

STRENGTHENING LOCAL INDUSTRIAL CLUSTERS BASED ON ISLAMICS TO ENHANCE WEST JAVA'S COMPETITIVENESS IN THE ERA OF GLOBAL DISRUPTION

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Abstract Purpose—This paper aims to examine an Islamic-based policy model for strengthening local industrial clusters as a strategic instrument to enhance West Java's competitiveness in the era of global disruption. By integrating Islamic values such as justice, inclusiveness, cooperation (*ta'awun*), and sustainability, the study highlights how industrial clusters can contribute not only to economic growth but also to equitable and ethical regional development.

Design/Methodology/Approach—A mixed-methods research design was employed, combining qualitative policy analysis with a quantitative Analytic Network Process (ANP) framework to identify priority strategies and stakeholder roles. Primary data were collected through expert interviews, focus group discussions, and regional case studies, while secondary data were sourced from national and international industrial reports. The ANP model was utilized to capture interdependencies among policy dimensions, including innovation, human capital, infrastructure, digital readiness, governance, and Islamic economic principles.

Findings—The results indicate that innovation capability, digital adoption, and collaborative governance, when reinforced by Islamic values of fairness and sustainability, are the most critical drivers for cluster resilience and competitiveness. Strengthening linkages among enterprises, universities, government institutions, and community actors in West Java fosters adaptability and creates inclusive, halal-based industrial ecosystems. Furthermore, policy simulations suggest that integrated digital infrastructure, targeted capacity-building programs, and halal industry development significantly accelerate West Java's economic growth trajectories, particularly in manufacturing, halal food, and creative industries.

Originality/Value—This study contributes to the literature by developing a comprehensive Islamic-based cluster policy model that integrates global disruption factors with Islamic economic values. It advances the discourse on regional competitiveness by demonstrating how Islamic principles can enrich industrial cluster development, ensuring that economic progress aligns with inclusivity, justice, and sustainability.

Research Limitations/Implications—The study is limited to selected regional case studies in Indonesia; Future research could adopt a comparative cross-country design to validate and generalize the model in broader contexts.

Practical Implications—The findings provide actionable insights for policymakers, regional governments, and industry stakeholders to formulate adaptive cluster-based strategies, strengthen innovation networks, and mitigate the risks of global disruption.

Social Implications—By reinforcing local industrial clusters, the proposed model fosters inclusive economic growth, enhances employment opportunities, and empowers communities to actively participate in sustainable regional development.

Keywords: Islamic Economics, Industrial Clusters, Regional Competitiveness, Policy Model, Global Disruption, Analytic Network Process (ANP)

I. INTRODUCTION

The era of global disruption, marked by rapid technological advances, digital transformation, climate change, and geopolitical uncertainty, has brought fundamental challenges to regional economic development. In this context, strengthening local industrial clusters has emerged as a strategic approach to improve competitiveness and resilience. West Java, as one of Indonesia's leading industrial provinces, possesses strong manufacturing and creative industry bases; however, the region faces structural constraints such as fragmented coordination, uneven access to technology, and dependence on imported raw materials. These conditions demand a comprehensive cluster-based development model that can accelerate competitiveness while maintaining sustainability and inclusivity.

What differentiates this study is its emphasis on integrating Islamic economic principles into the cluster development model. Islamic values such as *'adl* (justice), *ta'awun* (mutual cooperation), *maslahah* (public benefit), and sustainability (*istidām*) provide a normative foundation that complements modern economic theories of competitiveness. In West Java, where the majority of the population embraces Islam and the halal industry has become a national priority, adopting an Islamic perspective in cluster policy is highly relevant. It ensures that economic growth not only strengthens regional

competitiveness but also aligns with ethical principles, fairness in distribution, environmental stewardship, and community empowerment.

Theoretically, regional competitiveness can be understood through various perspectives, ranging from neoclassical approaches that emphasize resource efficiency, to endogenous growth theories highlighting innovation and technology, and strategic management frameworks that stress dynamic capabilities. By embedding Islamic values within these approaches, regional cluster development gains an added dimension ensuring that competitiveness is pursued without neglecting social equity, ethical standards, and long-term sustainability.

This study thus aims to develop a policy model for strengthening Islamic-based local industrial clusters in West Java. Using the Analytic Network Process (ANP) method, the model will capture the interdependencies between innovation, human capital, infrastructure, governance, and Islamic principles as drivers of competitiveness. The findings are expected to provide actionable insights for policymakers, industries, and communities in West Java to strengthen regional economic resilience, enhance halal industry potential, and create an inclusive development path that is adaptive to global disruption.

Adopting an industrial cluster approach is a crucial strategy for regional economic development. Industrial clusters enable the creation of a collaborative environment where companies can synergize, increase productivity, and innovate. Clusters support collective efficiency through the use of shared resources, such as infrastructure and technology, which can reduce operational costs while enhancing companies' regional competitiveness. Furthermore, this approach strengthens the linkages between industry players, universities, and research institutions, creating an innovation ecosystem that is adaptive to change.

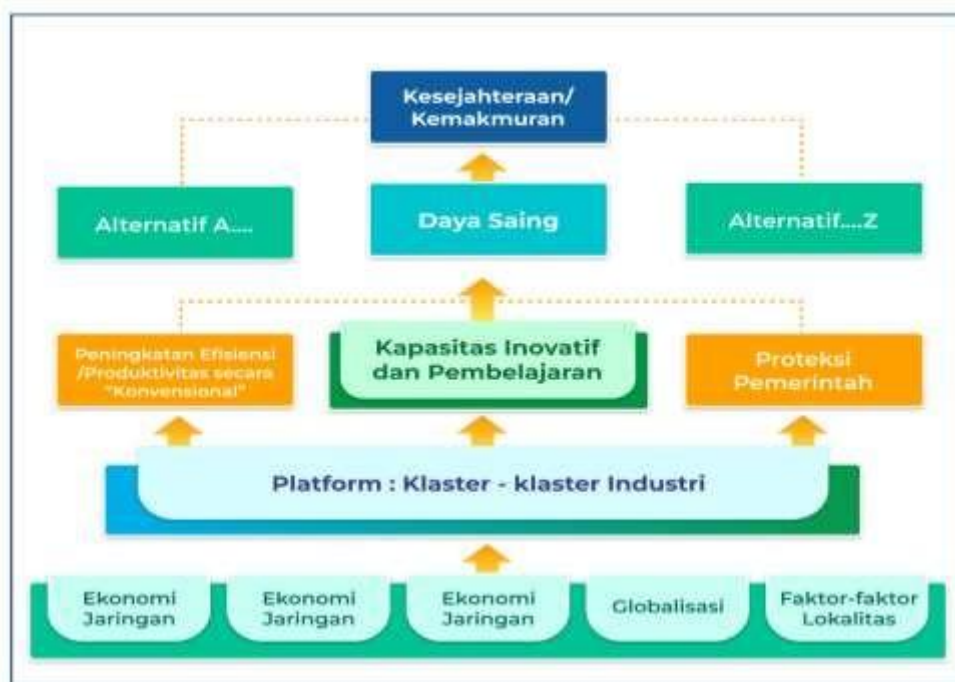


Figure 2. Reconceptualization of Platform: Regions and “Business” in the Context of Competitiveness

Industrial clusters help increase resilience to global disruptions characterized by technological change and economic crises. Within a cluster ecosystem, companies can quickly adapt to market dynamics, leverage regional connections to share knowledge, and diversify risks. Case studies such as Silicon Valley in the United States and Emilia-Romagna in Italy demonstrate the success of this approach in creating centers of economic growth based on collaboration and innovation. Therefore, strengthening industrial clusters is a strategic step to accelerate sustainable and inclusive economic development.

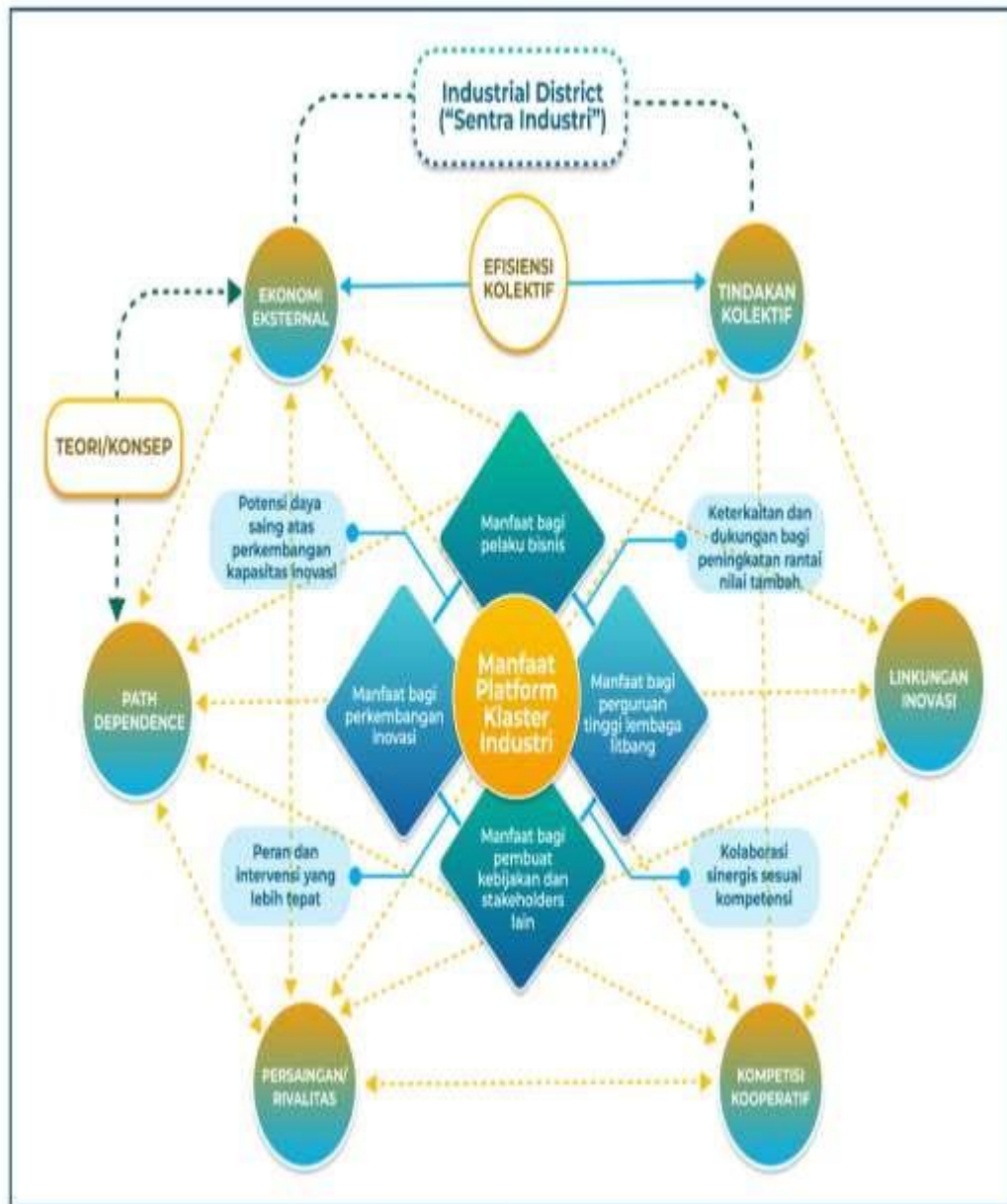


Figure 3. Industrial Cluster Concept and Its Benefits

This figure illustrates the concept of an Industrial District or Industrial Center in an economic context, with several interconnected concepts designed to address issues related to the economic development of industrial areas. The approach used encompasses various factors influencing the collective efficiency and sustainability of industry, as well as the various benefits to the various parties involved.

