Priorities and Challenges of Indonesia's Artificial Intelligence National Strategy (Stranas KA)

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Introduction

Since Artificial Intelligence (AI) was first developed by logic theorist of Herbert Simon in 1955, AI is now the hope of the future economy, including in business and public services such as banking, health care and entertainment. AI offers solutions to overcoming infrastructure problems by investing in cost-effective technology for every aspect of the industry to foster the economic development of the country. AI came to attention on the verge of the pace of computing infrastructure and efficiency and ease in data management. AI, machine learning, robotics, and big data are expected and have become to revolutionize production processes that serve as a major impact on developing economies. AI adoption around the world tends to be correlated to the degree of digitisation in economic sectors.

Nevertheless, the challenges in planning and developing AI to boost various economic sectors of developing countries require complex, effective and efficient strategic regulations to fulfil this vision. Lesson-learned from catching-up economies of Eastern Asia such as China, Taiwan and South Korea also inspired developing countries to start their ignition on the AI development race. The development of AI technology and national strategy from those newly industrialized countries also encourages developing country decision-makers to pay attention to regulatory aspects of establishing decent AI ecosystems. Recently, AI development has also become the main agenda to build a digital economy which is believed to have a positive impact on fulfilling people's welfare in developing countries, particularly in ASEAN countries[i].

Priorities of Indonesia's AI National Strategy

With its largest digital economy market in Southeast Asia today, Indonesia has the opportunity in Artificial Intelligence (AI) competitions. The Agency for the Assessment and Application of Technology (BPPT), a research organization under the National Research & Innovation Agency (BRIN), on August 10, 2020, launched the Indonesia National AI Strategy (Stranas KA) 2020-2045[ii]. The emergence of this strategy is a response to the need to build an AI ecosystem in Indonesia to immediately compete and dominate the digital economy market, without being dictated by other countries. Stranas KA is a national policy direction in the development of AI technology that aims to provide increased productivity for businesses, improve productivity from investment efficiency in the use of human resources, and encourage innovation in various sectors[iii]. Stranas KA is also in line with the agenda of Vision Indonesia 2045, the year that marks the centenary of the independence of the Republic of Indonesia. This national strategy is believed to be able to provide a blueprint for a long-term strategy for AI development in Indonesia until 2045, which is in line with the ambitious Vision of Indonesia 2045[iv].

There are 4 focus areas and 5 priority areas for Stranas KA[v]. The Four focuses are Ethics and Policy Talent Development, Infrastructure and Data, and Industrial Research and Innovation. In this focus, Indonesia is trying to develop their strategy toward the fulfilment that supports the

five priority areas. The priority areas are health services, bureaucratic reform, education and research, food security, mobility and smart cities. The National strategy recognized the challenges and the importance of these areas that open up the window of opportunities for Indonesia's AI competitiveness in the future.

(1) In health services, with a total population of 278 million[vi] delivering a consistent standard of healthcare is a national challenge. The archipelagic country of more than 17,000 islands and 6000 island inhabitants is facing consistent barriers to health services deliveries. The COVID-19 pandemic that hit the country somewhat accelerated plans for smart hospitals, smart tracing-tracking health systems to the health security infrastructure is accelerated. Although it has been slowly developed and criticized in the early pandemic[vii], the need to further develop the health system is significant. The Stranas KA incorporated the primary urgency of health services in the document.

(2) Bureaucratic reform. The convoluted bureaucracy is one of Indonesia's biggest challenges, a common struggle in underdeveloped and developing countries. In Indonesia, criticism is related to the sluggishness of service and the high economic costs in business because bureaucracy has become the scourge of every investment and business. In the early of the pandemic, the Indonesian government has spent less than 5% of the 87.6 trillion rupiahs ($6 billion) set aside for priority health care because of delays in the verification and approval processes because of red-tape bureaucracy[viii]. President Joko Widodo has initiated a policy of simplifying the bureaucracy in Ministries and Institutions since taking office and has been quite successful to some extent[ix]. A citizen-centric digitized service government (Pemerintahan Digital Melayani) in the next five years and develop cloud-based public services also have been initiated[x].

(3) Education and research. According to the government, Indonesia needs a digital workforce of nearly 130 million by 2020 in 8 large business sectors in Indonesia[xi]. As the core of the vision 2045, education in Indonesia has been extremely important. The government via the Ministry of education and culture (KEMDIKBUD) has created the Kampus Merdeka (Freedom Campus) program which is an effort to freedom the education system to be more supportive of students and lecturers in achieving meaningful quality of learning in the academic systems[xii]. The Kampus Merdeka program encouraged the free learning for students to shape a future that fits their career aspirations, including the digital business as digital start-ups initiators and human resources[xiii].

AI significantly provides solutions to challenges in the strategic plan of the Ministry of Education and Culture. Development of multimedia content, educational games, and adaptive assessment for learning has been encouraged in the Stranas KA. Integrated educational data, coordinated teaching subjects, and smart evaluation methods in the education sector will be developed using AI. Fostering adaptive assessment, intelligent student classification and precision learning system development. In research, Stranas KA opens the opportunities for AI in the field of AI hardware-related, such as "AI on Chip", research in the field of deep learning includes the development of new models of Deep Learning, Attention Models, Reinforcement Learning, or conducting research related to model optimization. Given its large population, with a diversity of cultures, languages, food, tourist destinations, natural resources, and other diversities, Indonesia's abundance of diverse sources of use-cases that AI will be able to produce new methods and improve existing methods.

