Artificial Intelligence Implementation Strategy to Make It Happen Smart Government Indonesia Gold 2045

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Abstract

The world is currently faced with the challenges of the industrial revolution 4.0 era to realize Smart Government based on internet of things (IOT), big data, augmented reality (AR), cyber security, artificial intelligence (AI), additive manufacturing (AM), simulation, system integration and cloud computing. The application of Artificial Intelligence / AI to public services has been successfully implemented in Singapore and Finland. Meanwhile, in Indonesia there are still challenges that must be faced in implementing AI in public services to realize Smart Government, including information technology (ICT) infrastructure, policies and regulations, rigid bureaucracy, and the ability of human resources to use ICT. So, this research will explain the strategy for implementing AI in Indonesia using the Al-Besher Smart Government Framework based on the results of the SWOT analysis. This research uses qualitative research methods through literature review in the form of primary references, namely journals, articles, news and government performance reports. The research results show that the application of AI to realize Smart Government must carry out the strategy of IoT Enable System, AI Principles/Regulation/IoT Principle, and Shareholders to form a Smart Government Domain which contains 5 (five) Priority Fields for Indonesian Artificial Intelligence for 2020-2045. Apart from that, this research found that to realize Smart Government, administrative reform efforts must be made by forming autonomous organizations, increasing ASN competency by strengthening the meritocracy system, building collaborative governance and establishing a bureaucratic digital transformation law.

***Keywords**: Smart Government, Artificial Intelligence, AI, Reform Administration.*

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A. INTRODUCTION

Nowadays technological developments are very rapid and there is no stopping from time to time from the development of old ways or new methods to complete tasks that are still traditional. Current technological developments have entered the era of industrial revolution 4.0 which has changed the fundamental views and paradigms in human life. So, the presence of this technology makes it possible to simplify all activities and can also support human life needs. Moreover, with society 5.0, it is hoped that this technology can be utilized by considering human aspects and the humanities side (Faruqi, 2019).

In the industrial era 4.0, there are 9 types of technology which will certainly become the main pillars and will help effectively and efficiently, as well as maximally in human life (Mitrohardjono & Yunus, 2021). The first is the internet of things (IOT) which is an object that functions to transfer data over a network without any human interaction. Second, big data which describes a large volume of data consisting of structured and unstructured data. Third, augmented reality (AR),

which is a technology that comes from combining two or three-dimensional virtual objects and then projecting them into a real situation. Fourth, cyber security is defined as a method or effort to protect information from cyber-attacks.

Fifth, artificial intelligence (AI) is a computer technology with intelligent capabilities like humans and can be used and regulated according to human needs. Next, the sixth is additive manufacturing (AM), which is a three-dimensional printer that can create a real object that is the same size and shape as an actual design. Seventh, simulation, where this technology will make operations representative from time to time. Then eighth is system integration, which is a series that will connect and combine several systems consisting of physical and functional ones by guaranteeing that they will function as one unit. Then the last one is cloud computing, which is a technology that uses the internet as a data and application management center by accessing virtual servers to be able to configure.

It was felt that these various types of technology were really needed, especially at the end of 2019 when the world was attacked and infected by the coronavirus disease 2019 (COVID-19) which later became a pandemic. The presence of technology when there are restrictions on face-to-face life and physical contact is able to help various kinds of human life activities, including bureaucratic services, educational services, health services and economic activities. So the COVID-19 pandemic is one of the reasons for the bureaucracy to make comprehensive administrative changes in order to provide optimal service to the public. For this reason, it is hoped that the government can build an agile bureaucracy that can force a comprehensive transformation due to the four major changes currently occurring, namely the COVID-19 pandemic, rapid digitalization and technological convergence in all aspects of life, the shift from the older generation to the millennial generation, and strengthening flexibility. and virtual public mobility (Prasojo, 2023: 171).

The phenomena of these four changes require a new bureaucratic order that is different from the previous governance. This is based on three things, firstly, this new governance will replace short-term crisis management with long-term strategic thinking that focuses on current problems and is accompanied by actions to overcome them. Second, this new governance must also replace the tunnel vision and top-down approach that existed in the past, because today life is much more complex and interconnected so it is hoped that the government will no longer act alone. The latter is governance that stops emphasizing narrow economic conceptions and short-term financial interests, but prioritizes public and natural interests (World Economic Forum, 2022).

So, in realizing new bureaucratic governance, it is hoped that the current bureaucracy will digitalize and provide flexibility in institutions and business processes (Prasojo, 2023: 173). By digitalizing the bureaucracy (e-Government) it will create a new, collaborative and more efficient service delivery model so that through this digitalization the government can provide services that are in line with public expectations which continue to develop and increase public trust in the government. Apart from that, e-Government will increase transparency in three ways, namely

transparency of decisions or policies taken because all data and information is open to the public, second transparency in implementing more effective policies such as taxation, and third is a new government paradigm that can reshape the relationship between citizens and administration (Liva et al., 2020).

The application of e-Government has now developed and is being implemented in many countries. Singapore and Finland are one of the countries that have best practice in implementing e-Government. According to the Chandler Good Government Index (CGGI) (2023), Singapore managed to rank first with a score of 0.865 and Finland was ranked third with a score of 0.834 out of 104 countries that have been assessed by CGGI. Singapore's success in implementing e-Government cannot be separated from the development of human resource competencies, orientation towards public services, the role of the Infocomm Development Authority (IDA), and also the political will of the government (Rahman, Satispi, & Adiyasha, 2020). Meanwhile, for Finland, the implementation of e-Government is supported based on online service components, infrastructure components, and also human resource components (Prihanto, 2013).

In implementing and using e-Government, Singapore as a neighboring country to Indonesia is the most rapid and advanced country in implementing the use of technology in the field of artificial intelligence / AI. Singapore has released the National AI Strategy (NAIS) which provides AI planning to be able to make the nation a smart nation of the future. Then Singapore established the National Artificial Intelligence Office (NAIO) as an institution that coordinates all efforts of various AI actors and prevents factions from working in silos.

