Industrial Cluster Design using Value Chain Analysis and Diamond Porter's Model (Case Study in Batik Trusmi Cirebon Center)

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Abstract. Batik Trusmi is one of Batik industry areas with 164 Batik Industry listed. Batik Trusmi, currently a center for Small Medium Enterprises (SMEs), has the high potential to grow into an industrial cluster to give its stakeholders competitive advantage. The government's plan to develop industrial areas in West Java, includes Trusmi Batik Area as one of industrial areas that will be developed over the next 20 years. This study focus on illustrating and describing the primary and secondary activities of the Industrial cluster and stakeholders function on the system by using Value Chain Analysis and Diamond Porter's Model, and the Industrial Cluster Component and Condition Assessment of Batik Trusmi as the result. The Diamond Porter Model describes the conditions of Internal and External Aspects of the Industrial Cluster. The industrial cluster design delivered the desired result for Batik Trusmi based on the Industrial Cluster Success Criteria. The Cirebon Industrial and Trading Agency will oversee the integrated system, which will be able to increase the competitive advantage, manage demand distribution, standardize production processes and quality, develop a tourism brand for Cirebon, and put in place a monitoring and evaluation system to gradually develop the industries under the management of industrial cluster.

1 Introduction

Indonesia is one of the largest archipelago countries, with an abundance of natural resources. The President of Indonesia, Joko Widodo, stated that Indonesia aimed to be a developed country by 2045 [1]. A developed country is typically distinguished by a generally higher standard of life, higher per capita income, and strong performance on the Human Development Index (HDI), which considers factors like health, education, and literacy [2]. Standard of life usually measured by Gross Domestic Product (GDP) value [3]. In order to accelerate the GDP value growth, Indonesia currently develops integrated industrial clusters in strategic areas around the nation [4]. The non-oil and gas business includes several different industries, including the textile and garment sector. Textile and apparel are considered as the fourth highest contribution in non-oil and gas industries from fifteen industries. This indicates that the industry has a pressing need to grow due to its ability to raise the country's GDP. The textile and apparel industry are in a fluctuating condition and experiencing a decrease in the last two years. This decrease conditioned is possibly caused by the COVID-19 pandemic in 2020 and 2021. In the current situation, this industry's growth is potential enough. The country's widely dispersed textile and clothing sector needs development to boost its productivity. One of the key industries that contributes to Indonesia's society's prosperity is the textile and clothing sector, which is dominated by small and medium-sized businesses (SME). Industrial clustering refers to the capability and possibility of integrating SME, where industries in the same geographic location with comparable resources and associated activities are merged into an industrial cluster to achieve a greater goal and benefits [5]. According to a study by [6], industrial clusters support rural income development, poverty reduction, and reduced income disparity in China. First, counties with industrial clusters had higher rural household income than counties without industrial clusters, notably non-farm income. Similar to this, counties with industrial clusters have poverty rates that are much lower than counties without clusters.

According to Annual Report published by [7], the Government of West Java also plans to develop the industrial area, including Trusmi Village into Rebana Industrial Area, which aims to develop industrial area, SMEs Centre, Production Centre in Villages and to develop Integrated Logistic Chain System between Industries and SMEs. To increase the competitiveness of Batik Trusmi to compete in the textile and apparel industry, the strategy to change that area into an industrial cluster is strategically matched with the government plan. In order to increase the understanding about the internal and external aspects of the industrial cluster in Batik Trusmi comprehensively, the development plan is to design the Batik Trusmi Industrial Cluster using the Value Chain and Diamond Porter Model [8]. Value Chain Analysis is a model for identifying all the related activities

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in a corporate or industrial cluster's business process. The model divides the activities into two classifications, primary and secondary activities, and then helps to specify the needs of the activities that are included as primary and secondary activities in order to achieve the goals or objectives to earn profit [9]. The Diamond Porter's Model is a set of interconnected main factors that contribute to increased competitiveness. The Diamond Porter Model seeks to create a self-reinforcing structure. The system that the Diamond Porter Model depicts is the connectivity of a nation's traits, attributes that individually and as a system comprise the national advantage, also known as the Diamond Porter major factors. The four primary factors explained by Diamond Porter's Model for an Industrial Cluster are industry strategy/rivalry, structure and competitiveness, factors condition, demand conditions, and associated & supported industries [10]. According to research by [11], Porter's Diamond can be used to identify and analyze the competitive advantage of an Industrial Cluster in a Romania. This study discusses about industrial clustering of Batik Trusmi Center Cirebon, by analyzing current situation and Industrial success criteria of Batik Trusmi Center. After measuring existing conditions, industrial clustering Design will be carried out using Value Chain Analysis and Diamond Porter's approach.

