EDUCATION, FUTURE JOBS AND SMART SYSTEMS

in the Age of Artificial Intelligence

PART B

SMART SYSTEMS AND FUTURE EMPLOYMENT IN THE AGE OF AI

EDITED BY

Miltiadis D. Lytras • Andreea Claudia Șerban

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Education, Future Jobs and Smart Systems in the Age of Artificial Intelligence, Part B: Smart Systems and Future Employment in the Age of AI

EDITED BY

MILTIADIS DEMETRIOS LYTRAS

The American College of Greece, Greece

AND

ANDREEA CLAUDIA ŞERBAN

The Bucharest University of Economic Studies, Romania

United Kingdom – North America – Japan – India – Malaysia – China

Emerald Publishing Limited
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To
Alexandru and Maria,
Dimitris, Hara and Katerina

With love and hope, we dedicate this volume to you – the dreamers, innovators and builders of the future. May your journey in this ever-evolving world be guided by curiosity, wisdom and the courage to shape a better tomorrow.

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About the Editors

Miltiadis Demetrios Lytras is an Expert in Advanced Computer Science and Management, Editor, Lecturer and Research Consultant, with extensive experience in academia and the business sector in Europe and Asia. Dr Lytras is a Research Professor at Deree College – The American College of Greece and a Distinguished Scientist at the King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia. Dr Lytras is a world-class expert in the fields of cognitive computing, information systems, technology-enabled innovation, social networks, computers in human behaviour and knowledge management. In his work, Dr Lytras seeks to bring together and exploit synergies among scholars and experts committed to enhancing the quality of education for all. Dr Lytras has coauthored more than 120 high impact factor papers in Q1 and Q2, Web of Science and Scopus-indexed journals such as: *IEEE Transactions on Knowledge and Data Engineering*, *IEEE Internet Computing*, *IEEE Transactions on Education*, *IEEE Access*, *Future Generation Computer Systems*, *Journal of Business Research*, *International Journal of Information Management*, *Journal of Innovation and Knowledge*, *Technological forecasting and Social Change*, *Journal of Ambient Technology and Humanized Computing*, *World Wide Web Journal*, *Computers in Human Behavior*, *Studies in Higher Education*, *Telematics and Informatics*, *Information Systems Management*, *IJ of Engineering Education*, *Journal of Universal Computer Science*, *Journal of Knowledge Management*, *British Journal on Education Technology*, *Interactive Learning Environment*, *Educational Technology and Society*, *Behaviour and Information Technology*, etc.

Andreea Claudia Şerban is a Professor at the Department of Economics and Economic Policies, Faculty of Theoretical and Applied Economics and the Director of Doctoral School of Economics. She holds a PhD in Economics from Bucharest University of Economic Studies and a post-PhD in Economics from Romanian Academy of Science. Her research activity consists of publication of more than 10 books and numerous economic studies in highly ranked journals and participation in many international conferences. She is an Associate Editor for *International Journal on Semantic Web and Information Systems* (IJSWIS – WoS-indexed journal) and the Editor in Chief for *Global Journal of Business, Economics and Management: Current Issues* (journal indexed in many international databases). She is a reviewer for prestigious international journals and a

member in editorial board or organizing committee of many international conferences. Her areas of research interests include sustainable development, smart development, knowledge economy, labour market, education and demographic issues.

About the Contributors

Mohammad Abiad, PhD, serves as an Assistant Professor and Chair of the Math and Stat Department at the American University of the Middle East. Holding a PhD in Applied Mathematics/Statistics in Industrial Engineering from University Politehnica of Bucharest, Romania, he specializes in machine learning, optimization and mathematical finance. Dr Abiad's research, published in esteemed peer-reviewed journals, focuses on applying these disciplines to enhance business decision-making and educational practices. Renowned for his dynamic teaching and curriculum development, his pedagogical approach emphasizes practical, data-driven problem-solving. Under his leadership, the department has excelled in fostering academic rigour and student engagement, earning him multiple accolades for educational excellence.

