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**Agglomeration without Growth?
A Comprehensive Assessment towards Palembang's Industrial
Agglomeration Policies**

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Abstract: This study undertakes a comprehensive assessment of Palembang's industrial agglomeration performance while also map policy interventions required to strengthen future outcomes. Using a mixed-method approach, we construct a five-dimensional Industrial Agglomeration Index: Capital Access (CAP), Infrastructure (INF), Local Market Conditions (LOM), Labor Availability (LAB), and Living Quality (HDI), to later examine its relationship with Palembang's Balassa Index over 2015–2024. Despite Palembang's poor performance when being compared nationwide, quantitative findings instead reveal a positive transformation within the city's manufactures, with the Index rising from -0.133 to 0.609 under a 10-year observation span. However, when being deepened from each dimension, progress remains uneven; LOM, INF, and LAB exhibit persistent volatility. Regression analysis uncovers a significant one-to two-year temporal lag between agglomeration conditions and realized industrial performance. Qualitative insights from stakeholder interviews identify three priority interventions: sustained infrastructure investment, local market development, and labor market stabilization. The findings demonstrate that effective agglomeration policy requires coordinated, multi-dimensional attention and a medium-term evaluation horizon to deliver inclusive growth. Those requirement becomes really urgent for a city like Palembang to increase their manufacturing power and achieve stable economic growth.

Keywords: Industrial Agglomeration, Infrastructure and Spatial planning, Mixed-methods, Policy Intervention, Palembang.

Introduction

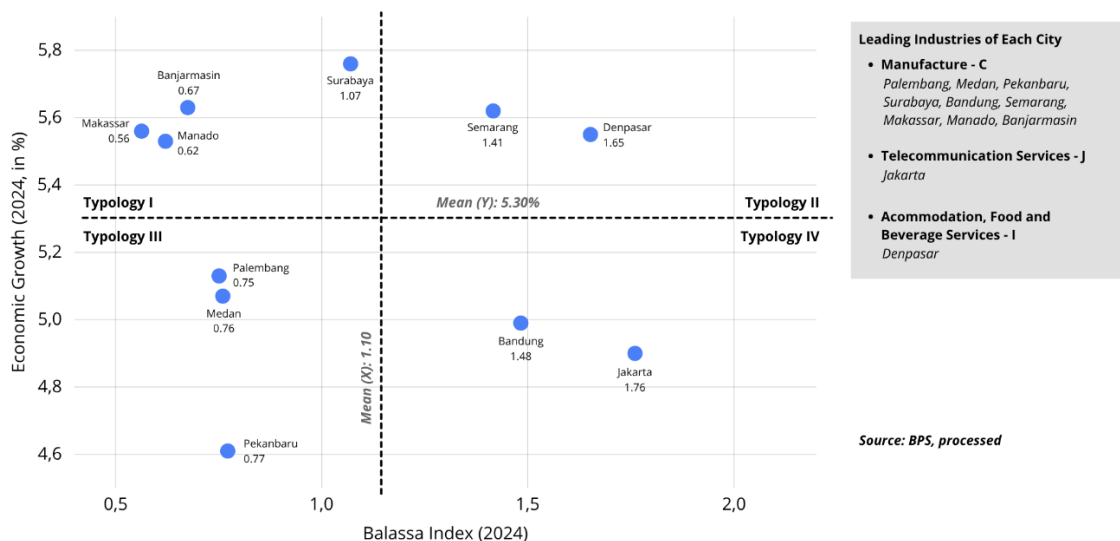
Indonesia's pursuit of inclusive and sustainable economic growth remains intrinsically linked to the performance of its industrial sector. As a nation endowed with abundant natural resources and a large domestic market, industrialization has long been viewed as the

primary engine for structural transformation, job creation, and value addition. Successive governments have prioritized industrial development to propel the country toward higher-income status, with particular emphasis on moving beyond resource-based activities into manufacturing and high-value services. The ambition to achieve 8 percent economic growth, as articulated under the current administration, further underscores the urgency of revitalizing the industrial sector (Cabinet Secretariat of the Republic of Indonesia, 2025). Yet, the challenge lies not merely in expanding industrial output, but in ensuring that the benefits of such expansion are distributed equitably across regions.

In addressing this dual objective of growth and equality, the concept of industrial agglomeration has gained significant traction in both policy circles and academic discourse. Agglomeration—the geographic concentration of firms and industries—is theorized to generate productivity gains, knowledge spillovers, and labor market efficiencies (McCann & Oort, 2019; Ottaviano & Puga, 1998). When managed effectively, agglomeration can serve as a vehicle for reducing regional disparities by channeling investment and employment to areas traditionally left behind by Java-centric development. Recognizing this potential, the Indonesian government has designated several regions outside Java as National Strategic Areas (Kawasan Strategis Nasional) for industrial agglomeration. Among them, Palembang, the capital of South Sumatra, stands as a critical case.

Palembang occupies a unique position in Indonesia's industrial geography. As the capital of South Sumatra, it functions as a logistical and administrative hub for a province rich in agriculture and extractive industries. Since 2015, Palembang has been formally included as one of the new National Strategic Areas intended to foster industrial agglomeration. This designation reflects a policy shift aimed at decentralizing industrial activity and leveraging the city's strategic location along the Musi River and its existing infrastructure base.

