International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)

International Journal of Economics, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS Journal) | ISSN(e): 2808-4713
Volumes 5 No. 6 (2025)

INTEGRATION OF RESOURCE-BASED VIEW AND DIGITAL ECOSYSTEM CAPABILITY FOR SUSTAINABLE COMPETITIVE ADVANTAGE IN THE ERA OF ARTIFICIAL INTELLIGENCE: A STUDY ON PT KAWASAN INDUSTRI NUSANTARA (KINRA)

Asmaul Husna
Politeknik LP3I Medan
Email: husna.nana2891@gmail.com

Received	: 01 October 2025	Published	: 28 November 2025
Revised	: 10 October 2025	DOI	: https://doi.org/10.54443/ijebas.v5i6.4561
Accepted	: 08 November 2025	Link Publish	: https://radjapublika.com/index.php/IJEBAS

Abstract

Special Economic Zones (SEZs) are important instruments for driving economic growth and industrialization, particularly in developing countries. The Sei Mangkei SEZ in Indonesia serves as a concrete example of the potential of SEZs in enhancing regional economic development. This study aims to determine how PT Kawasan Industri Nusantara (KINRA), as the manager of the Sei Mangkei SEZ, utilizes internal resources through a Resource-Based View (RBV) perspective, manages digital ecosystem capabilities, and leverages Artificial Intelligence (AI) capabilities to achieve Sustainable Competitive Advantage (SCA). A quantitative approach with a total sample of 125 employees was used, through a closed-ended questionnaire analyzed using PLS-SEM. The results show that RBV has a significant effect on SCA, emphasizing the importance of human resource competencies, technology, and infrastructure as the main foundation. Digital ecosystem capabilities have a positive, but insignificant, effect, indicating the need for stronger integration and collaboration between tenants, investors, and stakeholders. AI capabilities act as a moderating variable that strengthens the influence of RBV and digital ecosystem capabilities on SCA. These findings confirm that the integration of internal resources, the digital ecosystem, and AI technology can improve operational efficiency, innovation, market responsiveness, differentiation, and sustainable value creation in the Sei Mangkei Special Economic Zone (SEZ). This study recommends optimizing internal resources, strengthening the digital ecosystem, and strategically implementing AI for operational efficiency, industrial data management, and analytics-based decision-making. This integrative approach is expected to support the Sei Mangkei Special Economic Zone (SEZ) in maintaining long-term competitiveness, promoting inclusive growth, and creating sustainable economic value for the community and stakeholders.

Keywords:SEZ Sei Mangkei, Resource-Based View (RBV), digital ecosystem capabilities, Artificial Intelligence (AI), Sustainable Competitive Advantage (SCA)

Introduction

Special Economic Zones (SEZs) are a crucial instrument for driving economic growth and industrialization in many developing countries. In Africa, SEZs with clear strategies and inter-agency collaboration have been able to attract investment and create jobs. SEZs that are closely linked to local economies and capitalize on comparative advantages such as natural resources and agriculture have demonstrated positive results.(Danja & Wang, 2024; Rodríguez-Pose et al., 2022; Simo, 2023)In China, SEZs in coastal areas have successfully attracted foreign investment and driven economic prosperity through free market principles.(Chen et al., 2022; Crane et al., 2018; Lu, 2022; Moberg, 2015; Wan et al., 2014)In the Dominican Republic, SEZ policy reforms in accordance with World Trade Organization (WTO) rules have increased the attractiveness for exporters and investors.(Defever et al., 2019)Remote sensing technology and machine learning algorithms in Myanmar are helping monitor the environmental impact of SEZs in hard-to-reach areas, demonstrating progress in environmental management.(Aung et al., 2022; Hardaker, 2020). SEZs also face significant challenges. In Africa, many SEZs have been ineffective in attracting investment and creating jobs due to a reliance on fiscal incentives and a lack of integration with local economies. Weak governance opens up opportunities for corruption and rent-seeking practices that are detrimental

to development. SEZ development in Myanmar has caused serious environmental damage, such as the decline of mangrove forests and coastal ecosystems. From a legal and international trade perspective, SEZ tax incentives and subsidies have sparked controversy due to the potential for tax evasion, unfair competition between countries, and legal disputes.(Aung et al., 2022)Policies that contravene WTO rules increase legal and economic risks for SEZ-operating countries. In China, the success of SEZs in coastal areas widened the economic gap with less developed central and western regions, creating challenges for equitable development. In the Dominican Republic, SEZ policy reforms increased the attractiveness of SEZs, but the impact on national exports remained limited. The success of SEZs depends heavily on the quality of institutions and governance. Weak institutions lead to inefficient resource allocation and corrupt practices that hinder development goals.(Defever et al., 2019).

Although Special Economic Zones (SEZs) have significant potential as drivers of economic development and industrialization, several gaps remain that need to be addressed. First, many SEZs have not yet demonstrated optimal results due to a lack of focused strategic planning and strong governance. Second, SEZ integration with the domestic economy is often weak, preventing benefits from reaching local communities. Third, attention to environmental impacts and compliance with international law remains limited in SEZ development practices, creating risks of environmental damage and legal challenges globally. These gaps highlight the need for a more holistic and sustainable approach to SEZ design and management to ensure they truly serve as tools for inclusive and equitable development.

Furthermore, Special Economic Zones (SEZs) in Indonesia play a vital role as hubs for regional economic growth and drivers of industrialization. Several SEZs, such as Arun Lhoksumawe and Sei Mangkei, have successfully driven significant economic growth, particularly evident in the increase in Gross Regional Domestic Product (GRDP) and significant operational efficiency.(Indah Fadilla, 2024; Muzwardi* et al., 2024; Riesfandiari et al., 2023; Widoyoko et al., 2020)The Singosari Special Economic Zone (SEZ) also demonstrates an innovative approach by combining heritage tourism potential and technology, supporting sustainable development oriented toward social and cultural issues. Furthermore, the Kuala Enok Special Economic Zone (SEZ), which leverages the strategic location of its port, demonstrates the potential to improve the business climate, create jobs, and enhance community well-being. The Bitung and Batam Special Economic Zones (SEZs) also contribute to strengthening the fisheries industry and increasing productivity, despite various challenges.