Meanwhile in Finland, in 2017 Finland utilized technology in the field of AI by initiating one of the first national AI strategies and action plans in the world in order to improve services in the public sector more efficiently. With the successful implementation of AI, Finland has the potential to double its economic growth by 2035 (Accenture and Frontier Economics, 2017). According to the OECD, the Finnish government has issued 12 (twelve) priority programs for AI implementation. The 12 programs focus on industry 4.0, education and research, funding, administrative reform (superApps), and smart government (OECD, 2023).

With the successful implementation and use of technology in the field of AI in e-Government which has been carried out by both Singapore and Finland, Indonesia has participated in utilizing technology in the field of AI in order to provide increasingly optimal services to the public. This was then translated into a National Strategy for Artificial Intelligence in Indonesia 2020-2045, which is a national policy direction in carrying out activities in the field of AI technology in Indonesia.

However, in implementing and using technology in the field of AI in e-Government, Indonesia is still faced with various existing bureaucratic challenges. Because currently the characteristics of bureaucracy in Indonesia are at governance level 1.0, characterized by still high political orientation, overlapping various programs and activities between agencies, as well as various manual and fragmented business processes. The basic problems include the absence of standard

structures and metadata in ministries, institutions, regional governments, even in each unit or section within the agency itself. So this cannot be used as the basis for one data in the process of making policies, decisions, and programs or activities from related agencies because the data in various government application systems often has repetition, references are not the same, there is no accuracy, and standards are different. diverse. The second problem is that the use of technology is still fragmented due to the large number of applications created by Ministries/Institutions/Regional Governments for various kinds of government administration needs, making it difficult to integrate service provision. The next problem is the low sustainability of the application because its development does not comply with technology standards and good management which ultimately results in digital waste and is prone to hacking (Prasojo, 2023: 182-184).

Then, according to Prasojo (2023: 72-73), there are several other bureaucratic challenges, namely: first, cultural factors and basic public service values that are not formed on the part of ASN officials and employees in Indonesia. Mastering becomes the main culture that is formed instead of serving society. This can be drawn from the early history of colonialism as well as political influences in the bureaucracy. Second, the poor existing system and structure of public services has resulted in employee behavior abusing authority to gain personal benefits. This condition gives rise to acts of corruption in public services. Third, weak leadership to carry out bureaucratic changes, top leaders at the city, district and provincial levels who can be the main key to the success of administrative reform are faced with political economic concessions and the regional election costs that have been incurred. This makes regional heads tempted to use their positions for their own gain. Fourth, various processes in the Indonesian bureaucracy are very bad, starting from the practice of bribery in CPNS selection, buying and selling positions, KKN in the procurement of public goods and services.

Several problems are interrelated and constitute challenges in realizing administrative reform towards governance 4.0 in Indonesia. Improvements in public services cannot be interpreted as just front-line services, but improvements in bureaucratic organizations also need to be considered. Administrative reform can be carried out in various ways, including using and exploiting current technological developments to improve existing systems. For this reason, in facing these various challenges, several strategic analyzes are needed to implement the use of technology in the field of AI in order to realize the Golden Indonesia 2045 smart government.

B. LITERATURE REVIEW

1. Administrative Reform in Public Services

Administrative reform is a series of changes to the administration or governance system carried out by the government or organization with the aim of increasing efficiency, effectiveness, transparency, accountability and the quality of services provided to the community. Administrative reform aims to improve the

way governments or organizations manage the resources, processes and services they provide. The use of information technology in government is very important.

According to Caiden (1982) administrative reform is a process that has a purpose and is characterized by mandates, prudence and strategic planning, not an inherent and automatic phenomenon. Administrative reform was instituted as a means to induce change through the use of persuasive techniques, reasoning, and the application of punishment. Administrative adjustments are generally considered an organization's reflexive reaction to disruption or changes in circumstances. The goal of government is to improve existing conditions by eliminating administrative procedures that are inconsistent with ethical principles, such as abuse of authority.

In Indonesia, public administration reform has prioritized improving service quality in recent years. The use of information and communications technology (ICT) has emerged as a key catalyst for e-Government initiatives, which aim to facilitate service improvements. Administrative reform programs are starting to optimize the role of technology to help reduce frequent public service problems. This is supported by the emergence of various programs such as the SPBE Electronic Based Government System (SPBE) in Indonesia which refers to the government's efforts to use information and communication technology (ICT) to increase efficiency, transparency and the quality of public services provided to the community. SPBE covers various initiatives and technology applications to support government processes, including public administration, decision making, and service delivery to citizens. This is as stated in Presidential Regulation no. 95 of 2018 concerning Electronic-Based Government Systems.

Public services are the core of government tasks in meeting the needs and expectations of society. How these services are organized and run is an important aspect of public administration. At the same time, information and communications technology has become a driving force in shaping new ways in which governments provide public services. In this context, e-Government (electronic government) and administrative reform have a key role to improve the quality and efficiency of public services.

E-Government is a concept where information and communication technology (ICT) is used by the government to provide public services, communicate with citizens, and manage administrative processes electronically. This includes building government websites, information systems, mobile applications, and other online platforms that enable citizens to interact with the government digitally. E-Government can increase the efficiency, accessibility and responsiveness of public services.

Similarly, Nixon & Koutrakou (2007) emphasize that e-Government is about people and how democratic governments act in their interests (although using somewhat functionalist terms from the World Bank): “E-Government is about people and how their democratic governments act in their name"

E-Government requires a mature strategy, and there are several factors that need to be considered in determining a region's readiness to implement e-

Government (Indrajit, 2004: 8). In government agencies, the following factors are also very important:

a. Telecommunication Infrastructure: Computers, networks and infrastructure are very important in e-Government implementation. This is similar to AI;
b. Level of Connectivity and Use of IT by the government, the use of information technology by the government to help with daily activities will show their readiness to implement e-Government;
c. Readiness of Human Resources in government, the "main players" or subjects in e-Government efforts are government employees, so their competence and expertise will greatly influence implementation;
d. Availability of Budget, it is clear that every e-Government program requires funding and a budget;
e. E-Government is closely related to efforts to create and distribute data/information from one party to another, so that data/information security and intellectual copyright need to be protected by law or regulation;
f. Paradigm change—implementation of e-Government requires awareness and desire to change work methods, procedures, behavior and daily habits.

