MAPPING THE INDUSTRIAL LOCATIONS, DATA CENTERS AND IBTEC DEVELOPMENT IN THE JS-SEZ

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Abstract. The Johor-Singapore Special Economic Zone (JS-SEZ) represents a strategic initiative to strengthen cross-border economic integration between Malaysia and Singapore through industrial development, digital infrastructure, and sustainable urban planning. This study maps and analyses the industrial landscape of the JS-SEZ, focusing on the spatial distribution of industrial parks, data centre infrastructure, and the development of Ibrahim Technopolis (IBTEC) Sedenak. Data were compiled from government agencies, development authorities, and corporate sources and analysed through spatial mapping of industrial clusters, infrastructure connectivity, and sectoral activities across nine flagship zones. The findings indicate that the 3,588 km² JS-SEZ accommodates more than 100 industrial parks and a rapidly expanding data centre ecosystem, particularly within the Kulai-Sedenak flagship zone. IBTEC Sedenak, covering approximately 7,290 acres, further strengthens this industrial ecosystem through integrated industrial, residential, commercial, infrastructure, and green-space development. The study highlights how sectoral clustering, cross-border connectivity, digital infrastructure, and strategic land-use planning can enhance regional competitiveness. Overall, the JS-SEZ demonstrates significant potential to become an integrated economic ecosystem supporting advanced manufacturing, digital services, logistics, innovation, and sustainable development while strengthening Johor's position within Southeast Asia's evolving industrial economy.
Keywords: *JS-SEZ, Ibrahim Technopolis, industrial parks, data centres, spatial mapping, sustainable development*

Introduction

The Johor-Singapore Special Economic Zone (JS-SEZ) is a deal for ASEAN economic integration. It is project between two of the most advanced economies in Southeast Asia (Frick et al., 2019; Alkon, 2018). The agreement was made on January 7, 2025. It covers a 3,588 km² area in Johor. The goal is to create 20,000 jobs and host 50 projects in five years. By 2035 they want to host 100 projects. This article looks at where industrial sites are located how data centre infrastructure is built and the Ibrahim Technopolis (IBTEC) project in the JS-SEZ. Understanding the geography is key for policymakers, investors, and academics. They need to know how it affects economic development, sustainable industrial clustering, and digitalization of manufacturing ecosystems (Frick et al., 2019; Alkon, 2018). This is especially important in the era of Industry 4.0 (I4.0) and the Fourth Industrial Revolution (4IR). The JS-SEZ is a continuation of Iskandar Malaysia, which started in 2006 (Yasin et al., 2021; Rizzo and Khan, 2017; Razak et al., 2016; Rizzo and Glasson, 2012). By 2024 had exceeded its investment target of RM383 billion under the Iskandar Malaysia Comprehensive Development Plan (CDP). The figure 1 illustrates the zone now has than 100 industrial parks. Some of the industrial area includes i-Park @ Indahpura, i-Park @ Senai Airport

City, i-TechValley, Tanjung Langsat Industrial Complex, Sedenak Tech Park, and Nusajaya Tech Park (*Figure 1*).