New Economy in the Context of Regional Economic Transformation

The Local and Regional Economic Development (L&D) approach is now understood as a collaborative, region-oriented development strategy that positions local actors—local governments, businesses, academics, and communities—as key actors in driving economic transformation based on local potential, innovation, and sustainability. Its primary goal is to increase regional competitiveness through the integration of local resources, technology, and partnership networks, both horizontally and vertically.

As global dynamics become increasingly complex, particularly disruptions caused by digitalization, the climate crisis, and post-pandemic economic resilience challenges, the LED/D approach is undergoing a redefinition of its role and focus. Digital transformation, the green economy, and inclusive development are now key elements shaping LED/D strategies in various countries and regions, including Indonesia [24]-[25].

Local and regional economic development (L&D) does not occur linearly, but rather through evolutionary stages influenced by the global social, economic, political, and technological context. As development challenges and local institutional capacities change, the L&D approach also undergoes a paradigm shift. The following concept of "three waves of local economic development" is developed to illustrate how the orientation of regional development has shifted from an aid-based approach to one based on innovation, collaboration, and technology. This framework is highly relevant for designing regional policies, including in the context of strengthening industrial clusters in West Java.

Local economic development has become a strategic approach in response to regional inequality, the limitations of centralization, and demands for regional autonomy. This concept has undergone dynamic development, following the shift in the global development paradigm from a charitable approach to one based on local potential, innovation, and regional competitiveness. The history of local economic development shows a shift in focus that can be classified into three major waves, each reflecting different policy orientations, actor roles, and intervention methods.

This three-wave framework is not only historical but also strategic, as it can help regions map their current position and design policy leaps toward more inclusive, adaptive, and future-oriented development. In the context of West Java, as a province with a strong industrial sector but facing inter-regional disparities, strengthening local economic development based on industrial clusters and innovation is crucial.

Competitiveness and Industrial Clusters

Location Theory

Location theory is the oldest branch of regional economics, developed in the nineteenth century by H.W. Richardson. This theory was inspired by Weber's question of why factories tend to be located close to each other. Location theory explains where and how an economic activity chooses its optimal location. The answer to this question is crucial for public decision-makers, government planners, and business actors in determining regional development strategies and economic sector development. By understanding the factors influencing location choice—such as transportation costs, proximity to markets, labor availability, and access to raw materials—they can direct investment and infrastructure development more efficiently. Furthermore, location theory also forms the basis for formulating spatial planning policies, industrial estate development, and equitable development across regions.



Figure 4 Competitiveness Definition Framework

Growth Pole Theory

The Growth Pole Theory is an important theory in regional economics which was first introduced by the French economist, François Perroux in 1955. This theory states that economic development does not occur evenly throughout the region, but rather starts from one or several growth poles which have high industrial, innovation and investment strength, and then spreads to the surrounding areas through the multiplier effect (spread effect) and the absorption effect (backwash effect) [31].

In a modern context, this theory has been adapted to explain how certain regions with competitive advantages such as industrial agglomerations, superior infrastructure, or research and technology centers can drive broader regional economic

growth. These growth centers are usually the locations of core industries with strong forward and backward linkages, thus attracting other sectors to develop around them. However, the application of this theory also carries the risk of regional inequality if the spread effect does not occur optimally [32].

In regional development policies, the growth pole approach is used to design strategic interventions that focus on the development of leading areas such as special economic zones (SEZs), industrial areas, or metropolitan cities, as locomotives of regional growth. Therefore, it is important for regional planners to ensure physical and economic connectivity between growth centers and their hinterland areas so that the benefits of development can be felt more evenly [33].



Figure 5 Reconceptualization in Regional Economic Development

The reconceptualization of regional economic development, as depicted in Figure 5, demonstrates that regional competitiveness is a key foundation for driving community welfare and prosperity. Competitiveness does not exist in isolation but is influenced by internal factors within an economic entity, such as innovation capacity, knowledge diffusion, and learning processes, as well as a healthy competitive environment. In this context, the Growth Pole Theory plays a crucial role, emphasizing how growth centers with innovation and productivity advantages are able to attract economic activity and spread its impact to surrounding areas. Accordingly, the industrial cluster approach serves as a policy instrument that can optimize the growth pole effect through the concentration of leading sectors, synergy between business actors, and interregional connectivity.

II. METHODOLOGY

This research was conducted in all regencies/cities in West Java Province. The main objective of this research is to identify the leading sectors and sub-sectors as well as the leading products in each regencies/cities in West Java Province. To analyze comparative advantage, several analytical tools are used, including: Location Quotient (LQ), Shift-share (SS), Growth Ratio and contribution. Meanwhile, to analyze the cluster, a cluster analysis tool is used.

The data used in this study is a combination of secondary and primary data. Secondary data was obtained from various sources, including the Central Statistics Agency (BPS) at the central, provincial, and district/city levels in West Java. Primary data was collected through interviews with regional planning agencies, in this case the BAPPEDA (Regional Development Planning Agency) at district/city levels in West Java Province, and direct field observations.

To answer the problems that have been identified, several data analysis methods are used, namely:

Class Typology Analysis

The Klassen Typology is a regional economic analysis tool that can be used to determine the classification of economic sector growth in districts/cities in West Java Province. The Klassen Typology analysis is used to identify the position of district/city economic sectors by considering the economic sectors of West Java Province as a reference area. Classification of GRDP sectors according to the Classification Typology as listed in the following table:

Table 2. Classification of GRDP Sectors according to Class Typology

Quadrant I A sector that is advanced and growing with rapid (developed sector) $s_i > s$ and $s_{ki} > s_k$	Quadrant II Advanced but stagnant sector (sector) $s_i < s$ and $s_{ki} > s_k$
Quadrant III Potential or still possible sectors developing sector $s_i > s$ and $s_{ki} < s_k$	Quadrant IV Relatively lagging sectors (underdeveloped sector) $s_i < s$ and $s_{ki} < s_k$

Source: Sjafrizal, 2008:180

Location Quotient (LQ) Analysis

Used to determine the basic and non-basic sectors in the regional economy of districts/cities in West Java Province. In addition, LG analysis is an analysis used to determine the comparative advantage of a region. Then using business feasibility analysis. To obtain the Location Quotient (LQ) value, use a method that refers to the formula proposed by Bendavid-Val in Kuncoro (2004:183) as follows:

$$LQ = \frac{PDRB_{kab/kota,i} / \sum PDRB_{kab/kota}}{PDRB_{jabar,i} / \sum PDRB_{jabar}} \dots\dots\dots(1)$$

Based on the formulation shown in the equation above, there are three possible LQ values that can be obtained (Bendavid-Val in Kuncoro, 2004:183), namely:

- LQ value = 1. This means that the level of specialization of sector i in the Regency/City area is the same as the same sector in the economy of West Java Province.
- LQ value > 1. This means that the level of specialization of sector i in the Regency/City area is greater than that of the same sector in the economy of West Java Province.
- LQ value < 1. This means that the level of specialization of sector i in the Regency/City area is smaller compared to the same sector in the economy of West Java Province.

If the LQ value is >1, it can be concluded that the sector is a basic sector and has the potential to be developed as an economic driver for districts/cities in West Java Province. Conversely, if the LQ value is <1, the sector is not a basic sector and has little potential to be developed as an economic driver for districts/cities in West Java Province.

The data used in this Location Quotient (LQ) analysis is the GRDP of West Java Regency/City and Province in 2015-2021 according to business sector at constant prices.

Shift Share Analysis

It is used to identify changes and shifts in the economic sectors of districts/cities in West Java Province. This analysis method can also be used to project regional economic growth and as an analytical tool in rural development research.