2 Methods

Developing an Industrial Cluster requires a comprehensive investigation and analysis through all of the elements influencing The Industrial Cluster. Each of Industrial Cluster has diverse characteristics depends on the product or goods which will be sold. The elements to be investigated include current circumstances of Batik Trusmi Center, stakeholders of current Batik Trusmi Center and who will become the Batik Trusmi Cirebon Industrial Cluster stakeholder in the future. This research is divided into four main stages, which depicts by Figure 1.

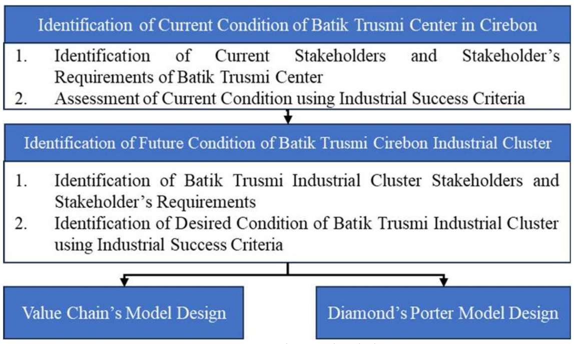


Fig 1. Research Methodology

Step 1: The first step is identifying the current condition of Batik Trusmi Center Cirebon, which consists of 1) Identify the existing stakeholder of Batik Trusmi Center, mainly the core industry and the supporting industry who will become the stakeholder of Batik Trusmi Industrial Cluster in the future. According to [12] which also shown in Figure 2, Industrial Cluster consists of 9 stakeholders; Core Industry, Government's related Institutions, Group of Funding Institutions, Group of Research Institutions, Expedition Corporates, Group of Machine Suppliers, Group of Training Institutions, Group of Raw Material Suppliers, and Industrial Exhibition Organizer.

Fig 2. Industrial Cluster's Stakeholders [12]

2) Identify each of stakeholder's expectation to Batik Trusmi Industrial Clustering using Industrial Success Criteria. Stakeholder's expectation was identified by interviewing some representation of core industry who are Batik Craftsmen, Government's related institutions, especially Cirebon's Industrial and Trading Agency who has role to manage Batik Trusmi Cirebon.

Step 2: The current condition of Batik Trusmi is used as an input to analyze the desired condition that results from the stakeholder requisites that has been classified and determined to follow the needs of industrial cluster stakeholders. The requisites that process into the desired condition of Batik Trusmi as an Industrial Cluster following the Industrial Cluster Success Criteria. The understanding of desired condition and compare it to the current conditions will furtherly give an improvement plan for Batik Trusmi and able to solve the problem exist in Batik Trusmi.

Step 3: Desired conditions that answering the stakeholder's requisites are not enough to illustrate the industrial cluster of Batik Trusmi as a system. Therefore, The Value Chain and Diamond Porter Model is used to design the Activities related to the industrial cluster and the stakeholder's role on each activities to give more understanding on the interaction between the industries and to analyze internal and external aspects of industrial cluster condition in Batik Trusmi and its relations between aspects. The Value Chain and Diamond Porter Model is complete by a further explanation on the Central Objectives of Batik Trusmi Industrial Cluster that will help the industry under the industrial cluster management achieve the competitive advantage by joining the industrial cluster that resulting from following the regulation made by the industrial cluster management to achieve the central objectives together as system.