However, SEZs and Special Economic Zones (SEZs) in Indonesia face several challenges that hinder their effectiveness and optimal benefits. Asset management in the Arun Special Economic Zone (SEZ) remains uneven and disproportionate, requiring better collaboration. The social impact of SEZs on poverty varies; some regions show a decline in poverty, while others experience an increase, demonstrating the complexity of social impacts. The performance of areas such as the Samarinda Special Economic Zone (SEZ) remains low and has not been able to drive significant economic growth, even accompanied by an increase in poverty rates. Basic infrastructure such as electricity and water do not always have a significant impact, while port connectivity is a key factor that is often suboptimal in some SEZs.(Gangga et al., 2024; Indah Fadilla, 2024; Sahgira et al., 2025).

Institutional and socioeconomic challenges also emerged, for example, in the Bitung Special Economic Zone (SEZ), which experienced dualistic development, land management issues, and conflicts with local communities. Income inequality tended to increase after the SEZ's opening, primarily due to the lack of benefits felt by low-skilled groups. Furthermore, company productivity in the Batam Special Economic Zone (SEZ) does not directly increase due to industrial agglomeration alone, necessitating the promotion of innovation and collaboration between companies to enhance technology and knowledge transfer. Management planning, spatial planning, and fiscal policies in several SEZs also still need strengthening to optimally realize their economic potential.(Rawung et al., 2024). Special Economic Zones (SEZs) in Indonesia have significant potential as key drivers of regional economic development and industrialization. The success of these zones depends on careful strategic planning, strong governance, integration with the local economy, and strengthening infrastructure, particularly port access. Addressing social and environmental impacts must also be a priority to ensure inclusive and sustainable development.(Ali et al., 2024; Pratama et al., 2023).

Although Indonesia's Special Economic Zones (SEZs) have significant potential to drive regional economic growth and industrialization, several gaps remain urgently needed. First, asset management and governance in some SEZs remain suboptimal and poorly integrated, hampering efficiency and the resulting economic benefits.(Wan et al., 2014)Second, social impacts such as poverty alleviation and equal distribution of welfare are still inconsistent, with some regions experiencing increased poverty and income inequality after the opening of the Special Economic Zone (SEZ).(Frick & Rodriguez-Pose, 2019)Third, basic infrastructure does not fully support the development of

SEZs, especially in terms of port connectivity, which is a key factor, while other aspects such as electricity and water have not made a significant contribution.(Rawung et al., 2024)Fourth, institutional and social problems, such as land conflicts and the lack of empowerment of unskilled local communities, remain serious obstacles.(Budimansyah, 2024)Fifth, although there has been an increase in company productivity in some SEZs, evidence that SEZs directly increase overall productivity is still weak, so an innovative and collaborative approach between companies is needed.(Budimansyah, 2024)These gaps indicate the need for more comprehensive and inclusive management, planning, and policy strategies so that SEZs and SEZs can achieve their sustainable economic development goals.(Wardhana et al., 2025). This can be illustrated in the following image:

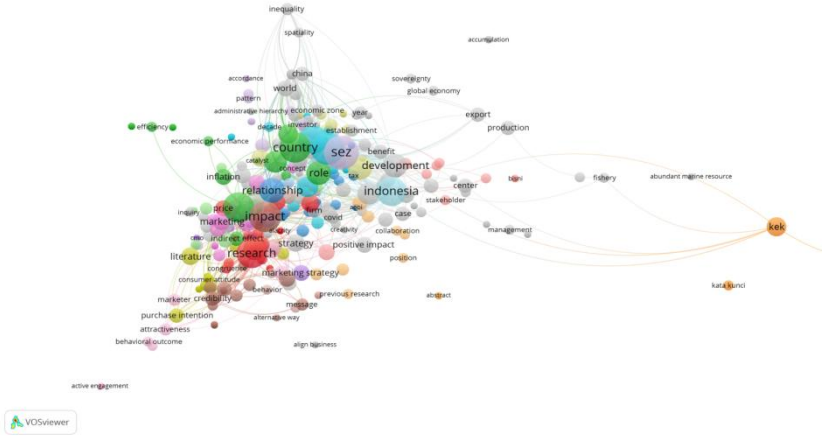

Figure 1. Vosviewer Visualization

From the analysis of emerging keywords, it is clear that the development of Special Economic Zones (SEZs) in Indonesia has been a primary focus in various studies, with keywords such as "SEZ," "Indonesia," "SEZ," "country," "development," and "impact" taking center stage. This confirms that these studies concentrate on how SEZs play a vital role in driving national and regional economic development and the resulting impacts. Additional keywords such as "infrastructure," "connectivity," and "investment" underscore the importance of infrastructure and connectivity as determining factors for the success of SEZs, which aligns with previous research findings that indicate that port access and supporting infrastructure are crucial in optimizing the potential of SEZs.

Keyword analysis using Vosviewer shows that the development of Special Economic Zones (SEZs) in Indonesia has been a primary focus in various studies, with keywords such as “SEZ,” “Indonesia,” “SEZ,” “development,” and “impact” frequently appearing. This confirms that previous research has emphasized the role of SEZs as strategic instruments in driving national and regional economic development and evaluating their impacts. Additional keywords such as “infrastructure,” “connectivity,” and “investment” highlight the importance of physical and digital infrastructure as key success factors for SEZs, in line with findings showing that port access, transportation networks, and supporting facilities are crucial for optimizing SEZ potential.

