AI Perspective as an Instrument for Optimizing BUMN Board of Directors' Decision Making to Increase Revenue and Build the State Economy

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Abstract: This paper examines the strategic role of artificial intelligence (AI) as an instrument for optimizing decision-making by the board of directors in Indonesian State-Owned Enterprises (BUMN), with the aim of increasing revenue and building the national economy. The study highlights the significant contribution of BUMN to Indonesia's economic growth, as reflected in rising dividends and profits, and explores the necessity for ongoing transformation to remain competitive in a dynamic environment. The research discusses the establishment of the Daya Anagata Nusantara Investment Management Agency (Danantara) to optimize state assets and strengthen BUMN management, drawing comparative lessons from international sovereign wealth funds such as Temasek, GPFG, and CIC. The analysis emphasizes the importance of robust governance, transparency, and risk management in business decisions, referencing legal frameworks and the business judgment rule doctrine. The paper further explores the integration of AI technologies—such as machine learning, deep learning, and neural networks—within BUMN operations to support efficient, data-driven decision-making, process automation, and resource optimization. The findings suggest that leveraging AI, supported by ethical and regulatory compliance, can enhance operational efficiency, mitigate risks, and foster innovation, thereby positioning BUMN as a key accelerator of Indonesia's economic development.

Keywords: State-Owned Enterprises (BUMN), Artificial Intelligence, Decision-Making, Business Strategy, Economic Development, Indonesia, Governance, Risk Management, Danantara, Digital Transformation

INTRODUCTION

The Ministry of State-Owned Enterprises (Ministry of SOEs) has realized a dividend deposit of IDR 82.1 trillion to the state treasury throughout 2023, an increase of 102.1% (one hundred and two point one percent) compared to 2022. The increase is also indicated by data on SOE dividend deposits in 2024, which reached IDR 85.5 trillion (CNBC Indonesia, 2024). The dividend deposit is the largest in the last four years. Then, the profit of State-Owned Enterprises (SOEs) continues to increase from year to year, where from 2020 to 2023 it increased by 2,415% (two thousand four hundred and fifteen percent) (Kompas, 2024). A more

optimal transformation of SOEs will have a major impact on increasing the contribution of SOEs to the state through dividends, taxes, and non-tax state revenues. In this case, the existence of SOEs is a consequence of the welfare state ideology adopted by Indonesia. The characteristics of a welfare state are the government's participation in all sectors of people's lives including the economic sector of society (Sumiyati, 2013).

The contribution of BUMN to the national economy is reflected through operational and capital expenditure. These expenditures contribute to national economic growth in terms of consumption and investment which will increase demand and encourage national economic turnover (Sasongko, 2024). BUMN has a significant role and function in maintaining economic stability in the country and can influence the government in determining policies within the scope of state politics. Based on this, the background and development of BUMN cannot be separated from the rules and policies made and implemented by the government (Hartini, 2017). Thus, BUMN has a vital influence in encouraging the implementation of domestic development, one of which is in the economic sector.

Indonesia is currently intensively making efforts to increase economic growth towards the vision of Indonesia Emas 2045. To support this goal, one of the government's steps is to formalize the establishment of the Daya Anagata Nusantara Investment Management Agency ("Danantara") as an entity that is expected to function to optimize state assets to accelerate economic development, attract strategic investment, and strengthen Indonesia's position in the global value chain (Solihin et al, 2025). Danantara manages BUMN. Based on Law of the Republic of Indonesia Number 19 of 2003 concerning State-Owned Enterprises as last amended by Law of the Republic of Indonesia Number 1 of 2025 (BUMN Law), Danantara aims to increase and optimize BUMN investment and operations and other sources of funds and is tasked with managing BUMN.

Given the important role of BUMN in increasing revenue and developing the country's economy and a series of government efforts to boost economic growth, BUMN must continue to transform in the future, including by using artificial intelligence (AI) technology instruments in their operations. In Indonesia today, AI has been used in several agencies and institutions that aim to reduce time and operational costs, including the Ministry of Health which is developing an AI-based platform for early detection of diseases and digital medical records (Indonesia.go.id, 2025). Then, the Ministry of Education is also developing an AI curriculum and generative AI for efficiency (Tempo, 2025). Furthermore, the Directorate General of Taxes of the Ministry of Finance has also implemented AI in a chatbot for taxpayers to obtain more practical and faster tax information and services (Komdigi, 2024). In addition to the above agencies, the use of AI in the bureaucracy and public service sectors will be increasingly massive considering that this is a strategic program initiated by the government.