3 Result and Discussion

3.1 Batik Trusmi Cirebon Center Current Condition

In the current condition, Batik Trusmi Cirebon is dominating the Batik Industry in Cirebon, with 164 batik industries located in Trusmi Village. The Stakeholders of Batik Trusmi, currently depend on each industry's business process and not yet integrated as system, although the agglomeration already happened. After identify the current situation by interviewing Cirebon's Industrial and Trade Agency's representative and several Batik Craftsmen and observing Batik Trusmi Center, it was known that the existing stakeholder of Batik Trusmi consists of Government Institution, which are Cirebon's Industrial and Trading Agency and Cirebon's Tourism Department, "*Paguyuban Perajin dan Pengusaha Batik Cirebon*", 164 Batik Industries as the core industry, and its Supporting Industries consists of raw material suppliers and machine suppliers. The existing stakeholders in Batik Trusmi are interactingto support each other businesses. To meet the urgencies and objectives on developing the Batik Trusmi as an Industrial Cluster, the stakeholders are analyzedfor its requisites in developing their businesses. The stakeholders and their requisites are shown in Table 1.

Table 1. Existing Stakeholder's Requisites

No.	Stakeholders	Requisites
1	Cirebon's Industrial and Trade Department	Integrated System
2	Cirebon's Tourism Department	Integrated marketplace
3	*"Paguyuban Perajin dan Pengusaha Batik Cirebon"*	Equally business development
4	164 Batik Industries in Trusmi area	Market reach, Business Development, reliable support industries
5	Supporting Industries of Batik Industry	Loyal Customer

Based on [13], The industrial cluster success criteria consists of 3 level : Expectation Level, Main Criteria Level, and Sub-Criteria Level. The condition of Batik Trusmi regarding the identification following the industrial cluster success criteria is showing that Batik Trusmi is already fulfilled several criteria as a success industrial cluster, although aspects that are spesifically related to an industrial cluster is not able to be observed yet. The requisites of stakeholders in Batik Trusmi is defined parallely with the identification of the industrial cluster success criteria [14]. And as the result, Batik Trusmi is now in Emerging phase of industrial cluster due to the condition that currently exist in Batik Trusmi. The result of interview and observation using industrial cluster success criteria could be found on : https://bit.ly/BatikTrusmiCenterInitialCondition.

3.2 Stakeholder Mapping and Requisites of Batik Trusmi as Industrial Cluster

The stakeholders mapping of Batik Trusmi as an Industrial Cluster is required to add and specify several related industries to be included in the industrial cluster system. The stakeholders of an industrial cluster that is consist of Government Related Institutions, Group of Funding Institutions, Group of Research Institutions, Expedition Industry, Group of Machine Suppliers, Group of Training Institutions, Group of Machine Institutions, and Industrial Exhibition Organizer is already specified to be integrated into an industrial cluster system that will be managed by Cirebon Industrial and Trading Agency as the industrial cluster management.

Table 2. Batik Trusmi Industrial Cluster's Stakeholder's Requisites

No	Industrial Cluster Stakeholder	Stakeholders	Advantages / Requisites
1	Government's Related Institutions	Industrial and Trading Department	Integrated System to Manage Industries
		Tourism Department	Tourism Icon
2	Group of Funding Institutions	*"Paguyuban Perajin dan Pengusaha Batik Cirebon"*	Business Development
		West Java Bank (Bank Jawa Barat/BJB)	Loyal Customer
		Government's associate Bank)	
3	Group of Research Institutions	Gunung Jati University	Research Object
		17 August University	Research Object
		IAIN Syekh Nurjati	Research Object
4	Expedition Corporates	Self-owned expedition service	Customer Satisfaction
		PT. Pos Indonesia	Loyal Customer
		Logistik Express	Loyal Customer
5	Group of Machine/Tools suppliers	Yogyakarta Batik Tools Manufacture	Loyal Customer
		Self-Owned tools manufacture	Production floorneeds fulfilment
6	Group of Training Institutions	Cirebon Industrial and Trading Department	Society or People who eager to be developed
7	Group of Raw Material Suppliers	Pekalongan Cloth Manufacture	Loyal Customer
		PT. Plumbon International Textile (PT. Pintex)	Loyal Customer

No	Industrial Cluster Stakeholder	Stakeholders	Advantages / Requisites
8	Industrial Exhibition Organizer	Cirebon Industrial and Trading Department	Exposure of Cirebon Industry and Culture
		"Paguyuban Perajin dan Pengusaha BatikCirebon"	Exposure of their business

The industrial cluster success criteria gives an illustration of the desired conditions that will be improved by developing Batik Trusmi into an industrial cluster. The criteria that already answered in current conditions will have improvement and the criteria that is not exist yet is planned to be answered using the industrial cluster implementation. The desired condition of the industrial cluster success criteria is an illustration to give understanding what will be improved from Batik Trusmi as an industrial cluster and give a reference in developing Batik Trusmi to fulfill the stakeholder's requisites as stated in Table 2. The curated data of Batik Trusmi desired condition identification could be found on the link : https://bit.ly/BatikTrusmiDesiredCondition.