This analysis technique begins with calculating changes in GRDP of a sector in a region between 2 periods, namely:

$$\Delta Q_{t\ ij} = Q_{t\ ij} - Q_{0\ ij} \dots\dots\dots(2)$$

Where :

$\Delta Q_{t\ ij}$ = Change in GRDP of a sector

$Q_{t\ ij}$ = GRDP of sector i, region j, period year t (certain)

$Q_{0\ ij}$ = GRDP of sector i, region j, base year period

Cluster analysis

Cluster analysis is a multivariate technique that has the main objective of grouping objects based on their characteristics. Cluster analysis classifies objects so that each object that is most similar to another object is in the same cluster. The clusters formed have high internal homogeneity and high external heterogeneity. Like other multivariate techniques, the cluster analysis process can be explained in six stages as follows: (1) Determining the Objectives of Cluster Analysis; (2) Research Design in Cluster Analysis; (c) Determining the Assumptions in Cluster Analysis; (d) The Process of Obtaining Clusters and Assessing Overall Feasibility; (e) Interpretation of Clusters; (f) Cluster Validation and Profiling Process (Sutikno & Mayvani, Titov Chuck's, 2016). This study combines qualitative and quantitative approaches. Quantitative research is used to determine the priority scale of selected commodities to be prepared for industrial cluster development. This research is descriptive-expansive, namely attempting to explain the facts that occur in the field and conduct an analysis of the relationship between research variables. A descriptive method was used to examine various

economic development programs that have been and will be implemented by local governments. The research process flow is as follows:

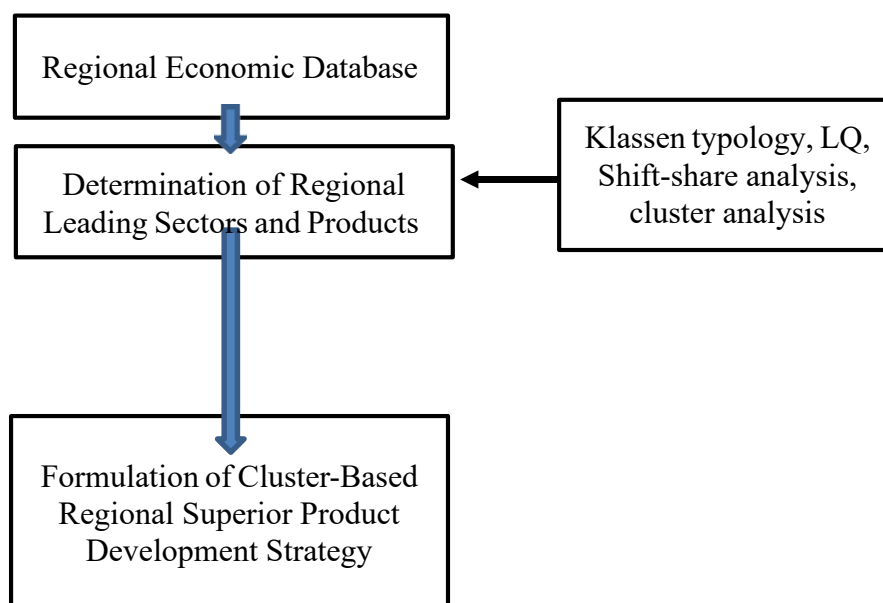


Figure 7. Research Procedure Flowchart

Analytical Network Process (ANP)

The Analytical Network Process (ANP) is a multicriteria decision-making method developed by Thomas L. Saaty. It can be described as a general theory of relative measurements with absolute scales for solving multidimensional problems in multicriteria decision-making for tangible and intangible criteria based on expert judgment in the field (Ascarya et al., 2021). ANP is a general tool useful for organizing thoughts and experiences to obtain judgments and quantify them as priorities. It allows for the representation of diverse opinions after discussion and debate (Ascarya, 2021).

The ANP is structured in a nonlinear network of influences consisting of clusters and nodes or elements contained within clusters that have external and internal dependencies among their elements, which represents the researcher's understanding of the flow of influence required to make complex and risky decisions (Saaty & Vargas, 2006; Saaty, 2008). The ANP addresses dependencies (both external and internal) because the world turns out to be much more interdependent than we think in the way we think and act. In other words, "the ANP is a general tool that helps the mind organize thoughts and experiences and to extract judgments stored in memory and quantify them in the form of priorities, and allows for the representation of diverse opinions after discussion and debate" (Saaty & Vargas, 2006).

Steps of Analytical Network Process Research

The ANP research comprises three phases: model construction, quantification, and analysis of results. Phase 1 will begin with a literature review of related studies, in-depth interviews, and focus group discussions (FGDs) with expert and practitioner respondents to generate a summary of the research questions, the ANP model, and the ANP network. Next, Phase 2 will construct pairwise comparisons based on the ANP network, survey respondents (experts and practitioners), and collect all responses. Finally, Phase 3 will prepare the data for input into Superdecisions software, run the complete ANP network, and obtain results for presentation and analysis.

Data

The ANP method requires primary data collected from paired comparison questionnaires and distributed to two groups of respondents, including experts and practitioners. Each group should be large enough to conduct a regular focus group discussion (FGD), which generally involves 6–12 participants, with 6–8 participants considered sufficient (Nyumba et al., 2018). Meanwhile, a small FGD can involve only 3–5 participants (Rabiee, 2004) if experts in the subject matter are scarce or if the researcher intends to conduct a broader, in-depth discussion. Therefore, this study surveyed nine experts and practitioners. The in-depth discussion/FGD for Phase 1 used a larger number of respondents to obtain more knowledge and information, while the respondents for Phase 2 used seven of the most experienced waqf experts and practitioners from the previous phase.

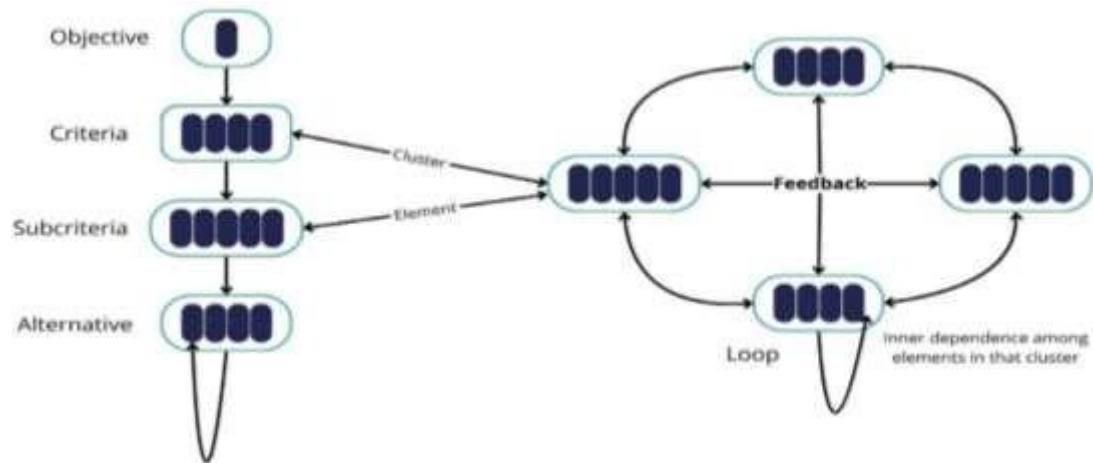


Figure 8. ANP Method Model

Source: Saaty and Vargas, 2006

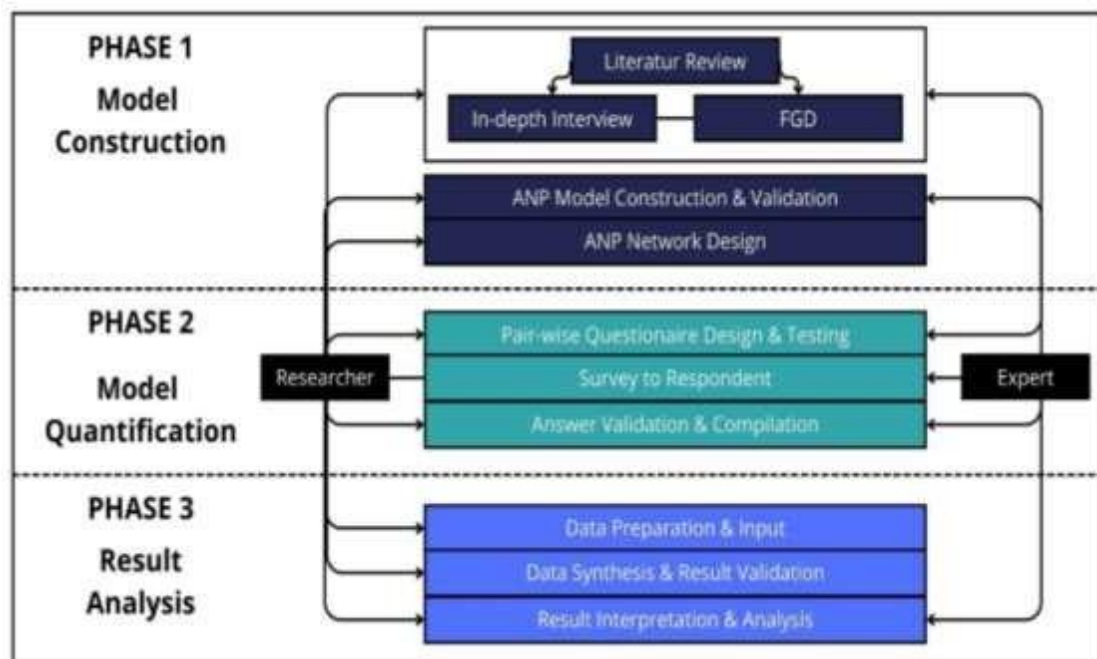


Figure 9. ANP Method Flow

III. RESULT

West Java's Competitiveness Profile Amidst Global Disruption

West Java Province is one of the national economic centers, boasting a strong industrial base and a relatively balanced economic structure. However, amidst global disruptions such as digitalization, market globalization, and climate change, West Java faces significant challenges in maintaining its competitiveness.

The 2024 EV-DCI (East Ventures Digital Competitiveness Index) report ranked West Java fourth nationally in terms of digital competitiveness. This province excels in human resource capacity, digital infrastructure, and digital entrepreneurship. Furthermore, according to data from the Central Statistics Agency (BPS) and Bank Indonesia (2024), West Java recorded the second-largest contribution to GRDP nationally and had the highest non-oil and gas export volume, particularly in the textile, automotive, food and beverage, and electronics sectors. This consistency has been evident since 2020, with provinces on the island of Java dominating the top digital competitiveness rankings. Improved digital literacy and infrastructure in West Java, including the Go Digital MSME initiative and digital literacy programs, have contributed

to maintaining this competitive position. This is crucial given that digitalization is key to facing the Industrial Revolution 4.0 and the knowledge-based economy.

However, global challenges such as dependence on imported raw materials, fragmented coordination between regions, inequality in access to technology between regions, and increasing ESG (Environmental, Social, Governance) pressures require a reformulation of the competitiveness strengthening approach that is not only based on physical resources, but also innovation and collaborative networks.

Table 1. Provinces with the Largest Export Contributions in Indonesia (Jan–Dec 2024)

Province	Export Value Jan–Dec 2024 (US\$)	Share of Indonesian Exports
West Java	37.87 billion	14.31%
East Java	25.72 billion	9.72%
East Kalimantan	25.46 billion	9.62%

Source: Central Statistics Agency, 2025

West Java continues to maintain its position as the province with the largest non-oil and gas export contribution in Indonesia. From January to December 2024, the total value of exports from West Java reached US\$37.87 billion, equivalent to 14.31% of total national exports, surpassing other provinces such as East Java (9.72%) and East Kalimantan (9.62%) [37]. West Java's main export commodities come from the export-oriented manufacturing sector, including textiles and textile products (TPT), automotive, electronics, chemicals, and processed food and beverages. West Java's strong involvement in the global value chain demonstrates the high competitiveness of its industrial clusters, particularly in the Greater Bandung, Karawang-Bekasi, and Bogor areas.

