Research Article

Artificial Intelligence and Robot Tax Regulation in Indonesia: Prospect and Challenges

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Article Information

Abstract

Background: *As the integration of artificial intelligence (AI) and robotics in various industries accelerates, Indonesia faces significant economic and social challenges, including job displacement and income inequality. In response, the Indonesian government is contemplating the implementation of an AI and robot tax.*

Methodology: *This article employs mix method since it discusses not only in legal aspect, but also in economic aspect such as the intersection of law, AI, the future of work, and the economy involves a multi-faceted approach to understanding how AI technologies impact labour markets, employment law, and economic regulations.*

Objectives: *This article aims to provide the overview of future of work as AI has influenced economic regulation. Besides that, this article provides the AI regulations, and economic policies to assess their adequacy in addressing the challenges posed by AI.*

Findings: *The findings are synthesized to provide a comprehensive view of how existing laws can adapt to the evolving landscape of AI*

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and work, and to propose legal and policy recommendations that ensure fair and equitable outcomes in the AI-driven economy through taxation.

Originality/Novelty: *The originality of this article lies in the approach to address the AI challenges towards Indonesian legal system. Besides that, there must be economic policy issued by the Government, followed by the company to tackle the negative impact towards economic growth. Comparison to other countries has been carried out to find the best formula and economic strategies to address the future of work and economy.*

Introduction

Integrating artificial intelligence (AI) and robotics into various industries has revolutionized productivity and efficiency.[1] However, this transformation brings significant economic and social challenges, such as potential job displacement and income inequality. Indonesia is contemplating implementing an AI and robot tax to address these issues. The rapid advancement of artificial intelligence (AI) and robotics is reshaping industries worldwide, presenting opportunities and challenges for economies transitioning into the digital age. In Indonesia, as in many other nations, this technological revolution brings to the forefront concerns about job displacement, income inequality, and the broader societal impacts of automation. To address these challenges, the Indonesian government is exploring the possibility of implementing an AI and robot tax.[2]

In response to these implications, stakeholders in Indonesia are exploring strategies to harness the benefits of AI while addressing its potential socio-economic impacts. This includes initiatives to promote digital literacy and skills development among legal professionals and efforts to ensure the ethical and responsible use of AI in legal practice.

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[1] AI, robotics, and IoT are revolutionizing production by enhancing operational efficiency and sustainability. These technologies automate processes, reduce manual labor, increase precision, and optimize resource use, leading to higher quality and less waste. See Gaaitzen J. de Vries et al., "The Rise of Robots and the Fall of Routine Jobs," *Labour Economics* 66 (October 1, 2020), https://doi.org/10.1016/j.labeco.2020.101885.

[2] Joao Guerreiro, Sergio Rebelo, and Pedro Teles, "Should Robots Be Taxed?," *The Review of Economic Studies* 89, no. 1 (2019): 279–311, https://doi.org/https://doi.org/10.1093/restud/rdab019.

Moreover, policymakers are considering regulatory frameworks to address issues such as human rights to work and economic decline.[3]

Furthermore, the intersection of AI and the future of work in Indonesia extends beyond the legal sector to broader societal and economic implications. As AI-driven automation transforms industries and occupations, there is a growing need for policies and programs to support workers transitioning to new roles and industries. This includes investments in education and training and social safety nets to mitigate the potential impacts of job displacement and income inequality.[4]

The implications of AI in law and the future of work in Indonesia are profound and multifaceted. While AI offers opportunities for innovation and efficiency in legal practice, it also presents challenges related to job displacement, skills development, and regulatory oversight.[5] By proactively addressing these implications and adopting a human-centered approach to AI adoption, Indonesia can navigate the transition towards a future where technology complements and enhances the capabilities of its workforce, ensuring inclusive and sustainable economic growth. Implementing a robot tax can serve as a multifaceted strategy to support economic stability during times of decline due to AI domination in the workplace. During economic downturns, companies often turn to automation to reduce costs. While this can increase efficiency and productivity, it also leads to job displacement, exacerbating unemployment. By levying a tax on robots or automated systems, governments can generate revenue that can be used to support workers who have lost their jobs due to automation. This revenue can be directed towards retraining programs and unemployment benefits or funding new industries that create jobs and contribute to social protection for unemployed people due to AI adoption in sectors.[6]