In the context of this research, the management of PT Kawasan Industri Nusantara (KINRA) in the Sei Mangkei Special Economic Zone (SEZ) serves as an example of how internal resources and digital capabilities can be strategically utilized to achieve sustainable competitive advantage. Based on the Resource-Based View (RBV) perspective, KINRA's unique resources such as human capital, technological assets, and organizational knowledge are critical factors in increasing efficiency and long-term competitiveness. Meanwhile, digital ecosystem capabilities enable KINRA to integrate operations with tenants, investors, and other stakeholders, facilitating collaboration, data exchange, and the application of Artificial Intelligence (AI) for real-time monitoring, predictive analysis, and more optimal decision-making.

PT Kawasan Industri Nusantara (KINRA) is the company responsible for managing the Sei Mangkei Special Economic Zone (KEK) in North Sumatra, Indonesia. The company plays a role in developing and managing strategic industrial areas to support regional and national economic growth. KINRA is tasked with providing adequate infrastructure, facilitating investment, and creating an integrated industrial ecosystem between tenants, investors, and other stakeholders. By leveraging its internal resources and digital capabilities, including the application of Artificial Intelligence (AI) technology, KINRA strives to improve operational efficiency, support innovation, and build sustainable competitive advantage for the industrial areas it manages.

By combining RBV and digital ecosystem capabilities, KINRA not only strengthens the impact of SEZs on regional economic development but also creates a competitive advantage that is difficult for other regions to replicate. This approach aligns previous literature on SEZ development, which emphasizes infrastructure, connectivity, and economic impact, with KINRA's strategic management practices, particularly in leveraging digital technology and AI to improve operational efficiency and long-term sustainability. Resource-Based View (RBV) is a management perspective that emphasizes the utilization of a company's internal resources that are valuable, rare, and difficult to imitate to achieve sustainable competitive advantage.(Kamardi et al., 2025)At PT Kawasan Industri Nusantara (KINRA), this includes leveraging infrastructure, technology, organizational knowledge, and employee competencies.

Furthermore, digital ecosystem capabilities are crucial, reflecting the company's ability to manage digital ecosystems, collaborate with tenants, investors, and other stakeholders, and leverage data and digital platforms to support innovation and operational efficiency.(Volz, 2025). Along with that, Artificial Intelligence (AI) capabilities enhance organizations' ability to adopt and utilize AI technology for decision-making and operations, thereby driving further innovation and efficiency.(Wamba, SF, Queiroz, MM, Pappas, IO, & Sullivan, 2024). This combination of RBV, digital ecosystem capabilities, and AI forms the basis for sustainable competitive advantage (SCA), which is a company's ability to maintain a superior position and create long-term value.(Urbanek, 2023). Based on the above background, this study aims to determine how PT Kawasan Industri Nusantara (KINRA) utilizes internal resources through a Resource-Based View (RBV) approach, manages digital ecosystem capabilities, and leverages Artificial Intelligence (AI) capabilities to support sustainable competitive advantage. This study also aims to analyze how the simultaneous integration of these three aspects can increase efficiency, innovation, and long-term value creation for the industrial estate and its stakeholders.

Literature Review

Sustainable Competitive Advantage (SCA)

Sustainable Competitive Advantage (SCA) is a company's ability to maintain a superior position compared to competitors in the long term by utilizing internal resources, digital capabilities, and the application of Artificial Intelligence (AI) technology, so as to create sustainable value for the organization and stakeholders.(Barney, 1991; Peteraf, 1993; Urbanek, 2023)(Barney, 1991; Peteraf, 1993; Urbanek, 2023). SCA is not simply a temporary advantage, but encompasses an organization's ability to continuously adapt, innovate, and maintain relevance in a competitive marketplace. In practice, SCA can be measured through several key indicators.

1. Operational efficiency, namely the company's ability to manage business processes efficiently and cost-effectively without reducing quality.
2. Innovation capability, namely the company's ability to produce innovations in products, services, and work processes to create new value.
3. Differentiation, namely the ability to create uniqueness that distinguishes the company from competitors, so that it becomes the consumer's first choice.
4. Market responsiveness, namely the company's ability to quickly adapt its strategies and operations to market changes, trends, and customer needs.
5. Value creation includes the creation of sustainable economic, social and environmental value, so that the benefits generated are not only felt by the company, but also by stakeholders and the wider community.

Resource-Based View (RBV)

The Resource-Based View (RBV) is a strategic perspective that emphasizes the importance of utilizing a company's internal resources to create sustainable competitive advantage. According to(Barney, 1991). RBV emphasizes that valuable, rare, difficult to imitate, and non-substitutable (VRIN) internal resources are the main basis for achieving competitive advantage.(Wernerfelt, 1984)He added that identifying and utilizing a company's internal assets as strategic resources is crucial for gaining an advantage over competitors.(Kamardi et al., 2025)states that RBV is a modern management approach that emphasizes the optimization of internal resources, both tangible and intangible, to improve long-term performance and competitiveness. In the context of measurement, RBV can be indicated through:

1. Tangible resources, such as infrastructure, technology, and company facilities
2. Intangible resources, including organizational knowledge, reputation, and intellectual property rights.
3. Human resources, namely employee competencies, skills, and experience; and.

4. Organizational capabilities, which include the company's ability to plan, coordinate, and utilize resources effectively.

Digital Ecosystem Capability

Digital Ecosystem Capability is a company's ability to operate effectively within a network involving other companies, partners, and stakeholders to create shared value. According to(Adner, 2017)This capability enables organizations to leverage the relationships between actors in the ecosystem for sustainable value creation.(Iansiti, M., & Levien, 2004)emphasizes that digital ecosystem capability is a company's capacity to manage interactions and relationships within an interdependent digital ecosystem, including aspects of collaboration, innovation, and technology integration.(Volz, 2025)states that digital ecosystem capability encompasses an organization's ability to leverage digital platforms and data, and build collaborative networks that support innovation and operational efficiency. In measurement practice, digital ecosystem capability can be indicated through:

1. Digital integration, namely the ability to integrate systems and processes with stakeholders.
2. Data sharing capability, the ability to share and utilize data effectively.
3. Collaboration and networking, the level of collaboration with partners, investors, and tenants.
4. Digital infrastructure readiness, platform readiness and digital networks.
5. Innovation and agility, the ecosystem's ability to support innovation and rapid response to market changes.
6.