More and more people realize that e-governance is very important for government services. The ultimate goal of e-governance is to provide government services efficiently and cost-effectively to the public and decision makers. e-Government services can provide benefits to the government and society by reducing costs and increasing access to services. Technological progress is very rapid from time to time. Many governments have difficulty providing e-Government services to the wider community. To provide benefits for all, the government must develop e-Government services. Effective government transformation requires understanding the main challenges in providing e-Government services by utilizing AI and IoT to increase efficiency and effectiveness.

2. Artificial Intelligence/AI

Intelligence refers to the ability to learn, understand, and think. The term artificial intelligence is typically used to describe robots or computers that mimic the 'cognitive' functions associated with the human mind, such as learning and problem solving (Russell & Norvig, 2021).

According to Nilsson (1998), artificial intelligence (AI) is the study of intelligent behavior in machines. In turn, intelligent behavior includes the ability to see, think, learn, speak, and act in complex situations. One of AI's long-term goals is to create tools that can do these things as well as humans can, or maybe even better. All these capabilities are combined and directed into a system.

AI systems have the ability to function autonomously, without requiring human intervention. They have the capacity to acquire knowledge, recognize patterns, and utilize this information to make decisions and draw various conclusions through examining various scenarios. The use of new AI-based

technologies has emerged as an important approach in the public sector in several countries around the world (Čerka et al., 2017).

The OECD provides a description of machine-based AI systems that can predict, recommend, or make judgments relevant to real or virtual environments based on human-defined goals. AI systems use different levels of autonomy. Furthermore, AI refers to machines with human-like cognitive abilities (OECD, 2019)

Zheng et al. (2018), which explores the provision of AI services by governments, highlights the bilateral relationship between public sector needs and the solutions provided by AI applications. This approach is particularly important because it investigates the provision of AI services by governments. Doing this shows that supporting e-Government tools with artificial intelligence technology will increase efficiency and improve the provision of government services.

3. Smart Government

Smart Government focuses on the importance of government that can achieve sustainable development. Smart governance refers to the use of existing technology to effectively monitor and synchronize activities carried out by various government agencies. This approach aims to encourage collaboration with other stakeholders and respond to citizens' needs, thereby improving the quality of public services and building trust in public institutions (EIBI, 2017: 5).

An important aspect of smart government is often called e-government or digital government. This technique aims to facilitate the delivery of digital public services and improve communication between the government and the public using digital platforms. E-Government plays an important role in facilitating digital transformation, where governments use information and communications technology (ICT) to develop automated public services to improve the quality of life of individuals in society (Pereira et al., 2018).

The Brazilian government as an example in 2020, was developed by the National Secretary for Urban and Regional Mobility and Development of the Ministry of Regional Development to encourage the convergence, consolidation and improvement of current smart city initiatives in various administrative and civil sectors. Issue regulations that have eight strategic objectives that must be achieved by decision makers, regulatory bodies, the commercial sector, and technical specialists:

a. SDG Integration: Digital transformation of government policies and initiatives that respect diversity and inequality in Brazil
b. Universal internet access:
c. Digital governance: privacy, security and transparency
d. Urban Governance: Empowering decision makers as managers and fostering trust in government through innovative and inclusive methods.
e. Local economy: helping local companies
f. Finance: develop and promote financial instruments that support the SDGs.

g. Education and communications: involving civil society in digital transformation
h. Evaluate the effects of smart initiatives: create measures and indicators.

The hope is that after the Government carries out administrative reform through e-Government and using AI, smart government will be realized in the areas of Smart Transportation, Smart Healthcare, Smart Education and Smart Energy.

4. Framework Strategi Digital Governance

Significant challenges are posed by the types of data received through IoT and intelligent government artificial intelligence applications. Given the complexity of its implementation, a holistic approach is needed that takes into account the essential components and combines them in a comprehensive framework. So, a framework is needed that can determine strategies for implementing AI for smart government, one of which is the framework proposed by Al-Besher & Kumar (2022) which divides it into four large areas, namely IoT, AI Principles, Shareholders, and Smart Government Domain.

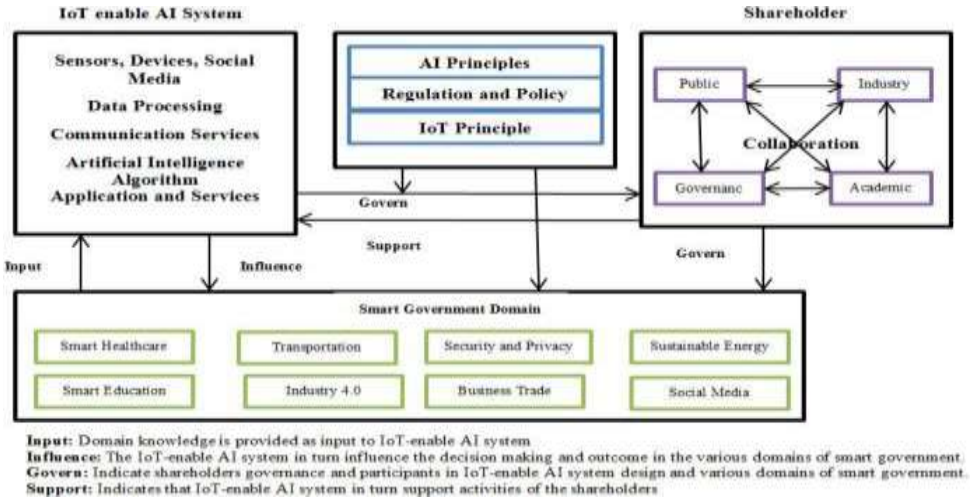

Figure 1. Framework for Smart Government

IoT Enable System

IoT requires the connection of digital objects and environments to provide applications and services to various constituents. Moreover, the Internet of Things is not limited to the connection of sensing devices; it also includes gaining insight or knowledge from data, which helps solve problems or automate processes without human intervention (Chatterjee, Kar, & Gupta, 2018). Artificial intelligence (AI) algorithms and techniques can analyze and learn from large amounts of data collected by connected IoT devices to produce public services and value. The increasing adoption of AI, which provides options for sophisticated data analysis, is significantly increasing the usability of IoT. On the other hand, by providing large amounts of data as input, IoT also enables the application of artificial intelligence in various sectors, including smart government.