3.3. Industrial Clustering Design using Value Chain Analysis and Diamond Porter's Model Result

The design of Industrial Cluster using Value Chain Model will give an illustration of the activities done in the industrial cluster and each stakeholder's role in executing each activity as shown in Figure 3, and the stakeholder's role explained on Table 3.

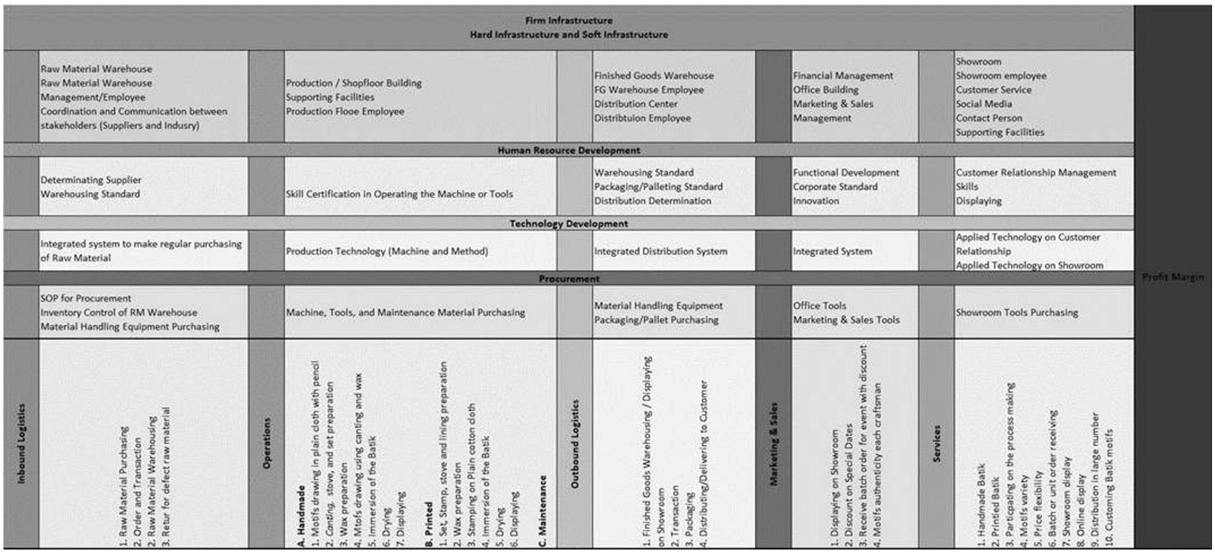


Fig 3. Value Chain Model of Batik Trusmi Industrial Cluster Design

Table 3. Stakeholders Function on Value Chain Model

Primary Activities	Stakeholder in Charge	Function
Inbound Logistics	• Core Industry (164 Batik Industry in Trusmi Area) • Group of Raw Material suppliers (Pekalongan Cloth Manufacture and PT. Plumbon International Textile (PT.Pintex)	Activities that related to receive, store, and disseminate inputs or raw material of a product, e.g., material handling, warehousing, production planning and inventory control.
Operations	• Core Industry (164 Batik Industry in Trusmi Area) • Group of Machine/Tools Suppliers (Yogyakarta Batik Tools Manufacture and Self-owned tools manufacture)	Activities are activities related to process or transform the inputs into the final product form by giving added value to the materials, e.g., machining, packaging, maintenance, assembly, quality checking, etc.
Outbond Logistics	• Core Industry (164 Batik Industry in Trusmi Area) • Expedition Corporates (Self-owned expedition service, PT. Pos Indonesia, and Logistic Express)	Activities related to collect, store, and distribute the product to the buyers, e.g., finished goods warehousing, distributing, order processing, delivery, etc.
Marketing and Sales	• Core Industry (164 Batik Industry in Trusmi Area) • Industrial Exhibition Organizer (Cirebon Industrial and Trading Department • Paguyuban Perajin dan Pengusaha Batik Cirebon	Activities related to provide the buyers needs to purchase the products, e.g., sales force, advertising, channel selection, pricing, etc
Services	• Core Industry (164 Batik Industry in Trusmi Area)	Activities related to provide service to improve or maintain the product's value, e.g., installation, repair, training, product adjustment, etc.
Secondary Activities	**Stakeholder in Charge**	**Function**
Procurement	• Core Industry (164 Batik Industry in Trusmi Area) • Group of Raw Material Suppliers (Pekalongan Cloth Manufacture and PT. Plumbon International Textile (PT.Pintex)	Supporting activities of an industry that aimed to provide the needs of materials and tools of an industry, e.g., material order, stock management, etc.