METHOD

If AI is used in BUMN operations, AI is useful for supporting efficient and data-based decision-making with a series of analyses, process automation, and optimization of resource allocation. Furthermore, the use of AI in BUMN business decision-making is expected to increase operational efficiency by reducing complicated bureaucracy. This is relevant to the government's demands for BUMN to act as a development agent as well as a profit-oriented and highly competitive corporation, especially amidst global dynamics and increasingly tight market competition. Based on the above, the perspective of AI as an instrument for optimizing BUMN directors' decision-making will be discussed further to increase revenue and build the country's economy.

RESULT AND DISCUSSION

Strategic Role and Aspects that Need to be Considered in Decision Making by BUMN Directors to Strengthen BUMN as an Accelerator of Economic Growth

BUMN is a business entity whose capital is wholly or mostly owned by the state through direct participation or if there are special state rights. As a business entity, BUMN certainly aims to obtain profits or benefits that can be given to the state. BUMN has an essential role in organizing the national economy in order to realize the welfare of the community (Suhayati, 2011). However, there are still opinions and assumptions that BUMN in general has not been maximized and in accordance with expectations to obtain profits and become a pillar of the national economy and a form of contribution from development agents to achieve proportional and equitable improvements in people's welfare (Suhayati, 2011).

This welfare is important considering the characterization of Indonesia as a welfare state where there is an obligation for the government to realize general welfare for its citizens (Syahnaz, 2021). One of them is through its instrument, namely BUMN. At the legal level, the Constitutional Court ("MK") through MK Decision Number 48 and Number 62/PUU-XI/2013 has determined that BUMN is an extension of the state and therefore provides an interpretation of the possibility of broad state intervention in BUMN. Meanwhile, at the political economy level, it is no secret that BUMN is used as a "cash cow" for the economic interests of political power (Arifardhani, 2019).

To achieve this goal, the board of directors as a company organ, based on Article 13 of the BUMN Law, plays a central role in managing BUMN. Then, based on Article 5 paragraphs (2) and (3) of the BUMN Law, the board of directors is fully responsible for managing BUMN for the interests and objectives of BUMN and representing BUMN, both inside and outside the court, and in conducting its duties, the board of directors is required to comply with the provisions of the BUMN articles of association and laws and regulations by always implementing the principles of professionalism, accountability, transparency, and fairness.

BUMN directors to realize optimal and transformative BUMN management are required to carry out a series of innovations and maximize all business opportunities that can be carried out by BUMN. However, making business decisions is also regulated in Article 19 of the BUMN Law. As a director of a company, in addition to having to pay attention to the provisions regarding directors in the BUMN Law, he must also pay attention to the provisions regarding directors contained in Law Number 40 of 2007 concerning Limited Liability Companies as last amended by Government Regulation instead of Law Number 2 of 2022 (PT Law). Several provisions that need to be observed in this case include the provisions in Article 92 paragraph (1) and Article 97 paragraph (5) of the PT Law, which in essence state that directors carry out management for the benefit of the company by the intent and purpose of the company and directors cannot be held responsible for company losses if they can prove, among other things, that the loss was not due to their fault or negligence and that they had carried out management in good faith and with caution.

Article 97 paragraph (5) of Law No. 40/2007 above is known as the business judgment rule doctrine. The business judgment rule is a doctrine where the company's directors cannot be legally held responsible for decisions taken even if the decision causes losses to the company, as long as the decision is made in good faith, in the right way, with a rational basis and carried out with full caution (Harahap, 2009). A decision made by the board of directors should be tolerated by law and the judge should not doubt the business decisions of the directors, according to the theory of the business judgment rule, provided that it has been carried out in good faith and caution.