Artificial Intelligence Capability (AI Capability)

Artificial Intelligence (AI) capability is an organization's ability to adopt and utilize AI technologies in business operations and decision-making to improve efficiency and innovation.(Sharma, R., Mithas, S., & Kankanhalli, 2021), AI capability enables organizations to implement AI in operational activities to support productivity and innovation.(Chen et al., 2022)emphasizes that AI capability is a company's capacity to leverage AI systems for data-driven decision-making and adaptive strategy development.(Wamba, SF, Queiroz, MM, Pappas, IO, & Sullivan, 2024)explains that AI capabilities involve the integration of AI technology, data, and human resources to improve performance, innovation, and decision-making quality. In practical measurement, AI capabilities can be indicated through:

1. AI integration, namely the ability to integrate AI into organizational systems and processes.
2. Predictive analytics, AI's ability to generate predictions and insights for decision making.
3. Automation capability, the use of AI to automate operational processes.
4. Data-driven decision making, decision making based on AI data analysis.
5. Innovation support, AI support in the development of innovative products, services and processes.

Conceptual Framework

The conceptual framework of this study is based on the relationship between the Resource-Based View (RBV), digital ecosystem capabilities, Artificial Intelligence (AI) capabilities, and sustainable competitive advantage (SCA) at PT Kawasan Industri Nusantara (KINRA). RBV emphasizes the importance of leveraging valuable, rare, difficult-to-imitate, and non-substitutable internal resources to achieve competitive advantage. Digital ecosystem capabilities enable companies to leverage partner, tenant, and stakeholder networks through digital integration, data sharing, and collaboration to support innovation and operational efficiency. Meanwhile, AI capabilities strengthen companies' ability to adopt intelligent technologies for data-driven decision-making, process automation, and innovation development. The integration of these three independent variables is expected to contribute significantly to SCA, which encompasses a company's ability to maintain a leading position, create innovation, differentiate itself from competitors, respond to market changes, and generate sustainable value for the organization and stakeholders. Thus, the conceptual framework of this study demonstrates a causal relationship in which RBV, digital ecosystem capabilities, and AI capabilities play a role as determinants in achieving sustainable competitive advantage. This can be seen in the following figure:

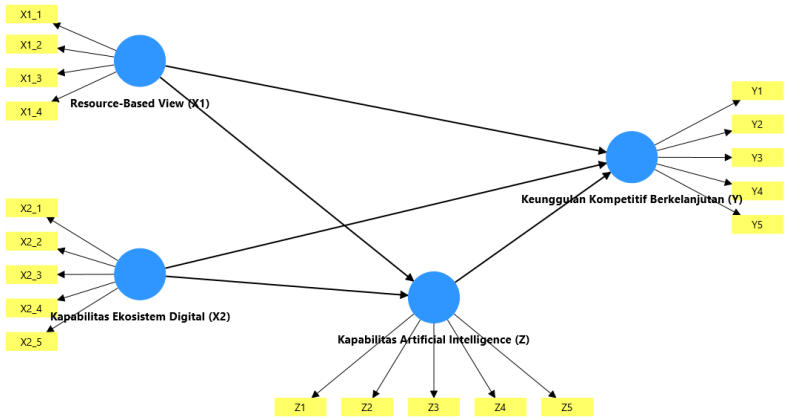

Figure 2. Conceptual Framework

Hypothesis

H1: Resource-Based View (RBV) has a positive effect on sustainable competitive advantage (SCA) at PT Kawasan Industri Nusantara (KINRA).

H2: Digital ecosystem capabilities have a positive effect on sustainable competitive advantage (SCA) at PT Kawasan Industri Nusantara (KINRA).

H3: Artificial Intelligence (AI) capabilities have a positive effect on sustainable competitive advantage (SCA) at PT Kawasan Industri Nusantara (KINRA).

H4: Artificial Intelligence (AI) capabilities mediate the influence of Resource-Based View (RBV) on sustainable competitive advantage (SCA).

H5: Artificial Intelligence (AI) capabilities mediate the influence of digital ecosystem capabilities on sustainable competitive advantage (SCA).

Research Method

This study uses a quantitative approach with the aim of analyzing the influence of Resource-Based View (RBV), digital ecosystem capabilities, and Artificial Intelligence (AI) capabilities on sustainable competitive advantage (SCA) at PT Kawasan Industri Nusantara (KINRA). This study is associative-causal, because it aims to determine the cause-and-effect relationship between the independent and dependent variables. The population of this study is all employees of PT Kawasan Industri Nusantara (KINRA) involved in resource management, digital ecosystems, and AI implementation, with a total of 125 people. Because the population is relatively small, this study uses total sampling, so that the entire population is used as a research sample. The research variables consist of RBV as an independent variable that includes the utilization of valuable, rare, difficult to imitate, and non-substitutable internal resources, with indicators of tangible resources, intangible resources, human resources, and organizational capabilities.

Digital ecosystem capability as another independent variable is defined as the organization's ability to manage the digital ecosystem through collaboration, integration, and utilization of data to support innovation and operational efficiency, with indicators of digital integration, data sharing capability, collaboration & networking, digital infrastructure readiness, and innovation & agility. AI capability as a moderating variable is the organization's ability to adopt, integrate, and utilize AI technology in decision-making, operations, and innovation, with indicators of AI integration, predictive analytics, automation capability, data-driven decision making, and innovation support. The dependent variable, SCA, is defined as the company's ability to maintain a superior position and create sustainable value through internal resources, digital capabilities, and AI, with indicators of operational efficiency, innovation capability, differentiation, market responsiveness, and value creation. Research data was collected using a closed-ended questionnaire with a Likert scale of 1–5, where 1 indicates "strongly disagree" and 5 indicates "strongly agree." Data analysis was conducted using multiple regression analysis to examine the influence of RBV and digital ecosystem capabilities on SCA, as well as moderation analysis to examine the role of AI as a moderating variable. Prior to analysis, validity and reliability tests were conducted on the research instruments to ensure the data obtained were valid and reliable.