This article examines the rationale behind the proposed tax, its potential implications, and the rules that may govern its application in the Indonesian context. By delving into the motivations behind this novel approach and its intended outcomes, it aims to provide insights into how Indonesia addresses the complex intersection of AI, regulation, economy, and society in the 21st century. As countries worldwide grapple with similar issues, the Indonesian experience with AI and robot taxation serves as a compelling case study for

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[3] Gilberto Gonzalez, "They Took Our Jobs! The Robot Tax, Its Impracticability, and A Better Solution," *University of Illinois Law Review Online* 2022, no. Spring (2022): 54–69, https://www.isa.org/about-isa/what-is-automation.

[4] Sudharto P. Hadi, Rizkiana S. Hamdani, and Ali Roziqin, "A Sustainability Review on the Indonesian Job Creation Law," *Heliyon* 9, no. 2 (February 1, 2023), https://doi.org/10.1016/j.heliyon.2023.e13431.

[5] Anna F. Gödöllei and James W. Beck, "Insecure or Optimistic? Employees' Diverging Appraisals of Automation, and Consequences for Job Attitudes," *Computers in Human Behavior Reports* 12 (December 1, 2023), https://doi.org/10.1016/j.chbr.2023.100342.

[6] Stéphane Gauthier and Fanny Henriet, "Commodity Taxes and Taste Heterogeneity," *European Economic Review* 101 (January 1, 2018): 284–96, https://doi.org/10.1016/j.euroecorev.2017.10.017.

policymakers and stakeholders seeking to strike a balance between technological progress and social welfare through the amendment of tax law 2021.

Research Method

This article employs mix method since it discusses not only the legal aspect but also economic aspects, such as the intersection of law, AI, the future of work, and the economy, involves a multi-faceted approach to understanding how AI technologies impact labor markets, employment law, and economic regulations. It then starts by identifying key legal questions, such as the implications of AI on employment, job displacement, and regulatory compliance. They gather relevant legal materials, including statutes, case law, regulatory guidelines, and scholarly articles that address AI-related employment issues and economic impacts. The research includes analyzing labor laws, AI regulations, and economic policies to assess their adequacy in addressing the challenges posed by AI. This article also examines comparative legal frameworks from other jurisdictions to identify best practices and potential reforms. This legal analysis is complemented by interdisciplinary insights from economics and technology studies to understand the socio-economic implications fully. The findings are synthesized to provide a comprehensive view of how existing laws can adapt to the evolving landscape of AI and work and to propose legal and policy recommendations that ensure fair and equitable outcomes in the AI-driven economy.

The rationale behind the AI and Robot Tax

Like many countries, Indonesia is witnessing a surge in the adoption of AI and robotics across sectors such as manufacturing, healthcare, and services. While these technologies promise substantial benefits in increased productivity and reduced operational costs, they pose risks to the workforce. Automation can lead to job displacement, particularly in industries reliant on routine manual labor.[7] As Indonesia embraces the advancements in artificial intelligence (AI) and robotics, the government faces a dual challenge: harnessing the economic benefits of these technologies while mitigating their potential socio-economic disruptions. The rationale behind proposing an AI and robot tax is rooted in addressing these challenges comprehensively.[8]

The AI and robot tax aims to fund social security programs that support workers displaced by automation. As AI and robotics increasingly take over routine and repetitive tasks, many traditional jobs are at risk.[9] This displacement can lead to significant economic hardship for affected workers and their families. By taxing companies that heavily utilize AI and

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[7] Ryosuke Shimizu and Shohei Momoda, "Does Automation Technology Increase Wage?," *Journal of Macroeconomics* 77 (September 1, 2023), https://doi.org/10.1016/j.jmacro.2023.103541.

[8] Tina Sever and Giuseppe Contissa, "Automated Driving Regulations – Where Are We Now?," *Transportation Research Interdisciplinary Perspectives* 24 (March 1, 2024), https://doi.org/10.1016/j.trip.2024.101033.