However, West Java's dependence on international markets also makes it vulnerable to global fluctuations, such as declining export demand, competition from foreign products, and changes in partner countries' trade policies. The Ministry of Industry notes that approximately 75% of the nation's industrial raw materials are still imported, making industrial independence a crucial issue. One strategy being promoted is strengthening import substitution, such as the development of wood pulp-based rayon fiber as an alternative to imported cotton, to support the independence of the national textile and textile industry. This innovation is particularly relevant for West Java, the center of Indonesia's largest textile cluster.

The industrial sector remains a major contributor to West Java's Gross Regional Domestic Product (GRDP), contributing approximately 42% by 2024. However, this sector's dominance also brings environmental challenges, one of which is the pollution of the Citarum River due to textile industry waste in the Rancaek-Majalaya area, which is estimated to reach 17 tons of liquid waste per day. This problem not only reduces environmental quality and public health, but also threatens long-term competitiveness due to the risk of regulatory sanctions (e.g., green trade policies and boycotts of environmentally unfriendly products).

To address these challenges, the West Java Provincial Government has begun positioning itself as a pioneer in the transition to green industry. This policy aligns with the national targets set by the Ministry of Industry, namely reducing industrial sector emissions by 31–43% by 2030 and achieving Net Zero Emissions (NZE) in the manufacturing sector by 2050. Several concrete programs at the provincial level include the development of renewable energy facilities (e.g., waste-to-energy projects in Legok Nangka and Lulut Nambo), strengthening green industrial areas, and facilitating incentives for green investors. These steps are the foundation for sustainable competitiveness, namely the ability of industrial clusters to continue growing economically while meeting global sustainability standards.

Furthermore, innovative clusters tend to be more resilient, long-lived, and contribute significantly to regional growth. The phenomenon of knowledge spillover—the spread of knowledge among actors within a cluster—encourages the creation of best practices, the adoption of new technologies, and research collaboration. Innovation is key to industrial sustainability, particularly in the face of dynamic market preferences and pressure from foreign products. In the context of West Java, various research institutions and universities play a crucial role in supporting the regional innovation ecosystem. One example is the collaboration between Bandung Institute of Technology (ITB), the National Agency for Research and Innovation (BRIN), and the pharmaceutical industry to develop raw materials for generic drugs such as amoxicillin. Furthermore, innovation is also encouraged through vocational training programs, university-based business incubation programs, and the development of technoparks around industrial areas. However, cluster strengthening in West Java is not free from various structural obstacles.

Coordination across sectors and levels of government remains weak, leading to program fragmentation and overlapping policies. Financing for cluster-scale research and development has also not been integrated into regional development funding schemes. Cases such as the failure of the One Village One Product (OVOP) program or the underdevelopment of special industrial areas demonstrate the importance of alignment between policy design, infrastructure readiness, and market networks. Therefore, strong commitment from all stakeholders and consistency in the management of cluster-based programs across sectors and sustainably.

As Porter (1998) stated, a cluster is a geographical concentration of interconnected companies and institutions in a specific field, encompassing various supporting sectors such as education, research, logistics, and financial institutions. This interconnectedness or linkage between economic activities is the main strength of the cluster, as it enables efficiency in supply flows, knowledge exchange, and the creation of collective added value. In the context of West Java, strengthening these interconnectedness is essential so that industrial clusters not only grow individually but also are able to form an integrated, competitive, and resilient regional production system in the face of global dynamics.

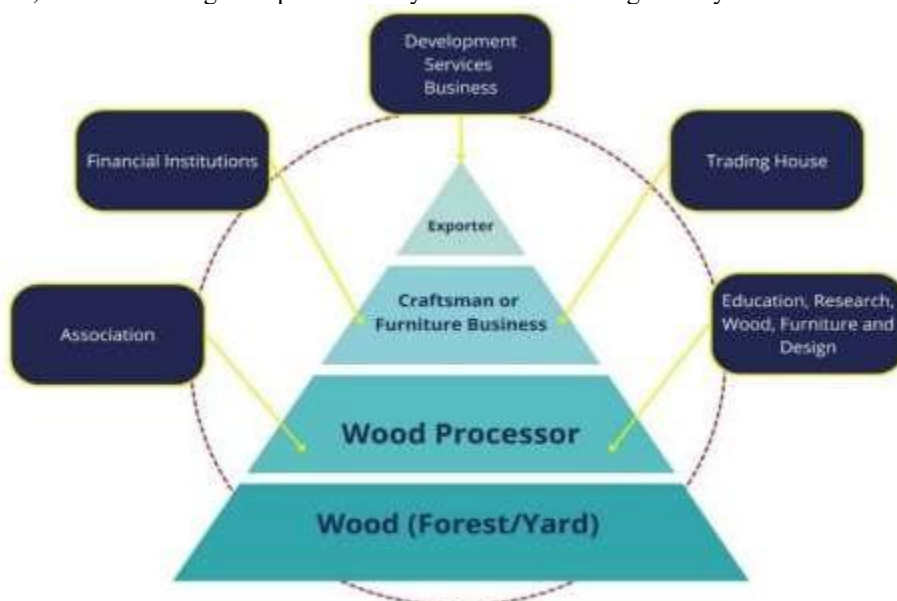


Figure 10. Example - Cluster Development Stages

Figure 10 shows the structure of industrial cluster development stages, illustrating the process of value transformation from upstream to downstream in a local resource-based production system. In the context of this research, the pyramid represents how local industrial clusters—particularly in the wood and furniture-based sectors—are developed in a phased and integrated manner. The first stage begins with the availability of natural resources, namely wood from community forests or wood yards, which is then processed by wood processors into semi-finished products.

The products are then processed by key industry players, namely craftsmen or furniture businesses, who play a strategic role in creating added value through creativity, design innovation, and local uniqueness. The resulting products are then marketed through exporters, who play a role in opening access to national and global markets. At the top of the pyramid are business development services businesses tasked with driving business capacity transformation through training, incubation, technical consulting, and other professional services.

The key to the success of this stage is the active involvement of external stakeholders. The figure positions key actors such as industry associations, financial institutions, trading houses, education and research institutions, and business development service providers as mutually supportive elements of the ecosystem. These institutions serve to strengthen cluster networks, increase access to capital, expand markets, and accelerate innovation and technology adoption.

Conceptually, this figure supports the research findings that cluster development cannot be carried out partially or sectorally, but rather through a holistic approach based on an integrated value-added system. In the context of West Java, a strategy to strengthen local industrial clusters needs to consider the connectivity aspect between key and supporting actors, both in the vertical (value chain) and horizontal (institutional network) dimensions. Such a model is considered more adaptive to the challenges of global disruption, such as digitalization, market globalization, and environmental sustainability pressures. Therefore, cluster strengthening policies need to be designed to not only intervene at the production level but also encourage strategic partnerships across actors to strengthen the region's economic competitiveness in a sustainable manner.

Regional competitiveness in the era of global disruption is no longer determined solely by resource abundance or production cost efficiency, but rather by the ability to build an integrated, innovative, and responsive economic system to global market changes. In the context of West Java, regional competitiveness is greatly influenced by the strength and readiness of local industrial clusters developing in various regencies/cities. One important framework for understanding this dynamic is the cluster development pyramid, as depicted in Figure 10.

The pyramid structure demonstrates that resilient cluster development begins with a natural resource base (such as community forest products), processed through a multi-stage process to produce high-value finished products accessible to export markets, and supported by an institutional ecosystem such as associations, financial institutions, research institutions, and business development services. When compared to conditions in West Java, it is apparent that a number

of leading sectors such as the furniture industry in Cirebon, textiles and garments in Greater Bandung, and agro-industry in Sukabumi and Garut have demonstrated a growing value chain, although not all of them are optimally integrated from upstream to downstream.

For example, in the furniture and crafts sector in Cirebon, the value chain encompasses businesses from artisans to exporters, but still faces challenges in access to financing, product design research support, and the suboptimal role of incubators and business development services. Meanwhile, in the Greater Bandung area, the textile industry boasts substantial production capacity but remains reliant on imported raw materials and faces pressure from changing export regulations and demands for environmentally friendly certification from the global market. This suggests that cluster development in West Java has not yet fully reached the highest levels of the cluster pyramid, particularly in the areas of downstreaming, innovation, and institutional support.

Furthermore, global disruptions such as digitalization and the climate crisis demand more strategic transformation in leading sectors. Digitalization of production, adoption of clean technologies, and data-driven value chain integration are new demands for enhancing regional industrial competitiveness. Without strengthening supporting institutions and cross-actor integration, as outlined in the ideal cluster model, industrial clusters in West Java will struggle to compete sustainably in an increasingly complex global economic context.

Thus, West Java's competitive profile depends heavily on the region's ability to develop and refine all stages of industrial clusters—from local raw material availability and processing and value-added production to export market dominance and innovation. Building competitiveness requires not only technical interventions by key industry players but also strengthening supporting structures, institutional synergy, and reformulating cluster-based policies that are adaptive to global disruption.

A. Determinants of the Success of Local Industrial Clusters in West Java

The success of local industrial clusters in West Java is greatly influenced by the region's ability to build an integrated system between products, organizations, institutional interactions, and the external environment. Figure 11 illustrates the conceptual framework for developing competitive advantage through a multi-level approach, starting from a local basis to the creation of superior products. This pyramid shows that to achieve competitive advantage, cluster development must begin with local factors and the global (regional) context, be strengthened by interactions between organizational entities within the cluster, then be developed through the core competencies of each actor, ultimately resulting in high-value products that can compete in national and international markets.



Figure 11. Determinants of the Success of Local Industrial Clusters in West Java in Building Competitiveness

In this context, there are several main determinants that influence the success of local industrial clusters in West Java:

1. Value Chain Linkages and Depth

Close relationships between business actors in the value chain, from raw material suppliers to final product distribution, are crucial for cluster success. A study by Irawati (2007) emphasized the importance of synergy between business actors, government, and educational institutions in building strong clusters in Java, including West Java.

2. Infrastructure and Technology Support

Adequate infrastructure, such as road access, electricity, and production facilities, as well as the adoption of modern technology, significantly impact cluster efficiency and competitiveness. Research by Pratiwi et al. (2024) shows that the development of the Trusmi Batik industrial area in Cirebon requires infrastructure and technological support to increase its competitiveness.