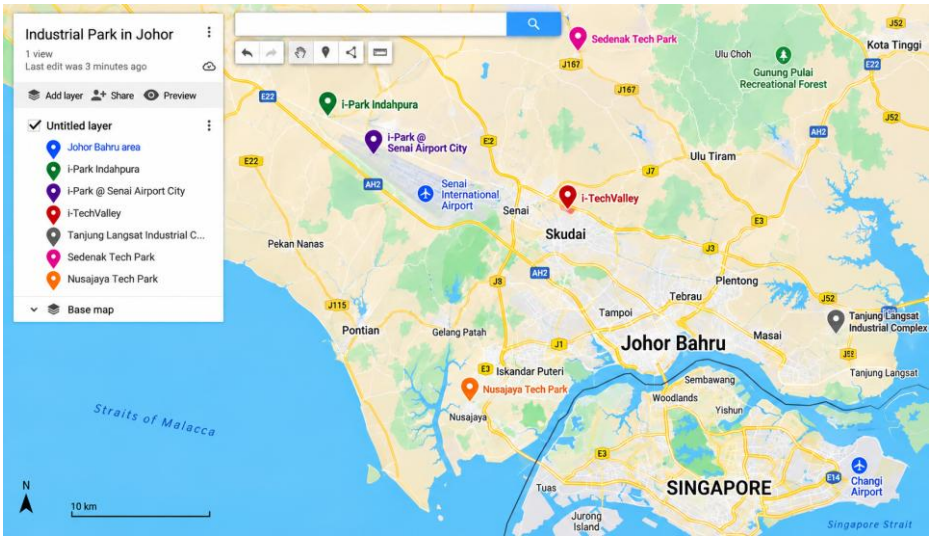

Figure 1. *The map location of Industrial Pack.*

Materials and Methods

This study looks at information from a lot of places. We got data from the Malaysian Investment Development Authority (MIDA) and Enterprise Singapore. We also looked at information from the Ministry of Digital Malaysia, and from companies like JLand Group (JLG) and Johor Corporation (JCorp). Here are the places we got our information from: The Official plans for the JS-SEZ guidelines and frameworks; List of industrial Park and information about investment statistics; Reports about how well data centre are working; Details about how IBTEC's being developed specifications; Information about the zone and the incentives they offer to certain sectors. We used a special kind of mapping to see how industries are grouped together how they are connected by roads and other infrastructure and what kinds of businesses are, in each of the nine main areas the Malaysian Investment Development Authority areas, the JLand Group areas and the Johor Corporation areas. We wanted to understand the JS-SEZ area and the nine flagship zones.

Results and Discussion

The nine flagship zones: Strategic industrial mapping

The JS-SEZ is organized into nine strategically differentiated flagship zones, each with distinct industrial specializations and infrastructure configurations as shown in *Table 1* and *Figure 2*.

Table 1*. JS-SEZ flagship zones and industrial specializations.*

Flagship Zone	Designation	Primary Industrial Sectors
Flagship A	Johor Bahru Waterfront	Urban regeneration, financial services, global business services, fintech hub
Flagship B	Iskandar Puteri	Education, healthcare, smart city development, EdTech, MedTech
Flagship C	Tanjung Pelepas-Tanjung Bin	Port logistics, maritime services, container handling,

		integrated logistics
Flagship D	Tanjung Langsat-Kong Kong	Downstream specialty chemicals, heavy manufacturing, petrochemicals
Flagship E	Senai-Skudai	Aerospace, advanced manufacturing, logistics, electronics, precision engineering
Flagship F	Kulai-Sedenak	Digital economy, data centre clusters, ICT infrastructure, AI/cloud computing
Flagship G	Desaru-Penawar	Integrated tourism, hospitality, eco-resorts, sustainable tourism
Flagship H	Pengerang Integrated Petroleum Complex (PIPC)	Oil and gas, petrochemicals, refining, energy infrastructure
Flagship I	Forest City	Mixed-use development, smart city technology, residential-commercial integration

Figure 2. *The JS-SEZ flagship areas.*

Statistical overview of industrial parks and manufacturing infrastructure

Established industrial parks & strategic industrial concentrations

Following the Iskandar Malaysia platform, the JS-SEZ also contains more than 100 managed industrial parks that have led to an overall industrial development and expansion since 2006 (Yasin et al., 2021; Rizzo and Khan, 2017; Razak et al., 2016; Rizzo and Glasson, 2012). Significant statistics concerning the development are: Total industrial land area: Roughly 3,588 km² spread across nine flagship zones; Number of industrial parks: More than 100 parks already established based on managed industrial parks concept; Cumulative investment (2006-2024): Exceeding RM383 billion more than originally Iskandar CDP goal; Origin of investors: Top countries are United States, China, Germany, Japan, United Kingdom and Singapore. And also include the: Senai-Skudai Zone (Flagship E): Focused on aerospace, electronics, precision engineering, and auto components for advanced manufacturing, utilizing accessibility from Senai International Airport and extensive logistics network; Pasir Gudang (Adjacent to Flagship D): Development area with significant focus on heavy industries and downstream manufacturing, including chemical processing, industrial materials production and exports; Tanjung Langsat-Kong Kong (Flagship D): Development of specialty chemicals cluster and petrochemical downstream processing, gaining from port proximity and access to Pengerang PIPC energy and logistics.