AI *Principles/Regulation/IoT Principle*

Regulation of artificial intelligence (AI) Considering that the use of digital algorithms in government is not a new phenomenon, government agencies have previously developed several strategies to monitor their implementation effectively. These steps include the establishment of data protection and privacy laws, improving and clarifying administrative regulations related to digital decision-making, and establishing regulatory bodies to oversee the use of digital technologies in the context of law enforcement and security. Artificial intelligence (AI) provides powerful support to the need to evaluate, advance, and improve processes. There are various technological and governance innovations that can organize, organize and form government effectively. the use of artificial intelligence (AI) by governments, with the aim of achieving desired social consequences.

Shareholder

In the context of collaboration, the term "shareholders" refers to parties who have an interest or stake in a particular initiative, project, or organization. The understanding of "shareholders" can vary depending on the context, but in general, they are parties who have a stake or interest in a collaborative effort.

It is important to identify and understand the roles and interests of each "shareholder" in the context of collaboration as this can influence collaboration dynamics, decision making, and the level of support provided by each party. Effective management of relationships with shareholders is key to maintaining successful collaboration.

Based on the literature, the shareholder model is in principle the same as The Quadruple Helix Model. in collaboration according to the Quadruple Helix Model expanded by Carayannis & Campbell (2009) by adding a fourth helix. The "Quadruple Helix" collaborative governance model includes four fundamental factors that influence policy making and decision making. These four fields include government, business, civil society, and academia. Each of these components is critical to achieving a common goal, according to this paradigm. Each point of the Quadruple Helix Model is explained in depth below:

a. Government: The authorities or government agencies responsible for policy making, regulations, and program implementation are the first aspect of this model. The government establishes the legal framework, allocates resources, and facilitates collaboration as a key stakeholder in government collaboration.
b. Private Sector (Business): Businesses and organizations make up the private sector. Private sector funding, technology, creativity, and knowledge can help community projects.
c. Civil society (Public)—nonprofit organizations, activist groups, and citizens—is the third factor. Civil society coordinates government efforts, represents community interests, and ensures policy accountability.
d. The fourth part is Academics, which involves educational and research institutions. Scientific knowledge, research, and analysis from academics help

make evidence-based decisions. They can also help innovate and improve solutions.

This Quadruple Helix approach emphasizes collaboration between these four fields for sustainable development and innovation. This model emphasizes dialogue and active interaction between government, the private sector, civil society, and academia to identify problems, formulate policies, and implement actions to improve community welfare and overcome complex environmental, economic, and social problems.

Smart Government Domain

Smart Government is a concept that covers various domains or fields in an effort to increase the efficiency and effectiveness of government and provide better services to the community. Some important domains or aspects of "Smart Government" include:

a. Smart Health services: The government improves health services through ICT. Building electronic health information systems, telemedicine, and health data analysis improve health services, diagnostic accuracy, and policy planning.
b. Smart Education: Technology is used in education. Governments can use e-learning, distance learning, and online education platforms to improve access, quality, and collection of education data to improve education planning.
c. Transportation: The government uses technology to improve transportation efficiency and safety through Smart Transportation. Sensor-based transportation systems, intelligent traffic planning, and sustainable mobility reduce congestion and environmental impact.
d. Data security and privacy: citizens in all services and policies. This includes data security, cyber security, and technology privacy.
e. Industry 4.0 (Industry 4.0): Smart Government uses IoT and automation in industry. The government can encourage innovation, production efficiency and private sector-education cooperation.
f. Business Trade: Smart Government can simplify licensing, supply chain monitoring, and electronic payments to improve business trade. Local and multinational companies may become more competitive.
g. Sustainable Energy: Smart Government can use technology to better manage energy resources, encourage renewable energy, and minimize carbon footprints to achieve environmental goals.
h. Social-Media: Governments can use social media to communicate with their citizens. This includes communicating public information, solving societal problems, and using social data to track public sentiment and design policy.

Smart Government uses information and communication technology to improve services, efficiency and quality of life for its citizens while protecting data, security and privacy. It also combines partnerships of the commercial sector, civil society, and the education sector to build and govern smart cities and countries.

5. SWOT Analysis

Humphrey developed SWOT Analysis in the 1960s. SWOT analysis is a strategic framework used to evaluate the strengths, weaknesses, opportunities and threats associated with a project or organization (Kurtz, 2008: 45). According to Humphrey, a SWOT analysis consists of four steps:

a. Data collection: Collect data about internal and external factors that influence a project or organization. Internal factors include strengths and weaknesses, while external factors include opportunities and threats.
b. Analysis: Analyze data to determine the most significant and relevant factors in the project or organizational context.
c. Strategy: Use the results of the analysis to develop an effective strategy. Strengths and opportunities can be used to strengthen strategies, while weaknesses and threats must be addressed or reduced.
d. Implementation: Implement the strategy and evaluate the results regularly.

SWOT analysis can be used by organizations to identify their internal strengths and weaknesses as well as the external opportunities and threats faced by the organization. The results of the analysis can help organizations to develop better strategic plans and ensure long-term success.