[9] Andrea Peláez-Repiso, Pablo Sánchez-Núñez, and Yolanda García Calvente, "Tax Regulation on Blockchain and Cryptocurrency: The Implications for Open Innovation," *Journal of Open Innovation: Technology, Market, and Complexity* 7, no. 1 (March 1, 2021), https://doi.org/10.3390/JOITMC7010098.

robotics, the government can generate revenue to finance unemployment benefits, retraining programs, and other social safety nets. These measures are essential to help workers transition to new roles and industries, reducing the negative impact of technological unemployment.[10]

The tax serves as a tool to encourage responsible automation. While AI and robotics can significantly enhance productivity and efficiency, their unregulated adoption can lead to excessive job losses and economic inequality.[11] By taxing automation; the government can create a financial disincentive for companies that replace human labor with machines without considering the broader social consequences. This approach encourages businesses to adopt AI and robotics in a way that complements rather than substitutes human workers, fostering a more balanced and inclusive economic development.[12] This practice has been implemented for social security system since the income of it can be from bipartite, tripartite, and/or tax.[13]

Moreover, the AI and robot tax is seen as a means to promote equity. The wealth generated by automation tends to concentrate in the hands of those who own and control the technology, exacerbating income inequality. By redistributing some of this wealth through taxation, the government can invest in public goods and services that benefit a broader segment of society. This includes improving education, healthcare, and infrastructure, which are critical for long-term economic growth and social stability.[14]

The tax addresses the need for sustainable economic policies in the face of rapid technological change. As AI and robotics reshape industries, the traditional tax base, heavily reliant on labor, is eroding. The AI and robot tax provides a forward-looking solution to this issue by establishing a new source of revenue that aligns with the evolving economic landscape. This ensures that the government can continue to fund essential public services and infrastructure projects, even as the nature of work transforms.[15]

Implementing a robot tax has sparked discussions and considerations in various countries worldwide, each approaching the concept with distinct perspectives and priorities. Several

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[10] Jürgen Antony and Torben Klarl, "The Implications of Automation for Economic Growth When Investment Decisions Are Irreversible," *Economics Letters* 186 (January 1, 2020), https://doi.org/10.1016/j.econlet.2019.108757.

[11] Pengqing Zhang, "Automation, Wage Inequality and Implications of A Robot Tax," *International Review of Economics and Finance* 59 (January 1, 2019): 500–509, https://doi.org/10.1016/j.iref.2018.10.013.

[12] Maya Eden and Paul Gaggl, "On the Welfare Implications of Automation," *Review of Economic Dynamics* 29 (July 1, 2018): 15–43, https://doi.org/10.1016/j.red.2017.12.003.

[13] John Bailey Jones and Yue Li b, "The Effects of Collecting Income Taxes on Social Security Benefits," *Journal of Public Economics* 159 (2018): 128-145, https://doi.org/10.1016/j.jpubeco.2018.01.004

[14] Uwe Thuemmel, "Optimal Taxation of Robots," *Journal of the European Economic Association* 21, no. 3 (June 1, 2023): 1154–90, https://doi.org/10.1093/jeea/jvaco62.

[15] Bernhard Schmidpeter and Rudolf Winter-Ebmer, "Automation, Unemployment, and the Role of Labor Market Training," *European Economic Review* 137 (August 1, 2021), https://doi.org/10.1016/j.euroecorev.2021.103808.

nations have either proposed or initiated steps towards implementing such a tax, while others have expressed scepticism or opted for alternative approaches to address the challenges posed by automation.[16]

In Europe, countries like France and Belgium have explored the idea of a robot tax to address concerns about job displacement and inequality. France, for instance, proposed a tax on robot usage as part of broader efforts to fund social security and support workers transitioning to new roles. Similarly, Belgium has considered taxing companies based on their use of robots, with the revenue intended to finance measures to assist workers affected by automation. These initiatives reflect a recognition of the potential societal impacts of automation and a desire to ensure that the benefits of technological advancement are shared equitably.[17]

In contrast, other European countries, such as Germany, have been more cautious about the concept of a robot tax. While acknowledging the need to address the challenges posed by automation, Germany has emphasized fostering innovation and competitiveness. Instead of imposing taxes on robots, the focus has been on promoting investment in research and development and supporting workers through training and education programs. This approach reflects a balancing act between addressing labor market disruptions and maintaining a conducive environment for technological progress.[18]