Alice AlAkoum, PhD student, is a Lecturer at the Arab Open University's Deanship of Business Studies in Ardiya, Kuwait, and a diligent PhD candidate in Business Studies with a focus on Human Resources at Bucharest University of Economic Studies, Romania, stands out for her rich academic background. Holding a Master's in Business Administration and a Licence in Law, Alice has cultivated a rich educational background. Her tenure at the Arab Open University has been marked by significant contributions to programme development, execution and evaluation, alongside assisting in strategic HR strategies and risk management studies. Alice engages in research that bridges theoretical knowledge with practical application in human resources, aiming to enhance organizational effectiveness and employee well-being. Her career is distinguished by a commitment to excellence, both in academia and in various professional roles that have leveraged her strong negotiation skills, ability to work under pressure and capacity for building professional relationships.

Bedour Alboloushi is an Assistant Professor of Business Management at Kuwait College of Science and Technology. She holds a PhD in Information Studies from the University of Sheffield, UK, and a Master's in Business Administration (MBA). Her research focuses on information systems, knowledge and innovation management. She teaches a range of courses related to information systems and project management. She has considerable expertise in project management and is certified as a Project Management Professional (PMP) by the Project Management Institute.

Mohammad Alkandari holds a PhD in Law from the University of Essex, UK, and is a distinguished lawyer and researcher. His research focuses on digital currencies, Electronic Funds Transfer (EFT), data protection and consumer protection. Dr Alkandari is renowned for his expertise in these advanced legal areas. He works to navigate the challenges posed by emerging technologies and to develop comprehensive legal frameworks that safeguard consumer rights and ensure data privacy. In addition to his research, he teaches a variety of legal courses and is committed to leading the way in legal innovation. Dr Alkandari is a strong advocate for ethical practices in the digital economy, constantly contributing to the advancement of legal knowledge in these rapidly evolving fields.

Ahmed Badran is an Associate Professor of Public Policy at the Department of International Affairs, College of Arts and Sciences, Qatar University. Dr Badran holds a PhD degree in Public Policy from the University of Exeter, the United Kingdom. Dr Badran has also worked as a Postdoctoral Research Fellow at Aston Centre for Critical Infrastructure and Services (ACCIS), Aston Business School, Aston University, Birmingham, the UK. Dr Badran's research interests extend to cover different areas of regulatory governance and politics of regulation in liberalized public utilities. That includes telecoms, water and energy sectors, particularly in transition and developing economies. At present, Dr Badran is leading an international research team working on modelling and assessing the transition towards a low carbon economy in the GCC. This NPRP research project is funded by QNRF.

Sara Badran is a University of Cambridge MPhil student studying Digital Humanities and specializing in AI policies and how colonial ideologies perpetuate through generative artificial models, and the subsequent impacts on political, social, educational and economic sectors. Miss Badran holds a First Class. Bachelor of Arts with Honours in Film and Television Studies from the University of Exeter, United Kingdom. Miss Badran has also presented her findings on how AI will impact labour markets in Qatar at the 14th Annual Gulf Research meeting. Miss Badran also has interests in other forms of digital media having completed work experience with the News and Current Affairs team at BBC Spotlight, United Kingdom, and the digital Channel 4 Work Experience skills course, and worked with many different local newspapers in the United Kingdom. Miss Badran has also created digital exhibitions of her own at the Bill Douglas Cinema Museum as well as working with digital marketing companies across the United Kingdom.

Mayssa Ahmed Ben Belgacem is a Senior Lecturer in the Department of Tourism and Management Studies at Oman Tourism College. She holds a Bachelor's degree in Business Management, and both her Master's and PhD degrees are specialized in Finance. With over 5 years of teaching experience, Dr Mayssa has established herself as an expert in her field. She has contributed significantly to academia, publishing extensively in reputable international journals indexed in

Scopus and Web of Science. Her research interests encompass finance, Islamic finance, banking and financial technologies.