Thus, the alleged loss should be assessed after operations are running and reflected in the financial statements, both from profits and increased assets so it is not right to immediately conclude that the directors of BUMN have harmed the company, let alone the state. As long as

the directors of BUMN do not commit criminal acts such as bribery or extortion, the losses arising from business decisions must be viewed as losses to the company, not as losses to the state. If the directors act outside the provisions of the articles of association and cause losses, sanctions can be imposed. However, these sanctions do not necessarily have to be criminal in nature but can be in the form of administrative or personnel sanctions, according to the level of violation that occurs.

In practice, there are several legal cases involving directors as BUMN organs. In 2012, PT Pertamina (Persero) procured liquefied natural gas (LNG) to overcome the gas deficit from 2009 to 2040, including meeting the needs of PT Perusahaan Listrik Negara (Persero) (PLN) and other industries. The President Director of PT Pertamina (Persero) for the 2009-2014 period collaborated with foreign producers such as Corpus Christi Liquefaction (CCL) LLC of the United States but allegedly made contracts and studies unilaterally without the approval of the board of commissioners. As a result, all LNG cargo was not absorbed into the domestic market, there was over-supply, and it did not enter Indonesia (Nugroho, 2024).

The next case is the alleged corruption case of PT Pertamina Gas Negara Tbk (PGN) with gas buying and selling process between PGN and a company with the initials PT IG in 2018-2020. The alleged corruption at PGN is estimated to have caused state losses of up to hundreds of billions of rupiah. The Corruption Eradication Commission (KPK) announced an investigation into the corruption case at PGN in the 2018-2020 budget year. This investigation is based on the results of an audit by the Supreme Audit Agency (BPK) which found irregularities in PGN projects.

Therefore, BUMN directors in making decisions need to consider all aspects and carry out risk management. Risk is defined as the chance of an undesirable outcome occurring so risk is only related to situations that allow negative outcomes and is related to the ability to predict negative outcomes (Knight, 1921). For these things, risk management can be carried out as an effort to map the possibilities of risks and how to anticipate and reduce these risks. Risk is divided into several, namely product risk, market risk, financial risk, operational risk, and legal risk (Fauzi et al, 2022).

Furthermore, for BUMN directors themselves in deciding, they must base their decisions on the theory of good decision-making. Decision-making theory is a science that studies how to choose the right alternative and will be used as a decision and is related to a person's behavior in deciding something (Amalia & Firmadhani, 2022). Decision-making theory can be applied in conditions of certainty, uncertainty, or risk (Febriansah & Meiliza, 2020). According to Herbert Simon, the decision-making process consists of three stages, the first is the intelligence phase, which is the information search phase for possible conditions to make decisions. Decision-making theory is an alternative that is chosen then decided and implemented, so it is an activity of choosing a particular action or alternative from various possibilities that can be done (Pasolong, 2023).

Based on the data, at the end of 2024, there were 65 (sixty-five) BUMNs operating in all sectors (Market Bisnis, 2024). The amount of BUMN dividend payments in 2024 reached IDR 85.5 trillion as described above, of course, it can increase even more. Then, the government gave a target of achieving potential BUMN dividends of IDR 300 trillion (Market Bisnis, 2025). Based on this significant amount, if the decisions of the directors of each BUMN are based on comprehensive data and analysis by carrying out optimal risk management, of course, it will impact the increasing potential profitability that will be obtained by BUMN. In addition, the speed and accuracy as well as effective and efficient business decisions by the principles of good corporate governance, including the prevention of misappropriation and other fraudulent behavior, will further encourage the ideal transformation of BUMN as an accelerator of economic growth in Indonesia.

Establishment of Danantara to Strengthen and Optimize BUMN Management

Indonesia is currently intensively making efforts to increase economic growth towards the vision of Indonesia Emas 2045. To support this goal, one of the government's steps is to formalize the establishment of the Daya Anagata Nusantara Investment Management Agency (Danantara) as an entity that is expected to function to optimize state assets to accelerate economic development, attract strategic investment, and strengthen Indonesia's position in the world (Solihin et al, 2025). Danantara manages BUMN. Based on the BUMN Law, Danantara aims to increase and optimize BUMN investment and operations and other sources of funds and is tasked with managing BUMN. In the theory of economic analysis of law by Richard A. Posner, the law should operate efficiently, therefore an evaluation is needed of the legal rules that apply in society that emphasize the principle of benefit. The principle of benefit is a very important principle in the issuance of a policy or law which is usually manifested in the form of legislation (Butarbutar et al, 2023).