Outside of Europe, countries like South Korea and Japan have also grappled with the implications of automation and the potential need for a robot tax. In 2017, South Korea, for instance, contemplated the idea of taxing companies that replace human workers with robots, with the aim of funding measures to support workers and promote job creation. Similarly, Japan has explored the possibility of taxing companies that invest in automation, although concerns have been raised about the potential impact on innovation and competitiveness in the global market.[19]

In the United States, discussions surrounding a robot tax have been relatively subdued compared to some European countries. While there have been proposals and debates on the topic at various levels of government, including at the state and federal levels, comprehensive robot tax legislation still needs to be enacted. Instead, the focus has largely

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[16] Adrián Popovič and Jozef Sábo, "Taxation of Robots and AI-Problem of Definition," *Financial Law Review1* 25, no. 1 (2022).

[17] Hasraddin Guliyev, Natiq Huseynov, and Nasimi Nuriyev, "The Relationship between Artificial Intelligence, Big Data, and Unemployment in G7 Countries: New Insights from Dynamic Panel Data Model," *World Development Sustainability* 3 (December 2023): 100107, https://doi.org/10.1016/j.wds.2023.100107.

[18] Guliyev, Huseynov, and Nuriyev.

[19] Shimpo Fumio, "The Principal Japanese AI and Robot Law, Strategy and Research toward Establishing Basic Principles," *Journal of Law and Information System* 3 (2018): 44–65, https://doi.org/https://doi.org/10.32235/alis.3.0_44; Robert J Kovacev, "A Taxing Dilemma: Robot Taxes and the Challenges of Effective Taxation of AI, Automation and Robotics in the Fourth Industrial Revolution," *The Contemporary Tax Journal* 9, no. 2 (July 13, 2020), https://doi.org/10.31979/2381-3679.2020.090204.

been on other policy approaches, such as workforce training and investment in infrastructure and technology.[20]

The comparison of implementing a robot tax in different countries highlights the diverse approaches and considerations involved. While some nations have embraced the concept to address labor market challenges and promote social equity, others have been more cautious, emphasizing the importance of innovation and competitiveness. As automation continues to reshape industries and economies worldwide, finding the right balance between harnessing the benefits of technology and addressing its societal impacts remains a complex and ongoing endeavor.[21]

Therefore, the rationale behind the AI and robot tax in Indonesia is multifaceted, aiming to balance the benefits of technological advancements with the need for social protection, economic equity, and sustainable development. By carefully designing and implementing this tax, the Indonesian government can tackle the complexities of the AI-driven economy while ensuring that the gains from automation are shared broadly across society. Indonesia should consider implementing a robot tax to address the potential socio-economic disruptions caused by increasing automation. As industries rapidly adopt robotics and AI, there is a significant risk of large-scale job displacement, particularly in labor-intensive sectors like manufacturing, agriculture, and retail, which employ millions of Indonesians. A robot tax would help mitigate this by discouraging the excessive replacement of human workers with machines, encouraging businesses to maintain a balanced workforce. Furthermore, the revenue generated from such a tax could be reinvested in education, retraining programs, and social welfare to prepare the workforce for more skilled, future-oriented jobs. This would not only ease the transition into a more automated economy but also reduce income inequality, which could widen as automation disproportionately benefits capital owners. By implementing a robot tax, Indonesia could promote a more equitable and sustainable approach to automation, ensuring that technological progress benefits society as a whole.

Key Provisions of the Proposed AI and Robot Tax

The robot tax is emerging as a new mechanism to address the social problems created by the rapid development of artificial intelligence (AI) and automation. As AI technologies increasingly take over jobs traditionally performed by humans, especially in industries like manufacturing, logistics, and services, many workers are at risk of displacement. This can lead to rising unemployment and widening income inequality. A robot tax aims to alleviate these social issues by imposing a levy on companies that replace human labor with

[20] Edidiong Bassey, Emer Mulligan, and Adeboyega Ojo, "A Conceptual Framework for Digital Tax Administration - A Systematic Review," *Government Information Quarterly* 39 (2022), https://doi.org/https://doi.org/10.1016/j.giq.2022.101754.

