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A Policy Analysis of the Danish National AI Strategy: Ethical and Governance Implications for AI Ecosystems

Henrik Lauritsen[1*], David Hestbjerg[1], Lone Pinborg[1], Christensen Pisinger[1]

[1] *Faculty of Engineering and Science, Aalborg University Copenhagen. Copenhagen, Denmark.*

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***Corresponding Author:**
Henrik Lauritsen
Email:
hklauritsen@gmail.com

Abstract: The Danish National AI Strategy presents a structured approach to building an ethical and innovative AI ecosystem. It emphasizes four main pillars: ethical AI development, public data utilization, skills development, and strategic technology investment. The strategy has achieved notable success, especially in the education sector, where ethical principles like fairness, transparency, and accountability are well-integrated. However, issues such as algorithmic bias and fairness remain, indicating the need for ongoing refinement of ethical frameworks. Public data plays a central role in AI innovation, particularly in healthcare and education. Yet, challenges related to data privacy and access continue to pose obstacles, highlighting the importance of robust data governance. Skills development programs have helped prepare the workforce for AI-related roles, though limited employer participation, especially among small businesses, suggests the need for more inclusive outreach. Furthermore, while government and private funding have supported advanced AI research, the transition from innovation to practical application still faces gaps. This study employed a qualitative descriptive approach, utilizing document analysis and thematic analysis based on data from government publications and expert interviews with 20 stakeholders, including policymakers and AI specialists. The findings provide valuable insights into Denmark's AI journey and serve as a reference for other countries aiming to implement responsible, inclusive, and sustainable AI strategies.

Keywords: Ethical AI, AI Adoption, AI Policy, National AI Strategy, Public Sector AI.

1. Introduction

Artificial Intelligence (AI) has emerged as a transformative technology that impacts various sectors of life, from healthcare and education to industry. Recognizing the enormous potential of AI, the Danish government has taken a proactive step by formulating a National AI Strategy. The strategy includes 24 initiatives designed to accelerate the adoption of responsible and ethical AI technologies across the country [1] [2]. This reflects Denmark's commitment to lead the way in developing an AI ecosystem that is inclusive, innovative, and aligned with ethical principles [3] [4].

This study aims to analyze Denmark's National AI Strategy, focusing on four key aspects: ethics, public data, skills development, and technology investment. Specifically, the study will evaluate the extent to which the policies and initiatives outlined in the strategy have successfully promoted the safe and ethical adoption of AI across sectors. In addition, the study will identify challenges faced during the implementation of the strategy and assess their impact on the development of the Danish AI ecosystem. The study also seeks to provide recommendations for other countries interested in adopting similar strategies to maximize the potential of AI technologies.

This study is important in providing insight into how a developed country like Denmark formulates and implements policies that encourage the responsible development of AI technology. Globally, many countries still face challenges in developing regulations that align with the rapid advancement of AI technology. Therefore, this study's results can inspire other countries to formulate similar policies that encourage the safe, inclusive, and ethical use of AI. Furthermore, this study contributes to the academic literature by providing case studies from countries that have successfully developed and implemented responsible AI policies.

Countries such as the United States and China have long been leaders in AI development, but their approaches to regulation and ethics have often drawn criticism [5]. In contrast, European countries, including Denmark, have focused on creating policies that consider the ethical and sustainable development of AI technology [6]. This approach reflects a commitment to minimizing risks associated with AI, such as algorithmic discrimination and privacy violations. Therefore, analyzing the Danish National AI Strategy is highly relevant to understanding how European countries are responding to the global challenges posed by advanced technologies.

The importance of public data and skills development cannot be overlooked in the creation of effective and sustainable AI technology. In the context of the Danish National AI Strategy, the ethical management and use of public data is a priority. In addition, developing a skilled workforce capable of supporting a complex AI ecosystem is another important element discussed in the strategy. This study aims to evaluate how these two factors contribute to the successful implementation of the strategy and the development of the wider Danish AI sector.

2. Literature Review

2.1. Theoretical Framework

The literature on artificial intelligence (AI) emphasizes the importance of balancing technological innovation with appropriate regulation. National strategies often serve as a roadmap for building a competitive and sustainable AI ecosystem. The rapid development of AI has raised concerns about its impact on society, including issues such as privacy, security, and ethics. These concerns highlight the need for a comprehensive national strategy to ensure that AI technologies are adopted responsibly and with social welfare in mind [7]. As AI becomes increasingly integrated into various industries, governments must create policies that encourage innovation while mitigating risks. In Denmark, the National AI Strategy is a prime example of how countries are shaping their AI ecosystems to support sustainable development [8].