Data centre infrastructure: The digital backbone of JS-SEZ

Statistical overview of data centre capacity

In *Table 2* shows Johor has emerged as Southeast Asia's fastest-growing data centre hub, with the JS-SEZ framework accelerating this trajectory (Mytton and Ashtine, 2024; Ichinose et al., 2022). As of early 2026, the statistical landscape includes as in the *Table 2*. The Ministry of Digital Malaysia confirmed over 50 data centres operating in Johor by late 2024, positioning the state as one of the largest data centre hubs in Malaysia. Minister of Digital Gobind Singh Deo projected continued expansion: "I am confident that more data centres will be built here, thanks to the establishment of the Johor-Singapore Special Economic Zone".

***Table 2**. Johor data centre infrastructure statistics (2024-2026).*

Metric	Value
Total data centres (operational)	13
Data centres under construction	15
Data centres approved in principle	14
Total data centres (pipeline + operational)	42+
IT capacity (percentage of Malaysia total)	~80%
Primary concentration area	Sedenak-Kulai (Flagship F)

Sedenak-Kulai: The data centre cluster epicentre

The Kulai-Sedenak flagship zone (Flagship F) has emerged as the primary data centre concentration area within JS-SEZ, housing the majority of operational facilities. This clustering is strategically driven by: Geographic proximity to Singapore approximately 50 km from Johor Bahru; Access to reliable power infrastructure and renewable energy capacity; Land availability for hyperscale developments 100+ MW facilities; Connectivity to Senai International Airport and regional transportation networks; Integration with IBTEC's digital infrastructure backbone. Major international data centre operators with investments or land acquisition in Sedenak-Kulai include Princeton Digital Group (PDG), K2 Data Centres, and the NVIDIA-YTL partnership. PDG's RM2 billion, 150 MW campus represents one of the largest single investments in the zone's digital infrastructure. Sedenak Tech Park West (StepWest), located within IBTEC, is specifically positioned to attract Singapore-based data centre operators seeking lower-cost alternatives to Singapore's constrained land market while maintaining operational proximity (Mytton and Ashtine, 2024; Ichinose et al., 2022).

Ibrahim technopolis (IBTEC): Asia's largest innovation sandbox

Development specifications and scale

IBTEC officially launched on December 2, 2025, by JLand Group (JLG), which is the real estate and infrastructure arm of Johor Corporation (JCorp) and Ibrahim Technopolis (IBTEC) represents the most ambitious single integrated development within the JS-SEZ as shown in *Table 3*. The IBTEC Sedenak Masterplan, depicted in *Figure 3*, sprawls across approximately 7,290 acres as a futuristic and integrated development. With convenient accessibility to Johor Bahru, Singapore and Kuala Lumpur, through extensive expressway networks. IBTEC Sedenak has the potential to become an economic growth, industrial and logistics focal point (Yasin et al., 2021; Rizzo and Glasson, 2012). Comprised of various land uses, the masterplan includes dominant industrial and mixed industrial development (39.3%), roads and infrastructure

(19.4%), open space and detention ponds (14.5%), and housing and mixed residential areas (13.6%) along with minimal commercial, mixed development and community facilities respectively. Broadly, the plan encompasses an balanced integrated development incorporating industry with commercial development, housings, infrastructure and green spaces; meaning that IBTEC Sedenak would likely not only be a specialized industrial development but a holistic ecosystem (Zanudin et al., 2024; Zanudin et al., 2022; Sultan et al., 2016).

***Table 3**. IBTEC development specifications.*

Parameter	Specification
Total land area	7,290-7,300 acres (2,950 hectares)
Gross development value (GDV)	RM27 billion (~USD 6.6 billion)
Development timeline	25 years (2025-2050)
Location	Sedenak, Kulai (Flagship F)
Distance from Johor Bahru	Approximately 50 km
Connectivity	Senai International Airport, Kulai railway station
Development model	Circular city, regenerative design
Primary sectors	MedTech, life sciences, advanced manufacturing, logistics, data centres, AgriTech

***Figure 3.** The masterplan of Ibrahim Technopolis (IBTEC) Sedenak.*

The *Figure 3* presents the IBTEC Sedenak Masterplan, covering approximately 7,290 acres as an integrated and future-oriented development. Strategically located with access to Johor Bahru, Singapore, and Kuala Lumpur via major expressways, the area is positioned as a key hub for economic growth, industry, and logistics. The masterplan combines several land use components, with the largest share allocated to industrial and mixed industrial development (39.3%), followed by road and infrastructure (19.4%), open spaces and detention ponds (14.5%), and residential and mixed residential areas (13.6%). Smaller portions are designated for commercial, mixed development, and community facilities. Overall, the plan reflects a balanced and integrated development concept, combining industrial activity with commercial spaces, housing, infrastructure, and environmental features. This suggests that IBTEC Sedenak is intended to become not only an industrial zone, but also a comprehensive economic ecosystem that supports investment, business operations, and community living (Zanudin et al., 2024; Zanudin et al., 2022; Rizzo and Khan, 2017; Sultan et al., 2016).

