



Artificial intelligence and socioeconomic perspective in Indonesia

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ABSTRACT

Artificial Intelligence (AI) has begun to penetrate various social and economic activities in Indonesia. During the pandemic, social distancing activities were able to accelerate the application of AI, and promptly became a safety valve and economic driver in various sector. However, attention to AI implementation opens up space for intensive discourse. AI as a technological element also has social and economic impacts, especially social, economic and political inequality. In the midst of obtaining positive economic benefits, innovation excellence and efficiency, AI in Indonesia still faces problems with agricultural workforce (38.7 million people), ethical and legal aspects, and organizational culture. Solutions from a social and economic perspective anticipating AI include (i) affirmative policies aimed at empowering and increasing the productivity of agricultural workers, (ii) collaboration between IT experts and business practitioners, social science experts and legal practitioners to ensure AI works within a safety and legality framework; and (iii) building an organizational culture in business and public sector management to run a business that meets sustainability principles.

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INTRODUCTION

Artificial Intelligence or AI is one technology that is getting attention nowadays. AI is a computer system capable of performing tasks related to human intelligence, including identification, analysis, and decision making. AI is capable of carrying out learning, reasoning and self-correction processes. AI works by modeling human thought processes, designing and imitating human behavior, and solving human life problems

AI has been widely applied in various social and economic activities. AI is used in various industries to improve efficiency and decision making. Some examples include (i) health services where AI analyzes medical records, and assist with diagnosis and

treatment planning (Lopez-Jimenez, 2020; Sunarti et al., 2021); (ii) agriculture, to streamline the need for production factors (Talaviya et al., 2020) and build a food security system (Kutyauripo, Rushambwa & Chiwazi, 2023); (iii) manufacturing where it improves production processes, reduces defects and downtime, and increases overall efficiency (Plathottam et al., 2023); (iv) transportation, for traffic management, safety, public transportation, and urban mobility, and asset productivity improvement (Abduljabbar et al., 2019); (v) education, in personalizing learning experiences, assessing student progress, and providing customized feedback (Tapalova & Zhiyenbayeva, 2022); (vi) e-commerce, where it makes easier for users to find products regarding their

interests (Rust, 2020). There are many examples of AI applications in other fields.

Facts show that the pandemic seems to accelerate AI adoption and MSME growth (Hradecky et al., 2022). During the pandemic, measures to prevent the transmission of COVID-19 infection led the termination of activities in most industries to avoid physical contact between people. At the same time, economic activities must work to drive production and consumption processes, so that automated processes become the mainstay of replacing the role of humans. At the 2022 World Economic Forum, CEOs strengthened their intentions to increase industrial automation. The general view is that AI technology will continue to work in all industries and businesses in line with the level of efficiency achieved through efforts to automate production processes and other business processes.

The presence of AI represents a technological intervention that has a massive impact on social and economic activities and its various implications. Sartori & Theodorou (2022) stated that AI practices force new values or frameworks of thinking that include requirements, design, and development methodologies in solving human problems which are more efficient and fair. AI calls for transparency and explanation, accountability and contestability of how business processes produce sustainable productivity under human control.

The existence of AI also demands certain institutional mechanisms that provide a socially and economically acceptable technological narrative. However, AI is also like a knife that can hurt and reveal traditional issues of social, economic and political inequality. That is why, the presence of AI must produce learning to build a better development vision to reduce social impacts. The practice of AI is very rich with an interdisciplinary approach and is expected to provide benefits from social, economic and technological perspectives.

There are many implications of AI use for socio-economic activities. First, in developed countries the application of AI will be accelerated by demographic conditions, where most of the population is aging, and the number of the workforce is constant or shrinking (Shin, Jung & Lee, 2022). Thus, AI's position will help smooth the workforce crisis entering retirement periods. On the other hand, in developing countries, where the workforce is still high, AI is considered a

challenging issue because it has a serious impact on "killing jobs".

Second, AI will create inequality (Sartori & Theodorou, 2022). Direct unemployment may occur in industries that apply AI technology. The automation process produces efficiency in business processes, as well as achieving product quality assurance and production system sustainability. Industries that implement automation will indirectly find higher added value than industries that have not been automated. This will give rise to economic disparities among community groups, among industries and its derivative implications. Population-dense developing countries will face the impact of AI very seriously, even if job opportunities remain abundant.

Third, the government needs to think about industry priorities and social safety policies to reduce the impact of AI. There are public sectors that really need AI for reasons of efficiency, accuracy and comfort/safety in their business processes. The transportation sector, or public service offices, may be amenable to joining AI as demand for labor shrinks, demands for quality of service and safety. However, in other sectors, where the need for labor is high, affirmative policies for reasons of social safety can be prioritized over efficiency-oriented AI (Nordström, 2022).

What are the opportunities and disadvantages of AI in Indonesia? Specific studies of AI implementation in Indonesia have not been widely published. This article tries to provide an analysis from a socio-economic perspective regarding the possibilities that will occur and anticipation of issues related to AI in Indonesia.