[21] Hisham O. Khogali and Samir Mekid, "The Blended Future of Automation and AI: Examining Some Long-Term Societal and Ethical Impact Features," *Technology in Society* 73 (May 1, 2023), https://doi.org/10.1016/j.techsoc.2023.102232.

machines. The revenue from this tax can then be used to support worker retraining programs, provide social security, and fund public services, ensuring that the benefits of AI advancements are more equitably shared across society. By slowing the pace of automation and ensuring that displaced workers are not left behind, the robot tax offers a potential solution to the social challenges posed by AI development.

The proposed AI and robot tax in Indonesia encompasses several key provisions to regulate the use of automation while effectively promoting socio-economic goals. The tax would target specific entities, primarily companies that deploy AI and robotics in their operations. This includes sectors such as manufacturing, logistics, and services, where automation has the potential to significantly impact the workforce. By focusing on these industries, the tax aims to capture the economic benefits of automation while addressing its potential negative consequences, such as job displacement.

The tax rates may vary depending on the degree of automation and the sector. Industries with higher levels of automation and greater potential for job displacement may face higher tax rates, reflecting the social costs associated with excessive automation. This progressive tax structure incentivizes businesses to adopt automation responsibly and encourages them to consider the broader societal impacts of their technological choices.[22]

The proposed tax may also include exemptions and incentives to encourage socially responsible automation practices. Companies that invest in retraining programs for displaced workers or adopt technologies that augment rather than replace human labor could receive tax incentives or exemptions. This provision incentivizes businesses to prioritize workforce development and invest in technologies that enhance human capabilities rather than supplant them entirely.[23]

Furthermore, the revenue generated from the AI and robot tax would be allocated to specific programs aimed at mitigating the negative impacts of automation. These programs may include vocational training initiatives, education subsidies, and social welfare programs designed to support workers affected by automation. By reinvesting tax revenue into measures that empower workers and strengthen social safety nets, the government can ensure a more equitable distribution of the benefits of automation.[24]

Implementing the AI and robot tax may follow a phased approach to allow industries time to adjust and implement measures to support affected workers. This gradual rollout

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[22] Luís Guimarães and Pedro Mazeda Gil, "Explaining the Labor Share: Automation Vs Labor Market Institutions," *Labour Economics* 75 (April 1, 2022), https://doi.org/10.1016/j.labeco.2022.102146.

[23] Haipeng Wang, "Application of New Features Based on Artificial Intelligent Robot Technology in Medium-Scale Urban Design Pedigree and Intelligent Management and Control," *Intelligent Systems with Applications*, May 2024, 200379, https://doi.org/10.1016/j.iswa.2024.200379.

[24] Knut Blind and Florian Münch, "The Interplay between Innovation, Standards and Regulation in A Globalising Economy," *Journal of Cleaner Production* 445 (March 15, 2024), https://doi.org/10.1016/j.jclepro.2024.141202.

enables businesses to adapt their operations and workforce strategies in response to the tax, minimizing disruptions while maximizing the potential benefits of automation.[25]

The key provisions of Indonesia's proposed AI and robot tax reflect a comprehensive approach to regulating automation while promoting socio-economic objectives. By targeting specific industries, implementing progressive tax rates, and providing incentives for responsible automation, the tax seeks to strike a balance between fostering innovation and protecting workers' interests. Additionally, the allocation of tax revenue to support workforce development and social welfare programs underscores the government's commitment to ensuring that the benefits of automation are shared equitably across society.[26]

Potential Impacts of the AI and Robot Tax

Implementing an AI and robot tax in Indonesia is expected to have far-reaching implications across various economic, labor market, and society dimensions.[27] From an economic standpoint, the tax could impact the profitability and competitiveness of businesses that heavily rely on automation. Companies in manufacturing, logistics, and retail sectors may face increased operational costs due to the tax, particularly if they use AI and robotics extensively in their operations. This could lead to adjustments in production processes, pricing strategies, and investment decisions as businesses seek to mitigate the financial impact of the tax. Additionally, the tax revenue generated could be channeled into funding social security programs and workforce development initiatives, stimulating economic growth and human capital development.[28]

The AI and robot tax is expected to affect the labor market significantly. By taxing automation, the government aims to slow down the pace of job displacement and encourage businesses to retain human workers.[29] This could lead to the preservation of certain types of jobs that might otherwise be automated, particularly those that require higher levels of creativity, emotional intelligence, and interpersonal skills. However, the tax may also incentivize companies to invest in upskilling and reskilling programs for their

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[25] Ross Gruetzemacher, David Paradice, and Kang Bok Lee, "Forecasting Extreme Labor Displacement: A Survey of AI Practitioners," *Technological Forecasting and Social Change* 161 (December 1, 2020), https://doi.org/10.1016/j.techfore.2020.120323.