Suzan Dsouza is an Associate Professor of Accounting at the American University of the Middle East, Kuwait, and teaches accounting courses in the BS Accounting and MBA programmes. With 7 years of corporate and 16 years of academic work experience across 3 countries, she has authored 35 research papers, 3 book chapters and 1 edited book and presented at various conferences throughout Asia and Europe. WHO selected one of her recent studies related to the impact of COVID-19 to be a part of their database. She is an active reviewer with various international journals and an editorial board member with 4 international journals. She has been a research advisor with the Institute of Management Accountants USA.

Revenio C. Jalagat, Jr. is currently employed in Al Zahra College for Women as an Associate Professor for almost 11 years. He taught at Gulf College as a Business Lecturer from 2011 to 2013. Prior to that, he had worked in various disciplines in both the academic and business industry with almost 9 years of accumulated experience in the Philippines acting as Accountant, Chief Account, Finance Manager, Assistant Professor and Professor. In 2023, he received an award as among the Top 50 Outstanding Philippine Awardee in the field of Research and Publication and Distinguished Researcher in his institution. He has published articles, edited books and chapters indexed in Scopus and Web of Science indexes and served as an editorial member and reviewer in various international refereed journals in the field of business management. He was also awarded in 2021 the Certified Business Management Educator by the Chartered Association of Business Schools in the United Kingdom.

Jen Ling Gan is a Senior Lecturer, School Quality Assurance Officer, and Head of Department at Taylor's University, Malaysia. In 2020, she completed her PhD at Universiti Teknologi Malaysia in the field of Management. She received her Bachelor's and Master's from the same institution. Her expertise lies within the areas of human resource management, training and development and industrial psychology. Dr Gan's current research focus is on emotional intelligence, leadership and bibliometric analyses. With active publications across international journals, Dr Gan was awarded VIWA International Young Researcher award in the Organizational Behaviour field in 2024. She was also selected as the Researcher of the Year 2022 in Taylor's University to work on the thoughts of emotional intelligence. Upon the appointment of the champion in curriculum design and delivery, as well as quality assurance officer at school level, Dr Gan is active in designing teaching activities innovatively and won several medals at national and international levels.

Mei Kei Leong is a Senior Lecturer and Programme Director at Taylor's University, Malaysia. In 2018, she completed her PhD at Universiti Putra Malaysia in the field of Consumer Science. She received her Bachelor of Consumer Studies from the same institution. Her expertise lies within the areas of marketing, branding and strategic management. Dr Mei Kei Leong's current research focus is

on technology, digital marketing, marketing management, consumer behaviour and quantitative research in social science. She has published in international journals such as the *International Journal for Hospitality Management*, *Asia Pacific Journal of Marketing and Logistics*, *British Food Journal* and *Asia-Pacific Journal of Business Administration* in embracing new advanced technology. In conjunction with Taylor's effort in introducing Impact Lab, she has been actively involved in Digital Innovation and Smart Society Impact Lab to create meaningful impact to the students, community and society.

Yen Mee Leow is a Senior Lecturer and Head of Department at Taylor's University, Malaysia. In 2023, she completed her PhD at Taylor's University in the field of Knowledge Management. She obtained her Bachelor of Information Technology from University of Southern Queensland, Australia, and Master's in Business Administration from University of Malaya, Malaysia. Her expertise lies in the area of e-commerce, digital marketing, business information system, knowledge management, teamworking, entrepreneurship and education management. Dr Yen Mee Leow's current research focus is centred on knowledge management, teamworking, tourism marketing, and consumer behaviour. Dr Yen Mee embarked on a research endeavour that delves into the intriguing interplay between the ageing population and the tourism industry. This novel study yielded significant contributions to the multidisciplinary field that is highly relevant in the contemporary business and IT landscape within the context of a mass ecosystem. She published papers in *International Journal of Social Science Research*, *International Journal Academic Research in Business and Social Sciences*, *Electronic Journal of Knowledge Management* and *Taylor's Business Review*. She is a reviewer for the Education + Training by Emerald Publishing as well as a reviewer for Taylor's Impact Lab Research Grant 2024.