OPPORTUNITIES FOR AI IMPLEMENTATION

The population of Indonesia in 2020 was more than 270 million people, with population growth of 1.25% per year (BPS, 2021). Of this population, as many as 53.6 million (20.5%) Indonesians fall into the middle class group, which according to the World Bank shows daily expenditures between USD7.75-USD38. The middle class is the backbone of the Indonesian economy, which is independently able to innovate and be creative in driving economic activity in all sectors (World Bank, 2019). According to Pratomo, Syafitri & Anindya (2020), the Indonesian middle class has adequate education and skills, entrepreneurial and digital communication abilities and is a driver of

economic transformation in the development of urban areas.

From a macroeconomic perspective, Indonesia's economic growth in 2022 was 5.31% (BPS, 2023a). The growth was largely driven by strong domestic consumption with an increase of 4.48% per year. The international trade balance recorded a trade surplus with a 14.93% annual growth in exports. Gross Domestic Product (GDP) at current prices reaches IDR19,588.4 trillion and GDP per capita reaches IDR71.82 million or USD4,788. As a result, according to the World Bank, Indonesia is included in the upper middle income group (USD4,046 to USD12,535).

Indonesia's ICT development has shown positive development in the last five years, with an increase in the ICT Index value from 5.07 (2018) to 5.85 (2022) (BPS, 2023b). The results of the East Ventures study (2023) stated that AI will be one of the keys to the growth of the ICT sector and the Indonesian economy. The IMD World Competitiveness Center report shows Indonesia's Digital Competitive ranking is in 51st position, a significant increase compared to 2018 which was ranked 62nd. Indonesia's ICT development indicates the fastest progress compared to other ASEAN countries (Table 1).

Tabel 1. Digital Competitive Ranking and Score of Indonesia

Negara	Digital Competitive Ranking					2022 Score
	2018	2019	2020	2021	2022	
Singapore	02	02	02	05	04	99.48
Malaysia	27	26	26	27	31	76.42
Thailand	39	40	39	38	40	68.19
Indonesia	62	56	56	53	51	56.74
Philippines	56	55	57	58	56	52.81

Source: IMD World Competitiveness Center (2023)

Indonesia's digital economy is estimated to reach USD360 billion in 2030 with annual growth of 21% during 2022-2030. Furthermore, the Indonesian market has the highest growth in information technology (IT) spending in Asia Pacific with annual growth of 13% during 2020-2024 to reach USD6 billion (East Ventures, 2023).

The growth of the ICT sector is driven by three main factors (East Ventures, 2023). First, increasing internet consumption. The increase in internet consumption is also accelerated by the increase in internet users from 224 million in 2022 to 269 million in 2028. At the same time, the increasingly widespread use of the Internet of Things (IoT) and

the expansion of the 5G network will encourage internet consumption.

Second, digitalization of MSMEs and startup growth. The government is encouraging the digitalization of MSMEs through several credit and electronic payment (e-payment) programs. Startup business activity with electronic transactions shows a sharp increase in tier-2 and tier-3 cities. Tier-2 cities or rising urbanites include Makassar, Denpasar and Semarang. Meanwhile, tier-3 or slow adapter regions are, for example, Magelang, Prabumulih and Bangli.

Third, vertical sector growth. The growth of the fintech and e-commerce industry is supported by adequate hardware and software. Conventional business actors are starting to adopt technology for operational efficiency. These things increase ICT investment by businesses in all sectors.

The social, macroeconomic and ICT performance shows that Indonesia is a strong emerging economic country. Population potential is a promising source of economic and market growth and has a geopolitical influence on the surrounding region. The number of the middle class far exceeds 50 million people (equivalent to the middle class in Singapore, Malaysia and Thailand), and will continue to rise along with economic progress. This is a driver for the acceleration of economic development and the implementation of automation of business and economic processes. There are optimistic developments that the Indonesian economy will continue to improve in the future, along with the implementation of automation in the production process to serve such large market demand.

OBSTACLE FACTOR FOR AI IMPLEMENTATION

In general, Indonesia's condition has not yet fully progressed to economic transformation, especially employment. The employment profile in 2022 shows that the agricultural sector still accommodates 28.6% of the workforce (Table 2) which equal to 38.7 million people. Meanwhile, the share of the agricultural economy (to GDP) is only 13.6% (Table 3). Meanwhile, in the manufacturing sector, the share of labor and the economy is 15.3% and 28.9% respectively. From this data, the development pie earnings for the agricultural and manufacturing sectors are equal to 0.48 and 1.89 respectively; or the manufacturing sector enjoys 3.94 times the development pie compared to the agricultural sector.

In other words, employment conditions in the agricultural sector (amounting to 38.7 million people) show low productivity and problems related to skills, entrepreneurship, empowerment, participation and subsistence conditions.