Industrial and economic functions

IBTEC envisions a largest innovation sandbox in Asia connecting high-value industrial ecosystem on a connected platform. IBTEC is intended to "making production smarter, supply chains more resilient and operations more efficient" that upgrading the Industrial base in Johor to complex, higher-value economic activities. Core industrial zones within IBTEC include: MedTech and Life Sciences Hub: Research and development facilities, biotechnology manufacturing, pharmaceutical production and medical device assembly; Advanced Manufacturing Zone: High-precision engineering, automation and robotics, Industry 4.0 integration and smart factory demonstrations; Logistics and Supply Chain Management: Warehousing facilities, distribution centers, cold chain infrastructure, smart logistics platforms; Data Centre Cluster: Hyperscale data centres including StepWest development, cloud computing infrastructure and AI processing facilities; AgriTech Innovation Park: Precision agriculture technology, controlled-environment agriculture and food technology R&D.

Support for SMEs and local enterprises

Despite its massive scale, IBTEC incorporates strategic support mechanisms for small and medium enterprises (SMEs) and local Malaysian businesses. JLG has committed to providing: Shared facilities and collaborative spaces; Plug-and-play infrastructure for rapid business deployment; Partnerships with larger industry players for supply chain integration; Skills development and workforce training programs. Managing Director Datuk Akmal Ahmad emphasized: "We will measure IBTEC's success not only by the investments it attracts, but by how it helps Malaysians and Johoreans move up the value chain as workers, entrepreneurs and communities".

Economic sectors and investment incentives

The JS-SEZ provides differentiated incentive packages across 11 key economic sectors, designed to attract high-value investments and create sustainable employment: Logistics and smart logistics complexes; Manufacturing such as downstream specialty chemicals, electronics and precision engineering; Financial services and fintech; Business services and global services hub; Digital economy such as data centres, cloud computing and AI; Tourism such as integrated tourism projects and eco-tourism; Food security and AgriTech; Education such as EdTech and international education hubs; Health and MedTech; Energy and renewable energy; Green economy and sustainability initiatives. Investment targets include creating 20,000 jobs and developing 50 projects within the first five years, scaling to 100 projects within ten years.

Infrastructure connectivity and cross-border integration

Transportation networks

For the industrial potency of the JS-SEZ's to realize, excellent multimodality connectivity must exist which includes (Mohd Yusop and Permana, 2016; Rizzo and Glasson, 2012): Airports: Senai International Airport for Flagship E and F regions; Seaports: Port of Tanjung Pelepas for Flagship C, Tanjung Langsat Port for Flagship D and Pasir Gudang Port; Railway: Kulai railway station, planned RTS Link (Rapid Transit System) to connect Johor Bahru and Singapore.; Highways: North-South Expressway, Senai-Desaru Expressway and coastal highway networks; Causeway connections: Johor-Singapore Causeway and Malaysia-Singapore Second Link.

Digital infrastructure

Beyond physical connectivity, the JS-SEZ emphasizes digital infrastructure as a competitive differentiator (Mytton and Ashtine, 2024; Chatlatanagulchai and Chantrapornchai, 2024; Ichinose et al., 2022; Shah et al., 2018): Fiber-optic backbone across flagship areas; 5G network deployment in industrial areas; Smart city platforms in Iskandar Puteri and Forest City; IoT sensor networks for supply chain visibility; Cloud computing and edge computing facilities within data centre clusters.

Comparative analysis: JS-SEZ in regional context

The *Table 4* represents the JS-SEZ's scale and cross-border integration model positions it distinctively within Southeast Asia's special economic zone landscape (Frick et al., 2019; Alkon, 2018). This positioning enables investors to leverage lower trade barriers, Singapore's business expertise, and Johor's cost advantages within a single integrated ecosystem (Frick et al., 2019; Alkon, 2018; Rizzo and Glasson, 2012).

