more enforced regulatory framework throughout the EU, began to clash with the French national strategy. In fact, the EU AI Act incorporated many of its principles and recommendations, considering its scope, such as ethical AI development and risk management. This alignment then ensured that AI technologies created in France complied with EU regulations and upheld the highest ethical standards. (Commision de l'intelligence artificielle, 2024)

National AI Strategy in the United Kingdom

The national AI strategy of the United Kingdom, as expressed in the two reports, has placed a strong emphasis on "developing a pro-innovation regulatory and governance framework that protects the public." (HM Government, 2021) with the goal of creating an environment that supports technical growth and as mentioned, maintains public safety and trust. Following Brexit, the UK worked to become a leader in AI by putting in place adaptable and flexible regulatory frameworks that encouraged innovation. The strategy included large investments in AI R&D in addition to programs to draw talent from around the world and advance AI education and training. Brexit presented both opportunities and challenges for the UK's AI ambitions. On one hand, it allowed the UK to develop its own regulatory frameworks tailored to its specific needs, which potentially could accelerate AI innovation, while, on the other hand, it created uncertainties regarding regulatory alignment with the EU, which could affect cross-border collaborations. The UK's AI strategy has shown the importance of international cooperation and the alignment with global standards to reduce these risks. The UK is said to "participate in Horizon Europe, enabling collaboration with other European researchers, and will build a strong and varied network of international science and technology partnerships to support R&I collaboration" (HM Government, 2021) Not only that but also the country is "already working with like-minded partners to ensure that shared values on human rights, democratic principles and the rule of law shape AI regulation and governance frameworks"

(HM Government 2021) Now, from those two crucial text fragments, it can be deduced that in an effort to promote the research and innovation (R&I) collaboration, the UK has established international science and technology partnerships in addition to its participation in Horizon Europe. This initiative lets the UK benefit from shared expertise and resources across European research networks, which might result in significant advancements in AI technology. To be sure that these collaborations are successful and that AI advancements adhere to high standards of safety and ethical criteria required by the EU AI Act, it is therefore crucial to comply with it. Additionally the focus on the ethical AI development and on ensuring shared values on human rights, will also influence hiring practices where companies will increasingly look for AI experts who are knowledgeable about both ethical and technical aspects of AI. With that, there will be a greater focus on training and education in ethical AI practices, resulting in the establishment of new academic and professional development programs designed to provide workers the skills they need to maintain these moral standards. (Olatoye, 2024)

The pro-innovation approach of the UK included measures such as establishing a regulatory sandbox for AI, which allowed businesses to test new AI technologies and "help AI innovators get new technologies to market" in a controlled environment with regulatory guidance. This approach aimed to reduce the time and cost associated with bringing AI innovations to market, through which it improved the UK's competitiveness in the global AI landscape or as the report stated "The UK is home to thriving start-ups, which our framework will support to scale-up and compete internationally" (Department for Science, Innovation & Technology, 2023) The UK's drive to building such an active and competitive AI sector is shown through its particular focus on supporting start-ups by offering the necessary framework and support, which has the potential to considerably boost employment creation. This, however, also requires robust reskilling and upskilling initiatives for ensuring that the workforce can meet the needs of an increasing AI-driven economy, which essentially would minimize the risk of job displacement. In the manufacturing sector specifically, the use of AI technologies through the so-called regulatory sandbox can lead to more efficient production processes, which can lower operational costs and boost productivity. This may then lead to the creation of highly skilled jobs in the development and maintenance of AI systems. But when technology replaces regular work, there's a chance that low-skilled employment might become obsolete. To address this exact topic, by fostering a workforce being able to adapt to AI advancements, the UK aims to mitigate these negative impacts of job displacement while maximizing the benefits of AI integration in manufacturing. This shift to an AI-driven manufacturing sector needs to remain inclusive in order to contribute to long-term economic growth, making the intentional focus on workforce development significant. (Brekke, 2023)

With the adoption of the EU AI Act in 2024, the UK now faces the challenge of aligning its national AI regulations with the stricter and more standardized framework of the EU. To guarantee seamless trade and cooperation with EU member states, this alignment is crucial. The previously mentioned EU AI Act's emphasis on ethical AI development and risk management complements the UK's pro-innovation approach but requires certain adjustments to meet the specific requirements of the EU Act. The UK's AI strategy also highlighted the potential for AI to transform various sectors, one of them being manufacturing, by improving efficiency and productivity. However, the need to comply with the EU AI Act may introduce additional regulatory burdens for UK businesses, potentially affecting their competitiveness. This forces the UK to balance its pro-innovation approach with the requirements of the EU AI Act to ensure that it remains attractive for AI investment and development.

5.1 Conclusion

This thesis analysed the integration of AI particularly centred around the manufacturing sectors of Germany, France, and the United Kingdom, focusing on the economic impacts of job displacement and creation within the European workforce. The primary findings of this study indicate that the EU AI Act significantly influences the economic dynamics of job displacement and creation. By aligning AI regulation with the values enshrined in the Union Charter, the Act attempts to strike a balance between technological advancement with ethical considerations. Such alignment reassures citizens that their safety and rights are of utmost importance, which is critical for building public trust in AI technologies. The Act's focus on increasing employment and innovation demonstrates its dual objectives of supporting economic growth and making sure that advancements in technology do not come at the expense of fundamental rights.