The company's mission, goals, strategies and policies always influence strategic decision making. Thus, the strategic plan must assess the company's existing strategic elements (strengths, weaknesses, opportunities, threats). The SWOT matrix integrates internal and external strategic considerations. This matrix shows how Rangkuti can match external opportunities and dangers with internal strengths and weaknesses (Rangkuti, 2001:31).

a. Strengths, or internal qualities that help the company achieve its goals and can be optimized for organizational development or implementation of work programs. Effective leadership, strong finances, competent HR, superior programs, etc.
b. Weaknesses, Weaknesses which are strong aspects that an organization needs, can become weaknesses if they do not exist. Internal weaknesses are organizational weaknesses. Examples are low quality human resources, inadequate quantity, limited funding, and inadequate facilities.
c. Opportunities (Supporting Factors) help organizations build stability and implement work initiatives. These supporting factors are external, not internal. Examples include government support, regulatory changes, and technical advances.
d. Threats (Inhibiting Factors/Threats) Threats can endanger the development, stability or existence of an organization or work program. Moreover, these factors are external to the organization. For example, bad government policies, financial cuts, etc.

The SWOT matrix shows the following complete combination interactions:

Table 1. SWOT Matrix

Internal **Exsternal**	***Strengths* (S)** **Strength factors internal**	***Weakness* (W)** **Internal weakness factors**
***Opportunities* (O)** **Opportunity factors external**	(*Strengths/Opportunities*) create strategies that use strengths to exploit opportunities	(*Weaknesses/Opportunities*) create a strategy that use minimize weaknesses to take advantage of opportunities.
***Threats* (T)** **Threat factors external**	(*Strengths-Threats*) create a strategy that use force to overcome threats.	(*Weaknesses-Threats*) create a strategy that use minimize weaknesses to overcome threat.

Source: Rangkuti (2001:31)

This SWOT analysis is shown to see the challenges and opportunities in implementing an appropriate policy. So, we look at the challenges and opportunities from the framework created by (Al-Besher & Kumar, 2022) to determine the right strategy for implementing AI.

C. METHOD

This research is a type of qualitative descriptive research that uses secondary data by collecting literature and documentation from related organizations. The literature data utilizes various significant research findings and is published in various national and international public media, with special reference to the Al-Besher & Kumar journal entitled Use of Artificial Intelligence to Enhance Government Services (2022) and the book National Strategy for Artificial Intelligence in Indonesia 2020 -2045 by the Working Group for Preparing a National Strategy for Artificial Intelligence BPPT (2020). The research analysis technique used is 4 step analysis, namely data collection, data reduction, data presentation and inference (Huberman & Miles, 1983).

D. RESULTS AND DISCUSSION

Indonesia is a strategic country with an archipelagic state, with a population of 275.7 million in 2022 (BPS, 2022) with cultural diversity and local wisdom. Apart from that, Indonesia is also a country that has the largest economic market power in Southeast Asia. So, Indonesia can utilize AI to increase the efficiency of economic productivity, provide the best services to the public accurately and quickly and help the government to formulate appropriate policies. Therefore, Indonesia has prepared a National Strategy for Indonesian Artificial Intelligence for 2020-2045 in order to realize a Golden Indonesia 2045.

However, Indonesia also faces many challenges in implementing this technology. These challenges can be grouped into four important things based on Al-Besher's Smart Government Strategy Framework, namely regulatory readiness that regulates the ethics of responsible use and utilization of AI; readiness of skilled workforce, computing infrastructure and data supporting AI modeling; readiness of collaborative relationships between stakeholders in adopting AI innovations; and success in determining AI priority areas.

To face these opportunities and challenges, researchers will analyze using the Smart Government Strategy Framework and pay attention to developments in AI strategies in other countries.

1. **Artificial Intelligence / AI Strategy in Singapore, Finland and the G20 Forum**

The use of AI in public services is a manifestation of a country achieving good government. Therefore, in this study, researchers took a sample of 2 (two) countries that had the best good government index scores based on the results of the assessment by the Chandler Good Government Index (CGGI). In 2022, Finland will be in number 1 position with an index value of 0.846 and in 2023, Singapore will succeed in replacing Finland in number 1 position with an index value of 0.865. This research will look at the extent of the national strategy in implementing AI to improve public services.

Apart from benchmarking the two countries that have succeeded in occupying the best position in realizing good government in the world, Indonesia also needs to pay attention to AI principles in multilateral forums, one of which is the G20 forum. The forum consists of 19 member countries and the European Union (EU) which represents more than 60% of the world's population, 75% of global trade and 80% of world GDP (Bank Indonesia, 2022). The G20 established AI principles and recommendations in 2019 in Osaka, Japan.

a. Singapura

In 2017, Singapore established four key AI initiatives, namely: (1) Fundamental AI Research, which funds scientific research that will contribute to Singapore's AI pillars, (2) Grand Challenges, which supports the work of multidisciplinary groups that provide innovative solutions to challenges challenges facing Singapore and the world (currently, the program focuses on health, urban solutions, and finance), (3) 100 Experiments, which funds scalable AI solutions to industry-identified problems, and (4) AI Apprenticeship, a program structured nine months to grow a new pool of AI talent in Singapore. For this, Singapore is establishing a new advisory council on the ethical use of AI and data, which will help the government develop AI governance and ethics standards and frameworks.