Elvira Nica, PhD, is a Full Professor at the Bucharest University of Economic Studies ranked 351–400th in the world, in the top 501-550 internationally and second in Romania in the Business and Management subdomain, and the Dean of the Faculty of Administration and Public Management. A distinguished scholar in management and economics, she focuses on human resource management and smart economies, employing advanced research methodologies. PhD coordinator since 2016 and holds a Doctor Honoris Causa from the University of Zilina, Slovakia. Recognized as a Highly Cited Scholar in Web of Science and SCOPUS, with a WoS H-index of 12 and SCOPUS H-index of 29, she ranks among Stanford University's Top 2% Scientists globally (2019–2022). She has contributed over 180 articles and 21 books in her fields, collaborating with top publishers and serving on several international editorial boards. She's also a Senior Research Fellow and a full member of Sigma Xi, The Scientific Research Honor Society.

Oleksandra Oliynychuk, The State University of Applied Sciences in Elbląg, Poland, PhD, the State University of Applied Sciences in Elbląg, Poland, 18 years of research and teaching experience. Graduate of the Academy of the World Intellectual Property Organisation. Author of about 100 publications, including intellectual property issues. Research interests: intellectual property and artificial intelligence.

Jacek Paluszak, The State University of Applied Sciences in Elbląg, Poland**,** BEng, PhD, graduated from the Gdansk University of Technology Faculty of ETI and obtained the title of PhD in the scientific discipline of computer science in 2014 with specialization in artificial intelligence and distributed systems. Employed at the State University of Applied Sciences in Elbląg since 2015 as a Senior Lecturer Specialist in the sciences: Artificial intelligence (Python, optimization algorithms, neural networks including deep networks), JavaScript programming, author of approximately 30 publications about artificial intelligence.

Soha Rawas, holding a Doctor of Philosophy degree (PhD) in Mathematics and Computer Science, graduated from Beirut Arab University (BAU) in 2019. Dr Rawas possesses a broad spectrum of expertise spanning several domains, notably artificial intelligence, deep learning, the Internet of Medical Things (IOMT), cloud computing and image processing. With unwavering dedication to her research pursuits, she currently serves as an Academic Lecturer within the Faculty of Science, Department of Mathematics and Computer Science, at BAU. In addition, she holds a directory role at the Continuing Education Center (CEC) at BAU.

Agariadne Dwinggo Samala is a professional educator, futurologist and dedicated researcher, currently serving as an Assistant Professor at the Faculty of Engineering, Universitas Negeri Padang (UNP), Indonesia. In 2023, he achieved his doctoral degree (S3) from UNP, Indonesia, with his research focusing on exploring innovative intersections of technology and education. Moreover, he is also an external collaborator of the Digital Society Lab at the Institute for Philosophy and Social Theory (IFDT), University of Belgrade, Serbia. His global engagement continues as a member of the International Society for Engineering Pedagogy (IGIP) in Austria. With a deep passion for education, Agariadne has conducted impactful research on technology-enhanced learning (TEL), educational technology, digital education, immersive technologies, emerging technologies in education, informatics education and TVET.

Karima Sayari is an Associate Professor in the Department of Managerial and Financial Sciences at Al Zahra College for Women. She holds a Bachelor's degree in International Trade, a Master's degree in Economics and International Finance and a PhD in Finance and Economic Sciences. Dr Sayari has over 10 years of teaching experience and has published extensively in reputable international journals indexed in Scopus and Web of Science. Her research focuses on economics, finance, banking and digital finance. She is an active peer reviewer in various academic journals.

Ana Vovk is a University Professor. She is regularly employed at the University of Maribor and lectures at the Faculty of Arts, at the Faculty of Agriculture and Biosystem Sciences and Faculty of Health. In 2007, she founded the International Centre for Ecoremediation, in 2010 Educational Polygon for Self-sufficiency and in 2020 International Centre for Self-sufficiency. She is the Director of the Institute for the Promotion of Environmental Protection. She works on new methods of education in open learning environments and writes manuals and

books on active forms of education for living. She is a member of the National Agency for Higher Education. Her research is in the fields of education, physical geography and public health. She has set up an open learning environment where she develops sustainable approaches to living with climate change. She works with municipalities on applied projects and runs an integrated self-sufficiency academy.