As for the national strategies of Germany, France and the UK, while comprehensive forward-looking, For instance, the goals of Germany's National AI Strategy were to ensure ethical AI use, promote public-private partnerships, and advance AI research. The Federal Ministry of Education and Research (2024), on the other hand stressed the need of increasing research capacity in order to maintain competitiveness on a global scale. However the absence of a binding regulatory framework like the EU AI Act meant that there were disparities in the use and enforcement of these strategies across different sectors. Similarly, France's AI national strategy's focus was on ethical guidelines, research excellence and international cooperation, which all stressed the need of developing AI-related kills and reskilling workers from traditional sectors to support the creation of new high-tech jobs while reducing job displacement. If the training capacity is not rapidly raised, the lack of well-trained profiles might seriously harm French competitiveness and overall innovation. The EU AI Act has been developed to complement these national efforts through providing a consistent regulatory framework that promises AI technologies are developed and utilised responsibly across the EU. Lastly, in order to test new technologies in a regulated setting, the UK established a regulatory sandbox for AI as part of its post-Brexit AI Strategy, placing the pro-innovation approach as the main focus. This particular strategy aimed to support start-ups and improve UK's competitiveness in the global AI landscape. The UK must, however take into consideration the rigorous standards outlined in the Act for high-risk AI systems, accountability and transparency in order to keep its market position and to ensure interoperability. The dynamics of the labour market and the broader economic landscape in the European manufacturing sector have shown to be significantly affected by the adoption of the EU AI Act. In an effort to prevent or at least lessen job displacement, the Act contributes to the creation of AI applications that enhance rather than replace human talents. In order to ensure that people are ready for the changes brought about by AI integration, it helps foster workforce transitions through the use of reskilling and upskilling initiatives. This implementation of the strategies, however may face certain challenges, particularly for smaller businesses that might struggle to invest in the necessary training programs. This could result in increased economic

disparity between various industries and regions, with larger businesses and more developed areas being better equipped to carry out these initiatives.

In conclusion the EU AI Act represents a significant step towards creating a harmonized regulatory environment for AI in Europe. The Act's comprehensive approach builds on the principles outlined in the national AI strategies, providing a more enforceable structure that ensures consistency across the EU. As AI technologies continue to evolve, the EU AI Act will surely play a crucial role in shaping the future of AI in Europe, so that the benefits are achieved, and the potential risks are minimized. The more AI develops, the more policies will need to be adopted to address new challenges and opportunities. This continuous adaptation will be essential for maintaining the balance between innovation and ethical standards, which will ultimately contribute to sustainable economic growth and workforce resilience across the European Union.

5.2 Limitations

One of the primary limitations of this analysis was the restricted access to complete national AI strategies, particularly those from Germany, France, and the UK. Due to this limitation, much of the analysis relies on summary reports and secondary sources rather than comprehensive national documents. This reliance on summaries may have resulted in an incomplete understanding of the full scope of each country's AI strategy. This might include important details and specific initiatives that could have provided a more in-depth and accurate picture which might have been overlooked. For instance, specific implementation challenges or regional differences within countries were not fully accessible, potentially impacting the precision of the analysis.

Furthermore, the reliance on summary reports may have led to the already mentioned previously oversight of critical aspects of the AI strategies that were not highlighted in the summaries but are essential for understanding the broader impact and effectiveness of these policies. Again, these might be key points related to the practical application of AI and detailed outcomes of the projects that came before, could have been either missed or not entirely presented. This gap in information could result in a more skewed view of the strategies' success and potential. Therefore, while the analysis provides a general overview and comparison of AI policies, it must be acknowledged that a more comprehensive examination of full national strategies might show additional insights and areas for improvement that have not been captured in this report.

5.3 Future Research

The findings and analysis presented in this thesis provide a comprehensive understanding of the economic impacts of AI integration on job dynamics within the manufacturing sector in Europe, however, there are several areas where future research could further enhance the insights and address limitations encountered in this study. One key area would be the depth of qualitative analysis. Future research should include more detailed interviews with key stakeholders, such as policymakers or industry workers directly affected by AI integration. Such interviews could provide insights into the practical challenges or even opportunities presented by AI. This primary data could then complement the secondary data used in this thesis, which would provide a more grounded analysis

Additionally expanding the scope in order to include other sectors beyond manufacturing could also be beneficial. While manufacturing is a critical sector to consider, AI integration affects various industries differently. A comparative analysis of multiple sectors perhaps could offer a broader picture of AI's economic impact across the broader economy.

5.4 Acknowledgments

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7. APPENDIX

7.1 Base template for the coding scheme

Subject	Keyword	Article Extract
AI Regulation Framework	AI Strategy	
	Regulatory Framework	
	International Cooperation	
Job Displacement	Automation	
	Labor Market	
	Workforce Transition	
Job Creation	New Jobs	
	Skills Development	
	Training and Reskilling	
Economic and Market Dynamics	Economic Growth	
	Innovation	
	Competitiveness	
	Risks and Opportunities	

7.2 Link to the excel sheet

[Coding scheme](#)