***Table 4**. SEZ comparative competitive advantages.*

Dimension	JS-SEZ Competitive Position
Geographic scale	3,588 km² among largest SEZs in ASEAN region
Cross-border framework	Unique bilateral Malaysia-Singapore regulatory harmonization
Data centre density	Highest concentration in Southeast Asia about 80% of Malaysia's IT capacity
Industrial diversity	11 promoted sectors across 9 specialized flagship zones
Sustainability focus	Circular city model (IBTEC), renewable energy integration and green economy incentives
Strategic location	Access to Singapore's financial, business services and Johor's cost-competitive manufacturing

Implications for Sustainable Development Goal (SDG) and urban planning

Alignment with Sustainable Development Goals (SDGs)

The JS-SEZ explicitly integrates these sustainability considerations aligned with the United Nations Sustainable Development Goals (SDGs) (Mytton and Ashtine, 2024; Zanudin et al., 2024; Ichinose et al., 2022; Shah et al., 2018; Rizzo and Khan, 2017; Behboudi et al., 2015). These considerations include SDG 8 (Decent Work and Economic Growth), which focuses on job creation, including 20,000 jobs in five years, skills development and SME support. SDG 9 (Industry, Innovation, and Infrastructure) is reflected through cutting-edge manufacturing processes, innovation integration and digitalization. SDG 11 (Sustainable Cities and Communities) is represented through the circular city at IBTEC Sedenak, smart cities and an integrated approach to urban industrial planning. SDG 13 (Climate Action) is addressed through renewable energy goals for data centres, green business initiatives and decarbonization strategies.

Circular economy and regenerative design

IBTEC's ideas to envision circular industrial towns deviates from typical industrial zone planning (Mytton and Ashtine, 2024; Ichinose et al., 2022; Shah et al., 2018; Behboudi et al., 2015). Under their circular city concept, key factors include waste-to-resource initiatives including integrating of industrial byproducts, green energy initiatives such as solar farms operations and renewable energy development infrastructure, water management solutions including recycling, principles and energy-efficiency in buildings design, and accessible transportation for public use with minimal car dependence. The model addresses crticisms of industrial zones as potential negative

environmental impact and in instead highlights (Mytton and Ashtine, 2024; Ichinose et al., 2022; Shah et al., 2018; Behboudi et al., 2015).

Critical and challenges considerations

Land administration and governance

For 3,588 km² to be accommodated in nine flagship areas strong land administration systems will need to exist to govern the following (Zanudin et al., 2024; Zanudin et al., 2022; Rizzo and Khan, 2017; Sultan et al., 2016). This includes coordination among federal, state, and local government authorities, land acquisition and conversion processes, land for reserved purposes (see Section 62 Reserved Land), sharing benefits equally between landowners and developers, and appropriate land valuation and compensation.

Housing accessibility and affordability

Rapid industrial development generates housing demand pressures. Ensuring affordable housing accessibility for the projected workforce growth (20,000+ jobs) requires integrated residential planning within or adjacent to flagship areas, public housing programs aligned with industrial workforce needs especially in JS-SEZ areas, transportation infrastructure connecting affordable housing areas to employment centers, and rent control or affordable housing programmes or scheme for large-scale developments (Zanudin et al., 2024; Zanudin et al., 2022; Sultan et al., 2016; Razak et al., 2016). IBTEC's commitment to "resilient, community-focused environments that include housing, amenities, public spaces, and mobility solutions" represents a positive integration of residential and industrial planning (Zanudin et al., 2024; Zanudin et al., 2022; Sultan et al., 2016; Razak et al., 2016).

Digital division and gap of skills

The digital economy is really taking off with things like data centres, artificial intelligence and cloud computing (Mytton and Ashtine, 2024; Chatlatanagulchai and Chantrapornchai, 2024; Ichinose et al., 2022). If we do not make sure that people have the right skills it could make a big difference between the rich and the poor. We need to do something about it. We need to teach people the skills that they need to work in the economy like what they call Industry 4.0. We need to teach people who are already working how to use computers and other digital tools so they can do their jobs better. Companies, schools and the government need to work to make sure that people are learning the right things. We need to give people a chance to learn by doing, like with apprenticeships. This can happen at places, like IBTEC and data centres. The digital economy is important. We need to make sure that people have the skills they need to work in the digital economy.