Furthermore, in June 2018, the Singapore government announced three new initiatives on AI governance and ethics, namely the creation of an advisory council on the ethical use of AI and data that will help the government develop standards and frameworks for AI governance and ethics, a discussion paper released by

Personal Data Protection Commission (PDPC) on the responsible development and adoption of AI, and research programs on AI governance and data use.

b. Finlandia

Finland succeeded in establishing the First Artificial Intelligence Accelerator (FAIA) which provides assistance to public organizations in implementing AI. Currently, FAIA has collaborated to build AI in 15 public organizations in Nordic countries, such as Denmark, Sweden and Norway (FAIA, 2022). Apart from the mentoring program, Finland, through FAIA, has built an AI laboratory program, namely Silo.Ai. This program focuses on building a smart society, smart industry, smart machines and smart devices. And in 2023, Silo.Ai will become the largest laboratory in the Nordic countries, producing more than 200 artificial intelligence programs (Silo.Ai, 2023).

c. Artificial Intelligence Recommendations from the G20

The G20 Artificial Intelligence Principles (G20 AI Principles) were agreed upon at the G20 Summit on 28-29 June 2019 in Osaka, Japan. The AI principles set by the G20 are (1) inclusive growth, sustainable development and prosperity, (2) human-centered values and justice, (3) transparency and explainability, (4) robustness, security and safety, and (5) accountability. Furthermore, the G20 also encourages national policies and international cooperation for trustworthy AI by implementing 5 things, namely: 1. Encouraging investment in AI research and development; 2. Fostering a digital ecosystem for AI; 3. Establish a policy environment that supports AI; 4. Building human capacity and preparing for labor market transformation; and 5. Encourage international cooperation for trustworthy AI (OECD, 2019).

2. SWOT Study of Indonesia's National Artificial Intelligence Strategy

After seeing the development of AI in other countries and seeing the principles of AI in international forums, researchers need to analyze the strengths, weaknesses and opportunities in Indonesia to produce recommendations for applying AI to realize smart government using the SWOT method. This AI SWOT analysis was studied based on the parameters identified by the Working Group for the Preparation of the National Strategy for Artificial Intelligence (BPPT, 2020) and reformulated by researchers within the framework of the Al-Besher Smart Government Strategy Framework, namely 1. Digitalization/infrastructure; 2. Regulation; 3. Human Resources; and 4. Stakeholder Collaboration. Meanwhile, the parameters for opportunities in the innovation ecosystem and industrial adoption in the public sector are threats.

(*Strength*)	(*Weakness*)
Digitalization / Infrastructure	
● Adequate telecommunications and	● Digital infrastructure is inadequate in

Internet networks for cloud computing services; ● Infrastructure development and national connectivity are increasing throughout the archipelago; ● Indonesia is the largest digital economic market in Southeast Asia with the potential for four-fold growth by 2025.	most regional and remote governments for AI development; ● There is no data that is well integrated.

(*Strength*)	(*Weakness*)
Regulation	
● There is a legal umbrella for the ethical use and development of responsible AI, which is based on Pancasila and the 1945 Constitution; ● Availability of regulations governing ethics regarding personal data protection as stated in Law (UU) no. 27 of 2022 ● The availability of regulations governing the use of ICT and electronic transactions is contained in Law no. 19 of 2016; ● Availability of regulations governing legal certainty in the relationship between the community and public service providers in Law no. 25 of 2009 ● Availability of regulations governing public information disclosure in Law no. 14 of 2008 ● Availability of Grand Design Bureaucratic Reform regulations in Presidential Regulation (Perpres) no. 81 of 2010 and Changes to the RB Road Map in PAN-RB Ministerial Regulation No. 3 of 2023 ● Availability of Electronic Based Government System (SPBE) regulations as stated in Presidential Decree no. 95 of 2018 and no. 132 of 2022;	● There is no regulatory instrument that regulates ethics and policies for the responsible development and use of AI in Indonesia ● There is no integrated supervisory institution that supervises and controls the development and use of AI in society ● There are not enough regulations regarding data issues and sharing infrastructure that will be used publicly and openly by the community for research and innovation development needs ● There is no national AI standard in Indonesia yet

● The availability of the One Data Indonesia regulation is contained in Presidential Decree no. 39 of 2019 ● Strong government motivation for the use of domestic innovation production through TKDN regulations and appeals to the public to love domestic products;	

(*Strength*)	(*Weakness*)
Human Resources	
● Indonesia's demographic bonus can be used as a workforce that is ready to use and excels in various sectors of AI development and utilization; ● Indonesia's new generation is increasingly interested in studies in the fields of information technology, computer science and science, which are requirements for mastering AI.	● Lack of ASN human resources with the ability to graduate from mathematics, science, engineering and computer science to be ready to work in the field of AI; ● Indonesian society has not been well educated by AI knowledge and learning.

(*Strength*)	(*Weakness*)
Stakeholder Collaboration	
● The government provides incentive funds for research programs resulting from industrial collaboration with universities or with government research institutions, such as RISPRO from the LPDP, as well as Research-Pro and PRIN from the Ministry of Research and Technology;	● Belum optimalnya harmonisasi antar lembaga yang mengakibatkan adanya silo *mentality*; ● Masih sedikit jumlah kerja sama riset dan pengembangan inovasi AI dengan pihak swasta dan lembaga riset; ● Kualitas produk inovasi masih belum teradopsi baik kepada publik, seperti SIPPN, SPAN-LAPOR, dsb.

(*Opportunities*)	(*Threats*)
Innovation Ecosystem	Adoption of Innovation in the Public Sector

● The government has begun to implement a conducive innovation ecosystem to combine investors, government, industry, universities, research institutions and non-governmental organizations; ● The government has started implementing the One Data Indonesia Program through Presidential Decree Number 39 of 2019 for the need to share for the advancement of research and development of technological innovation; ● The government has started implementing the One Data Indonesia Program through Presidential Decree Number 39 of 2019 for the need to share for the advancement of research and development of technological innovation; ● Golden Indonesia Vision 2045: (1) Human Development and Mastery of Science and Technology, (2) Sustainable Economic Development, (3) Equitable Development, and (4) Strengthening National Resilience and Governance. ● Indonesia has priority areas ● national plan which has been planned in the RPJMN, Making Indonesia 4.0 Roadmap, and National Research Master Plan; ● The SPBE program needs AI to help the government make the right policies; ● There is a growing need for ASN who are experts in AI to support industry 4.0; ● The discourse on the need to move	● The world is currently facing the VUCA Era (volatility, uncertainty, complexity and ambiguity); ● Indonesia's digital market is dominated by imported technology; ● Decline in public trust in the products created by the nation's children; ● Misuse of technology that is detrimental to society; ● Misuse of privacy data that escapes scrutiny; ● Legislation that is inconsistent in its implementation; ● AI disruption that causes workforce shifting failure.

to the country's new capital city has the criteria of smart, beautiful and sustainable, as well as modern international standards with efficient and effective government governance.	