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Chapter 1

Regulating Artificial Intelligence for Social Impact

Miltiadis Demetrios Lytras[a] *and Andreea Claudia Şerban*[b]

[a]The American College of Greece, Greece
[b]The Bucharest University of Economic Studies, Romania

Abstract

In the context of increasing global competition and the need to find efficient and rapid solutions to be successful in this process (at private business or state level), factors such as knowledge, technology, innovation and more recently Artificial Intelligence (AI) are considered elements that can be exploited in order to create competitive advantages and increase the added value for the participants. The aim of this chapter is to examine the opportunities and challenges that AI creates, in the context of the increasing need for regulation to supervise the development and deployment of AI in different sectors. The increasing adoption of AI has already produced significant transformations in many sectors: education, healthcare, finance, manufacturing, transportation by increasing efficiency, improving innovation and facilitating service delivery. At the same time, these advances have raised questions related to solutions for job replacement, data privacy, fairness and societal inequalities. In this chapter, the authors aim to highlight how different countries have regulated AI and the differences between general regulations on AI, such as the EU AI Act, and the sector-specific regulations prevalent in some countries, such as the United States, Japan, China or Canada.

Keywords: Ethics; smart systems; Artificial Intelligence; social impact; regulation

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Introduction

The current increased integration of Artificial Intelligence (AI) and automation into the labour market is reshaping the demand for skills and competencies across various industries. In this context, occupations requiring routine cognitive and manual tasks are increasingly at risk of being replaced by robots, automation and advanced technologies while the demand for nonroutine analytical, creative and interactive tasks is increasing. This transformation requires a change in education, to face the current need, emphasizing the development of critical thinking, creativity and problem-solving skills. Educational systems need to align to the new and evolving landscape of AI-driven industries. This way, schools and universities, as well as different institutions, as the provider of lifelong learning services, can prepare students for future job markets that demand adaptability based on lifelong learning and increased flexibility (Mean & Mochel, 2023).

The rapid adoption of AI requires a robust regulatory framework to ensure that its deployment and use promotes social equity and minimizes harm for different participants. It should align with ethical and societal values, that is why regulations must address ethical concerns and manage the risks of labour force displacement while promoting trust in AI technologies. The focus should be on policies that support innovation for using AI and automation while ensuring that society can promote AI's potential for positive social impact. Ensuring equitable access to opportunities and the equitable distribution of the benefits of AI supports a vision in which intelligent systems promote education, empower workers and contribute to broader societal well-being. Using real-time data and predictive analytics to track skill changes can improve labour force readiness, ensuring that individuals remain competitive in an era defined by intelligent systems.

The increasing complexity of technological skills, such as those required for software engineering and various business applications, requires organizations to renew strategies to remain competitive, highlighting the transformative role of technology, especially AI, in redefining skill requirements across industries and professional roles. Education systems must respond by integrating training and courses that ensure the skills needed to use AI tools, having as final goal increased productivity. The need for regulatory frameworks to ensure equitable access to education and employment opportunities remains a necessity and challenge (EY, 2023).

Rapid advances in AI are restructuring labour force and education requirements, leading to significant changes in how skills are developed, applied and improved. Integrating the use of AI into work tasks requires organizations to focus on continuous learning and upskilling to adapt to human–machine collaboration. This involves a reshaping of workplace roles and brings not only a transformation but also multiple challenges. The negative impact on jobs and digital overload must be carefully managed.

AI in the Modern Economy: Regulatory Challenges and Sectoral Transformations

The increasing use of AI in local, national and global economic activities generates profound effects on jobs, economic structures and social well-being, highlighting the urgent need to balance between promoting innovation and AI and maintaining social stability. Even AI offers opportunities to improve productivity and create new development in different economic sectors, its rapid adoption has led to concerns such as job displacement, job losses and increasing inequalities. It should be mentioned that AI can increase the risks for those groups that were already at risk even before the increasing use of AI. This will be a challenge for our current societies which are striving for more inclusion and preparedness for all their citizens. Addressing these economic challenges requires regulatory frameworks that ensure that all segments of society benefit from innovation and the use of AI. Until now, the current concept to define these groups were *vulnerable*, but the context imposes a new concept of *AI-vulnerable*.