Figure 1. **Typologies of Agglomeration Index (x) and GDRP growth rate (y) of All Indonesian Metropolises in Statistical Year of 2024**



Source: Statistics Indonesia, 2025

Despite these policy intentions, empirical evidence suggests that Palembang's industrial performance has yet to match its strategic ambitions. As illustrated in Figure 1 above, the city continues to underperform across key indicators of agglomeration and growth. Its

manufacturing Location Quotient (LQ), a standard measure of industrial specialization, remains low relative to other major urban centers, while its Gross Domestic Regional Product (GDRP) growth rate has shown limited momentum over the past decade.

Perhaps more concerning, urban poverty in Palembang remains among the highest in Indonesia, even as its population has increased rapidly. This combination of stagnant industrial concentration, modest economic growth, and persistent poverty raises fundamental questions about the effectiveness of current agglomeration policies.

Moreover, the existing literature on agglomeration in Indonesia has predominantly focused on Java-based industrial clusters, leaving a notable gap in our understanding of how agglomeration dynamics unfold in secondary cities such as Palembang (Widodo, 2014; Octifanny & Hudalah, 2017; Hardjoko et al., 2021). Studies that do examine Palembang tend to rely on conventional measures like the Balassa Index without systematically accounting for the multi-dimensional nature of agglomeration conditions such as infrastructure readiness, labor market quality, and institutional capacity (Mukhlis et al., 2017; Imelda & Yunisvita, 2020; Hariyanto et al., 2024).

Guided by this approach, the paper seeks to answer the following research question: To what extent has Palembang's industrial agglomeration performed? and what policy interventions are required to strengthen future agglomeration outcomes?

This study addresses that gap by undertaking a comprehensive assessment of Palembang's industrial agglomeration performance. Specifically, we construct a multi-dimensional Industrial Agglomeration Index that captures five key dimensions: capital access (CAP), infrastructure (INF), local market conditions (LOM), labor availability (LAB), and living quality (HDI). We then examine the relationship between this composite index and Palembang's Balassa Index—a measure of industrial specialization—over the period 2015–2024. To further enrich our analysis, we integrate qualitative insights from in-depth interviews with key regional stakeholders, enabling a more nuanced understanding of the policy mechanisms underlying observed trends.

By answering this question, the study aims to provide evidence-based recommendations for refining agglomeration strategies in Palembang and, more broadly, for secondary cities across Indonesia that are navigating the complex interplay between industrial policy, regional development, and social equity.

Literature Review

Industrial Agglomeration in Indonesia

The study of industrial agglomeration has long been central to understanding regional economic development, particularly in emerging economies like Indonesia. Agglomeration—the spatial concentration of firms and industries—is theorized to generate productivity gains, knowledge spillovers, and labor market efficiencies (Marshall, 1920; Glaeser et al., 1992). In the Indonesian context, this phenomenon has become a defining feature of industrial development, yet empirical investigations into its determinants remain fragmented.

Early foundational studies established that industrial agglomeration in Indonesia is predominantly concentrated in Java, driven by natural market forces, infrastructure availability, and the presence of large firms that act as “first movers” in attracting subsequent investment (Narjoko, 2008; Kuncoro & Downing, 2025). Narjoko (2008), through a comprehensive firm-level survey, identified that factors such as physical infrastructure, government institutional support, skilled labor availability, and domestic market size are critical for establishing business operations and fostering agglomeration. Importantly, his work suggested that agglomeration is not a spontaneous process but one that requires deliberate capacity-building across multiple dimensions.

More recently, Widodo (2014) provided a rigorous examination of agglomeration economies at the firm level, confirming that specialization (MAR externalities) positively influences firm-level technical efficiency and productivity growth, while diversity (Jacobs’ externalities) yields mixed effects. His findings underscore that agglomeration benefits are not monolithic; rather, they depend on the interaction between firm characteristics and the broader regional environment, including infrastructure, labor quality, and market conditions.

Imantria (2025) further advanced this discourse by identifying determinants of manufacturing agglomeration across Indonesian provinces, finding that average years of schooling, road infrastructure, wages, and per capita income exert significant positive effects, while labor force and labor productivity show negative associations—suggesting the onset of diseconomies of agglomeration where firms begin to relocate due to rising costs.

Taken together, these studies reveal a critical gap: while individual dimensions such as infrastructure, labor, and capital have been examined separately, no single study has integrated them into a unified, multi-dimensional framework to holistically assess industrial agglomeration performance. Previous research tends to focus on singular or partial determinants, often relying on classic indices like the Balassa Index, which captures only industrial specialization without accounting for the enabling environment that sustains agglomeration.

Therefore, this study adopts a five-dimensional Industrial Agglomeration Index, encompassing Capital Access (CAP), Infrastructure (INF), Local Market Conditions (LOM), Labor Availability (LAB), and Living Quality (HDI). This approach, inspired by Narjoko’s (2008) emphasis on capacity-building factors and Widodo’s (2013) firm-level insights, allows for a more comprehensive assessment of how multiple enabling conditions collectively shape agglomeration outcomes. By moving beyond single-indicator measurements, this framework better captures the complex interplay of factors that determine whether a region can successfully attract, sustain, and benefit from industrial concentration—a critical consideration for policy formulation in Palembang and similar secondary cities navigating Indonesia’s evolving industrial landscape.