Results and Discussion

This section presents the analysis results from 125 respondents, namely employees of PT Kawasan Industri Nusantara (KINRA) involved in internal resource management, digital ecosystems, and AI implementation. The analysis was conducted using SEM/Path Analysis to test the influence of RBV, digital ecosystem capabilities, and AI capabilities as moderators of sustainable competitive advantage (SCA). The results show that RBV and digital ecosystem capabilities have a significant positive effect on SCA, while AI capabilities not only have a direct effect but also strengthen the influence of RBV and digital ecosystem capabilities. These findings confirm that optimal integration between internal resources, digital ecosystems, and AI can improve PT KINRA's competitiveness.

Outer Model

The outer model or measurement model in PLS-SEM is used to evaluate the reliability and validity of measurement constructs, both for reflective and formative indicators. In this study, all constructs use a reflective model, namely Resource-Based View (RBV), Digital Ecosystem Capability, Artificial Intelligence (AI) Capability, and Sustainable Competitive Advantage (SCA). Convergent validity is tested through factor loading and Average Variance Extracted (AVE) to ensure each indicator is able to represent the construct being measured, while internal reliability is evaluated using Cronbach's Alpha and Composite Reliability (CR) to ensure the consistency of indicator measurements. The test results show that all constructs have adequate reliability and validity, with the values of factor loading, AVE, Cronbach's Alpha, and CR being above the minimum required limit, so these indicators are suitable for use in testing structural relationships in the inner model.

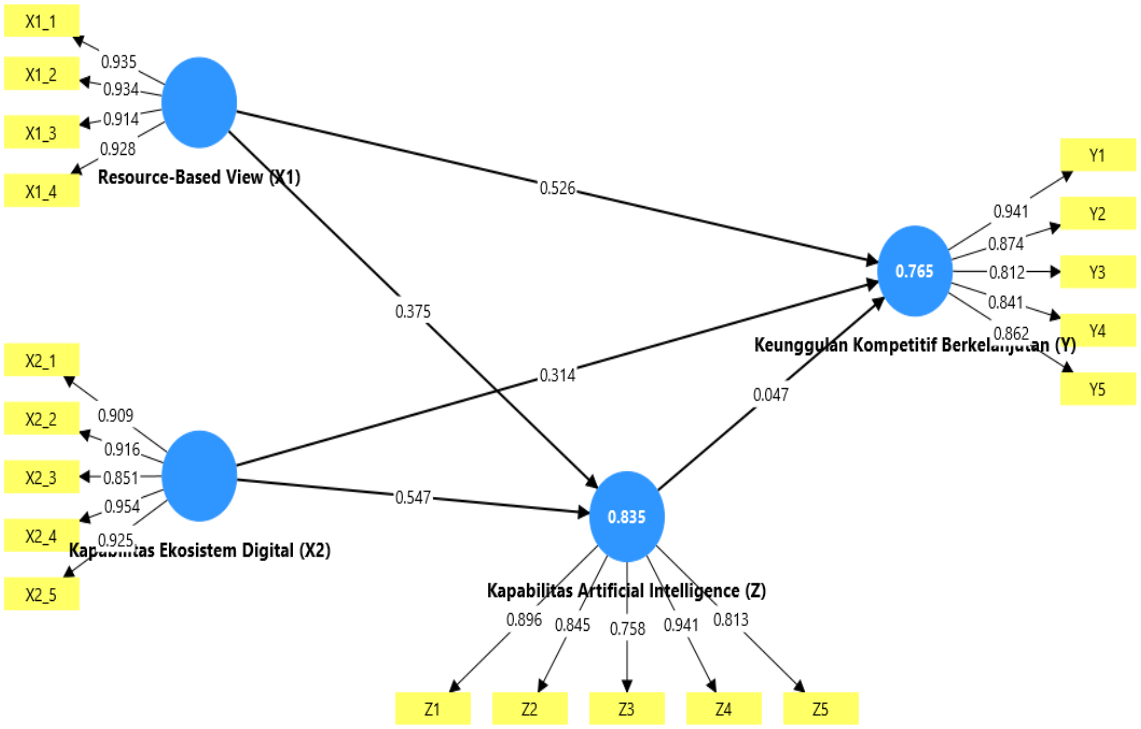

Figure 3. Measurement Model

This figure shows the results of the measurement model (Outer Model) testing using PLS-SEM with the constructs Resource-Based View (X1), Digital Ecosystem Capability (X2), Artificial Intelligence Capability (Z), and Sustainable Competitive Advantage (Y). Each construct is represented by several reflective indicators with loading factor values all above 0.7, indicating good convergent validity. The composite reliability and Average Variance Extracted (AVE) values for each construct also meet the criteria for adequate reliability and validity. The path coefficients indicate a positive and significant relationship between RBV and Digital Ecosystem Capability on Sustainable Competitive Advantage, as well as the role of Artificial Intelligence Capability which has a direct influence and also acts as a moderating variable that strengthens the relationship. The values recorded in the blue circles indicate the AVE value of each construct, indicating the strength of the construct's overall validity.

The following are the results of outer loading.