3. Human Resources (HR) Capacity

The availability of skilled and highly educated workers is one of the determinants of cluster success. According to research by Narjoko (2008), the availability of skilled and professional workers is a crucial factor in the formation and development of industrial clusters in Indonesia, including in West Java. ERIA

4. Institutional Quality and Partnerships

A solid partnership between business actors, government, and educational/research institutions is crucial for cluster development. A study by Irawati (2007) highlighted the importance of the Triple Helix model, which involves collaboration between universities, industry, and government, in building successful industrial clusters in Java.

5. Access to Markets and Financing

Easy access to domestic and international markets, as well as the availability of affordable financing, are determining factors in cluster success. Research by Karmagatri et al. (2024) shows that access to market information and adequate financing support are crucial for the growth of MSMEs in the creative industries sector in West Java.

By understanding and strengthening these five determinants, local industrial clusters in West Java can increase their competitiveness amidst the challenges of global disruption. A holistic and collaborative approach across multiple stakeholders is key to achieving this success.

B. Pentahelix Synergy in Building Sustainable Industrial Clusters

The pentahelix approach is a key pillar in building a sustainable industrial cluster ecosystem. Pentahelix involves five strategic actors: government, business, academia, the community, and the media, each of which has a specific contribution to making in strengthening regional industrial competitiveness. In the context of West Java, synergy between these elements is crucial in addressing the challenges of global disruption such as digitalization, climate change, and regional economic inequality.

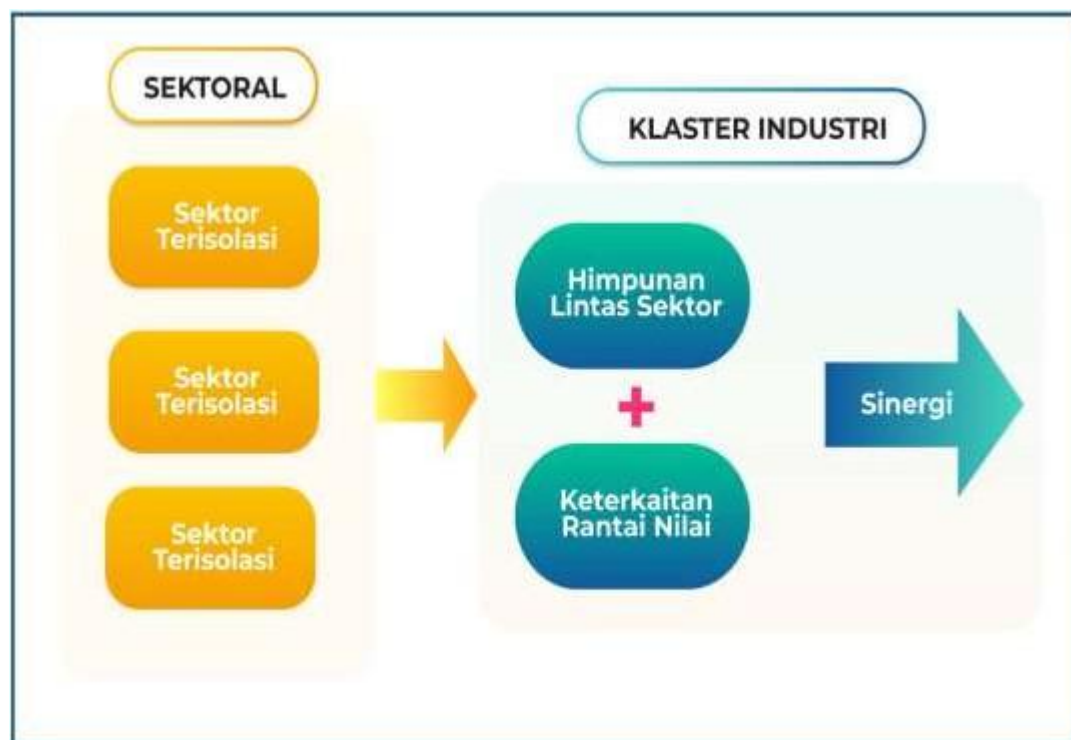


Figure 12. The Essence of Paradigm Change in “Industrial Clusters” vs “Sectoral”

1. Paradigm Shift: From Sectoral to Synergistic Clusters

Referring to Figure 12, it is clear that the previous economic development model tended to adopt a fragmented sectoral approach. In this approach, each sector—whether agriculture, industry, education, or services—operated in isolation without adequate connectivity to one another. The lack of coordination and integration led to overlapping work programs, duplication of activities, and inefficient budget allocation. This situation ultimately hampered the creation of greater added value because each sector did not complement and strengthen each other. More crucially, this siloed work pattern also hampered the emergence of cross-sectoral innovation, even though innovation often arises from interdisciplinary interactions and multi-actor collaboration.

In contrast, the industrial cluster paradigm offers a new, more systemic and collaborative perspective. Clusters are no longer understood as mere agglomerations of businesses within a particular sector, but rather as interconnected and coordinated cross-sectoral associations within a shared value chain. These relationships are not only horizontal (between equal business actors), but also vertical (from upstream to downstream), and diagonal (across functions: production, logistics, research, distribution, and promotion). In this context, the interconnections between actors are no longer incidental, but interdependent and mutually reinforcing.

When this cluster paradigm is developed using a pentahelix synergy approach, what is formed is not just a collection of economic entities, but a vibrant, adaptive, and sustainable industrial ecosystem. Synergy between government, business actors, academics, communities, and the media creates a strong collaborative foundation to support the cluster's primary functions, such as technological innovation, human resource capacity building, market expansion, and response to global disruption. The government is no longer the sole policymaker, but rather part of a co-creation process with other actors in shaping the direction of local industrial growth. Business actors not only carry out business activities but also play a role in human resource development and research collaboration. Academics focus not only on scientific publications but also participate in prototype development, business incubation, and technology transfer.

Thus, industrial clusters built through pentahelix synergy not only address productivity and efficiency needs but also become drivers of innovation and regional competitiveness, capable of surviving in an era of disruption and global uncertainty.

2. The Critical Role of Each Pentahelix Element in the Cluster

The success of industrial cluster strengthening is largely determined by synergistic collaboration among pentahelix actors: government, business, academia, the public, and the media. Each actor has a strategic and complementary role in shaping an innovative, adaptive, and sustainable industrial ecosystem.

Table 2. Critical Role of Each Pentahelix Element in the Cluster

Pentahelix Actor	Role in Industrial Clusters
Government	Providing regulations, infrastructure, and fiscal incentives; acting as an orchestrator of inter-sectoral policies.
Business/Industry Actors	Becoming a key driver of production, innovation, and investment; establishing partnerships in the supply chain.
Academics	Producing skilled human resources, applied research, and technology to support industrial needs.
Public	Acting as users, MSME actors, and local-based empowerment partners.
Media	Increase awareness, support promotion and advocacy of cluster success to the public.

The ability of each actor to abandon sectoral ego, and building a shared vision within a collaborative framework. Strong clusters are not simply the result of superior industry players, but rather the result of a mutually supportive ecosystem. Ideally, the pentahelix approach can unite economic, social, technological, and cultural interests in a single direction of inclusive and sustainable growth.

The provincial and district/city governments in West Java play a strategic role as policymakers and providers of supporting ecosystems for clusters. In addition to regulations and infrastructure, local governments also play a role in synchronizing the Regional Medium-Term Development Plan (RPJMD) with the development of leading regional clusters, such as the textile cluster in Greater Bandung, the textile and textile (TPT) cluster in Majalaya, the automotive cluster in Bekasi-Karawang, and the horticulture cluster in Cianjur-Garut. Local governments also need to encourage integration between regionally-owned enterprises (BUMD) and local industry players to avoid unfair competition between regions.

As an industrial province, West Java has a concentration of large, medium, and small businesses. Their role in the cluster is not only as producers, but also as technology absorbers, mentors of satellite MSMEs, and creators of downstream innovations. Many sectors, such as garments, footwear, processed foods, and precision metals, require synergy across business scales to achieve collective advancement. Collaboration between corporations and MSMEs is key to the regional value chain.

With many leading universities in West Java, such as ITB, UPI, Unpad, Unpas, Tel-U, and other private universities, the role of academics in applied research and human resource development is crucial. However, one of the main challenges is ensuring a link between the academic world and the real needs of industry. Therefore, the development of cluster science and technology centers of excellence (science-techno parks) and cluster-based vocational internship programs are solutions that must be expanded.

The people of West Java have a strong entrepreneurial spirit, supported by a creative culture and strong social networks. Within the cluster ecosystem, communities can play a role as MSMEs, village cooperatives, or digital economy communities. Empowering communities within clusters not only boosts the local economy but also strengthens their sense of ownership of local industries, thus supporting social sustainability.

The role of media in West Java, including print media, local TV, digital communities, and community-based social media, is crucial in strengthening regional cluster branding, expanding digital markets, and advocating for evidence-based industrial policies. Media also serves as a bridge between local actors and the global market.

Synergy among pentahelix actors is not merely a normative approach, but rather a collective force for West Java to escape the trap of a sectoral economy. When this collaboration is built strategically and institutionalized, industrial clusters in West Java can not only strengthen regional competitiveness but also become a national model for economic development based on multi-actor collaboration and local values.

Findings: Pentahelix Synergy in West Java Remains Weak

To strengthen regional competitiveness through industrial cluster development, this study identified the main challenges faced in implementing cluster policies in West Java Province. The approach used was the Analytic Network Process (ANP) method, involving three strategic actor groups: academics, industry practitioners, and regulators/government. The measurement results were synthesized to determine the priority level of the issues based on average weights and to test the level of consistency and agreement among respondents.

In general, there are three key problem elements that are the focus in strengthening industrial clusters, namely:

1. Pentahelix Collaboration
This problem is related to the weak synergy between government, industry, academics, society, and media elements in developing an integrated cluster ecosystem.
2. Infrastructure and Technology
This includes limitations in technology adoption, supporting facilities, data platforms, and connectivity between industry players and the value chain.
3. HR Competence
These include a mismatch between the curriculum and industry needs, a lack of cluster-based training, and limited capacity of experts in leading sectors.

For each element, the priority weighting results are displayed based on the perceptions of the three respondent groups. Furthermore, statistical indicators of model validity and consistency are presented, such as inconsistency values, Kendall's W, and p-values.

The following table presents the results of the analysis for each problem element:

Table 3.