There are some challenges that must be carefully considered and addressed in order to make this shift a successful step for all the participants (Fig. 1.1). Currently, the global standards are missing and this absence led to fragmented and discontinuous policies in different countries, situation that can create barriers and difficulties in international cooperation, effective governance and general social reliance. However, the ethical concerns and ambiguity, the differences in cultural and social factors in terms of long term orientation, uncertainty avoidance, individualism or motivation towards achievements and success (Schram, 2024) related to AI create difficulties in developing, accepting and establishing general accepted rules, considering these differences in economic, social, cultural values and priorities.

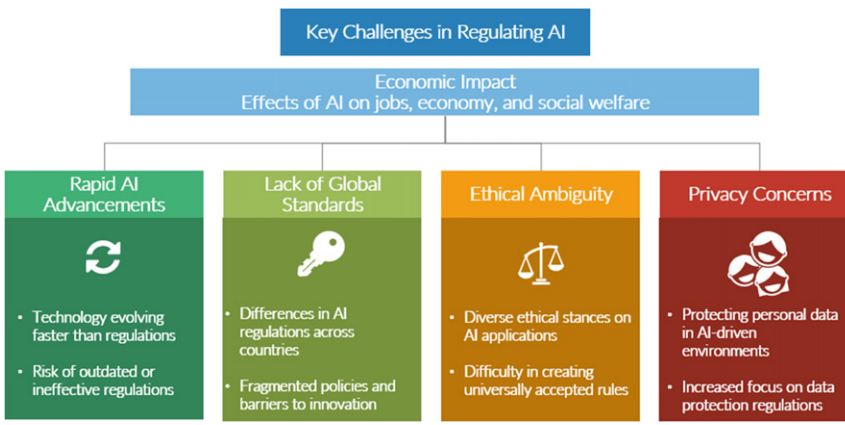

Fig. 1.1. Key Challenges in Regulating AI. *Source:* Authors' own contribution.

One important issue in balancing AI and regulation is that the rapid advances in AI are overpassing the adaptation of regulatory systems, and this can lead to the risk of using outdated, out of scope or ineffective, unreliable policies. However, one other aspect should be considered. As with many other aspects of business and education that must carefully consider privacy concerns, AI increasingly relies on personal data, which is why it requires strict regulations to protect data security, individual rights and promote public trust. These aspects represent essential challenges that highlight the complexity of the regulatory framework for AI and that require a strict framework to maximize its benefits, without neglecting the multiple risks at the economic, social or personal data protection levels.

There are many studies analyzing the sectors highly affected by AI and the need for flexible regulation to mitigate the risk and social impacts. Finance is a sector where AI is performing risk assessment checks; it detects fraud attempts, enhances predictive systems and portfolio management and makes a major part of customer service activities while also raising concerns about transparency and traceability (Bahoo et al., 2024; Weber et al., 2024). In healthcare sector, based on AI use, diagnostics are improved and also administrative processes and patient care. Also, AI has acted as a transformative engine revolutionizing medical research, early disease detection and decision support. As in all other sectors, there are concerns especially related to reliability and patient safety (Meskó & Topol, 2023; Talati, 2023). Education is another sector highly impacted both by AI and digital transformation. Its impact refers to personalized teaching methods and improving teaching efficiency, offering immediate support, and skill development, content generation, etc. Open AI act as virtual teaching assistants, assisting students during study process while enabling educators to save time and improve pedagogy. There are major concerns in education related to reliability, data quality and ethical considerations. The use of AI for content generation has introduced new academic integrity issues, forcing institutions to develop and use innovative detection tools and clear policies to avoid the cheating risks. The use of AI and its effect should be considered and addressed to ensure equitable access and opportunities, reduce the effects of digital divide and overpass ethical issues and concerns (Adeshola & Adepoju, 2023; Labadze et al., 2023; Montenegro-Rueda et al., 2023; Su & Yang, 2023). Another impact observed in some sectors, like transportation or manufacturing, is that AI creates job losses risks but also improvements in efficiency and sustainability as result of automatization of routine tasks. In transportation, AI plays and will play an increasing role in adaptive intelligent traffic management systems, congestion control, reducing energy consumption, improving mobility conditions and building smart cities architecture. In manufacturing, AI use and AI applications contributes to predictive maintenances, quality assurance for production flows and optimization of processes. Challenges are related to reliable data acquisition platforms, trust, data security and interoperability, implementation complexity, especially for small and medium sized enterprises. Also, infrastructure limitation especially for transportation remains crucial (Bharadiya, 2023; De Simone et al., 2023; Jafari et al., 2023; Plathottam et al., 2023). For all the sectors, labour force skills and competencies represent one of the major concerns, highlighting the critical need for lifelong learning, reskilling and upskilling to ensure the labour force flexibility and adaptability.