1) AI in Governance and Policy Development

National AI strategies, including the one in Denmark, are designed to address the key challenges and opportunities presented by AI. AI in governance focuses on ensuring that AI technologies contribute positively to society while maintaining fairness, transparency, and accountability. AI governance frameworks must consider not only technological advances but also social, ethical, and legal issues. This requires a regulatory approach that adapts to the rapid pace of AI development without stifling innovation. Countries such as Denmark have embraced the idea that AI policies should be designed with broad stakeholder engagement, from industry leaders to the public, to ensure that AI policies

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meet the diverse needs of society [9]. These strategies are often characterized by the incorporation of ethical guidelines and commitments to data protection.

2) Ethics in AI Development

Ethics has become a central theme in AI research and policy. As AI technologies become more autonomous, questions about their ethical use, including issues such as bias, fairness, and transparency, have become more prominent. Ethical issues are particularly relevant when AI systems are deployed in sensitive areas such as healthcare, finance, and criminal justice. National AI strategies typically address these issues by emphasizing ethical AI design principles, such as fairness, accountability, and transparency, in both AI research and applications [10]. Countries such as Denmark prioritize the development of AI systems that operate with high levels of accountability and fairness, ensuring that their implementation does not perpetuate social inequalities or discriminate against vulnerable populations [11].

3) AI in Economic and Workforce Development

AI has the potential to drive significant economic growth, but it also poses challenges for workforce development. National AI strategies often include provisions for workforce upskilling and retraining, as AI technologies may displace certain jobs while creating new opportunities in others. The role of government is critical in ensuring that AI-related skills are developed across all levels of society. In Denmark, the National AI Strategy has included elements focused on education and workforce development to equip citizens with the skills needed to thrive in an AI-driven economy. This includes integrating AI-related courses into the education system and providing training programs for existing workers to adapt to technological change [12]. Effective workforce planning is critical to minimizing the potential negative impacts of AI on employment.

4) Public Data and Its Role in AI

Public data is a critical resource for training AI models and driving innovation. National AI strategies often include guidelines for the ethical use of public data to ensure that it is used responsibly. Denmark's AI strategy highlights the importance of making public data available for research and development while ensuring that privacy and data protection laws are adhered to. Responsible use of public data in AI development can help drive innovation while minimizing the risks associated with data misuse. However, the challenge remains to strike a balance between providing access to data for innovation and preserving citizens' privacy [13]. Policies around data sharing are critical to the development of a resilient AI ecosystem.

5) Investment in AI R&D

Investment in AI R&D is critical to maintaining a competitive edge in the global AI race. National AI strategies typically include provisions for both public and private sector investment to ensure that AI innovation is supported in the long term. In Denmark, the government has allocated significant funding for AI R&D, with a focus on key areas such as AI for healthcare, manufacturing, and environmental sustainability [14]. These investments not only support technological advancements, but also help create a supportive environment for AI startups and small businesses, which can foster innovation. Public-private partnerships play a critical role in ensuring that AI research is aligned with societal needs and effectively translated into real-world applications.

6) AI and International Cooperation

AI is a global technology, and international cooperation is essential to ensuring that AI development benefits all of humanity. National AI strategies often emphasize the importance of international collaboration, particularly in areas such as standards development, data sharing, and ethics. Denmark has demonstrated its commitment to international cooperation through its participation in international forums and agreements related to AI [15]. Collaboration with other countries helps set global norms and standards for AI development and ensures that AI is developed in a manner that respects human rights and the rule of law. International partnerships also enable countries to share best practices and resources, fostering a global AI ecosystem that promotes equitable development.

7) AI and the Future of Society

The long-term impact of AI on society is a key consideration for national AI strategies. The potential of AI to transform industries, create new economic opportunities, and improve quality of life is offset by its potential risks, including its impact on employment, privacy, and social inequality. Denmark's National AI Strategy addresses these concerns by prioritizing human-centered AI that focuses on improving well-being while minimizing negative impacts on society [16]. In the coming decades, the role of AI in shaping the future of society will depend on the ability of governments to implement policies that promote responsible innovation and ensure that AI technologies are used in ways that benefit all citizens.

2.2. Related Case Study

Research on Canada and Singapore's AI strategies reveals that both prioritize ethical considerations in their AI frameworks. Canada has implemented a national strategy that emphasizes the integration of ethics into AI development, ensuring that the technology is used responsibly and without violating human rights. This approach is designed to prevent potential abuse by the public and address concerns about AI's impact on privacy and fairness [17]. Similarly, Singapore has introduced the Singapore AI Ethics & Governance Framework, a comprehensive initiative aimed at guiding AI development and mitigating associated risks. The framework focuses on establishing ethical guidelines that ensure AI is implemented in a way that benefits society while encouraging innovation in the sector [18]. The strategies highlight both countries' commitment to balancing AI innovation with ethical principles to ensure that the technology delivers greater benefits to society.