[26] Antonio Faúndez Ugalde and Rafael Mellado Silva, "Use of Artificial Intelligence by Tax Administrations: An Analysis Regarding Taxpayers' Rights in Latin Countries," Computer Law and Security Review 38 (May 13, 2020), https://doi.org/https://doi.org/10.1016/j.clsr.2020.105441.

[27] Gizem Akar, Giorgia Casalone, and Martin Zagler, "You Have Been Terminated: Robots, Work, and Taxation," *International Review of Economics* 70, no. 3 (September 1, 2023): 283–300, https://doi.org/10.1007/s12232-023-00419-6.

[28] Milla Sepliana Setyowati et al., "Strategic Factors in Implementing Blockchain Technology in Indonesia's Value-Added Tax System," *Technology in Society* 72 (February 1, 2023), https://doi.org/10.1016/j.techsoc.2022.102169.

[29] Jianjun Li et al., "The Effect of Industrial Robot Adoption on Firm Value: Evidence from China," *Finance Research Letters* 60 (February 1, 2024), https://doi.org/10.1016/j.frl.2023.104907.

workforce, enabling employees to transition to new roles that complement rather than compete with AI and robotics. Overall, the tax can shape the future of work by influencing the trajectory of automation adoption and its impact on employment patterns.[30]

Moreover, the AI and robot tax could have broader societal impacts, particularly on income distribution and social welfare. By redistributing wealth generated from automation, the tax seeks to address income inequality and ensure that the benefits of technological progress are shared more equitably across society. This could improve living standards, access to education, and healthcare outcomes for marginalized communities. The tax revenue could also be used to fund social safety nets, such as unemployment benefits and universal basic income programs, providing a buffer against the economic disruptions caused by automation.[31]

The potential impacts of the AI and robot tax in Indonesia are multifaceted, encompassing economic, labor market, and societal dimensions. While the tax may pose challenges for businesses and industries that rely heavily on automation, it also presents opportunities for stimulating economic growth, preserving human employment, and promoting social equity. By carefully balancing these considerations and implementing supportive policies and programs, the government can maximize the benefits of automation while minimizing its negative consequences, ensuring a more inclusive and sustainable future for all Indonesians. [32]

Furthermore, a robot tax can incentivize companies to invest in human labor rather than solely relying on automation. Businesses may hire more workers when there's a financial disincentive to automate, thus bolstering employment levels. This can be particularly beneficial during economic downturns when job creation is critical for stimulating demand and reviving the economy. By encouraging a balance between automation and human labor, a robot tax can help mitigate the adverse effects of technological advancement on employment levels.[33]

Implementing a robot tax can offer unemployed individuals a glimmer of hope by signaling a commitment from policymakers to address the challenges posed by automation. Knowing that revenue from such a tax is earmarked for supporting displaced workers can instill

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[30] Somesh Sharma, "Benefits or Concerns of AI: A Multistakeholder Responsibility," *Futures* 157 (March 1, 2024), https://doi.org/https://doi.org/10.1016/j.futures.2024.103328.

[31] Joseph E. Stiglitz, "Pareto Efficient Taxation and Expenditures: Pre- and Re-Distribution," *Journal of Public Economics* 162 (June 1, 2018): 101–19, https://doi.org/10.1016/j.jpubeco.2018.01.006.

[32] Zhongsheng Zhou et al., "Robot Adoption and Enterprise R&D Manipulation: Evidence from China," *Technological Forecasting and Social Change* 200 (March 1, 2024), https://doi.org/10.1016/j.techfore.2023.123134.

[33] Elena A. Lavrentyeva and Elena D. Karavaeva, "Transformation of Taxation of Water Transport Activities in the Digital Economy," in *Transportation Research Procedia*, vol. 68 (Elsevier B.V., 2022), 15–20, https://doi.org/10.1016/j.trpro.2023.02.002.

confidence and provide a safety net during uncertain times.[34] Additionally, the potential shift towards greater reliance on human labor could create new job opportunities across various sectors, providing avenues for re-entry into the workforce for those unemployed.