	• Group of Machine/Tools Suppliers (Yogyakarta Batik Tools Manufacture and Self-owned tools manufacture)	
Technology Development	• Core Industry (164 Batik Industry in Trusmi Area) • Group of Research Institutions (Gunung Jati University, 17 August University, and IAIN Syekh Nurjati)	Supporting activities of an industry that aimed a broadly grouped into efforts to improve the product and the process by doing research and development, e.g., production technology, machine technology, information system, etc.
Human Resource Management	• Core Industry (164 Batik Industry in Trusmi Area) • Group of Training Institutions (Cirebon Industrial and Trading Department)	Supporting activities that aimed to support both individual primary and secondary activities and the entire value chain, e.g., recruiting, hiring, training, development, and compensation.
Firm Infrastructure	• Government's Related Institutions (Industrial and Trading Department and Tourism Department) • Group of Funding Institutions (Paguyuban Perajin dan Pengusaha Batik Cirebon and West Java Bank (Bank Jawa Barat (BJB))	Supporting activities that aimed to support the entire chain and not individual activities as the overhead in an industry, e.g., general management, finance, accounting, legal, government affairs, and quality management.

The Diamond Porter's Model is used to illustrate the internal and external aspect condition of an industrial cluster. In this research, to identify all of the internal and external aspect comprehensively, interview process was conducted to several stakeholders ; representative of Batik craftsmen, Cirebon's Industrial and Trade Agency, Cirebon's Tourism Department, Supporting Industries which mainly from material and machine suppliers. From the interview result, it was known that the internal aspect consists of Chance that explain the potential of Batik Trusmi through its signature Batik motifs called "Mega Mendung", Current SMEs Central Market, Agglomerate and specified supporting industries, and the government development plan for Trusmi Area, and Government aspect that currently executed by Cirebon Industrial and Trading Department to Train, Control, Advocate and Coordinate the industries, Cirebon Tourism Department that manage the SMEs market center, and the government development plan.

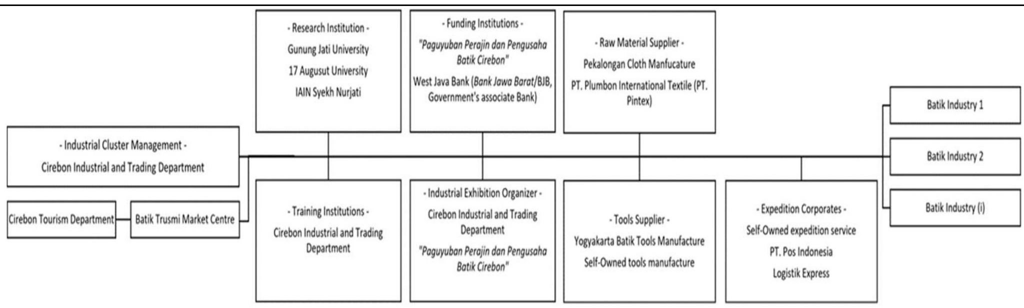
In the Diamond Porter's Model, external aspect consists of corporate strategy that in Batik Trusmi Industrial Cluster is determined to implement Cost Leadership and Operational Excellence Generic Strategy as the standardization for the industries, as shown in Table 3, and able to give competitive advantages such as loyal customer, market reach, integrated system, skill development, exposure, and welfare improvement, Factors Condition that is currently have sufficient human resource but need improvement for the infrastructure in Trusmi Village, Demand condition that have explained in Table 2, and Related institutions that is already described in the Value Chain Model.