From the theoretical perspective above, the regulation regarding the establishment of Danantara in the BUMN Law can be understood as a legal step to increase economic efficiency and public benefits through more optimal management of BUMN. In Article 3H Jo. Article 3I Jo. Article 3J of the BUMN Law, Danantara as a legal entity fully owned by the government has broad authority to manage dividends, investments, assets, and the formation of holdings, which are directed at maximizing the economic value and profitability of BUMN. The existence of the above authority reflects efforts to encourage adaptive and innovative business decision-making while maintaining the principles of good governance, transparency, and accountability.

In addition, in carrying out its functions, Danantara is also strengthened by provisions regarding sources of capital originating from state capital participation or other sources, with a minimum capital of IDR 1,000 trillion. This law also regulates the mechanism of cooperation between Danantara and third parties through management powers or other forms of cooperation to increase asset value. All asset management is carried out based on the principles of good corporate governance, accountability, and transparency, and is protected by the prohibition on confiscation of assets that are not pledged. If implemented properly, Danantara can increase efficiency, and transformation, and maximize profits obtained by BUMN.

One of the benchmarks of Danantara's formation is Temasek Holdings (Temasek), an investment super holding owned by Singapore. Temasek's reputation is built through careful investment decisions and stable corporate governance, where its organizational structure is designed to separate ownership and management of state assets to ensure autonomy in investment decision-making (Puchniak et al, 2017). Temasek has proven itself successful with a portfolio worth more than S$389 billion with a basic exposure of 64% (sixty-four percent) as of March 2024 to developed countries (Temasek Holdings, 2025). The findings show that Temasek's success is due to its long-term focus and efficiency in business decisions while running its subsidiaries, which contribute to its success and growth (Tagliani, 2021).

In addition to Temasek, for comparison, Norway through the Government Pension Fund Global (GPFG) is considered to be one of the best examples of a successful sovereign wealth fund (SWF). The success of GPFG depends on a strict supervision system, high transparency, and independence with its operational management carried out by Norges Bank Investment Management which is separate from the Norwegian Ministry of Finance (Gunawan et al, 2023). Another comparison is China Investment Corporation (CIC) owned by China as a successful SWF in the world which has managed assets worth more than $ 1,300 billion since its establishment in 2007. CIC is an SWF established to manage part of the country's foreign exchange reserves and diversify global investments with characteristics that reflect the Chinese economic model through close links to government policies and its role in supporting its strategic investment objectives with China's national interests (Dixon, 2019).

Based on the successful examples above, Danantara is expected to make the best efforts, such as making the right and efficient business decisions and taking advantage of all existing investment opportunities. Furthermore, Danantara can evaluate from the example of a similar failed institution, namely 1 Malaysia Development Berhad (1MDB) which experienced a major failure due to a corruption scandal, large debts, and political intervention. Corruption in 1MDB was widespread due to ineffective investment strategies, and political interference to thwart law enforcement against corruptors serving in 1MDB organs (Md. Ali, 2023). Political intervention and inappropriate business decisions ultimately eroded 1MDB further, such as embezzlement and laundering of funds from companies affiliated with and controlled by parties and politicians, to the point that in its biggest fraud, Malaysian Prime Minister Najib Razak together with his business partners raked in more than RM40 billion through embezzlement, money laundering, and fraud (Md. Ali, 2023). In 2016, the Auditor General issued a report highlighting irregularities in 1MDB, but the investigation team was hampered by a lack of cooperation from the bureaucracy, including not being allowed to audit important documents and access to 1MDB computers and servers (Md. Ali, 2023).

Through a comparison between Temasek, GPFG, CIC, and 1MDB, it can be concluded that the optimization of Danantara as a BUMN manager is largely determined by the effectiveness of business decision-making supported by a prevention system against irregular activities that have the potential to cause fraud, embezzlement, corruption, or other forms of deviation. The success of Temasek, GPFG, and CIC reflects the importance of strong governance, transparency, independence, and a clear separation between political interests and professionalism.