Table 1. Outer Loading Results

	Artificial Intelligence Capabilities (Z)	Digital Ecosystem Capabilities (X2)	Sustainable Competitive Advantage (Y)	Resource-Based View (X1)
X1_1				0.935
X1_2				0.934
X1_3				0.914
X1_4				0.928
X2_1		0.909		
X2_2		0.916		
X2_3		0.851		
X2_4		0.954		
X2_5		0.925		
Y1			0.941	
Y2			0.874	
Y3			0.812	
Y4			0.841	
Y5			0.862	
Z1	0.896			
Z2	0.845			
Z3	0.758			
Z4	0.941			
Z5	0.813			

Source: PLS4, 2025.

The Outer Loading table shows the loading factor values for each indicator in the constructs of Artificial Intelligence Capability (Z), Digital Ecosystem Capability (X2), Sustainable Competitive Advantage (Y), and Resource-Based View (X1). All indicators have loading values above 0.7, indicating that all indicators are valid and able to represent their respective constructs well. The highest loading values are found in indicator Y1 (0.941) for Sustainable Competitive Advantage and indicator X2_4 (0.954) for Digital Ecosystem Capability, while the lowest value is still above the validity threshold, namely indicator Z3 (0.758) in Artificial Intelligence Capability.

Table 2 Construct reliability and validity results

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Artificial Intelligence Capabilities (Z)	0.906	0.924	0.930	0.728
Digital Ecosystem Capabilities (X2)	0.949	0.953	0.961	0.832
Sustainable Competitive Advantage (Y)	0.917	0.925	0.938	0.752
Resource-Based View (X1)	0.946	0.949	0.961	0.861

Source: PLS4, 2025.

This table shows the results of the reliability and construct validity tests using Cronbach's Alpha, Composite Reliability (rho_a and rho_c), and Average Variance Extracted (AVE). All constructs have Cronbach's Alpha and Composite Reliability values above 0.7, indicating good internal reliability. The AVE values for all four constructs are also above 0.5, indicating adequate convergent validity. This confirms that the indicators in this study are consistent and valid for measuring the constructs of Artificial Intelligence Capability, Digital Ecosystem

Capability, Sustainable Competitive Advantage, and Resource-Based View. Overall, all constructs meet the requirements for convergent validity through strong AVE values.

Inner Model

In the inner model testing stage, this study tests hypotheses describing causal relationships between the main constructs in the structural model. The hypotheses are designed to examine the influence of the Resource-Based View (RBV), Digital Ecosystem Capabilities, and Artificial Intelligence (AI) Capabilities on Sustainable Competitive Advantage (SCA), as well as the role of AI Capabilities as a moderating variable. The testing is conducted using path analysis in SEM-PLS to determine the direction, strength, and significance of the relationships between variables, thus identifying which hypotheses are supported by empirical data.

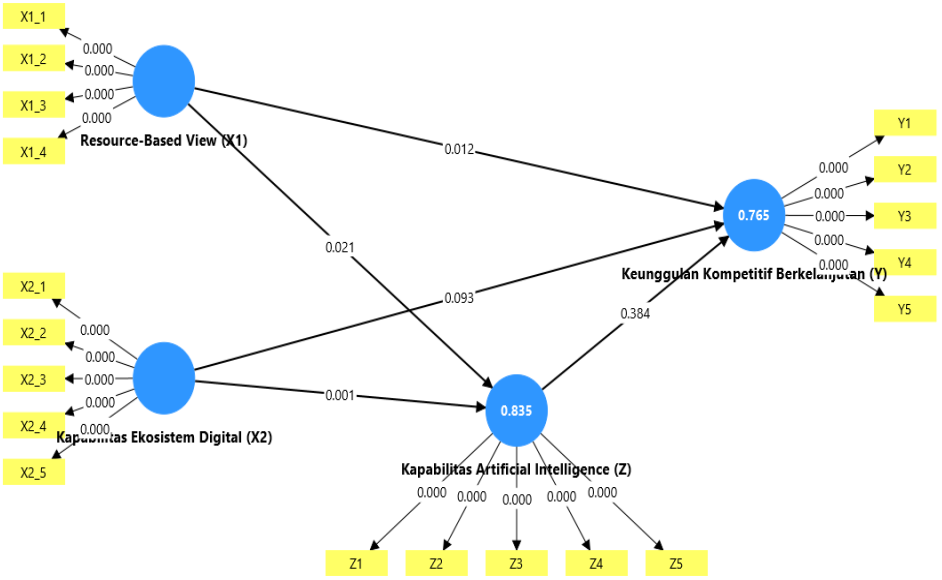

Figure 4. Structural Model

Based on the image above, it can be concluded in the following table:

Table 3 Inner Model Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Resource-Based View (X1) -> Sustainable Competitive Advantage (Y)	0.526	0.536	0.232	2,270	0.012
Digital Ecosystem Capability (X2) -> Sustainable Competitive Advantage (Y)	0.314	0.299	0.237	1,322	0.093
Artificial Intelligence Capability (Z) -> Sustainable Competitive Advantage (Y)	0.047	0.054	0.158	0.296	0.384
Resource-Based View (X1) -> Artificial Intelligence Capabilities (Z)	0.375	0.371	0.183	2,044	0.021
Digital Ecosystem Capability (X2) -> Artificial Intelligence Capability (Z)	0.547	0.553	0.181	3,030	0.001
Resource-Based View (X1) -> Artificial Intelligence Capabilities (Z) -> Sustainable Competitive Advantage (Y)	0.018	0.021	0.068	0.259	0.398
Digital Ecosystem Capability (X2) -> Artificial Intelligence Capability (Z) -> Sustainable Competitive Advantage (Y)	0.026	0.029	0.091	0.281	0.390

Source: PLS4, 2025.

Table 3 displays the results of the inner model test using SEM-PLS to examine the influence of Resource-Based View (RBV), Digital Ecosystem Capabilities, and Artificial Intelligence (AI) Capabilities on Sustainable Competitive Advantage (SCA), including the moderating role of AI. The results show that RBV has a positive and significant effect on SCA ($\beta = 0.526$; $t = 2.270$; $p = 0.012$), confirming that utilizing valuable, rare, and difficult-to-

imitate internal resources is the main foundation for creating competitive advantage. This is reflected in RBV indicators such as X1_1 to X1_4, which measure the utilization of employee competencies, technology, organizational knowledge, and KINRA infrastructure.