Strategic Policy Recommendations for AI Regulation

The use of AI has created new opportunities in different economic fields, and this has generated significant ethical, social and economic challenges. As AI is widely used in areas such as health, finance, education or transport, the need for clear and effective regulatory frameworks has become a priority for policymakers. Policies must create a balance between encouraging innovation using AI and the risks that arise, such as privacy, job loss or replacement, access to reliable data or risks related to secure access to information. Even if the concerns and risks are similar, regulations differ reflecting national or regional priorities and the orientation of governance models. Regulations regarding AI target, on the one hand, general aspects, such as transparency, fairness, safety and responsibility, but also aspects specific to different sectors of activity. This approach allows to create tailored and flexible answers for the AI challenges.

In European Union (EU), the AI Act (European Parliament, 2024) represents the first comprehensive framework for using AI, highlighting the need of safety, transparency and accountability. The Act refers to unacceptable risks, such as social scoring, real-time biometric surveillance or manipulative applications, and also categorizes the other risks in high, limited or minimal. The high risks refer to sectors such as healthcare, education, law and employment. Limited risks refer to the use of chatbots and other AI systems in compliance with transparency obligations to inform users of their AI nature. The minimal risks refer to aspects with a low risk to safety of rights. The high risks are highly regulated and penalties are mentioned for non-compliance.

In United States of America, the approach is different in regulating AI. Despite the EU, where there is a single regulation governing the use of AI, in United States, there is a sector-specific approach, with regulations applied to different industries or to particular AI applications. Different institutions regulate domains, for example Healthcare (Food and Drug Administration), Finance (Federal Trade Commission) or Transportation (Department of Transportation). There are also state-level initiatives in states like California and Ilinois related to the use of personal data (California) or AI in hiring (Ilinois). At US federal level, there are policy guidance: The Blueprint for an AI Bill of Rights (White House, 2022), National Institute of Standards and Technology AI Risk Management Framework (NIST, 2023), etc.

In Japan, there are guidance that are non-binding, reflecting the commitment to support responsible AI development. Currently, there are discussions regarding the draft of the 'Basic Law for the Promotion of Responsible AI', a document that would set the limits of AI models. However, the Ministry of Economy, Trade and Industry (METI) released some guidance for business (voluntary guidance for AI developers, providers or users), for the implementation of AI principles (a framework for AI companies to implement AI principles effectively) and for AI governance in Japan (clarifies trends in AI and rule-making (METI, 2024a,b,c)).

China has been proactive in AI regulation. It targeted a balance between technological innovation and ethical consideration, under state supervision. The mix of these aspects is highly important for state development in a global context. The China Aerospace Studies Institute (CASI, 2023) was the institution that

introduced one of the first regulatory frameworks on generative AI globally. It promotes innovation while addressing concerns about privacy, transparency and data security, applicable to both domestic and foreign companies. However, rules on rigorous testing of AI models to ensure compliance with political and ethical concerns can smother creativity and innovation.