Use of AI as an Instrument for Optimizing BUMN Board of Directors' Business Decisions
Concept and Purpose of Using AI

The classic definition of AI comes from 1955 by John McCarthy, an American computer scientist and cognitive scientist, and his colleagues who described AI as "making a machine behave in ways that would be called intelligent if a human were so behaving." Furthermore, Florini and Cowls view AI as "a growing resource of interactive, autonomous, and often self-learning agency (in the machine learning sense...), that can deal with tasks that would otherwise require human intelligence and intervention to be performed successfully." (De Spiegeleire et al, 2017). Referring to the two definitions, it can be understood that AI is a technology that allows machines to act independently, interact, and even learn on their own, to complete tasks that usually require human intelligence and intervention to be successful.

AI can learn depending on the type of AI system and how the system is designed. In general, AI learning can be divided into 3 (three) main types, namely machine learning, deep learning, and neural networks, with further descriptions as follows: (Haleem et al, 2022)

a. Machine Learning
   Machine learning is a learning process similar to the way humans learn, where AI systems collect data from the environment, form knowledge, and become more efficient at solving problems over time by recognizing patterns and forming algorithms to respond to situations, and is often used in internet search engines, traffic simulations, statistics, and AI system design, and is classified as a weak AI system.

b. Deep Learning
   Deep learning is a learning process similar to machine learning but involves the formation of neural networks by AI, requires human assistance as an example of problem-solving, is used in layered learning to handle complex problems, extracts data to create different levels of learning, and is applied in various systems such as

speech recognition, image recognition, drug testing, toxicology analysis, and recommendation and security systems such as dangerous person facial recognition.

c. Neural Networks

Neuron networks are similar to the human brain because they consist of several interconnected elements and allow AI to learn from examples, with each node having a specific task to achieve the desired result, and are used to monitor and optimize complex systems and processes, able to adapt to the environment through data enhancement, useful in solving non-linear problems through in-depth analysis, very relevant in the era of industry 4.0 and big data because they can store and utilize large amounts of data and are often used in decision making and the development of strong artificial intelligence because the learning process resembles the way humans form knowledge based on data and experience.

AI has several advantages over natural human intelligence, namely the following: (Pasaribu, 2022)

a. AI provides information that has been stored permanently but can grow with new information, while human nature is forgetful so that information can be lost or humans are conservative so that they are satisfied with what they have and do not care about new information;

b. AI is easier to duplicate and spread in the process of moving from one computer to another, while transferring knowledge from one person to another usually requires a long process and cannot be guaranteed to be accurate;

c. AI has a stable nature because it is part of computer technology, while human intelligence tends to be inconsistent because it is influenced by feelings and emotional conditions, especially when facing pressure; and

d. AI can complete tasks with better speed and quality than humans who often need preparation time.

Perspective of AI Use in Decision-Making

In Indonesia, AI has been used by several agencies and institutions, including the Ministry of Health which is developing an AI-based platform, the Ministry of Education which is developing an AI curriculum and the use of generative AI for efficiency, and the Ministry of Finance which has also implemented AI in chatbots for taxpayers to obtain more practical and faster tax information and services. However, several provisions must be met in using AI instruments in Indonesia, one of which is Law Number 11 of 2008 concerning Electronic Information and Transactions as last amended by Law Number 1 of 2024 ("Law No. 11/2008"). Although Law No. 11/2008 does not directly provide an explicit definition of the implementation of AI. However, Law No. 11/2008 contains a definition of an electronic agent, which is interpreted as: "a device from an electronic system operated by a person and made to automatically act on certain electronic information." Implementing regulations of Law No. 11/2008, namely, Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions (PP No. 71/2019), establishes general principles that must be adhered to by AI service providers, namely: (a) the principle of prudence, (b) security and integration of information technology systems; (c) security control over electronic transaction activities; (d) cost efficiency and effectiveness; and (e) consumer protection by applicable laws and regulations.