In essence, a robot tax generates revenue for supporting those affected 34 by automation and fosters a more balanced approach to technological advancement that prioritizes human well-being and employment. By incentivizing companies to consider the social and economic implications of automation, such a tax can play a pivotal role in shaping a more inclusive and resilient economy, especially during economic decline.

Challenges and Considerations

In 2021, Indonesian tax law did not encompass provisions addressing the emerging concept of robot tax, necessitating amendments to reflect the evolving landscape of automation and artificial intelligence (AI). The absence of specific regulations about the taxation of AI and robotics reflects the rapid pace of technological advancement outpacing legislative frameworks designed to govern such innovations. As industries increasingly integrate automation into their operations, traditional tax laws may need to be revised to capture the economic activities facilitated by AI and robotics. Therefore, there is a pressing need for legislative reforms to ensure that the tax code remains relevant and equitable in the face of technological disruptions.[35]

The absence of robot tax norms in Indonesian tax law underscores the need for legislative amendments to address the implications of automation and AI on the economy and society.[36] By introducing provisions for robot tax, policymakers can create a more responsive and equitable tax framework that promotes sustainable economic growth and social welfare in the digital age. Moreover, these amendments signal Indonesia's commitment to embracing technological advancements while ensuring that the benefits are shared inclusively among its citizens.

Regulating robot tax within Indonesian tax law poses several challenges and considerations that policymakers must carefully navigate to ensure effective implementation and mitigate unintended consequences.[37] One of the primary challenges is defining the scope of the robot tax and determining which entities and activities should be subject to taxation. This

[34] Pierre Cahuc and André Zylberberg, "Optimum Income Taxation and Layoff Taxes," *Journal of Public Economics* 92, no. 10–11 (October 2008): 2003–19, https://doi.org/10.1016/j.jpubeco.2007.12.006.

[35] Roberta F Mann, "I Robot: U Tax? Considering the Tax Policy Implications of Automation," *McGill Law Journal* 64, no. 4 (2019): 705–806.

[36] José M. Arranz and Carlos García-Serrano, "Assistance Benefits and Unemployment Outflows of the Elderly Unemployed: The Impact of A Law Change," *Journal of the Economics of Ageing* 26 (October 1, 2023), https://doi.org/10.1016/j.jeoa.2023.100466.

[37] Sebastian Eichfelder, Martin Jacob, and Kerstin Schneider, "Do Tax Incentives Affect Investment Quality?," *Journal of Corporate Finance* 80 (June 1, 2023), https://doi.org/10.1016/j.jcorpfin.2023.102403.

requires policymakers to develop clear and precise criteria for identifying automated systems and distinguishing between AI-driven processes and traditional human labor. Given the diverse range of industries and technologies encompassed by automation, defining the scope of the tax presents a complex task that requires careful consideration of technological advancements and industry-specific nuances.[38]

Establishing appropriate tax rates for robot tax poses a significant challenge. Determining the level of taxation for automation involves balancing competing interests, such as incentivizing innovation and investment in technology while ensuring equitable distribution of the economic benefits generated. Setting tax rates too high may stifle innovation and economic growth, while setting them too low may fail to adequately address the socio-economic implications of automation, such as job displacement and income inequality.[39] Moreover, determining tax rates based on the degree of automation and its impact on employment requires robust data collection and analysis, which may be challenging in practice.

Another challenge is addressing potential legal and ethical considerations surrounding robot tax implementation. Policymakers must consider issues such as the legal status of AI and robotic entities, the liability for AI-driven decisions, and the ethical implications of taxing automation.[40] For example, determining whether AI and robots should be considered legal entities for tax purposes raises questions about accountability and responsibility for tax liabilities. Additionally, ensuring that robot tax complies with principles of fairness and non-discrimination requires careful consideration of how the tax affects different stakeholders, including businesses, workers, and consumers.

Furthermore, enforcing compliance with robot tax regulations presents practical challenges for tax authorities. Monitoring and verifying the extent of automation in businesses' operations require sophisticated technological capabilities and expertise in AI auditing. Moreover, preventing tax evasion and ensuring transparency in reporting

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[38] Colin P A Jones and Colin P Jones, "The Robot Koseki: A Japanese Law Model for Regulating The Robot Koseki: A Japanese Law Model for Regulating Autonomous Machines Autonomous Machines Recommended Citation Recommended Citation," *Journal of Business & Technology Law* 14, no. 2 (2019), https://digitalcommons.law.umaryland.edu/jbtl/vol14/iss2/3.