Agglomeration Literatures in Palembang/South Sumatra

Existing empirical studies on industrial agglomeration in Palembang and South Sumatra, while insightful, reveal a fragmented understanding of the phenomenon. Early work by Mukhlis et al. (2017) established that agglomeration in South Sumatra remains relatively

weak, with a Balassa Index value between 1 and 2, and found that economic growth, population, and regional inequality significantly influence agglomeration formation. Their simultaneous equation model demonstrated that agglomeration, in turn, negatively affects income inequality—suggesting that concentration of economic activity could potentially narrow regional disparities. However, their analysis was constrained by the use of a single-dimension agglomeration measure (Balassa Index) and aggregated provincial-level data, limiting its ability to capture the multi-faceted nature of agglomeration drivers.

Subsequent studies attempted to map spatial concentration more granularly. Rorencia et al. (2024) applied the Herfindahl-Hirschman Index (HHI) to measure large and medium industry concentration across districts in South Sumatra, finding that Palembang City consistently exhibited the highest spatial concentration from 2019 to 2021, while Ogan Komering Ulu Selatan remained the lowest. Their findings confirmed that infrastructure quality and market accessibility are key determinants of industrial location. Yet, their analysis focused solely on employment-based concentration without examining the underlying causal factors or linking concentration to broader outcomes such as productivity or welfare.

Barika et al. (n.d.) extended the regional perspective by applying Klassen typology to seven southern Sumatra provinces, revealing that 57.14 percent of provinces—including South Sumatra, Bengkulu, Lampung, and Jambi—fall into the category of “developed but depressed” regions, characterized by above-average growth but below-average per capita income. Notably, they found that South Sumatra is the only province with a Balassa Index exceeding 1, yet this agglomeration has not translated into equitable welfare gains, as evidenced by persistently high poverty in neighboring regions. Their work, however, did not explore why agglomeration benefits fail to spill over effectively.

Collectively, these studies suffer from three key weaknesses: (1) reliance on single-indicator measures of agglomeration (Balassa Index or HHI) that fail to capture the multi-dimensional enabling environment; (2) limited attention to the temporal lag between agglomeration conditions and their realized effects; and (3) insufficient integration of qualitative insights to explain why agglomeration policies succeed or fail in specific local contexts.

This study addresses these gaps by constructing a five-dimensional Industrial Agglomeration Index (CAP, INF, LOM, LAB, HDI) that captures the full spectrum of agglomeration determinants. Furthermore, we explicitly test for temporal lag effects between agglomeration conditions and industrial specialization, and complement quantitative findings with in-depth stakeholder interviews to uncover the institutional and policy mechanisms underlying agglomeration outcomes in Palembang. A more particular explanation would be explained through the Methods segment.

Methods

Overview of Research Design

To answer the research questions regarding the development of Industrial Agglomeration policies in Palembang, this research mainly employs the technique of measuring Industrial Agglomeration Index. The selection of the technique is based on its convenience in

understanding determinants indicators towards industrial agglomeration success, and also its initialization which was made according to the studies in Indonesia. Narjoko (2008) determined indicators to agglomeration success after conducting studies connecting policies-firm behaviors in early Javanese agglomeration areas in early 2000s. Multiple studies have also followed this model upon the same purpose and each found conclusive findings (Negara, 2010; Widodo et al., 2014; Prihadyanti, 2017; Imantria, 2025).

However, the Index is not the sole measurement in assisting this research to reach its conclusions. There are two identified challenges in using Narjoko's Industrial Agglomeration Index, which are:

- This model has not previously been tested in any previous Palembang (or South Sumatra) agglomeration studies. Instead, studies in Palembang's agglomeration policies are centered using a more classic index – the agglomeration or “Balassa Index” (Mukhlis et al., 2017).
- Available data to support the study is limited. BPS – Indonesia's main statistical data provider – only covered the years of 2015-2024 on their online database. This leads to a relatively minimum amount of observation to only 10.

Therefore, to address those challenges, our research decided to extend the collecting and analysis method into two further analytical streams. After finishing the Index calculation, we are testing the results with the existing Balassa Index of Palembang's agglomeration performance. Second, we also add an-extra layer of qualitative data collection by conducting in-depth interviews with relevant stakeholders on agglomeration policies.

Those additional streams helped enrich our research's design to now properly include mixed-methodology and hybrid data collection. Guided by previous studies, the inclusion of mixed-methodology is designed so that the methodology could reduce the amount of error by employing a single methodology of only qualitative-or-quantitative (Jiang et al., 2024; Salazar et al., 2024; Chamout & El-Adaway, 2025; Zahid et al., 2026).

Quantitative Data Collection

The model to measure Industrial Agglomeration performance in Indonesia, as being introduced by Narjoko (2008), consists of several dimensions and indicators as provided by Table 1 below. The table also includes relevant data source that supports the operationalization of this model.