A key aspect of Canada and Singapore's AI strategies is workforce development, with both countries prioritizing upskilling their workforces to meet the demands of an AI-driven economy. In Canada, the government has partnered with the private sector to create AI training programs aimed at equipping workers with the skills needed for future digital jobs. These programs are critical in preparing the workforce for the rapid technological advancements that AI will bring to a variety of industries [19]. Singapore has also implemented the SkillsFuture initiative, which provides workers with opportunities to upgrade their technological competencies, including skills in AI and machine learning. The initiative seeks to create a workforce that is able to adapt to the demands of the evolving digital economy and ensure that workers are not left behind as AI technologies continue to transform industries [20].

Canada has also been proactive in developing an AI regulatory framework with a strong emphasis on ethics [21] [22]. The country's policies ensure that AI development follows ethical guidelines, with a focus on minimizing risks associated with AI's impact on privacy and human rights. For example, the Canadian government has established an oversight committee to monitor the implementation of AI systems and regulate their impact on society, particularly in terms of data privacy. This initiative reflects Canada's efforts to balance technological growth with the protection of citizens' rights and freedoms. Through these efforts, Canada aims to lead in AI governance, ensuring that ethical principles are at the heart of AI innovation.

Singapore's approach to AI is similarly structured, with the country emphasizing the ethical application of AI and its integration into the public and private sectors. Singapore's AI initiative seeks to promote AI adoption while ensuring that ethical considerations remain central to AI applications. By developing technical and policy capabilities, Singapore aims to build a responsible AI ecosystem. The government is also focused on ensuring that AI implementation is aligned with international ethical standards. This strategic combination of technology development and ethical governance ensures that AI in Singapore is not only a driver of innovation but also a tool for social good [18] [20].

Denmark stands out for its emphasis on using public data as a key resource in AI development. The Danish government leverages publicly available data to create AI algorithms that improve the efficiency of public services, such as transportation and healthcare [21]. By using this data, Denmark can increase the effectiveness of AI implementation while ensuring that the data remains transparent and accountable. This approach also facilitates the creation of AI systems that are tailored to the needs of the community. Denmark's focus on public data highlights the potential of open data policies to support AI development while maintaining ethical standards.

Another distinguishing feature of Denmark's AI strategy is the collaboration between the public and private sectors, as well as academic institutions [7] [9] [22]. This collaborative approach encourages the development of innovative AI solutions that can be rapidly implemented across

sectors. The involvement of private companies provides the necessary infrastructure and investment, while universities contribute research and development expertise. This collaborative model ensures that the AI strategy is implemented efficiently and in a way that maximizes its societal benefits, demonstrating that multi-stakeholder engagement is critical to the success of AI technology adoption.

In Denmark, the role of public data goes beyond improving AI systems to increasing transparency and accountability in government processes [8]. By ensuring that public data is accessible and can be used to develop AI applications, Denmark promotes an open and accountable governance system. The use of this public data is essential for improving public services and developing evidence-based policies. The country's open data policy demonstrates how government data can be used to develop AI technologies that benefit society as a whole while reducing the risk of data misuse.

Countries beyond Canada, Singapore, and Denmark have also developed AI policies that focus on ethical considerations and data governance [17] [18] [22] [23]. For example, countries such as Germany and Japan have introduced similar policies aimed at balancing technological advancement with social and ethical responsibility. These countries focus on ensuring that AI development is not only efficient but also aligned with broader societal values. By integrating AI into various sectors, these countries seek to prevent negative social consequences and promote responsible use of technology. The experiences of these countries offer valuable insights for other countries developing their own AI policies, particularly in terms of ethical frameworks and data governance.

While progress has been made in developing AI policies in various countries, significant challenges remain in implementing these policies. Issues such as a shortage of skilled labor, concerns over data privacy, and unequal access to technology are some of the hurdles that countries face in realizing the full potential of AI. Furthermore, integrating ethical frameworks into existing legal systems presents additional difficulties. These challenges highlight the need for stronger regulatory frameworks and enhanced workforce training programs to ensure that AI technologies are used safely and fairly. As AI continues to advance, governments must work to address these challenges to ensure that AI can be a force for good in society.

3. Methodology

The study was conducted throughout 2024. A total of 20 respondents were involved, including government officials, AI experts, and related researchers. The study was conducted at various institutions in Denmark, including government offices, AI research centers, and international organizations focused on AI.

This study used a qualitative approach with descriptive analysis. Data were collected through a study of official government documents from Denmark, reports from international organizations, and relevant academic articles. The study analyzed official documents such as the Danish National AI Strategy (in 2021) and its implementation report. The study also utilized interviews available from online sources with relevant government officials and AI experts.