Table 2. Share of Agricultural, Manufacturing and Services Workers by Education, 2022

Education level	Agriculture	Manufacture	Services	Total
	%			
Never attending school	74.3	7.7	18.0	100
Not completing elementary school	56.8	10.9	32.3	100
Elementary school	43.7	14.2	42.2	100
Junior high school	27.6	18.0	54.4	100
High school	16.5	16.9	66.6	100
Vocational high school	9.4	24.3	66.3	100
Akademi	5.0	10.6	84.4	100
University	3.5	7.2	89.3	100
Total	28.6	15.3	56.1	100

Source: BPS (2023c)

Table 3. Economic Share of GDP from Agriculture, Manufacturing and Services

Economic sector	2013	2018	2023
	%		
Agriculture	13.36	12.81	13.57
Manufacture	32.04	27.94	28.92
Services	54.60	59.25	57.51
Total	100.00	100.00	100.00

Source: BPS (2023d)

The implication of this figure is the creation of inequality in various situations (Sartori & Theodorou, 2022). The manufacturing and service sectors will benefit from the flow of development benefits, whereas the agricultural sector receives welfare at a low level. Because the agricultural sector is more dominantly found in rural areas, or areas outside Java, this inequality has an impact on disparities between rural and urban areas, as well as between outside Java and Java. This gap also works to create economic inequality between the middle class and lower income class. When AI adaptation or disparity is related to racial characteristics, it will also create racial disparities (Zhang et al., 2021). This economic inequality creates social and political problems if not managed well, and can hinder the implementation of AI in general.

Solos & Leonard (2022) stated that AI has an impact on low and medium skilled workers. AI will also

have a detrimental impact on their income. The industrial automation process results in worker losses not due to the loss or replacement of jobs, but due to a decrease in the volume of jobs and job income

Table 2 further explains the educational status of agricultural workers. They are generally dominated by workers from the elementary education category, including never attending school, not completing elementary school, graduating from elementary school and graduating from junior high school, respectively at 74.3%, 56.8%, 43.7%, and 27.6%, or the equivalent of 1.46, 9.19, 14.99 and 6.54 million people. The total number of them is 32.19 million people, or around 83% of the total agricultural workforce (38.7 million people).

This situation will complicate the development process in general. This workforce with low education will certainly be a heavy burden for the development of the agricultural sector, and indirectly contrasts with efforts to develop automation in the agricultural sector. The solution to this problem cannot be done instantly, but requires strategy and the suitable target to make them superior and productive human resources.

Ethical and legal constraints can create complications and uncertainties in AI implementation. The implementation of AI in the public sectors has become an intense debate among parties. As a product of technology, AI works like a robot to process and decide things absolutely into efficient or inefficient, black or white, win or lose choices. Whereas, the public sector prioritizes substantive, sensitive and persuasive matters rather than innovation and efficiency. Therefore, the implementation of AI in the public sectors contains many uncertainties. In this case, decision makers in the public sector can adopt strategies from argumentative, temporal, or affirmative approaches to mitigate the indicated uncertainties (Nordström, 2022).

Indonesia, according to Aulia, Nugraha & Parlindungan (2023), has not yet accommodated regulations regarding works of art created by AI, giving rise to uncertainty in term of the protection of works created by AI. Also, banking industry activities still do not guarantee the protection of customer data from possible legal risks (Ayunda & Rusdianto, 2021). In the health services activity, it is found that the legal risks resulting from AI malpractice are still unclear and

cannot be overcome (Al Ghozali, Destyarini & Anggraini, 2022).

According to Sobrino-García (2021), AI has the potential to cause several problems such as opacity, legal uncertainty, bias, or violation of personal data protection. Existing institutional mechanisms may not be able to manage these risks because they have not been designed to answer or meet the needs of AI implementation. The recommended practice is how to implement AI in the health sector, which collaborates AI design (including the process of selecting data sources, interpretation, validation, and generalization of findings) with final decision making that prioritizes safety and ethics (Lopez-Jimenez, 2020).

Barriers to implementing AI are also faced and are often found at the organizational management level (Hradecky et al., 2022). In general, these obstacles are related to (i) leadership, namely the lack of innovation and leadership commitment to investing in AI; (ii) skills, namely low human resource skills, unfocused resource allocation and no ongoing training program to develop AI; and (iii) organizational culture, namely organizational life that is rigid and lacks respect for innovation, not paying attention to competence and appreciation of innovative human resources.

CONCLUSION AND SUGGESTION

Policies or programs from a socio-economic perspective can be addressed to overcome AI implementation problems.

The abundant workforce in the agricultural sector (38.7 million people) requires attention to how to increase its productivity. Affirmative policies for the workforce continue to be pursued through improving skills, technical assistance and capital, as well as efforts to empower and increase entrepreneurship so that they can participate more actively in development programs.

Collaboration is an important keyword for AI implementation, by positioning IT developer human resources together with sociological experts, business and manufacturing practitioners, legal and institutional experts to design and find innovation and efficiency, as well as ensuring AI works within a normative, safety, ethical and legal framework.

Implementation of Environmental, Social and Governance (ESG) should be enforced. ESG is a

standard for business enterprises (large or MSMEs) that carry out governance that is transparent, accountable, and meets ethics and legality (East Ventures, 2023). Thus, ESG should become an organizational culture in business and public sector management, at the same time as a design framework for the development of Trustworthy AI (TAI) and contribute to social welfare, economic progress of society, and take into account environmental aspects; thereby ensuring business sustainability (Thiebes, Lins & Sunyaev, 2021).

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