Based on the results of SWOT 4 (four) focus areas, strategies can be determined into strategic priority areas for realizing smart government. Furthermore, in Al-Besher's Smart Government Strategy Framework, there are 8 (eight) domains that must be considered to realize smart government, namely: Smart Healthcare, Transportation, Security and Privacy, Sustainable Energy, Smart Education, Industry 4.0, Business Trade and Social-Media.

3. Artificial Intelligence Strategy to Realize Smart Government

Based on the results of the SWOT analysis, the Working Group for Preparing a National Strategy for Artificial Intelligence formed by BPPT has determined a strategy for implementing AI in Indonesia in 2020-2045 (BPPT, 2020). So the researchers mapped the strategy into four main focuses to realize the Smart Government Domain based on Al-Besher's Smart Government Strategy Framework, namely: 1. IoT Enable System Strategy; 2. AI Principles/Regulation/IoT Principle Strategy; 3. Shareholder Strategy; and 4. Smart Government Domain as follows:

a. IoT Enable System Strategy
   1). Building cloud computing network infrastructure and providing unique Indonesian public datasets to support the productivity of the national AI innovation ecosystem;
   2). Building cloud computing network infrastructure and providing public datasets from the Satu Data Indonesia data center for AI research;
   3). Improving the One Data Indonesia implementation system that overcomes silo attitudes and sectoral egos of data owners;
   4). Maximizing the use of cloud computing technology for equitable development and utilization of AI in all priority national development sectors;
   5). Taking advantage of Indonesia's large population of Internet users as the largest digital economy market in Southeast Asia for Indonesian start-up companies;
   6). Improving government digital datasets for study and analysis of strategic planning for implementing AI for electronic-based government systems and the country's new capital;
   7). Preparing infrastructure to face shifts in employment opportunities due to the presence of Al.

b. Strategy AI Principles/Regulation/IoT Principle
   1). Develop institutional policies that orchestrate the national AI innovation ecosystem;
   2). Establish a National Data and Artificial Intelligence Ethics Council to create data sharing regulations and monitor their use;
   3). Prepare an ethical policy for the use and development of AI, especially in priority areas of AI technology;
   4). Create guidelines and policies for the use and application of AI for electronic-based government systems;
   5). Prepare national standards to support products and systems produced by the national AI innovation ecosystem orchestra;
   6). Create a policy that prioritizes products made by the nation's children in government procurement to reduce dependence on imported products, as well as to increase TKDN;
   7). Provide competitive AI HR awards with better salary levels in the country;
   8). Political will from the executive and legislative in implementing and supervising the regulations that have been established;
   9). Prepare policies to deal with shifts in employment due to the presence of Al;
   10). Taking advantage of the number of young people who are interested in the field of AI to develop superior and ready-to-use Indonesian AI talents through an effective education system, in order to make the Indonesian Industrial Roadmap (Making Indonesia 4.0) a success;
   11). Recruit AI talents for skilled workers who will develop and operate AI in national priority sectors;
   12). Prepare technology education systems and programs for AI in all formal and non-formal educational institutions to produce many Indonesian AI talents who are competitive as workers, researchers and entrepreneurs, starting from elementary school level;
   13). Provide greater incentives and investment in innovation research in AI priority areas.

c. Strategy of Shareholder
   1). Develop technical guidelines for the realization of a national AI innovation ecosystem (triple, quadruple, penta helix) that effectively links and matches all stakeholders (government, industry, universities/research institutions, and society);
   2). Increase investment, both from industry and government, to accelerate the growth of innovation that can be absorbed by industry and the public sector;
   3). Increasing incentives for research and development of new technological innovations originating from collaboration between industry and universities/research institutions;

4). Increasing the quality and quantity of innovative products that can be absorbed by the Indonesian digital market through the incubation process and product dissemination to the public.

d. Smart Government Domain

Based on the Al-Besher Smart Government Framework, after 3 (three) main aspects are fulfilled, namely the IoT Enable System Strategy, the AI Principles/Regulation/IoT Principle Strategy and the Shareholder Strategy, you can realize the Smart Government Domain which consists of 8 (eight) fields, namely : Smart Healthcare, Transportation, Security and Privacy, Sustainable Energy, Smart Education, Industry 4.0, Business Trade and Social Media.

The Indonesian government has determined 5 (five) priority areas for Indonesian National Artificial Intelligence 2020-2045, namely: Health services, Bureaucratic Reform, Education & Research, Food Security, and Mobility & Smart Cities (BPPT, 2020). According to researchers, these five fields have fulfilled 8 fields to realize Smart Government Al-Besher. However, the aim of using AI in the Smart Government Domain is to improve services, efficiency and quality of life for citizens while protecting data, security and privacy. It also combines partnerships of the commercial sector, civil society, and the education sector to build and govern smart cities and countries.

Therefore, the Indonesian Government must be forced to create a platform that accommodates these five priority areas to realize Smart Government using AI. Just as Finland created the Silo AI platform, Indonesia must also be forced to develop an e-Government platform, namely SuperApps, which can integrate various services in one application. The discourse for developing SuperApps was conveyed by the Minister of Communication and Information in 2022 (Rachman, 2022). This needs to be supported because with SuperApps various government business processes and services must of course be reorganized, especially the One Data Indonesia infrastructure by preparing machine learning and AI technology which will be used for big data analytics as a basis for various decision making needs and development policies.

SuperApps can be created like LifeSG in Singapore which provides various integrated online public services in one hand effectively and efficiently. On the other hand, work in the bureaucracy will also become more flexible with quality assurance based on an integrated and standardized system (Prasojo, 2023: 184). According to Utomo, Andrian, & Wills (2023), developing an AI framework for Smart Government can be identified in four ways, namely AI factors for e-Government, IoT, Big Data and Open Data. Thus, SuperApps is a product that integrates 5 priority areas in the Smart Government Domain to realize Smart Government in Indonesia.