(4) Food security. AI will help to optimize the governance of food and agriculture and ensure its targetted deliveries and goals. Nevertheless, Food has always become Indonesia's top priority because of its multidimensional aspects, related to politics, economy and defence. It has even become the main agenda in the policy of the Coordinating Ministry for Politics, Law and Security in Indonesia[xiv]. Stranas KA expects in the food security, identification of poverty and areas most in need of food is a key component to be able to overcome the problem of poverty. Image satellites via AI will provide the data and help to identify certain geographical areas and assist to solve the problems. In terms of food resilience, big data using Life Cycle Inventory (LCI) will provide a national food database to help manage, predict and optimize food availability, acceptability, affordability, accessibility and sustainability. Life Cycle Impact Assessment (LCIA) technique using AI will transform the static data to be dynamic and real-time. This will be very beneficial in agricultural land management, selection of crops, climate prediction, and supply chain and stock distributions. LCIA will also be able to manage the larger-scale food database and regions and analyse it to comprehensively manage the distributions across the country. Satellite technology, machine learning and smart farming are starting to deploy to better plan, forecast and manage agricultural production and natural resources including fisheries.

(5) Mobility and smart cities. Almost 60% of people in Indonesia live in urban areas, compared to those who live in rural areas. There are two significant developments in smart mobility and smart cities in Indonesia. First, the relocation of the capital city of Indonesia, from Jakarta to a green area in the Borneo Islands, the lung of the world. Second, is Indonesia's 100 smart cities plan, which plans to develop 98 smart cities and 416 smart districts. Following the actions, enabler technology such as the Internet of Things (IoT), Artificial Intelligence, Big Data, to Cloud Computing is deployed to the concept and strategy. Ministry of Communication and Informatics has carried out a development movement of Indonesia's 100 smart cities since 2017. The focus of Smart City development is emphasized on 6 main pillars, namely Smart Governance, Smart Mobility, Smart Economy, Smart Living, Smart People, and Smart Environment. National Development Planning Board (Bappenas) has planned the relocation of the national capital and Smart and Sustainable Cities as a part of National Development Planning until 2045. The government is also initiating the preparation of the Digital Transformation Strategy Framework as a guide in implementing the digitalization process directed at 3 strategic sectors, namely Digital Government, Digital Economy and Digital Society, where the implementation of Smart City is one of the indicators in the development of Digital Governance[xv].

People mobility also focused on the Stranas KA. Currently, Indonesia has entered the industrial era 4.0 which is marked by the massive use of information technology in various sectors, including the transportation sector. Taking advantage of these technological advances, sectoral and regional governmental organizations trying to improve services to the community by implementing Smart Mobility with the support of AI. The application of AI is also related to several activities, including recognizing traffic management with the Area Traffic Control System (ATCS), application of technology in freight transportation, installation of Variable Message Signs (VMS), and application of e-log book applications, which is a system for monitoring work and rest times for transportation drivers[xvi].

AI Innovation Orchestracy Challenges

Stranas KA takes a multi-stakeholder cooperation approach in the form of a quadruple helix (quad helix) in which all stakeholders, namely government, industry, academics and the community are

involved, to optimize all community potentials and capacities. With the Quad helix innovation model approach, it is hoped that this model can interact with the concept of customization that is adapted to local resource conditions and will create effective collaboration for a learning and innovation ecosystem. In this approach, it is necessary to have an institution that harmonizes activities in realizing the strategies driven by these different parties. This institution also functions as a shift in the axis of innovation driving from government-driven to market-driven so that it can answer market needs with a value-driven business model and in close synergy with the government.

The successful implementation of the AI national strategy requires a synergistic and sustainable collaboration from all quad helix components consisting of government, academia, industry, and the community. Indonesian technology policymakers and practitioners in AI believe that there must be a trusted orchestrator organization established, to orchestrate the implementation, and bridge the very-soon-to-be Presidential Regulation on Stranas KA to all stakeholders' action and operational strategies. Continuing the guidelines in the Stranas KA, an artificial intelligence innovation centre (PIKA) was created. One of PIKA's main activities is to form an orchestrator institution, namely "Collaboration to accelerate Indonesian Artificial Intelligence innovation" (KORIKA), which plays a role in overseeing the implementation of AI strategy[xvii]. KORIKA will be in charge of orchestrating all development and application of research and innovation of artificial intelligence technology in all strategic sectors, both public and private. Thus, KORIKA can become the driving axis of quad helix-based innovation. KORIKA was officially established one year later, on August 10, 2021.

Indeed, in developing AI, even though the national strategy has been announced and agreed upon, Indonesia still has many challenges. One of the national infrastructure challenges supporting AI is national projects including the Palapa Ring, a national underwater fibre-optic network that connects 514 districts/cities. The infrastructure is expected to support the rapid growth of the digital economy, driven by the preparation of a 4G / Long Term Evolution (LTE) access network across the archipelago in Indonesia and the rollout of 5G and shutdown of 3G, thus the 2,100 Mhz frequency spectrum can be optimized by operators for 4G and 5G[xviii]. To overcome digital human resources, the government has created a Digital Talent program to develop 1,000 young talents who master digital skills to realize Indonesia's vision as the largest digital economy by 2030. Another challenge is a shared understanding of the development and application of AI in Indonesia. There should be forum or platforms with the goal of harmonization and understanding the AI implementation across sectors and create public awareness. One of the efforts is the annual Artificial Intelligence Innovation Summit (AIIS). AIIS is a conference and exhibition activity that displays the latest developments and the use of artificial intelligence technology in Indonesia[xix]. AIIS also a place to show the capabilities of the components of the Indonesian nation to the global community in developing AI technology and show various artificial intelligence innovation products in various fields in Indonesia.

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