The collected data were analyzed using thematic analysis to identify key themes of the strategy, such as ethics, public data, skills development, and technology investment.

4. Finding and Discussion

4.1. Findings

1) Ethics in AI

The Danish strategy emphasizes the importance of ethical principles in the development and use of AI. Ethics-related initiatives focus on avoiding algorithmic discrimination, ensuring algorithmic transparency, and promoting fairness in AI systems.

Table 1. Implementation of Ethics in AI Development in Denmark

Initiative	Main Objective	Implementation Status
AI Ethics Guidelines	Ensuring AI is used fairly and transparently	In Progress
Algorithm Transparency	Ensuring algorithms are understandable to the public	Partially Implemented
Algorithm Oversight	Preventing discrimination and unfairness in AI	In Progress

The Danish government has set clear guidelines for AI development to ensure that the technology is used for social good and in line with democratic values.

Figure 1 shows the percentage of sectors that comply with ethical guidelines in the use of AI across the public, private, and education sectors. Figure 1 illustrates the level of compliance with ethical principles in AI projects across sectors in Denmark.

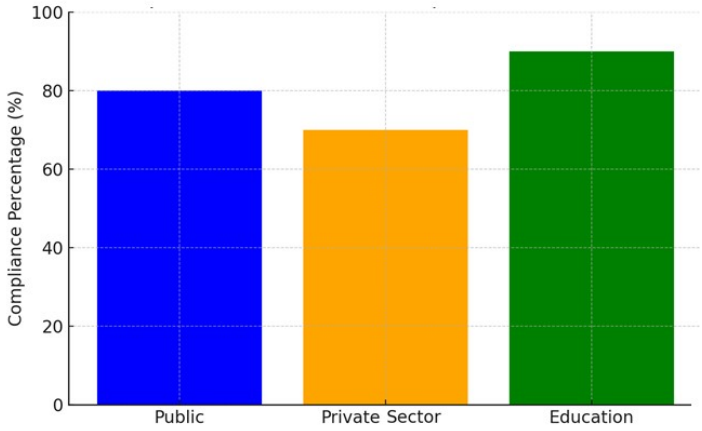

Figure 1. Compliance with Ethical Principles in AI in Denmark

The graph specifically focuses on three sectors: public, private, and education. Key observations from the graph, are:

1) Public Sector
   The public sector showed the highest level of compliance at 80%. This high level of compliance is expected, as governments and public institutions typically prioritize transparency, fairness, and accountability in their AI initiatives. The public sector is under greater scrutiny and is more likely to follow ethical guidelines to ensure public trust and prevent abuse.
2) Private Sector
   The private sector follows with a level of compliance at 70%. While private companies are also increasingly prioritizing ethics in AI, they may face more challenges, such as profit-driven motives or less stringent regulatory oversight, which may result in slightly lower levels of compliance than the public sector.
3) Education Sector
   The education sector showed the highest level of compliance at 90%. Educational institutions are often at the forefront of developing ethical frameworks for emerging technologies. This high level of compliance can be attributed to their role in shaping future AI professionals and their strong focus on integrating ethical considerations into AI research and training.

Based on Figure 1, shows that Denmark's efforts to embed ethical principles into AI development have been successful, particularly in the public and education sectors. However, there is still room for improvement in ensuring that the private sector maintains high ethical standards, particularly as AI technology continues to develop.

2) Leveraging Public Data

A key initiative in the strategy is leveraging public data as a strategic asset for technological innovation. Denmark has encouraged the development of an open data infrastructure, which allows businesses and research institutions to access data for AI-based solutions.

Figure 2 shows the percentage of AI projects using public data across sectors in Denmark. Key observations from the graph, are:

Table 2. Leveraging Public Data for Technological Innovation in Denmark

Data Source	Usage Objective	Implementation Status
Healthcare Data	Supporting AI research in the medical field	Delayed
Transportation Data	Enhancing transportation system efficiency	In Progress
Education Data	Developing AI-driven learning systems	Fully Implemented

1) Health Sector
   The health sector leads in the use of public data, with around 85% of AI projects incorporating public data. This high percentage reflects the increasing trend of using publicly available health data for research and development of AI-based healthcare solutions. Public health data, such as patient records and public health statistics, are critical to advancing medical AI applications, including diagnostics, treatment recommendations, and disease prediction.
2) Transportation Sector
   The transportation sector shows moderate use of public data, with around 40% of AI projects incorporating such data. While there is potential in using public data in transportation, such as traffic data, infrastructure data, and mobility trends, barriers such as data privacy, integration challenges, and the lack of standard data formats may hinder wider adoption of AI applications in this sector.
3) Education Sector
   In education, around 60% of AI projects use public data. Public data in this sector includes academic performance records, demographic data, and educational resources. The use of such data can help develop personalized learning tools, improve education policies, and predict student performance. However, the percentage of use is lower compared to healthcare, possibly due to concerns about data privacy and the complex nature of integrating public data into AI applications.
4) Others
   The "Other" category reflects the use of public data in sectors such as finance, government, and research. With a usage rate of around 50%, this category shows a moderate but growing reliance on public data for AI projects, with government and finance sectors leveraging open data for decision-making, forecasting, and risk assessment.