ANP results regarding the issue of strengthening industrial clusters in West Java						
Element		Respondents			Overall	Priority
		Academics	Practitioner	Regulator		
Pentahelix Collaboration						
1.	Low Pentahelix Synergy	0.295	0.295	0.295	0.295	0.295
2.	Lack of cross-sectoral contribution	0.270	0.270	0.270	0.270	0.270
3.	Fragmentation of agency programs and development actors	0.170	0.170	0.170	0.170	0.170
4.	The cross-party coordination forum has not yet been formed	0.165	0.165	0.165	0.165	0.165
	Inconsistency	0.00195	0.00240	0.00180	0.00000	
	Kendall's W				0.32	
	X2				11	
	p-value				0.0192	

Infrastructure and Technology					
1. Low adoption of technology in local industry	0.28	0.25	0.32	0.283	1
2. Limited supporting facilities	0.275	0.215	0.29	0.26	2
3. Lack of industry data platforms	0.22	0.18	0.1	0.167	3
4. Weak connectivity between actors and supply chains	0.125	0.155	0.14	0.14	4
Inconsistency	0.00222	0.00231	0.00154	0.00000	
Kendall's W				0.42	
X ²				12	
p-value				0.0187	

HR Competence					
1. The gap between industry needs and vocational curriculum	0.31	0.255	0.14	0.235	2
2. Lack of cluster-based adaptive training	0.36	0.335	0.355	0.35	1
3. Low level of expert staff facilities	0.165	0.19	0.1	0.152	3
4. Industry and education needs do not match	0.13	0.14	0.125	0.132	4
Inconsistency	0.00222	0.00194	0.00170	0.00139	
Kendall's W				0.42	
X ²				17	
p-value				0.00194188	

The problem identification results indicate that West Java Province faces serious challenges in building effective and competitive industrial clusters, particularly in terms of Pentahelix synergy, infrastructure and technology limitations, and human resource competency gaps. However, simply recognizing these challenges is not enough to generate impactful transformation. Strategic, realistic, and contextual solutions are needed, tailored to the regional characteristics and key actors in West Java.

Therefore, this study proceeds by developing and evaluating alternative solutions to these three key elements. The reassessment process uses the ANP approach involving actors from three strategic groups: academics, industry practitioners, and regulators. Each solution is given a priority weight based on the collective perceptions of stakeholders, thus reflecting preferences that can be used as a basis for formulating policies or implementing programs. The results of this solution analysis not only indicate technical interventions that need to be prioritized but also illustrate how collaborative strategies, digitalization, and capacity building can be directed synergistically to strengthen sustainable industrial clusters in West Java.

The following table presents the results of the solution assessment of the three priority elements:

Table 4
ANP results regarding solutions to the problem of strengthening industrial clusters in West Java

Element	Respondents				Priority
	Academics	Practitioner	Regulator	Whole	
Strengthening Pentahelix Synergy					
1. Formation of regional cluster coordination forum	0.301	0.322	0.28	0.301	1
2. Program harmonization between pentahelix actors	0.188	0.17	0.175	0.177666667	3
3. Strengthening the role of media in promotion and advocacy	0.165	0.155	0.14	0.153333333	4
4. Cluster institutional arrangement based on regional potential	0.22	0.2	0.21	0.21	2
<i>Inconsistency</i>	0.00240	0.00148	0.00182	0.00209	
<i>Kendall's W</i>				0.42	
<i>X²</i>				16	
<i>p-value</i>				0.0042	
Digital Transformation and Infrastructure					
1. Digitalization of information systems and mapping of local industries	0.301	0.322	0.28	0.301	1
2. Development of innovation centers and cluster coworking spaces	0.188	0.17	0.175	0.177666667	3
3. Integration of value chain data between industry players	0.165	0.155	0.14	0.153333333	4
4. Fiscal incentives for technology adoption	0.22	0.2	0.21	0.21	2
<i>Inconsistency</i>	0.00195	0.00178	0.00182	0.00185	
<i>Kendall's W</i>				0.46	
<i>X²</i>				18	
<i>p-value</i>				0.0029	

Improving Human Resources Quality					
1. Demand-driven training design based on basic needs clusters	0.315	0.34	0.28	0.311666667	1
2. Link and match between universities, vocational schools and industry	0.25	0.21	0.225	0.228333333	2
3. Competency certification based on superior sectors	0.11	0.135	0.26	0.168333333	4
4. Industrial internships and exchange of local experts	0.18	0.16	0.205	0.181666667	3
<i>Inconsistency</i>	0.00130	0.00115	0.00135	0.00127	
<i>Kendall's W</i>				0.53	
<i>X²</i>				21	
<i>p-value</i>				0.0011	

Efforts to strengthen industrial clusters in West Java are inextricably linked to the need to develop a more targeted, integrative strategy based on local potential. After identifying key issues and formulating appropriate solutions through the ANP approach, the next step is to develop a priority strategy that bridges the gap between policy, industrial needs, and regional capacity.

This strengthening strategy is key to addressing the challenges of global disruption while simultaneously accelerating sustainable regional economic growth. The strategy is developed based on the level of interest and consensus among stakeholders (academics, practitioners, and regulators), focusing on three main aspects:

- 1) Strengthening cluster institutions,
- 2) Improvement of infrastructure and supporting facilities, as well as
- 3) Strengthening human resource capacity.

The results of the prioritization of the industrial cluster strengthening strategy are presented in the following table.

Table 5.
ANP Results on Industrial Cluster Strengthening Strategy in West Java

Objective	Academic Respondents	Practitioner Respondents	Regulator Respondents	Overall	Priority
1. Strengthening Commitment	0.265	0.235	0.185	0.228	3
2. Digital	0.410	0.430	0.490	0.443	1
3. Human Resources Development	0.280	0.290	0.280	0.283	2
4. Ecosystem Formation	0.045	0.045	0.042	0.028	4
<i>Inconsistency</i>	0.00187	0.00164	0.00155	0.00169	
<i>Kendall's W</i>				0.41	
<i>X²</i>				8	
<i>p-value</i>				0.0211	

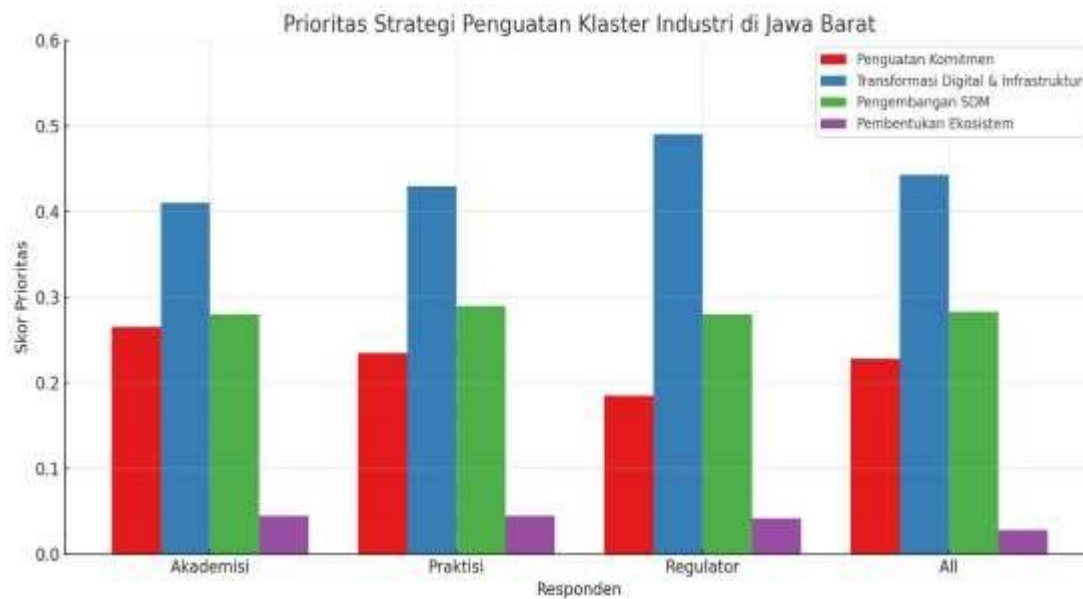


Figure 13. Synthesis of Priority Strategies for Strengthening Industrial Clusters in West Java

C. Cluster Development at the Regional Level

A cluster is a relationship between one type of economic activity, starting from primary production activities, collectors, semi-finished or finished processors (medium and large industries), traders and exporters, as well as supporting activities and services such as financial institutions, business services, education, research, and others. As defined by competitiveness expert Michael Porter (1998): "Clusters are geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition." The linkage between economic activities is important in cluster development because the relationship between complementary activities will support excellence (Sa'id et al. 2007). This concerns not only the efficiency of transportation costs but also the matching of specifications required by each will be easier to do, because it involves the exchange of "knowledge, relationships, motivation" (Nusantoro, Jawoto, 2011).

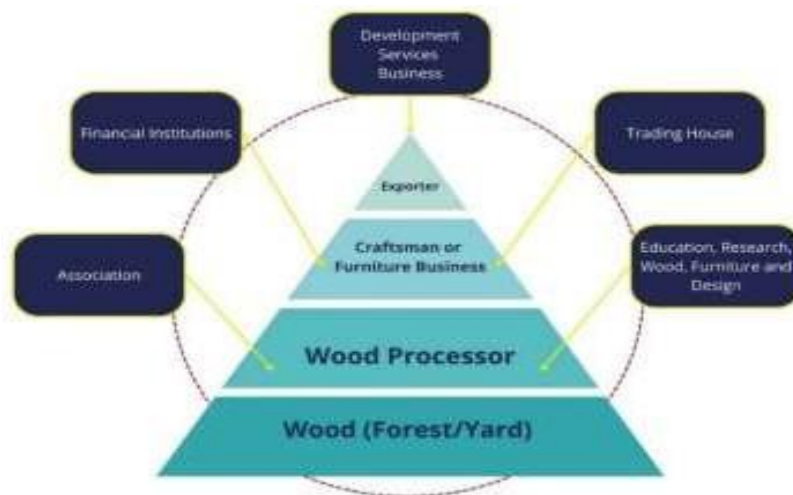


Figure 14. Cluster Development Stages

From experience, once again, prioritization is needed regarding which clusters will be developed first, or become pilots. To determine this priority, there are several criteria in selecting economic activities for cluster development priority, including: Potential for export outside the region, Extent of multipliers and added value, Number of small businesses involved in the cluster, Regional competitiveness compared to other regions and the sector is relatively organized.