In Canada, *Artificial Intelligence and Data Act* aims to mitigate the risks, to establish compliance and enforcement mechanisms, and to promote transparency and accountability among AI developers and users. Also, the objective of the *Pan-Canadian Artificial Intelligence Strategy* was to position Canada as a global leader in AI research and innovation by high investments in the field. *Canadian Sovereign AI Compute Strategy* tries to enhance research and development capabilities and to ensure the competitiveness and sovereignty in the global AI landscape. As strategy, Canada uses investment incentives and legal actions to achieve the target of positioning it as a leader in sustainable AI infrastructure.

AI regulations in different countries reflect diverse approaches shaped by regional priorities and governance models. From a risk-based approach, ensuring safety and transparency while addressing societal risks in the EU, to a sector-specific model, relying on voluntary guidelines to address the use of AI in industries such as healthcare, finance and transport, in the United States, to a centralised, prescriptive approach, emphasising state oversight to align AI development with national priorities, particularly in areas such as surveillance and public safety, in China, current AI regulations highlight the need for increased adaptability and uniformity (Table 1.1). Not only governments are playing a central role in creating legal frameworks but also industry groups and NGOs contribute by setting standards, promoting ethical practices and promoting societal interests. Effective AI governance requires collaboration between these actors to ensure innovation while mitigating risks, promoting rights and encouraging trust in AI systems globally.

Discussion and Conclusion

In order to ensure equitable access to education and career opportunities, regulatory frameworks remain an essential necessity and challenge. The need for regulatory frameworks to guarantee the distribution of education and employment opportunities continues to be an essential requirement and challenge. Combining dynamic workforce with regulatory frameworks that prioritize societal well-being, AI can be used to build inclusive, innovative and adaptable education and employment systems that maximize both human potential and social impact.

As new AI technologies emerge and are applied in the market, there is an immediate need for well-articulated, flexible, transparent, actionable and inclusive regulatory policies. This has required a combination of transparency, fairness, public engagement and continuous oversight to address the risks of AI while tapping its transformative potential. All the involved stakeholders: governments, civil society, industries must collaborate and joint their efforts to ensure that AI

Table 1.1. Comparative Overview of Global AI Regulations.

Region/ Country	Regulatory Body	Key AI Regulations and Policies	Focus Areas
European Union	European Parliament and Council of EU	AI Act https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1689	High-risk AI, transparency
United States	Federal Trade Commission; Food and Drug Administration; Department of Transportation	• Sector-specific regulations, e.g. healthcare, finance, transportation • US federal level – Blueprint for an AI Bill of Rights (White House Office of Science and Technology Policy), AI Risk Management Framework (The National Institute of Standards and Technology) • State-level: California Consumer Privacy Act (California); Artificial Intelligence Video Interview Act (Illinois)	Data privacy, competition, Safety,
China	Ministry of Industry Cyberspace Administration of China AI Standards Committee	• Multiple AI regulations – establishing strict standards for AI ethics, security, and data governance	Surveillance, cybersecurity
Japan	Ministry of Internal Affairs	• AI Guidelines for Business Ver. 1.0 (Ministry of Economy, Trade and Industry) • Governance Guidelines for Implementation of AI Principles Ver. 1.1 (Ministry of Economy, Trade and Industry)	Innovation, ethics

(Continued)

Table 1.1. *(Continued)*

Region/ Country	Regulatory Body	Key AI Regulations and Policies	Focus Areas
		• AI Governance in Japan Ver. 1.0 (Ministry of Economy, Trade and Industry) • Basic Law for the Promotion of Responsible AI (e Working Group members of the AI Project Team)	
Canada	Innovation, Science, and Economic Development Canada; National Research Council Canada; Canadian Government Ministries	• Artificial Intelligence and Data Act (Innovation, Science and Economic Development Canada) • Pan-Canadian Artificial Intelligence Strategy • Canadian Sovereign AI Compute Strategy • Responsible Use of AI in Government	Ethics, transparency

Source: Authors'.