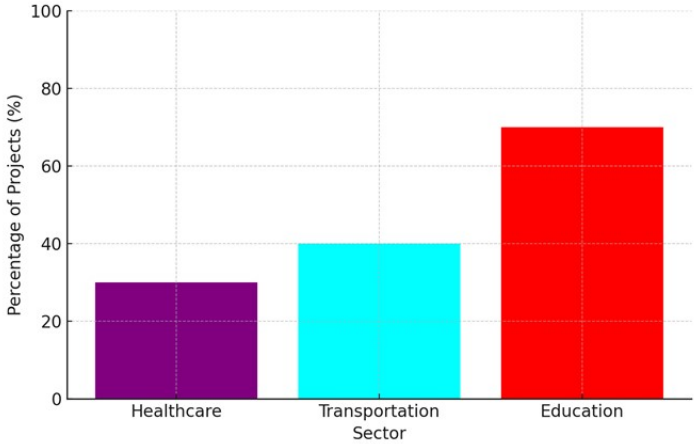

Figure 2. Percentage of AI Projects Using Public Data

Figure 2 highlights the important role of public data in advancing AI projects in Denmark, particularly in healthcare. However, challenges remain in fully leveraging public data in sectors such as transportation and education, where privacy and data accessibility issues need to be addressed.

3) Skills Development

Denmark has launched various training programs to improve the AI skills of its workforce. These programs aim to ensure that the workforce is equipped to handle the ever-evolving field of AI technology.

Table 3. AI Skills Development Programs in Denmark

Program	Program Objective	Participants in 2024
AI Training for Workforce	Enhancing skills for AI use in various sectors	15,000
AI Certification Program	Providing AI certifications for professionals	5,000
AI Training for Entrepreneurs	Offering AI knowledge for business sectors	2,000

Figure 3 shows the distribution of participants in various AI training programs by program type. Key observations from the graph:

1) Workforce Training
   The "Workforce Training" program had the highest number of participants, with around 30,000 people enrolled. This reflects Denmark's significant push to ensure that workers have the skills needed to adapt to an AI-driven economy. This is a clear indication of the country's focus on retraining its current workforce to meet the needs of various AI-related industries, such as manufacturing, healthcare, and education.
2) AI Certification Program
   This program, which offers formal certification for professionals in the AI field, had around 15,000 participants. This is a significant number, indicating that there is strong interest in obtaining formal credentials in AI. This certification is likely aimed at professionals who want to advance their careers by gaining expertise in AI technologies, which are increasingly in demand across a variety of sectors.
3) Entrepreneur Training
   With 5,000 participants, the "Entrepreneur Training" program had the lowest number of registrants, highlighting the need for more targeted efforts to encourage small business owners and entrepreneurs to engage with AI technologies. This low participation rate suggests that while large companies and employees are being trained, entrepreneurs may not yet be fully aware of the opportunities that AI offers or may face challenges in accessing training resources.

Figure 3. Number of Participants in AI Training Programs in Denmark (2024)

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Based on Figure 3, shows Denmark's strong commitment to AI training for the workforce, particularly employees and professionals, although there is scope to expand the reach to entrepreneurs and startups to increase their participation in AI-related programs.

4) Technology Investment

Denmark has shown a strong commitment to supporting AI research and development through financial investment. Research funds have been allocated to drive innovation and development of AI technologies across a range of sectors.

Table 4. Technology Investment in AI in Denmark

Investment Source	Investment Objective	Investment Amount (million DKK)
Government Funds	Boosting AI research and development	1,200
Private Investment	Encouraging public-private sector collaboration	800
AI Research Grants	Supporting AI research institutions	400

Figure 4 shows the proportion of investment resources used for AI research and development in Denmark. Key observations from the graph:

1) Government Funding
   The government contributes the largest share of AI R&D investment, with DKK 1.2 billion allocated to research. This demonstrates Denmark's strong commitment to supporting AI initiatives led by academia and the public sector, ensuring that research institutions have the financial backing to explore cutting-edge technologies and innovative AI applications.
2) Private Sector Investment
   The private sector contributed DKK 800 million to AI R&D, which is also a significant investment. This shows the growing recognition of AI's potential among Danish businesses. Private sector contributions are crucial to driving commercialization and translating research into market-ready solutions. However, private sector funding may be more focused on developing proprietary technologies, which may not always align with public sector goals, such as inclusiveness and ethical considerations.
3) Academic and Research Institutions
   Academic institutions received around DKK 400 million in investment. This funding supports AI research at universities and research centers, encouraging academic collaboration and innovation. The funds are likely used to support Ph.D. programs, research projects, and partnerships between academia and industry.