Table 1. Dimensions, Indicators, and Operationalizations of Industrial Agglomeration Index

Dimension	Code	Indicator	Data Source	Note
Capital Access (CAP)	CAP1 – Investment subsidies	Total amount of local government subsidies intended to support industrialization process (in trillion Rupiah)	SIKD Portal by the Ministry of Finance	Captures the region's additional incentives to attract more firms besides several national incentives/tax reliefs

Infrastructure (INF)	INF1 – Road Infrastructure	Total road length with proper condition (km)	BPS	Measures the physical preparedness of a region to handle a higher degree of goods and labour mobility
	INF2 – Shipping Capacity	Z-average of: maximum capacity of local airports and shipping ports (tonnes)	Local Office of Transportation, processed	
	INF3 – Electricity	Total installed capacity of electricity (in MW)	BPS	
	INF4 – Water Supplies	Total installed capacity of water for business and households (in km3)	BPS	
	INF5 – Internet Coverage	The percentage of homes/buildings with internet access	BPS	
Size of Local Market (LOM)	LOM1 – Strength of local enterprises	Location Quotient (LQ) of wholesale and retail trade sector	Sakernas, processed	Represents the capability of local market to supply/absorbs emerging goods input/output
Labor Availability (LAB)	LAB1 – Availability of highly-skilled workforce	Total amount of highly educated workforce (graduating from at least senior high school)	Sakernas	Captures the potential amount of local labor prepared to scale-up industrialization
	LAB2 – Labor efficiency ratio	The ratio of labor productivity (IDR/person), divided by regional minimum wage (UMK)	Sakernas, processed	Maps the potential labor cost v. productivity that the incoming industries always consider
Living Quality (HDI)	HDI – Human Development Index	Total number of the city's HDI – a general numeric tool to measure its degree of education, healthcare, and living condition	BPS	Baseline indicator of basic services availability in the region

As we are also determined to test this model and connecting it with Balassa Index, the Index itself is derived from the formula of,

$$BI_{ij} = \frac{\left(\frac{E_{ij}}{\sum_i E_{ij}} \right)}{\left(\frac{\sum_j E_{ij}}{\sum_i \sum_j E_{ij}} \right)}$$

Where,

- E_{ij} = employment in sector i , region j
- $\sum_i E_{ij}$ = total employment in region j
- $\sum_j E_{ij}$ = total employment in sector i across all regions

- $\sum_i \sum_j E_{ij}$ = total employment across all sectors and all regions

Data source of employment used in measuring this Balassa Index is mainly referred towards Sakernas statistics.

Qualitative Data Collection

The sources of qualitative data to support this research is derived from a series of in-depth interviews involving relevant stakeholders in South Sumatra. Stakeholders contributing their insights towards our research includes:

- Regional Development Planning Board (*Badan Perencanaan Pembangunan Daerah/BAPPEDA*).
- Local Office of Public Works, Public Highways, and Spatial Planning (*Dinas Pekerjaan Umum, Bina Marga, dan Tata Ruang/Dinas PUBMTR*).
- Local Office of Transportation (*Dinas Perhubungan/Dishub*).
- Local Office of Energy and Mineral Resources (*Dinas Energi dan Sumber Daya Mineral/DESDM*).

The structure of research questions refers to the indicators and dimensions of Industrial Agglomeration performance, as explained by Table 1.

Data Processing and Analysis

Since each indicator of Industrial Agglomeration is gathered with different units, the processing and harmonization step is required to help track the true value of yearly progress. In doing so, our research employs three particular steps of data processing, which are:

Standardization, whereas the z-score method is employed. The standardization process would observe the transformation of initial (raw) data into values considering a mean of zero and a standard deviation of one. The formula we are using to calculate the z-score is,

$$z = \frac{x - \mu}{\sigma}$$

Where X is the raw value of indicator i in year j , while μ and σ respectively represents the indicator's mean and standard deviation.

Weighting, with a further two-step approach consisting of:

Dimensional weighting, in which equal weights are divided into five dimensions of industrial agglomeration (CAP, INF, LOM, LAB, HDI) – this reflects their equal conceptual importance (Narjoko, 2008; Widodo, 2014). Indicator-level weighting, whereas within each dimension, each indicator also shared similar weights. This is also employed to reflect their equal conceptual importance. Each weight for each indicator would be multiplied with the initial standardized score (z-score) to form the aggregated value. Aggregation, whereas after all datasets for each indicator have been standardized and weighted, scoring from all five dimensions would be combined using simple means to form the Industrial Agglomeration score for each year. The final formula is,

$$IAI_j = w_1 \cdot CAP_j + w_2 \cdot INF_j + w_3 \cdot LOM_j + w_4 \cdot LAB_j + w_5 \cdot HDI_j$$

Where,

- IAI_j = Industrial Agglomeration Index for year j
- $w_1, w_2, \dots, w_5$ = Weights for each dimension

Later, we run the regression to identify the relationship between the Industrial Agglomeration Index and actual Balassa Index. The formula we were testing is,

$$BI_{ij} = \beta_0 + \beta_1 \cdot IAI_j + \epsilon_{ij}$$

Where,

- BI_{ij} = Balassa Index for sector i in year j
- IAI_j = Industrial Agglomeration Index for year j
- β_0 = intercept
- β_1 = coefficient measuring the effect of Industrial Agglomeration on Balassa

To complete the studies, results from qualitative data collection were combined. The analytical model we are using is the Process Tracing – as it views the flow of any socio-political phenomenon being divided by two sides of: (a) the causes or causal mechanism; and (b) the causal effects.

We put the results of each dimension of the Industrial Agglomeration Index as the causal effects. Policy interventions that influence the effects are put as the causal mechanism – this is the core of data we aimed to gather from the local stakeholders. By applying this analytical model, the research would not just be successful in combining both qualitative and quantitative data, but also ends up highlighting conclusive results.