[39] Klaus Prettner and Holger Strulik, "Innovation, Automation, and Inequality: Policy Challenges in the Race Against the Machine," *Journal of Monetary Economics* 116 (December 1, 2020): 249–65, https://doi.org/10.1016/j.jmoneco.2019.10.012.

[40] Arfah Habib Saragih et al., "Finding the Missing Pieces to An Optimal Corporate Tax Savings: Information Technology Governance and Internal Information Quality," *International Journal of Accounting Information Systems* 52 (March 1, 2024), https://doi.org/10.1016/j.accinf.2023.100665.

automation-related income and activities necessitate robust enforcement mechanisms and cooperation between tax authorities and businesses.[41]

Regulating robot tax within Indonesian tax law presents complex challenges and considerations that policymakers must address to effectively harness the economic benefits of automation while mitigating its socio-economic impacts. By carefully defining the scope of the tax, setting appropriate tax rates, addressing legal and ethical considerations, and implementing robust enforcement mechanisms, policymakers can develop a regulatory framework that promotes innovation, fairness, and accountability in the era of automation.

Amendments to Indonesian tax law are essential to address the unique challenges of automation and AI-driven economies. By introducing provisions for robot tax, policymakers can establish a framework to capture the economic value generated by automated systems and redistribute it to align with broader socio-economic goals.[42] This may include imposing taxes on companies that deploy AI and robotics extensively, with rates determined based on the level of automation and its potential impact on employment.[43] Additionally, amendments to the tax law could incorporate incentives for businesses that invest in workforce development and retraining programs, fostering a more inclusive approach to technological innovation.

Furthermore, updating tax legislation to include provisions for robot tax reflects Indonesia's commitment to embracing technological advancements while safeguarding the interests of its citizens. By proactively addressing the implications of automation on the economy and labor market, policymakers can ensure that the benefits of technological progress are shared equitably across society. Moreover, incorporating robot tax norms into the tax code demonstrates Indonesia's readiness to adapt to the challenges and opportunities of the Fourth Industrial Revolution. It signals to domestic and international stakeholders that Indonesia is a proactive and forward-thinking environment for innovation and business development.[44]

Conclusion

The concept of a robot tax aims to mitigate economic and social challenges posed by increased automation, such as job displacement and reduced income tax revenue, by taxing businesses that replace human workers with robots. Benefits include generating

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[41] Tinu Iype Jacob and Sunil Paul, "Labour Income Share, Market Power and Automation: Evidence from An Emerging Economy," *Structural Change and Economic Dynamics* 69 (June 1, 2024): 37–45, https://doi.org/10.1016/j.strueco.2023.11.016.

[42] Carolyn M. Callahan, James M. Plečnik, and Jiwoo Ryou, "Do Competitive Markets Encourage Tax Aggressiveness?," *Advances in Accounting*, 2023, https://doi.org/10.1016/j.adiac.2023.100702.

[43] Arranz and García-Serrano, "Assistance Benefits and Unemployment Outflows of the Elderly Unemployed: The Impact of A Law Change."

[44] Abbott and Bogenschneider, "Should Robots Pay Taxes? Tax Policy in the Age of Automation."

government revenue, redistributing wealth through social programs, incentivizing human employment, and promoting ethical automation. However, challenges include defining and valuing robots, potential impacts on innovation, complex implementation and compliance, and global economic disparities. In Indonesia, amending tax laws to include a robot tax would involve legislative changes, precise definitions, stakeholder engagement, strategic revenue allocation, and robust monitoring and enforcement mechanisms. Balancing innovation with socio-economic impacts, a robot tax offers potential benefits but requires careful planning and execution.

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Conflict of Interest

The authors state that there is no conflict of interest in the publication of this article.

Author(s) Contribution

Author 1: initiated the research ideas, instrument construction, data collection, social and economic analysis, and draft writing.
Author 2: revised the research ideas, literature review, data presentation and analysis, and the final draft.

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