Based on their development stages, clusters can be categorized into four types, as shown in the following image:

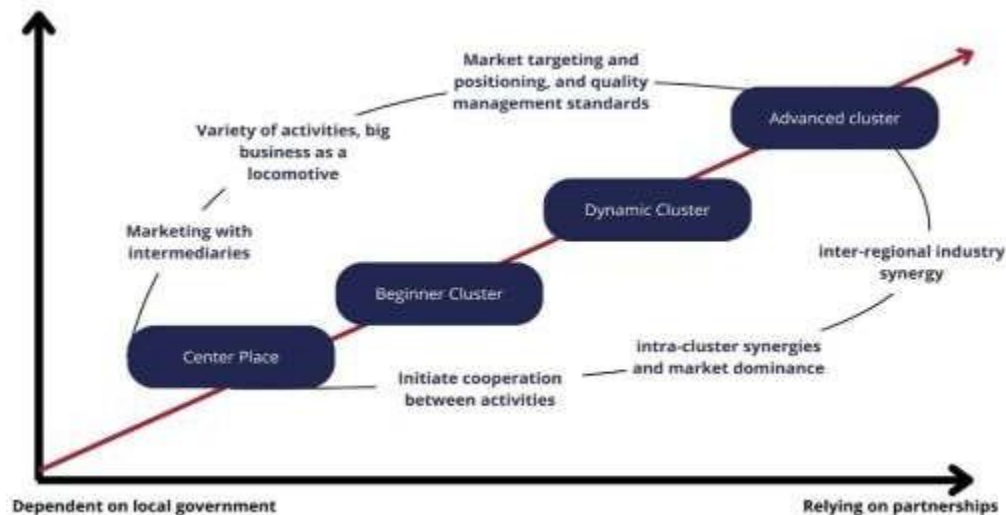


Figure 15. Private, Community and Local Government Partnerships

Furthermore, Porter's study (Lestari, Etty Puji, 2010) of approximately 2,700 locations worldwide produced a model for describing the competitiveness of a microeconomic business environment, popularly known as Porter's diamond. In his study, Potter explained the need to diagnose the potential and problems in target industrial clusters. This diagnosis is conducted by mapping four factors determining competitiveness, namely:

1. Input factors, consisting of geographical conditions, natural resources, human resources, physical infrastructure, administrative infrastructure, and innovation infrastructure
2. Supporting industries available, such as credit schemes, transportation, packaging, consulting services.
3. Existing demand conditions and demand opportunities and local demand behavior.
4. Competitive conditions, such as barriers to entry for new players, competitive strategies implemented by existing players

These four factors are interrelated and influence company performance and competitiveness. Community economic empowerment is essentially an effort to improve these four factors. Therefore, the next step is to develop an economic strengthening agenda by improving the competitive environment, placing greater emphasis on improving the business environment and promoting innovation processes within specific business environments. In addition to these four variables, there are two additional variables: opportunity and government.

Results of Klassen Typology Analysis

The Klassen Typology is used to identify the position of the economic sectors of districts/cities in West Java Province as a reference area. The results of the Klassen Typology analysis focus more on advanced and rapidly developing sectors (developing sectors) in Quadrant I. Quadrant I is a quadrant where the growth rate of a particular sector in GRDP (si) is greater than the growth rate of that sector in regional GRDP. This becomes the reference (s) and has a sector contribution value to GRDP (ski) that is greater than the contribution of that sector to regional GRDP, which becomes the reference (SK).

The results of the Klassen Typology analysis show that:

Table 6. Results of Klassen Typology Analysis

No	Sector	Top Priorities from Regency/City
1.	Agriculture, Forestry and Fisheries Sectors	Sukabumi Regency; Cianjur Regency; Garut Regency; Tasikmalaya Regency; Pangandaran Regency
2	Mining and Quarrying Sector	Bogor Regency; Bandung District; Sukabumi Regency; Garut Regency; Majalengka Regency
3	Processing Industry Sector	Bandung district; Purwakarta Regency; Karawang Regency
4	Procurement of Electricity and Gas	Bogor Regency; Purwakarta Regency; Bekasi Regency

5	Water Supply, Waste Management, Waste and Recycling Sector	Bekasi city
6	Construction Sector	Depok City; Majalengka Regency; Sumedang Regency; Subang Regency; Cimahi City; Tasikmalaya City; Banjar City; Sukabumi Regency; Cianjur Regency; Tasikmalaya Regency; Kuningan Regency
7	Wholesale and Retail Trade Sector; Car and Motorcycle Repair	Ciamis Regency; Kuningan Regency; Majalengka Regency; Sumedang Regency; Subang Regency; Bogor City; Sukabumi City; Bandung; Bekasi City; Depok City; Cimahi City; Tasikmalaya City; Banjar City; Sukabumi Regency; Cianjur Regency; Garut Regency; Tasikmalaya Regency; Pangandaran Regency
8	Transportation and Warehousing Sector	Cirebon Regency; West Bandung Regency; Cirebon City; Ciamis Regency; Kuningan Regency; Bogor City; Bekasi City; Pangandaran Regency
9	Accommodation and Food and Drink Provision Sector	Cirebon City; Garut Regency; Bogor City; Tasikmalaya City; Cianjur Regency; Pangandaran Regency; Depok City; Sukabumi City; Banjar City
10	Information and Communication Sector	Bandung; Cimahi City
11	Financial Services and Insurance Sector	Sukabumi City; Cirebon Regency; Depok City; Tasikmalaya Regency; Ciamis Regency; Cimahi City
12	Real Estate Sector	West Bandung Regency; Ciamis Regency; Banjar City; Cianjur Regency; Bogor City
13	Corporate Services Sector	Purwakarta Regency; West Bandung Regency
14	Government Administration, Defense and Mandatory Social Security Sectors	Majalengka Regency; Sumedang Regency; Subang Regency; Banjar City; Bandung District; Garut Regency; Tasikmalaya Regency; Cirebon Regency; Sukabumi City; Bandung; Cirebon City; Kuningan Regency; Tasikmalaya City
15	Education Services Sector	Bandung district; Cirebon Regency; Ciamis Regency; Kuningan Regency; Sukabumi City; Bandung; Cirebon City; Bogor city; Cimahi City; Sukabumi Regency; Pangandaran Regency; Depok City
16	SectorHealth Services and Social Activities	Bekasi city; Majalengka Regency; Sumedang Regency; Subang Regency; Tasikmalaya City; Bandung district; Cirebon Regency; Bandung; Cirebon City

Location Quotient (LQ) Index Analysis Results

The results of the Location Quotient (LQ) Index calculations in districts and cities in West Java, as shown in Table 2, show that:

- The district area (consisting of 18 regencies) in West Java Province is known to have a basic (leading) sector in the fields of Agriculture, Forestry, and Fisheries ($LQ = 2.356 > 1$), Education Services ($LQ = 1.711 > 1$), Mining and Quarrying ($LQ = 1.489 > 1$), followed by the Construction sector, Wholesale and Retail Trade; Car and Motorcycle Repair, Transportation and Warehousing, Provision of Accommodation and Food and Beverages, Real Estate, Corporate Services, Government Administration, Defense and Compulsory Social Security, Health Services and Social Activities, and Other Services. Meanwhile, other non- basic sectors are the processing industry, electricity and gas supply, water supply, waste management, waste management and recycling, information and communication, financial services, and insurance.

- It is known that urban areas in West Java Province have the main base sectors (leading) in the fields of Financial Services and Insurance ($LQ = 2.451 > 1$), Health Services and Social Activities ($LQ = 2.445 > 1$), Corporate Services ($LQ = 2.098 > 1$), followed by the sectors of Electricity and Gas Supply, Water Supply, Waste Management, Waste Management and Recycling, Construction, Wholesale and Retail Trade; Car and Motorcycle Repair, Transportation and Warehousing, Accommodation and Food and Beverage Provision, Information and Communication, Real Estate, Government Administration, Defense and Compulsory Social Security, Education Services, and Other Services. Meanwhile, other sectors are non-base sectors, namely Agriculture, Forestry, and Fisheries; Mining and Quarrying; and Processing Industry. Urban areas are more focused on the service sector.
- In general, in the West Java region, it is known that the basic (leading) sector of Agriculture, Forestry, and Fisheries ($LQ = 1.873 > 1$) is still the dominant sector, followed by the Government Administration, Defense and Compulsory Social Security sectors; Education Services; Health Services and Social Activities; Water Supply, Waste Management, Waste Management and Recycling; Construction; Wholesale and Retail Trade; Car and Motorcycle Repair; Transportation and Warehousing; Provision of Accommodation and Food and Beverages; Financial Services and Insurance; Real Estate; Corporate Services; and Other Services. Meanwhile, other non-basic sectors are Mining and Quarrying, Processing Industry, Electricity and Gas Supply, and Information and Communication.

Table 7.

Calculation of Location Quotient (LQ) Values for Regencies and Cities in West Java, 2021- 2023

NO	SECTOR	District Average LQ	LQ Average City	LQ Average West Java Province
1	Agriculture, Forestry and Fisheries	2.356	0.322	1.873
2	Mining and excavation	1,789	0.022	0.972
3	Processing industry	0.688	0.485	0.635
4	Procurement of Electricity and Gas	0.658	1,634	0.958
5	Water Supply, Waste Management, Waste and Recycling	0.698	1,645	1,120
6	Construction	1,042	1,521	1,215
7	Wholesale and Retail Trade; Car and Motorcycle Repair	1,125	1,814	1,361
8	Transportation and Warehousing	1,177	1,609	1,341
9	Provision of accommodation and food and drink	1,222	1,347	1,264
10	Information and Communication	0.711	1,396	0.940
11	Financial Services and Insurance	0.999	2.451	1.422
12	Real Estate	1,349	1,279	1,332
13	Company Services	1,055	2,098	1,394
14	Government Administration, Defense and Mandatory Social Security	1,381	1,787	1,516
15	Education Services	1,722	1,290	1,434
16	Health Services and Social Activities	1.072	2.445	1.419
17	Other Services	1,005	1,205	1,075

Source: Research data processed

Note: $LQ > 1$ = base sector (leading); $LQ < 1$ = non-base sector**Shift Share Analysis (Net Change Indicator, PB) by Plotting LQ Values**

It is known that the economic structure of the regencies in West Java has shifted from agriculture to industry. However, agriculture still plays a significant role and is the base sector in these regencies. Meanwhile, in more developed regencies and urban areas, there has been a shift or increase in the industrial economic structure, coupled with the development of the trade and financial sectors. In the city of Bandung, a more significant shift has occurred, moving towards a service-based city.