Methods section describes the steps followed in the execution of the study and also provides a brief justification for the research methods used (Perry et al., 2003:661). It should contain enough detail to enable the reader to evaluate the appropriateness of your methods and the reliability and validity of your findings. Furthermore, the information should enable experienced researchers to replicate your study (American Psychological Association, 2001:17).

The methodology section typically has the following sub-sections:

Sampling (description of target population, research context and units of analysis; sampling; and respondent profile), data collection, measures (Alternatively: Measurement).

Findings

Palembang's Industrial Agglomeration Performance

After conducting a series of data collecting and processing, the Industrial Agglomeration Index of Palembang is visible through Table 2 below. To assess whether Palembang's

agglomeration policies have translated into improved industrial specialization, this study examines the temporal relationship between the composite Industrial Agglomeration Index (through “Total”) – comprising government incentives (CAP), infrastructure (INF), local market (LOM), labor market (LAB), and living quality/human development (HDI).

Table 2. Palembang’s Industrial Agglomeration Index, statistical year 2015-2024

Year	CAP	INF	LOM	LAB	HDI	Total
2024	0.210	0.165	-0.060	0.000	0.294	0.609
2023	0.295	0.243	-0.349	-0.231	0.239	0.198
2022	0.274	0.382	-0.034	0.091	0.189	0.902
2021	0.193	0.302	-0.202	-0.212	0.119	0.199
2020	-0.162	0.001	0.043	-0.014	0.083	-0.049
2019	-0.162	-0.174	0.056	0.045	-0.074	-0.309
2018	-0.162	-0.210	-0.116	-0.128	-0.127	-0.743
2017	-0.162	-0.214	0.008	0.115	-0.191	-0.443
2016	-0.162	-0.318	0.331	0.171	-0.251	-0.230
2015	-0.162	-0.177	0.323	0.162	-0.280	-0.133

The data reveals a striking transformation. Despite ranked poorly when being compared nationwide, Palembang’s industrial agglomeration has actually jumped from -0.133 score to 0.609 in a 10-year span of 2025. This is a notable improvement despite showing a three-segmented development period of Scattered development in 2015-2018, where its Industrial Agglomeration notably plummeted. The scoring even gained its 10-year lowest point in 2018, as the city only scored -0.743. It indicates that, during this 4-year period, policies related to industrialization and/or agglomeration does not have any clear direction. Pandemic-related decline in 2019-2021, whereas the city’s index still relatively weak compared to years afterward. However, significant recovery period has shown since 2020. Infrastructure indicators got better and supported with a positive government incentive that kept growing later. Total rebound and clear positive development from 2022 onwards – with the highest score was proven in 2022 (0.902). This positive trend continued until 2024, as the latest score of Palembang’s industrial agglomeration still stands at 0.609.

Returning to the central research question of, What sectoral improvements are required to improve Palembang’s agglomeration performance? the data points out the need to improve policy interventions in three dimensions of local market (LOM), infrastructure (INF), and labor availability (LAB).

First, local market conditions (LOM) represent the most urgent area for intervention. With a score of -0.060 in 2024 and persistent negativity since 2021, this dimension remains Palembang’s weakest link. Improving local market conditions through strengthening supply chains, expanding domestic demand, and supporting small and medium enterprise.

Second, infrastructure (INF) requires restoration and sustained investment. The Industrial Agglomeration index, divided a city’s infrastructure into five distinct indicators. In the case of Palembang, this number is varied with particular indicators shows continuous improvement, while the others have not. A detailed explanation on this dimension is visible through Table 3.

Table 3. **Industrial Agglomeration Index on Palembang's Infrastructure Dimension**

Year	INF1	INF2	INF3	INF4	INF5
	Road	Port Capacity	Electricity	Water	Internet
2024	-0.018	-0.017	0.017	-0.028	0.053
2023	0.009	-0.056	0.029	-0.034	0.046
2022	0.040	-0.027	0.023	0.072	0.036
2021	0.001	0.009	0.051	0.048	0.035
2020	0.092	-0.016	0.042	0.045	0.010
2019	-0.018	-0.010	0.004	0.011	-0.010
2018	-0.037	0.050	-0.003	-0.057	-0.019
2017	-0.037	0.036	-0.036	-0.015	-0.038
2016	-0.046	-0.009	-0.080	-0.022	-0.050
2015	0.014	0.040	-0.047	-0.022	-0.064

The indicators scoring reveals that Palembang's infrastructure strength lies on its internet and electricity access. Initial data from both the BPS and regional PLN offices also confirmed this strength. The internet access has reached over 80% of the city's total population, while the electricity supply has even surpassed its demand thanks to the installation of new power plants and transmission lines. Other three indicators, however, requires more intention to keep its number positive. The government should work on maintaining proper road condition, particularly ensuring convenient access towards industrial hubs and intra-regional facilities. Similar attention should also be provided towards port (and seaport) capacity, also the access to clean water which has been declining since 2023.

Third, Palembang's labor availability (LAB) also demands more attention. The volatility in LAB scores, ranging from -0.231 in 2023 to 0.171 in earlier years, suggests that workforce dynamics are not yet stable enough to support sustained agglomeration. Policies aimed at reducing labor market fluctuations, such as workforce training alignment with industry needs and wage stability, would complement improvements in other dimensions.