Future recommendations and research pathways

Investment pipeline and economic projections

The first five years of the JS-SEZ from 2025 to 2030 will be very important for getting things started. The investments that have been promised and approved far show that things are off to a good start especially in a few areas. These include building data centres with plans for than 42 facilities, expanding manufacturing in the Senai-Skudai

and Tanjung Langsat areas, developing logistics and warehouses near the Port of Tanjung Pelepas, and creating MedTech and life sciences facilities within IBTEC Sedenak. For the JS-SEZ to be successful, in the run it needs to keep getting investments even after the initial incentives are gone. The JS-SEZ also needs to show that it can really improve productivity and come up with ideas (Frick et al., 2019; Alkon, 2018).

Research framework

We need to look at some things in studies about special areas where businesses can operate with special rules (Zanudin et al., 2024; Zanudin et al., 2022; Frick et al., 2019; Alkon, 2018). We have to see how well the people in charge are doing their jobs. This means looking at how different countries work together to make rules how fast the government can get things done and if the people investing money are happy (Zanudin et al., 2024; Zanudin et al., 2022). We need to figure out how these special areas affect the economies are they creating jobs are people earning good money are small businesses in the area benefiting and is the government getting enough money from taxes (Frick et al., 2019; Alkon, 2018). We also have to check if these areasre good for the environments are they reducing the bad things they release into the air are they using renewable energy sources and are they using resources in a way that does not harm the planet (Mytton and Ashtine, 2024; Ichinose et al., 2022; Shah et al., 2018; Behboudi et al., 2015). We need to see if everyone is being treated fairly that can people afford to buy or rent homes is there a difference between how much money rich and poor people have are people being forced to leave their homes and are the benefits of these areas being shared equally among all groups of people (Zanudin et al., 2024; Zanudin et al., 2022; Sultan et al., 2016; Razak et al., 2016). We should also compare these areas to others in Southeast Asia for example we can look at the Eastern Economic Corridor in Thailand and the industrial areas, in Vietnam to see how they are doing things differently (Frick et al., 2019; Alkon, 2018).

Conclusion

The JS-SEZ is a change in the way we plan for economic growth across borders (Frick et al., 2019; Alkon, 2018; Rizzo and Glasson, 2012). It brings together industrial areas, digital infrastructure and a commitment to being sustainable across a huge area of 3,588 km² in southern Johor in Malaysia. This analysis shows us three patterns. First the JS-SEZ has nine areas that focus on different industries, like financial services in Johor Bahru Waterfront and Forest City and petrochemicals in Pengerang PIPC. Second the JS-SEZ has a lot of data centres with over 50 of them which's about 80% of Malaysias IT capacity in the Kulai-Sedenak zone. This makes the JS-SEZ the best place for data centres in Southeast Asia, which is important for cloud computing, AI and growing the economy (Mytton and Ashtine, 2024; Chatlatanagulchai and Chantrapornchai, 2024; Ichinose et al., 2022; Shah et al., 2018). Third the IBTEC development is a project that covers 7,300 acres and is worth RM27 billion. It is a space for innovation with MedTech, advanced manufacturing, logistics, data centres and AgriTech all working together in a city that is designed to be sustainable and fair for everyone.

The JS-SEZ will be successful if it can show that industrial development can be good for the economy the environment and society at the time (Mytton and Ashtine, 2024; Zanudin et al., 2024; Ichinose et al., 2022; Frick et al., 2019; Alkon, 2018; Rizzo and

Khan, 2017; Behboudi et al., 2015). It is not about how much money is invested or how many jobs are created. For people who study administration, land governance, urban planning and economic development the JS-SEZ is a great example to study (Zanudin et al., 2024; Zanudin et al., 2022; Yasin et al., 2021; Rizzo and Khan, 2017; Sultan et al., 2016; Razak et al., 2016; Mohd Yusop and Permana, 2016; Rizzo and Glasson, 2012). It shows how planning, working together across borders and planning infrastructure can shape the economy of a region. As Malaysia and Singapore work together in this way the industrial landscape will keep changing. We need to keep an eye on it evaluate it carefully and be able to adapt to changes so that the JS-SEZ can be a model for other special economic zones in Southeast Asia and beyond by 2030. The JS-SEZ is a project and the JS-SEZ will be important, for the future.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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