Digital Ecosystem Capability has a positive but insignificant effect on SCA (β = 0.314; t = 1.322; p = 0.093), which indicates that the ability to manage digital networks, collaborate with tenants, investors, and stakeholders, and utilize digital platforms (measured through indicators X2_1 to X2_5) has the potential to increase SCA, but its effectiveness still depends on the integration of a more mature digital strategy.

AI capability does not have a significant direct effect on SCA (β = 0.047; t = 0.296; p = 0.384), but acts as a moderating variable that strengthens the influence of RBV and Digital Ecosystem Capability on SCA. This emphasizes that AI indicators such as Z1 to Z5, which include an organization's ability to adopt AI, technology and data integration, and HR support, function optimally when combined with good internal resource management and a digital ecosystem.

In addition, RBV and Digital Ecosystem Capability have a significant effect on AI Capability (β = 0.375; t = 2.044; p = 0.021 and β = 0.547; t = 3.030; p = 0.001), which shows that RBV indicators (X1_1–X1_4) and Digital Ecosystem Capability indicators (X2_1–X2_5) are key factors in building AI capabilities that support innovation, operational efficiency, and data-based decision making.

Overall, these findings confirm an integrative model with RBV as the primary foundation, Digital Ecosystem Capability as the strategic link, and AI Capability as the enabler and moderator. The integration of indicators from these three constructs enables PT KINRA to achieve Sustainable Competitive Advantage (Y1–Y5), which is reflected in operational efficiency, innovation, differentiation, market responsiveness, and sustainable value creation.

Conclusion and Recommendations

The results of the study indicate that Resource-Based View (RBV) has a significant effect on Sustainable Competitive Advantage (SCA) at PT Kawasan Industri Nusantara (KINRA), the manager of the Sei Mangkei Special Economic Zone (SEZ). This confirms that the utilization of internal resources such as employee competencies, technology, and SEZ infrastructure is the main foundation for increasing regional competitiveness. Digital Ecosystem Capability has a positive but insignificant effect on SCA, indicating that digital network management and collaboration with tenants, investors, and other stakeholders still need to be strengthened. AI Capability acts as a moderating variable that strengthens the influence of RBV and Digital Ecosystem Capability on SCA. The integration of these three constructs is an important strategy for the Sei Mangkei Special Economic Zone (SEZ) in achieving sustainable competitive advantage in the digital era.

The suggestions in this research include:

1. Optimize the internal resources of the Sei Mangkei Special Economic Zone, including workforce competencies, technology, and infrastructure to increase the region's competitiveness.
2. Strengthen the SEZ digital ecosystem by enhancing collaboration between tenants, investors, and stakeholders through digital platforms.
3. Apply AI strategically, for example for operational efficiency, industrial data management, and analytics-based decision-making, thereby supporting the region's sustainable competitive advantage.

REFERENCES

Adner, R. (2017). Ecosystem as structure: An actionable construct for strategy. *Journal of Management*, *43*(1), 39–58.

Ali, M., Juaini, M., Pahrudin, P., Nadia, S., Salmiah, S., & Fatihi, T. (2024). Innovation and Creativity of Stakeholders Toward Sustainable Tourism Development in the Time of Crisis: A Case of Special Economic Zone, Indonesia. *International Journal of Sustainable Development and Planning*, *19*(12), 4573–4583. https://doi.org/10.18280/ijsdp.191206

Aung, T. S., Overland, I., Vakulchuk, R., & Xie, Y. (2022). The environmental burdens of special economic zones on the coastal and marine environment: A remote sensing assessment in Myanmar. *Remote Sensing Applications: Society and Environment*, *28*(December 2021), 100809. https://doi.org/10.1016/j.rsase.2022.100809

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120.

Budimansyah, B. P. (2024). Analisis Strategi Pemasaran Influencer Marketing Dan Integrated Marketing

Communication Erigo Untuk Meningkatkan Brand Awareness. *Jurnal Ilmiah Manajemen Ekonomi Dan Akuntansi*, *1*(Februari), 99–106.

Chen, J., Long, X., & Lin, S. (2022). Special Economic Zone, Carbon Emissions and the Mechanism Role of Green Technology Vertical Spillover: Evidence from Chinese Cities. *International Journal of Environmental Research and Public Health*, *19*(18). https://doi.org/10.3390/ijerph191811535

Crane, B., Albrecht, C., Duffin, K. M., & Albrecht, C. (2018). China's special economic zones: An analysis of policy to reduce regional disparities. *Regional Studies, Regional Science*, *5*(1), 98–107. https://doi.org/10.1080/21681376.2018.1430612

Danja, I. I., & Wang, X. (2024). Matching comparative advantages to special economic zones for sustainable industrialization. *Heliyon*, *10*(14), e34411. https://doi.org/10.1016/j.heliyon.2024.e34411

Defever, F., Reyes, J. D., Riaño, A., & Sánchez-Martín, M. E. (2019). Special Economic Zones and WTO Compliance: Evidence from the Dominican Republic. *Economica*, *86*(343), 532–568. https://doi.org/10.1111/ecca.12276

Frick, S., & Rodríguez-Pose, A. (2019). Are special economic zones in emerging countries a catalyst for the growth of surrounding areas? *Transnational Corporations*, *26*(2), 75–94. https://doi.org/10.18356/0554caef-en

Gangga, I. G. A., Dewi, S., Turisno, B. E. K. O., Prasetyo, A. B., & Adhi, Y. P. (2024). *SUSTAINABILITY PERSPECTIVE AND LEGAL POLICY FOR LAND ACQUISITION AND MANAGEMENT IN THE TANJUNG KELAYANG SPECIAL ECONOMIC ZONE*. *XII*(2), 1267–1276.