Table 8.
Average Location Quotient (LQ) Index and Net Change Value (NSV) for Regencies and Cities in West Java Province

No	Sector	LQ	Position	PB	Position	Information
		Index		Mark		
1	Agriculture, Forestry and Fisheries	1,873	> 1	-0.043	< 0	Potential sector
2	Mining and excavation	0.97	< 1	-0.319	< 0	Underdeveloped sector
3	Processing industry	0.635	< 1	0.007	> 0	Growing sector
4	Procurement of Electricity and Gas	0.958	< 1	0.060	> 0	Growing sector
5	Water Supply, Waste Management, Waste and Recycling	1,120	> 1	0.043	> 0	Leading sector
6	Construction	1,215	> 1	-0.021	< 0	Potential sector
7	Wholesale and Retail Trade; Car and Motorcycle Repair	1,361	> 1	-0.015	< 0	Potential sector
8	Transportation and Warehousing	1,341	> 1	0.006	> 0	Leading sector
9	Provision of accommodation and food and drink	1,264	> 1	0.018	> 0	Leading sector
10	Information and Communication	0.940	< 1	0.042	> 0	Growing sector
11	Financial Services and Insurance	1,133	> 1	-0.040	< 0	Potential sector
12	Real Estate	1,332	> 1	0.084	> 0	Leading sector
13	Company Services	1,394	> 1	0.078	> 0	Leading sector
14	Government Administration, Defense and Mandatory Social Security	1,516	> 1	-0.112	< 0	Potential sector
15	Education Services	1,434	> 1	-0.032	< 0	Potential sector
16	Health Services and Social Activities	1,419	> 1	0.050	> 0	Leading sector
17	Other Services	1,075	> 1	0.036	> 0	Leading sector

Source: Research processing data

The following are the results of the mapping of the identification of leading sectors in West Java based on the mapping of Location Quotient (LQ) and net change value (PB) in West Java Province, as shown in Table 3. Based on Table 3 and Table 4, the leading sectors in regencies/cities in West Java Province in general are Health Services and Social Activities; followed by Water Supply, Waste Management, Waste Management and Recycling; Provision of Accommodation and Food and Beverages; Transportation and Warehousing; Real Estate; Corporate Services; and Other Services.

Table 9.
Identification of Leading Sectors Based on Plotting LQ and PB Values in West Java

PB > 0	
Quadrant III	Quadrant I
DEVELOPING SECTOR	LEADING SECTOR
Processing industry; Procurement of Electricity and Gas; Information and Communication	Health Services and Social Activities; then the Water Supply, Waste Management, Waste and Recycling, Provision of Accommodation and Food and Drink, Transportation and Warehousing, Real Estate, Company Services, and Other Services sectors.
Quadrant IV	Quadrant II
BACKWARD SECTOR	POTENTIAL SECTOR
Mining and excavation	Agriculture, Forestry and Fisheries; Construction; Wholesale and Retail Trade; Car and Motorcycle Repair; Financial Services and Insurance; Education Services; and the Government Administration, Defense and Mandatory Social Security sectors
PB < 0	

Potential sectors in West Java that can be developed into leading sectors in the future include agriculture, forestry, and fisheries; construction; wholesale and retail trade; car and motorcycle repair; financial services and insurance; education; and government administration, defense, and compulsory social security. Furthermore, developing sectors in West Java include manufacturing, electricity and gas supply, and information and communications. Meanwhile, the mining and quarrying sector is relatively underdeveloped in West Java.

D. Formulating an Effective Local Industrial Cluster Policy Model

Given the diverse potential and growing sectors, a cluster-based economic development approach is becoming increasingly relevant for promoting integrated regional competitiveness. Industrial clusters enable strengthened linkages between economic actors—from core industries, suppliers, buyers, to supporting institutions—in a mutually reinforcing ecosystem. Therefore, it is crucial to understand how the structure and relationships within the industrial cluster model are designed, as illustrated in Figure 16 below.

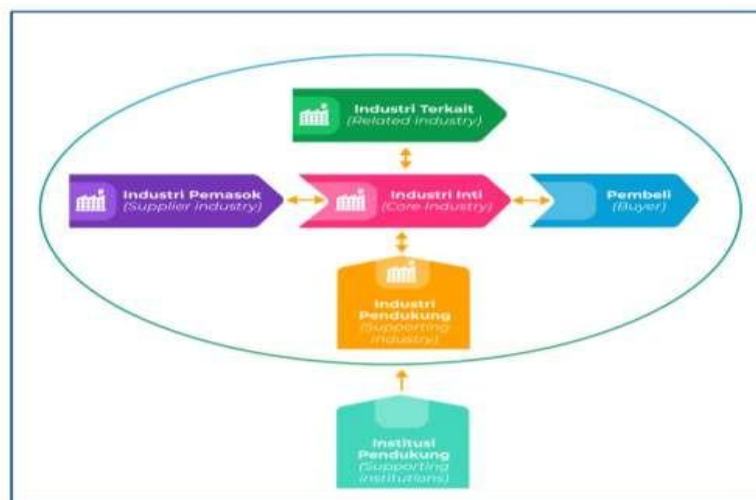


Figure 16. Industrial Cluster Model

The industrial cluster model depicted in Figure 16 emphasizes the importance of interconnectedness among various industrial elements from supplier industries, core industries, related industries, to buyers all supported by supporting industries and institutions. This concept has been substantially adopted in several regional economic development policies in West Java Province, but its implementation still faces significant challenges.

The West Java Provincial Government, through its New Economic Growth Center policy and the development of Special Economic Zones (SEZs), has sought to consolidate leading sectors in regions such as Bekasi-Karawang (manufacturing cluster), Greater Bandung (creative economy and technology cluster), and Cirebon-Indramayu-Majalengka (agriculture and fisheries cluster). Each region is directed to form a cluster structure as shown in the model:

- **Core Industry:** For example, the automotive and textile industries in Karawang and Bandung are the main centers with large contributions to exports and employment absorption.
- **Supplier Industry:** MSMEs providing spare parts components, raw materials, or supporting services grow around large industrial areas.
- **Related and Supporting Industries:** Such as logistics, packaging, ICT, and financial services that strengthen the cluster ecosystem horizontally and vertically.
- **Supporting Institutions:** Including universities, vocational training centers, research institutions (such as the Research and Development Center), as well as policy instruments and incentives from local governments, which support innovation and technology transfer.

Although the cluster concept has been internalized in regional development planning, the research and ANP analysis in this study indicate that the level of integration between cluster elements is suboptimal. Some of the main obstacles identified include:

- The lack of synergy between core industries and research/academic institutions means that innovation is mostly produced by large companies and not as a result of systemic collaboration.
- The low involvement of small/medium industries in the supply chain causes supporting industries to only develop around metropolitan areas.
- Supporting institutions are not yet fully adaptive, particularly in supporting competency certification, fiscal incentive schemes, and digital infrastructure relevant to the needs of each cluster.

To strengthen the effectiveness of industrial cluster policies in West Java, an integrated approach is needed that involves all components as described in the model:

- Synchronization of sectoral and spatial policies at the provincial and district/city levels to avoid fragmentation of planning between regions.
- Strengthening the role of vocational and higher education institutions to be able to supply human resources that meet the needs of core and supporting industries.
- Facilitate business incubators, coworking spaces, and regional innovation centers, especially outside major cities, to expand the reach of cluster benefits.
- Implementation of a digital cluster information system, including an interactive dashboard for mapping business actors, local potential, and market opportunities.

By strengthening connectivity between elements as demonstrated in the industrial cluster model, West Java can optimize the region's economic potential in a sustainable manner, while simultaneously increasing regional competitiveness amidst global dynamics and digital disruption.



Figure 15. Direction of Strengthening Local Industry in West Java

The direction of strengthening local industrial clusters in West Java is directed spatially through an economic development corridor approach based on the region's superior potential. The division of West Java into four main corridors—the West, North, South, and East—reflects the regional government's strategic orientation in fostering new growth centers through a contextual and decentralized cluster model. In the West Corridor (Bogor and Sukabumi), development is directed toward modern agriculture, herbal medicine, MSMEs, and tourism, in line with the strength of its natural resources, biodiversity, and high natural tourist attractions. Meanwhile, the North Corridor (Karawang, Purwakarta, and Subang) is focused on becoming the center of large industrial clusters such as automotive, electronics, and chemicals, supported by excellent logistics infrastructure and connectivity, including access to ports and national toll roads.

The Eastern Corridor (Cirebon, Majalengka, and Indramayu) is geared toward strengthening the furniture and small- and medium-sized craft industries, which have cultural roots and traditional expertise in crafts and furniture, and are supported by a skilled local workforce. Meanwhile, the Southern Corridor (Garut, Tasikmalaya, Pangandaran, and surrounding areas) holds significant potential in modern agriculture, creative MSMEs, and locally-based tourism, with demographic and geographic characteristics that support the development of the creative economy, agro-industry, and ecotourism.

This mapping aligns with the principles of place-based development, which emphasize not only economic efficiency but also equity and sustainability. This corridor approach also emphasizes the importance of cross-sector integration and pentahelix actors, enabling each cluster to thrive through connectivity, collaboration, and innovation. Therefore, strengthening local industrial clusters in West Java serves not only as an instrument for regional economic growth but also as a means to strengthen industrial resilience, reduce spatial disparities, and encourage structural transformation of the regional economy toward a more inclusive and sustainable direction

IV. CONCLUSION

This study concludes that strengthening local industrial clusters in West Java is a crucial strategy for driving regional economic growth amidst global disruptions such as digitalization, climate change, and international market competition. Although West Java has significant potential, with the highest non-oil and gas export contribution in Indonesia and an economic structure dominated by the industrial sector, cluster competitiveness still faces serious challenges such as low synergy among pentahelix actors, weak technology adoption, and a mismatch between human resource competencies and industry needs. The ANP analysis results indicate that priority strategies that need to be prioritized include digital transformation and infrastructure, human resource development, and strengthening commitment among stakeholders. Furthermore, LQ and shift-share mapping confirm that several sectors such as information and communication, processing, and energy have potential for growth, while the service sector still dominates in urban areas. Based on these findings, it is recommended that the West Java Regional Government strengthen cluster institutions through an active pentahelix coordination forum, encourage investment in industrial digitalization, design demand-driven human resource training, and build an innovation ecosystem and green industry to enhance cluster competitiveness in a sustainable and contextual manner.

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