Based on number 6 letter b of the Circular Letter of the Minister of Communication and Information Technology Number 9 of 2023 concerning Artificial Intelligence Ethics (SE No. 9/2023), there are ethical requirements that must be met by business actors and electronic system providers in carrying out AI-based programming efforts including (i) inclusivity; (ii)

humanity; (iii) security; (iv) accessibility; (v) transparency; (vi) credibility and accountability; (vii) protection of personal data; (viii) sustainable environmental development; and (ix) intellectual property.

Then, in the scope of AI regulation on an international scale, there is the EU Artificial Intelligence Act ("EU AI Act") which aims to ensure that AI development is in line with the values of safety, transparency, and human rights, while encouraging innovation. Referring to Article 2 of the EU AI Act, the EU AI Act in the European Union applies to all parties that develop, distribute, import or use AI systems in the European Union, including business actors outside the EU if their AI systems are used or marketed within the EU. In its provisions, the EU AI Act sets out 4 (four) levels of risk for AI systems, namely (i) unacceptable risk; (ii) high risk; (iii) limited risk; and (iv) low risk. Furthermore, referring to Annex III of the EU AI Act, there are 8 (eight) areas of AI use, including (i) as a component of employment management; and (ii) as access to private essential benefit services. Concerning the implementation of the EU AI Act above, currently around 40% of large companies in the Netherlands have implemented AI systems in the workplace, and more than 75% of companies in the Netherlands are expected to use AI applications in the next 5 (five) years. The use encourages automation in workforce management, known as algorithmic management. Although work and production optimization models have been used for a long time, many companies in the Netherlands have now succeeded in increasing employee efficiency through the use of data and AI systems, especially for the recruitment, selection, and decision-making processes related to the workforce, which refers to the EU AI Act (DCA, 2024).

Use of AI as an Instrument for Optimizing BUMN Board of Directors' Business Decisions

About the role of BUMN in increasing revenue and developing the country's economy as well as a series of government efforts to boost economic growth, BUMN must use AI instruments to support efficient and data-based decision-making with a series of analyses, process automation, and optimization of resource allocation. Referring to the economic analysis of law approach by Richard Posner, it is explained that economics is a science chosen by rational actors who have a self-interest in a world where resources are limited; modern microeconomic analysis is that rational actors will try to maximize their wealth from the limited resources available (Pi & Parisi, 2023). Furthermore, Richard Posner explained that to realize justice during legal problems, in the economic analysis of law, law is used as an economic tool to achieve maximization of happiness. However, the approach and use of the economic analysis of law must be formulated with economic considerations without eliminating the element of justice, so that justice can become an economic standard based on value, utility, and efficiency based on human rationality (Pi & Parisi, 2023). Based on Richard Posner's economic analysis of law, the use of AI instruments for BUMN is a strategic step that is in line with the principles of efficiency, utility, and rationality in economic decision-making.

Within the framework of Richard Posner's economic analysis of law, BUMN as a state economic entity is required to act rationally and efficiently to maximize the value of public wealth and welfare. Therefore, AI instruments allow BUMN to optimize resource allocation, accelerate the decision-making process, and minimize bureaucratic risks and inefficiencies that have been obstacles to corporate governance. This has proven to be an indicator of the success of Temasek, GPFG, and CIC which have strong governance, transparency, independence, and a clear separation between political interests and professionalism in management. In addition, the fact is that around 40% of large companies in the Netherlands have implemented AI systems and have succeeded in increasing employee efficiency through the use of data and AI systems, especially for the recruitment, selection, and decision-making processes related to the workforce (DCA, 2024).

CONCLUSION

In practice, AI as an instrument that can be used in the form of machine learning, deep learning, and neural networks, namely (i) machine learning in the context of BUMN can be used to analyze market trends, optimize supply chains, and project operational needs based on historical data—driving cost efficiency and improving services; (ii) deep learning as a form of in-depth learning, is very effective in handling complex and dynamic problems so that this system is very appropriate for use by BUMN to handle needs such as facial recognition in security systems, anomaly detection in financial reports, or risk analysis in large projects; (iii) neural networks are very relevant for BUMN operating in complex sectors such as energy, infrastructure, and transportation, where AI systems can monitor and optimize processes in real-time. However, of course, the use of AI as an instrument above must be based on the ethics of use and laws and regulations in Indonesia so that there is accessibility, transparency, and credibility.

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