Hardaker, S. (2020). Embedded Enclaves? Initial Implications of Development of Special Economic Zones in Myanmar. *European Journal of Development Research*, *32*(2), 404–430. https://doi.org/10.1057/s41287-020-00271-2

Iansiti, M., & Levien, R. (2004). Strategy as ecology. *Harvard Business Review*, *82*(3), 68–78.

Indah Fadilla, M. (2024). Efisiensi Keberhasilan Kawasan Ekonomi Khusus (Kek) Sei Mangkei Terhadap Perekonomian Regional Kabupaten Simalungun. *Ekonomi & Bisnis*, *23*(1), 68–78. https://doi.org/10.32722/eb.v23i1.6598

Kamardi, A. A., Mahdiraji, H. A., Masoumi, S., & Jafari-sadeghi, V. (2025). Developing sustainable competitive advantages from the lens of resource-based view : evidence from IT sector of an emerging economy. *Journal of Strategic Marketing*, *33*(6), 775–797. https://doi.org/10.1080/0965254X.2022.2160485

Lu, Z. (2022). Human Capital Spillovers from Special Economic Zones: Evidence from Yangtze Delta in China. *Economies*, *10*(5). https://doi.org/10.3390/economies10050099

Moberg, L. (2015). The political economy of special economic zones. *Journal of Institutional Economics*, *11*(1), 167–190. https://doi.org/10.1017/S1744137414000241

Muzwardi*, A., Fera, M., & Maryam, S. (2024). An Analytical of the Design Process of Special Economic Zone Governance in Indonesia. *JURISMA : Jurnal Riset Bisnis & Manajemen*, *14*(1), 105–118. https://doi.org/10.34010/jurisma.v14i1.12386

Peteraf, M. A. (1993). he cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, *14*(3), 179–191.

Pratama, I. P., Winarso, H., Hudalah, D., & Syabri, I. (2023). Social relations in megaproject planning: exploring the roles of local government in the development of Indonesia's special economic zones. *Town Planning Review*, *94*(5), 513–533. https://doi.org/10.3828/tpr.2023.10

Rawung, S. S., Kumendong, S. R. V. T., Rumagit, M. C. N., & Montolalu, V. K. (2024). Development Strategies for the Special Economic Zone (SEZ) in Bitung City: Social and Economic Perspectives. *Society*, *12*(2), 1011–1021. https://doi.org/10.33019/society.v12i2.780

Riesfandiari, I., Setyawan, B., & Wahyudi, I. T. (2023). Dampak Kawasan Ekonomi Khusus (Kek) Sei Mangkei Terhadap Perekonomian Di Kabupaten Simalungun. *Jurnal Perspektif Bea Dan Cukai*, *7*(1), 147–170. https://doi.org/10.31092/jpbc.v7i1.2131

Rodríguez-Pose, A., Bartalucci, F., Frick, S. A., Santos-Paulino, A. U., & Bolwijn, R. (2022). The challenge of developing special economic zones in Africa: Evidence and lessons learnt. *Regional Science Policy and Practice*, *14*(2), 456–481. https://doi.org/10.1111/rsp3.12535

Sahgira, N. N., Dewi, H. P., & Harahap, Z. C. M. (2025). Pengaruh Customer Experience, Review Product dan Perceived Value terhadap Repurchase Intention Konsumen Shopee pada Mahasiswa Universitas Battuta. *AKADEMIK: Jurnal Mahasiswa Humanis*, *5*(2), 1039–1053. https://doi.org/10.37481/jmh.v5i2.1441

Sharma, R., Mithas, S., & Kankanhalli, A. (2021). Transforming decision-making processes: A review of AI

capability. *MIS Quarterly Executive*, *20*(1), 1–15.

Simo, R. Y. (2023). Special Economic Zones in an Era of Multilateralism Decadence and Struggles for Post-Pandemic Economic Recovery: Perspectives from the Global South. *German Law Journal*, *24*(1), 199–226. https://doi.org/10.1017/glj.2023.11

Urbanek, T. (2023). Sustainable Competitive Advantage in the Digital Era: Integrating Resources and Capabilities. *Journal of Business Research*, *1*(53), 112–123.

Volz, F. (2025). *Digital ecosystems and their impact on organizations — A dynamic capabilities approach*. *November 2022*, 398–419. https://doi.org/10.1111/ijmr.12396

Wamba, S. F., Queiroz, M. M., Pappas, I. O., & Sullivan, Y. (2024). Artificial Intelligence Capability and Firm Performance: A Sustainable Development Perspective by the Mediating Role of Data-Driven Culture. *Information Systems Frontiers*, *26*(6), 2189–2203.

Wan, Z., Zhang, Y., Wang, X., & Chen, J. (2014). Policy and politics behind Shanghai's Free Trade Zone Program. *Journal of Transport Geography*, *34*, 1–6. https://doi.org/10.1016/j.jtrangeo.2013.10.015

Wardhana, I. W., Riesfandiari, I., Jamal, E., Hanifah, V. W., Pihri, P., Handoyo, F. W., Purwono, N., Ramadhan, R. P., Setyawan, B., Placek, M., W, B. P. A., Chrysanti, N. D., Daniswara, R. M., Wijanarko, B., & Setiadi, E. (2025). Does a special economic zone impact the surrounding economy? The case study of Kendal, Indonesia. *Humanities and Social Sciences Communications*, *12*(1), 1–17. https://doi.org/10.1057/s41599-025-04448-0

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180.

Widoyoko, Nazaruddin, & Hidayati, J. (2020). Optimization of Sei Mangkei special economic zone (sez) industrial land based on user needs. *IOP Conference Series: Materials Science and Engineering*, *801*(1). https://doi.org/10.1088/1757-899X/801/1/012105