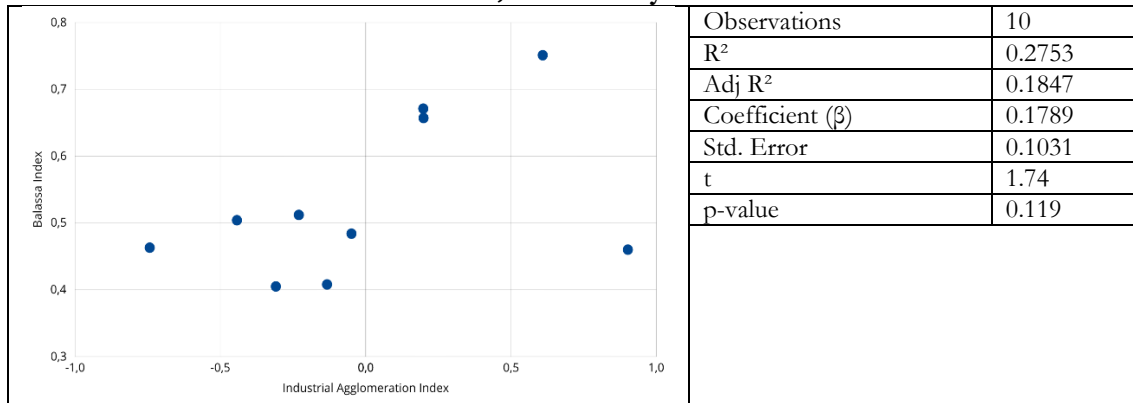
In contrast, living quality (HDI) and government incentives (CAP) to support industrial agglomeration have consistently shown significant improvements – although there are also notable inputs towards these two indicators. Regarding HDI, despite Palembang scored a high living quality through its Human Development Index, the rate of poverty within the city is still comparatively high. It indicates that, despite the city has been successful in providing basic needs that increase its industrial attractiveness, actual impacts to the locals' condition might require further attention.

While for the government incentives (CAP), our research only measures direct fiscal allocation to support investment recorded by the Ministry of Finance's portal. Other forms of incentives such as particular allowances, tax holiday, or tax exemption – usually implemented in any Special Economic Zones (SEZ) – are discounted by our model. Palembang's initiative to form the SEZ in Tanjung Api-Api and Tanjung Enim has also been halted. No significant economic infrastructures have been poured. This might shown a positive scoring in Palembang's CAP, yet with no actual SEZ, the city might lose its attractiveness towards emerging industrial area that offer more generous incentives from the central government.

Testing the Model with Balassa Index

As we test the model into Palembang's Balassa Index – the findings shows a more directed alternative to linking both models of Industrial Agglomeration and Balassa Index. The regression results are described by Table 4 below, while the results of Palembang's Balassa Index (2015-2024) are as follow, 2015 (0.408); 2016 (0.512); 2017 (0.504); 2018 (0.463); 2019 (0.405); 2020 (0.484); 2021 (0.657); 2022 (0.460); 2023 (0.671); 2024 (0.751).

Table 4. Regression results of Industrial Agglomeration Index with Palembang's Balassa Index, statistical year 2015-2024



According to the regression, it reveals a positive but statistically insignificant relationship between TOTAL and BI ($\beta = 0.180$, $p = 0.119$). The model explains 27.5 percent of the variation in BI ($R^2 = 0.275$), though the adjusted R-squared drops to 18.5 percent, indicating some overfitting given the limited sample size. It indicates that same-year agglomeration conditions do not reliably predict industrial specialization in Palembang. The coefficient, while positive, fails to reach conventional significance levels ($p > 0.05$), and the confidence interval crosses zero ($[-0.058, 0.418]$).