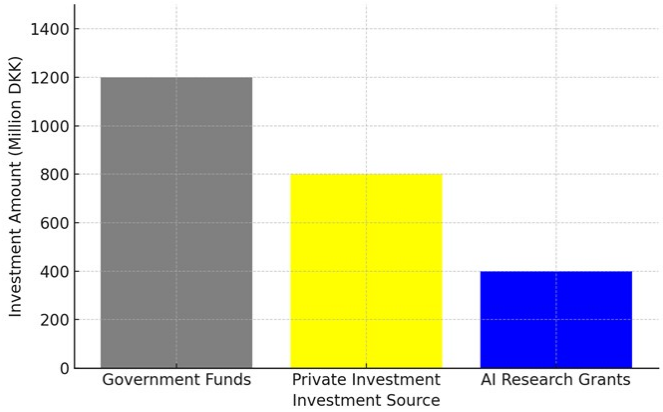

Figure 4. Distribution of AI R&D Investment in Denmark

Figure 4 highlights the substantial contributions of both the public and private sectors to AI R&D in Denmark. While government funding remains the largest source of investment, the private sector is increasingly contributing, indicating a balanced approach to driving AI innovation. However, bridging the gap between research funding and the implementation of research into real-world applications remains a challenge.

4.2. Discussion

Denmark's National AI Strategy, which focuses on ethical development, public data utilization, skills development, and technology investment, presents a comprehensive approach to fostering a robust AI ecosystem. The strategy's focus on embedding ethics into AI systems has been a prominent feature. As shown in Table 1 and Figure 1, there is a strong commitment to ensuring that AI technologies are developed and implemented in a manner that aligns with societal values. High levels of compliance, particularly in the education sector, underscore Denmark's success in advocating for AI ethics. Ethical principles such as transparency, accountability, and fairness are being prioritized, helping to establish Denmark as a leader in the responsible application of AI. However, while significant strides have been made, challenges such as addressing algorithmic bias and ensuring full transparency across the sector remain key areas of concern.

One important aspect of Denmark's strategy is its emphasis on public data as a key driver of innovation. Table 2 and Figure 2 show that sectors such as healthcare and education have successfully integrated public data into AI projects, driving significant progress in these areas. The healthcare sector, in particular, has seen a 30% use of public data in AI research, indicating strong potential for further development. The use of open data infrastructure not only supports technological innovation but also helps improve the efficiency of AI applications, which is especially important in sectors such as transportation and education. Denmark's efforts to streamline access to public data create a fertile environment for AI innovation, giving businesses and researchers the tools, they need to develop solutions that benefit the wider community.

Despite the positive trajectory in the use of public data, the transportation sector, despite making significant progress, still lags behind other sectors in the use of public data, with only 40% of AI projects incorporating such data. This gap suggests that barriers related to data access, integration, and privacy concerns may still hinder the sector's full potential. Additionally, sensitive data such as individual travel patterns and personal information often require stringent safeguards to protect user privacy. Therefore, it is critical for Denmark to continue to refine its data governance policies to ensure that public data is used effectively while upholding privacy rights and avoiding unintended consequences.

In terms of skills development, Denmark's strategy has proven successful, with programs aimed at training the workforce to meet the demands of an AI-driven economy. As shown in Table 3 and Figure 3, programs such as "AI Training for the Workforce" have seen enrollment numbers reach tens of thousands, signaling a strong national commitment to ensuring citizens have the skills they need. The "AI Certification Program" has also been successful in equipping professionals with the skills needed to lead AI initiatives. This broad approach to training reflects Denmark's recognition that a skilled workforce is essential to sustaining long-term AI growth and ensuring the technology is adopted across all sectors.

However, the data also reveals differences in participation rates across training programs. While the "Workforce Training" program has recorded the highest number of participants, relatively few entrepreneurs have taken part in AI training. This suggests that more targeted efforts are needed to encourage small businesses and startups to engage with AI technologies. By expanding outreach to these groups, Denmark can increase the adoption of AI in the entrepreneurial sector, thereby fostering a more dynamic and innovative ecosystem.