4. Administrative Reform to support the realization of Smart Government

The current change towards Smart Government has forced a complete transformation of the bureaucracy to provide services to the community and open up investment. The current conditions in Indonesia are basically still at governance

level 1.0, which is characterized by a very high political orientation, overlapping various programs, various manual and fragmented business processes. Meanwhile, the world has forced developments in the public sector towards governance 4.0 by implementing e-Government 3.0. So the Artificial Intelligence Strategy to realize Smart Government will not be realized if the government does not carry out administrative reform to carry out a strategy to change the governance structure in the bureaucracy.

So the Indonesian government must force various efforts to change statutory regulations, changes in organizational structure and government business processes, changes in culture and mental attitudes, as well as changes in the competency of ASN employees to realize a digital transformation of a bureaucracy that is flatter and more agile based on performance which will then provide services. an increasingly fast, transparent, accountable and innovative public based on technology (Prasojo, 2023: 202).

According to Prasojo, the steps for change are as follows: First, form an autonomous organization that can orchestrate the AI national strategy collaboration ecosystem. Currently there are 11 Ministries/Institutions (K/L) that have overlapping authority in implementing the national AI strategy in Indonesia (BPPT, 2020). The large number of ministries/institutions involved will increasingly result in silo mentality and sectoral egos. In government organizations, sectoral egos and silo mentality have the potential to be counterproductive to strategies for achieving organizational targets and goals (Sudewo, 2021). According to Aggarwal & Sindakis (2022), the Quadruple Helix innovation model can integrate overlapping processes by using knowledge and technology to form an aggregate output that is invested in producing more service products, innovation and technology.

Like what Singapore did with the Public Service Commission (PSC) and Finland with FAIA, BPPT proposes to form an Artificial Intelligence Industrial Research and Innovation Collaboration team (KORI-KA) consisting of Government, Industry, Community and Academia, which is something that needs to be supported. KORI-KA is tasked with providing direction from the governance mechanisms of strategy implementing organizations and carrying out execution and supervision of 5 national strategic priority programs, namely health services, bureaucratic reform, education & research, food security and mobility & smart cities (BPPT, 2020). The existence of KORI-KA will be essential to ensure that industrial research and innovation initiative programs run well and sustainably so that they need to be realized in the context of quick wins.

Second, increasing the competency of ASN employees. Bureaucratic rigidity causes the decision-making process for public services to take a long time due to silo mentality and sectoral egos. So there are 2 important things, namely: 1. The bureaucratic simplification that has been carried out by the government at this time is appropriate and must be continued by strengthening the competency of functional officials to carry out their duties and functions well; and 2. Strengthening the Merit

System based on qualifications, competencies and performance to build and produce ASN capable of AI technology.

This strategy has been successful in Singapore which emphasizes the principle of meritocracy (focusing on qualifications, performance and potential) and the importance of efficiency and competitiveness in terms of recruitment and promotion of public services in 15 ministries and 62 statutory bodies in Singapore, which are important units of public administration overall in Singapore (Quah, 1996). So that recruitment of human resources in Singapore (especially in the IT sector) is carried out based on a merit system and the result is that Singapore has human resources who are reliable and competent in their fields (Rahman, Satispi, & Adiyasha, 2020). Meanwhile, Finland succeeded in carrying out bureaucratic reform in 2012 by creating a modern organizational structure that can eliminate silo systems and sectoral egos and improve public service performance (Mukhtar, 2015).

Third, build collaborative governance led by aspirational leaders. Some collaborative efforts focus on system change, for example changing existing structures, creating new relationships, increasing client access to better services (Liu & Zheng, 2018). According to (Fitrianingrum, 2020) aspirational leadership also encourages successful collaborative work patterns. The model that is often used for collaboration is the pentahelix. Pentahelix Collaboration is a collaborative activity consisting of academics, the business/corporate world, society, government and media. First, academics as a source of knowledge/research. Second, self-confidence ta as an entity that carries out business processes in creating added value and realizing sustainable development. Third, society acts as an intermediary between interest groups and society itself. Fourth, the government as one of the policy formulators and implementers has responsibilities ranging from planning to evaluation. Fifth, the media acts as a supporter of the publication and socialization process to the public (Sari et al., 2022; Yunas, Wahyuningsih, & Jatmiko (2021). So the collaborative results created from this pentahelix model have facilitated the public's desires in a participatory manner.

And fourth, form bureaucratic digital transformation regulations. According to Prasojo (2023:202), the Government really needs to establish a Digital Government Law to force changes to various statutory regulations and other structural obstacles that are not in accordance with the philosophy and basic elements of digital bureaucracy. This law will relate to data integration between government agencies (SDI), structuring business processes within agencies and across agencies, various shared infrastructure and applications used nationally, collaboration and virtual work, increasing HR capacity and of course community involvement.

E. CONCLUSION

The application and use of technology in the field of AI is currently needed by Indonesia. This is to answer various challenges, problems and changes in realizing a new, agile, effective and efficient governance system. For this reason, starting from the results of the SWOT analysis and also the AI smart government strategy

framework from Al-Besher, it was concluded that the Indonesian Government must make AI strategy efforts in the aspects of IoT Enable System, AI Principles/Regulation/IoT Principle, and Shareholders form a Smart Government Domain which contains 5 (five) Priority Fields for Artificial Intelligence for 2020-2045 and packaged on the Smart Government SuperApps platform. In order to realize this AI strategy, the Indonesian Government must also make various changes to administrative reform, namely forming the autonomous organization KORI-KA, increasing ASN competency by strengthening the meritocracy system, building collaborative governance by involving government, academics, society, the private sector and the media; as well as establishing a bureaucratic digital transformation law. By establishing the four main administrative reform agendas, researchers hope that Indonesia can realize smart government in the field of AI towards a Golden Indonesia 2045.

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