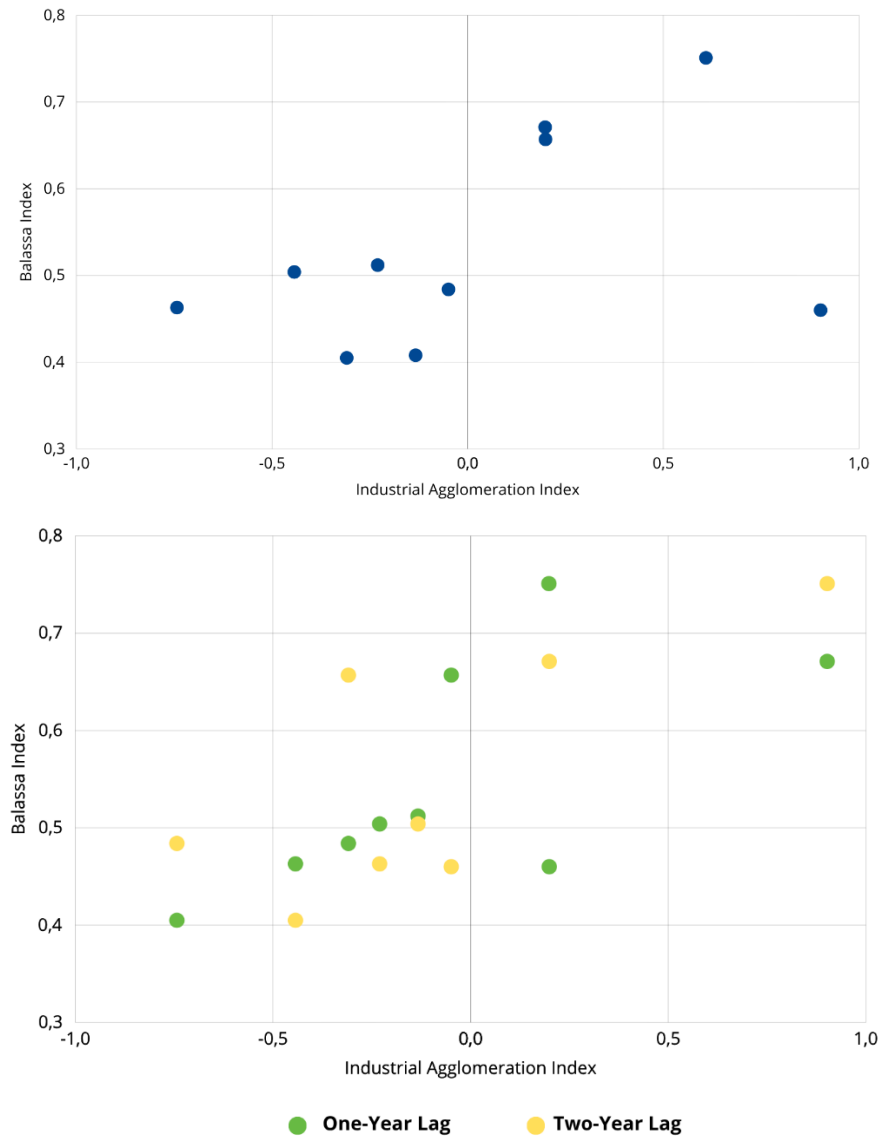
This finding is not unexpected from a theoretical standpoint. Agglomeration effects—such as firm entry, workforce mobility, and knowledge spillovers—are rarely instantaneous. Improvements in incentives, infrastructure, or human capital typically require time to translate into measurable gains in industrial concentration, only being insignified by the model explained by Narjoko (2008). The absence of a significant contemporaneous relationship therefore warrants further investigation into whether a temporal lag exists between improvements in agglomeration conditions and their realization in BI.

Our research, then, examines whether agglomeration conditions exhibit temporal lag effects on industrial specialization – and the results supported this argument. Table 5 below presents the regression results for direct (contemporaneous), one-year, and two-year lag specifications linking the two models.

Table 5. Regression Results of Palembang's Industrial Agglomeration Index and Its Balassa Index after Considering One and Two-year Time Lag Into the Formula

Test	Observations	R ²	Adj R ²	Coefficient (β)	p-value
One-Year Lag	9	0.4895	0.4165	0.2535	0.036
Two-Year Lag	8	0.5778	0.5075	0.2848	0.029

Figure 2. **Contemporaneous Regression (Upper) and the Time-lagged Regression (Bottom)**



The one-year lag model reveals a statistically significant positive relationship ($\beta = 0.254$, $p = 0.036$), explaining 49.0 percent of the variation in BI. The two-year lag model yields even stronger results ($\beta = 0.285$, $p = 0.029$), explaining 57.8 percent of the variation in BI—more than double the explanatory power of the contemporaneous model.

Notably, the 2022 TOTAL peak (0.902) corresponds with the 2023 Balassa Index rebound (0.671) and the 2024 Balassa Index peak (0.751) -- a pattern that descriptively validates the two-year lag finding. The 2021 Industrial Agglomeration improvement (0.199) similarly precedes the 2023 Balassa Index gain, though the 2022 anomaly (where a high Industrial Agglomeration performance goes alongside a low Balassa Index) reinforces the necessity of examining lagged rather than contemporaneous effects.

These results indicate that agglomeration conditions in Palembang do not influence industrial specialization instantaneously. Instead, improvements in government incentives,

infrastructure, local market conditions, labor market, and living condition require approximately one to two years to translate into measurable gains in manufacturing concentration. The stronger performance of the two-year lag model suggests that the full effects of agglomeration policies materialize over a longer horizon. These results also provide new insights on using the Industrial Agglomeration model, being differed from past insights based on the model testings in multiple Javanese cities.

Taken together, these results establish that Palembang's agglomeration policies require a medium-term evaluation horizon. Immediate assessments are unlikely to capture policy effectiveness, whereas a two-year window provides a robust framework for understanding how improvements in agglomeration conditions translate into industrial specialization.

Discussions

To connect the causes of Palembang's industrial agglomeration performance with its actual policy, our research conduct series of in-depth interviews with local policy stakeholders. Lists of stakeholders met are South Sumatra Regional Development Planning Board (*BAPPEDA*), particularly government officials Economic Development and Financing sector. Interview was conducted twice on January 21st, 2026, and February 25th, 2026. South Sumatra Local Office of Public Works, Public Highways, and Spatial Planning (*Dinas PUBMTR*), particularly with the government officials on Spatial Planning sector. Interview was conducted on February 6th, 2026. South Sumatra Local Office of Transportation (*Dishub*), particularly with the government officials on Land and Water Transportation sectors. Interview was conducted on February 12th, 2026. South Sumatra Local Office of Energy and Mineral Resources (*DESDM*), particularly with the government officials on electricity related sector. Interview was conducted on February 5th, 2026.