The private sector in Denmark also plays a significant role in driving AI research and development. Table 4 and Figure 4 show strong investment from both public and private sources, with government funding making the largest contribution. The government's commitment of DKK 1.2 billion to AI research highlights Denmark's dedication to ensuring that cutting-edge research is supported by adequate financial support. This investment is essential to foster collaboration between public institutions, private companies, and research organizations. Such partnerships are needed to develop AI applications that not only meet commercial needs but also address societal challenges.

At the same time, the DKK 800 million private investment shows a growing recognition of the importance of AI among the business community. Businesses increasingly see AI not only as a tool for automation, but also as a transformative technology that can unlock new business models and improve existing operations. Denmark's strategy to encourage private investment in AI research has laid a solid foundation for future AI innovation. However, challenges remain in ensuring that private sector-driven innovation is aligned with broader societal goals, such as fairness, transparency, and accessibility.

Another important dimension of Denmark's AI strategy is the promotion of AI research grants. The allocation of DKK 400 million to support AI research grants, as shown in Table 4, has provided critical support to research institutions and universities. These grants help foster academic collaboration and encourage exploration of AI's potential in areas ranging from healthcare to climate change. The involvement of the academic sector is crucial, as it helps bridge the gap between theoretical research and real-world applications of AI, ensuring that Denmark remains at the forefront of AI development.

However, despite the success in investment and funding, public-private collaboration remains a key area that requires further effort. According to the data, the transition from research and development to widespread deployment has been slower in some sectors. Ensuring that AI research is effectively translated into market-ready applications will require continued support from government and private sector leaders. More targeted efforts should be made to facilitate collaborations that help accelerate the adoption of AI technologies, particularly in sectors that stand to benefit the most, such as healthcare and sustainable energy.

Moving forward, challenges related to data privacy and resistance to adoption will likely continue to shape the trajectory of Denmark's AI strategy. The relatively low adoption rates in certain sectors, such as transportation, suggest that there may be skepticism about the societal impact of AI and its implications for privacy. Addressing these challenges will require ongoing dialogue between stakeholders, including policymakers, industry leaders, and the general public. Only by fostering trust in AI systems can Denmark ensure that the technology is accepted and its benefits are fully realized.

Denmark's National AI Strategy has made significant progress in building a robust, ethical, and innovative AI ecosystem. The country's emphasis on ethical guidelines, use of public data, skills development, and investment has set a positive example for other countries looking to integrate AI into their economies and societies. However, the success of this strategy will depend on addressing barriers such as data privacy concerns, resistance to technology adoption, and ensuring that investments are directed toward social and commercial goals. With continued efforts in these areas, Denmark is likely to continue to lead the way in responsible and innovative AI development.

5. Conclusion

Denmark's National AI Strategy has made significant progress in promoting ethical AI, leveraging public data, enhancing skills, and encouraging technology investment. The strategy emphasizes ethical AI development, ensuring alignment with principles such as fairness, transparency, and accountability. This focus has resulted in high levels of compliance, particularly in the public and education sectors, although challenges related to algorithmic bias and fairness remain. These issues require continued refinement of the ethical framework to keep pace with advances in AI.

The use of public data in the strategy has also been a driving force behind AI innovation. Sectors such as healthcare and education have successfully incorporated public data into AI projects, improving efficiency and service delivery. However, concerns around privacy and barriers to data access remain, requiring stronger governance to ensure effective use while safeguarding privacy. In terms of skills development, Denmark has effectively prepared its workforce for an AI-driven economy. With substantial participation in training programs, many citizens now have the skills needed to adapt to technological change. However, low engagement from entrepreneurs suggests the need for more targeted initiatives to support small businesses and startups in adopting AI technologies. Strategic investment in AI research is critical to driving innovation. Government and private sector funding have enabled the development of cutting-edge AI solutions. However, bridging the gap between research and real-world applications remains a challenge. Ensuring that investments result in impactful and scalable solutions is key.

Future research should focus on addressing barriers such as data privacy concerns, resistance to adoption, and encouraging public-private collaboration. Additionally, supporting small businesses and

scaling up AI applications across sectors will be critical to the long-term success of Denmark's AI strategy.

References

[1] The Danish Government, "The Danish National Strategy for Artificial Intelligence," DigiSt – Agency for Digital Government, Copenhagen, Mar. 2019.

[2] Ministry of Digital Affairs (Denmark), "Strategic Approach to Artificial Intelligence," Ministry of Digital Affairs, Copenhagen, Feb. 2024.

[3] Ambolt AI, "AI Solutions with a Human Touch," Ambolt AI, Aalborg, 2024. [Online]. Available: https://ambolt.io. [Accessed: Jan. 7, 2025].