In order to achieve competitive advantages provided by the industrial cluster system, Batik Trusmi Industrial Cluster Management needs to have and able to enforce several regulations in order to achieve the Central Objective which is Demand Distribution. Central objectives are applied to industrial cluster as the main objectives on implementing the industrial cluster system. In Batik Trusmi Industrial Cluster design, the Central Objectives are applied to help industries under the Industrial Cluster Management to gain the Competitive Advantages provided by the industrial cluster. Demand Distribution Regulation that will be regulated by aligning order received to Batik Trusmi Industrial Cluster Management with the production capacity of the industries, make relationship with potential industries to increase demand.

Table 4. Diamond Porter Model of Batik Trusmi Industrial Cluste for Internal Aspects

Diamond Porter Aspect	
I Internal Aspects	
1.1	Chance Government's develoopment for Trusmi that included in Rebana Industrial area Existing Trusmi SME's Industrial Centre ruled by Cirebon Tourism Department Agglomerate and sufficient supported industry around the Area Famous signature motifs called "Mega Mendung"
1.2	Government Training discussion forum and exhibition program by Cirebon industrial and trading departement West Java Province government plan on developing the Rebana Industrial Area including Trusmi Cirebon Tourism department that managing the SME's Industrial Centre of Batik Trusmi Integrate the stakeholders related on the industrial cluster system

Table 4. Diamond Porter Model of Batik Trusmi Industrial Cluste for External Aspects

Diamond Porter Aspect		
II External Aspects		
2.1	Corporate Strategy, Structure, and Competitiveness	
	Corporate Strategy	
	Porter's Generic Strategy Tracy & Wiersema's Generic Strategy Cost Leadership Operational Excellence	
	Corporate Structure	
		
	Corporate Competitiveness	
	Compotitive Advantages 1. Integrated System 2. Standardization of the product quality 3. Equally demand fulfilm ent by the industries 4. Market reach 5. Certainty on market price, demand, and business process 6. Business and human resource development	
2.2	Factors Conditions Human Resources	
	4779 workers in Cirebon Batik Industry in 2020	
	Infrastructure	
	General Public Infrastructure	Strategic SME's Centre Market of Batik Trusmi near the Toll Road SME's widelyspread inside the Trusmi Village
	Institutions Infrastructure	"Paguyuban Perajin dan Pengusaha Batik Cirebon" Secretariat Market building for the SME's Batik Trusmi Centre by Tourism Department Centred Government Related Institutions Research Institutions (University)
2.3	Demand Condition Batik Trusmi cover 36% production capacity of overall Cirebon batik industry with 150.388 pcs from 423.4410 pcs. Batik Trusmi cover 42% production value of overall Cirebon batik industry with Rp 53.387.740.000 from Rp 128.319.140.000	
2.4	Related and Supported Industries	
	Government's Related Institutions	Cirebon's Industry and Trade department Cirebon's Tourism Department
	Group of Funding Institutions	"Paguyuban Perajin dan Pengusaga Batik Cirebon" West Java Bank (Bank Jawa Barat/BJB, Government's associate Bank)
	Group of Research Institutions	Gunung Jati University 17 August University IAIN Syekh Nurjati
	Expedition Corporates	Self-owned expedition service PT Pos Indonesia Logistik Express
	Group of Machine Suppliers	Yogyakarta Batik Tools Manufacture Self-Owned tools manufacture
	Group of Training Institution	Cirebon Industrial and Trading Department
	Group of Raw Material Suppliers	Pekalongan Cloth Manufacture PT Plumbon International Textile (PT Pintex)
	Industrial Exhibition Organizer	"Paguyuban Perajin dan Pengusaga Batik Cirebon" Cirebon Industrial and Trading Department

4 Conclusion

The Industrial Clustering Design of Batik Trusmi has been done in this research. The use of Value Chain Analysis and Diamond Porter's Model illustrates the initial system of the Industrial Cluster. Batik Trusmi that potentially to be developed as an Industrial Cluster with Central Objective of Demand Distribution between the industries under the Industrial Cluster Management will be able to give Other Competitive Advantage to fulfill the Related Stakeholder's requisites, such as loyal customer, market reach, integrated system, skill development, exposure, and welfare improvement. In Advance research, Strategic and Performance Management System is needed to be part of the Industrial Cluster System. Government's development plan on Industrial Area is aligned with the research result, therefor another research is needed regarding other industrial area in Cirebon, specifically Ciwaringin Village that signature the natural handwrite Batik product.

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