The results are explained following each dimension of industrial agglomeration. Starting from the government incentives (CAP), BAPPEDA officials revealed that dedicated funding for investment facilitation was only institutionalized after 2021, channeled through national-to-regional transfer funds (TKDD). This timing aligns with the regression results: TOTAL entered positive territory in 2021, peaked in 2022, and the BI subsequently rose to its highest levels in 2023–2024. However, this funding was almost entirely cut in 2025, raising concerns about sustainability.

Palembang's protracted effort to establish a Special Economic Zone (SEZ) remains unfulfilled. The Tanjung Api-Api SEZ failed to materialize due to land ownership conflicts, while the Tanjung Carat port—now under construction with COD targeted for 2029—lacks clarity on whether it will be designated as an SEZ or simply serve as an industrial hub. Beyond Palembang, industrialization plans in Sungai Lais and Tanjung Enim remain in early stages. The absence of a finalized SEZ framework represents a structural constraint that has likely limited the effectiveness of Palembang's incentive framework compared to peers such as Semarang.

Dishub officials articulated a coherent strategy to strengthen Palembang's position as an industrial hub through expanded connectivity: double-track railway construction along the Muara Enim–Palembang corridor, five new flyovers to reduce bottlenecks, new highway exits for Kapalbetung and Palembang–Muara Enim, and development of private ports along the Musi River. Meanwhile, DESDM officials highlighted electricity readiness as a

strategic advantage, with oversupply already in place and the Tanjung Enim SEZ powered by a new 2×660 MW plant. The national gas pipeline (jargas) program further signals improving utility access on energy.

However, Dinas PUBMTR officials identified a critical institutional constraint: Palembang has not updated its Spatial Planning document since 2012, despite the provincial update responding to Presidential Regulation No. 23/2024. This disconnect may explain the volatility in INF scores—peaking at 0.382 in 2022 before declining to 0.165 in 2024—as infrastructure investments proceed without a coherent long-term framework.

The missing link could be pointed on the Local Market (LOM) dimension, which also represent Palembang’s most persistent weakness, remaining negative since 2021. BAPPEDA officials acknowledged a strategy to build new MSME market hubs, but emphasized that this must be coherent with spatial planning—a document that remains outdated. This institutional gap underscores the government’s unpreparedness in scaling up the local market to support agglomeration. Without a vibrant local market, the spillover effects of industrial concentration—job creation, local procurement, and knowledge diffusion—remain unrealized.

The absence of a strategic regional approach also appears to happen in improving the labor (LAB) dimension. BAPPEDA officials indicated that regional government intervention is limited to ensuring facilities are supplied to local schools, with no coordinated strategy to enhance high-skilled workforce supply or labor productivity. This gap contrasts sharply with successful agglomerated regions such as Surabaya and Semarang, which have implemented workforce development programs aligned with industry demand.

While for the living quality which represents Palembang’s most reliable success story, improving consistently from -0.280 in 2015 to 0.294 in 2024, qualitative evidence reveals that this improvement is largely driven by national government directives. Particularly, national directives in healthcare and education—which includes programs such as National Health Insurance (JKN) and school operational assistance (BOS). While this reliance on central programs has yielded results, it also suggests vulnerability should national priorities shift.

Conclusions

Our research conducted a comprehensive policy assessment, particularly to assess Palembang’s industrial agglomeration performance and identify policy interventions using mixed-methodology and multi-dimensional approaches. Through quantitative data collection, the use of Industrial Agglomeration Index has revealed that Palembang’s industrial agglomeration has undergone a striking transformation over the 2015–2024 period, with the Index rising from -0.133 to 0.609.

However, the aggregate improvement masks uneven progress across the whole five dimensions. While government incentives (CAP) and living quality (HDI) have shown consistent gains, critical dimensions such as infrastructure (INF), local market conditions (LOM), and labor availability (LAB) remain volatile and, in some cases, persistently weak. As we test the Industrial Agglomeration model with Balassa Index, another model oftenly use to measure agglomeration performance, the test reveals that agglomeration conditions

in Palembang do not influence industrial profficiency instaneously. Rather, a suggested one-to-two-year temporal lag exists. This finding underscores that Palembang's agglomeration policies might require a medium-term evaluation horizon to accurately capture their effectiveness.

Regarding required policy improvements, our quantitative findings were enriched with qualitative inputs gained through in-depth interview with South Sumatra local government officials. We identify three priority areas that future policies should address: First, infrastructure investments must be sustained and strategically targeted. While electricity and internet access are robust, road conditions, port capacity, and clean water access require urgent attention—particularly to ensure connectivity between industrial hubs and intra-regional facilities. Second, local market development demands immediate intervention. The persistently negative LOM-dimensional scores since 2021 indicate that supply chains, domestic demand, and small-medium enterprise support remain underdeveloped. Third, labor market stabilization is critical. The volatility in LAB scores reflects a mismatch between workforce skills and industry needs, compounded by the absence of a coordinated strategy to enhance high-skilled labor supply and labor productivity.

Ultimately, Palembang's agglomeration journey demonstrates that while improvements are achievable, they require coordinated, multi-dimensional policy attention that addresses not only incentives and infrastructure, but also the labor market and local economic ecosystem that together determine whether agglomeration delivers inclusive growth.

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