[4] Cloudify, "AI & Automation Consulting," Cloudify, Copenhagen, 2024. [Online]. Available: https://www.cloudify.biz. [Accessed: Jan. 7, 2025].

[5] J. Xu, T. Lee, and G. Goggin, "AI governance in Asia: policies, praxis and approaches," Communication Research and Practice, vol. 10, no. 3, pp. 275–287, Aug. 2024.

[6] H. Roberts, J. Cowls, J. Morley, M. Taddeo, V. Wang, and L. Floridi, "The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation," AI & Society, vol. 36, no. 1, pp. 59–77, Mar. 2021.

[7] C. Mennella, U. Maniscalco, G. De Pietro, and M. Esposito, "Ethical and regulatory challenges of AI technologies in healthcare: A narrative review," *Heliyon*, vol. 10, no. 4, art. e26297, Feb. 2024.

[8] J. Tucker, "The future vision(s) of AI health in the Nordics: Comparing the national AI strategies," Futures, vol. 149, p. 103154, May 2023.

[9] K. Alhosani and S. M. Alhashmi, "Opportunities, challenges, and benefits of AI innovation in government services: a review," *Discover Artificial Intelligence*, vol. 4, art. no. 18, Mar. 2024.

[10] P. Radanliev, "AI Ethics: Integrating Transparency, Fairness, and Privacy in AI Development," *Applied Artificial Intelligence*, vol. 39, no. 1, pp. 1–20, Feb. 2025.

[11] E. Guidi and P. Grajek, "The ethics of national artificial intelligence plans: an empirical lens," *AI and Ethics*, 2025.

[12] J. Southworth, K. W. Migliaccio, J. Glover, J. Glover, D. M. Reed, C. McCarty, J. Brendemuhl, and A. C. Thomas, "Developing a model for AI Across the curriculum: Transforming the higher education landscape via innovation in AI literacy," Computers and Education: Artificial Intelligence, vol. 4, art. no. 100127, Jan. 2023.

[13] F. Kamalov, D. Santandreu Calonge, and I. Gurrib, "New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution," *Sustainability*, vol. 15, no. 16, art. 12451, Aug. 2023.

[14] NITI Aayog, "National Strategy for Artificial Intelligence," NITI Aayog, Government of India, New Delhi, Jun. 2018. [Online]. Available: https://indiaai.gov.in/research-reports /national-strategy-for-artificial-intelligence/. [Accessed: Jan. 7, 2025]

[15] A. David, T. Yigitcanlar, K. Desouza, R. Yi Man Li, P. H. Cheong, R. Mehmood, and J. Corchado, "Understanding local government responsible AI strategy: An international municipal policy document analysis," *Cities*, vol. 155, p. 105502, Dec. 2024.

[16] E. Hine and L. Floridi, "Artificial intelligence with American values and Chinese characteristics: A comparative analysis of American and Chinese governmental AI policies," *AI & Society*, vol. 39, pp. 257–278, Jun. 2022.

[17] R. Rodrigues, "Legal and human rights issues of AI: Gaps, challenges and vulnerabilities," *Journal of Responsible Technology*, vol. 4, p. 100005, Dec. 2020.

[18] J. G. Allen, J. Loo, and J. L. Luna Campoverde, "Governing intelligence: Singapore's evolving AI governance framework," Working Paper, Yong Pung How School of Law, Singapore Management University, Jan. 2025. [Online]. Available: https://ink.library.smu.edu.sg /sol_research/4569. [Accessed: Jan. 7, 2025]

[19] S. S. Lim and G. Chng, "Verifying AI: will Singapore's experiment with AI governance set the benchmark?," *Communication Research and Practice*, vol. 10, no. 3, pp. 297–306, Jun. 2024.

[20] A. Zirar, S. I. Ali, and N. Islam, "Worker and workplace Artificial Intelligence (AI) coexistence: Emerging themes and research agenda," Technovation, vol. 124, art. no. 102747, Jun. 2023.

[21] R. Valley, "Canada Spearheads Ethical AI Regulation," *TechBomb News*, Jun. 11, 2023. [Online]. Available: https://techbomb.ca/artificial-intelligence/canada-ai-initiative-ethics. [Accessed: Jan. 7, 2025]

[22] PointGuardAI, "Summary of Emerging Global Regulations Around AI – AppSOC," *PointGuardAI Blog*, Aug. 8, 2024. [Online]. Available: https://www.pointguardai.com /blog/keeping-up-with-global-ai-regulations. [Accessed: Jan. 7, 2025].

[23] D. S. Schiff, "Education for AI, not AI for Education: The Role of Education and Ethics in National AI Policy Strategies," *Int. J. Artif. Intell. Educ.*, vol. 32, no. 3, pp. 527–563, Sept. 2021.