

# The institutionalisation process of Transit Oriented Development practices for peri-urban development in Indonesia: Actor network perspective

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**Abstract.** Transit Oriented Development (TOD) has increasingly become a popular concept for peri-urban developments in Indonesia. It offers regeneration approaches to create compact, mixed-use, and walking-distance public transit areas that promote more effective land-use growth and efficient public transport uses towards sustainable environment in urban peripheries. This paper focuses on the institutionalisation of TOD peri-urban through analysis of stakeholder interactions in TOD peri urban. Interpretations of stakeholder interactions are observed from a case study of the establishment of TOD planning standard from two TOD peri-urban plans, Gedebage (Greater Bandung) and Purabaya (Greater Surabaya). Applying the logic of Actor Network Theory (ANT), this paper discusses emerging networks, key actors, intermediaries, and their interaction process. Data and information are produced from triangulation of semi-structured interviews and documentary reviews. The conclusion provides dynamic stakeholder interaction maps for TOD peri-urban institutions, which identify strong engagements of cross-boundary transportation agencies, planning agencies, public transport operators, the state government, and property developers.

## 1. Introduction

Rapid urbanisation in Indonesian metropolitan cities has been growing uncontrolled and leading to massive increases of land conversion, car-dependent commuters, and environmental issues in peri-urban areas. In Jabodetabek metropolitan area, for instance, in last 40 years, there have been going intensive land conversions in about 32,000 hectares of agriculture and green spaces in peri-urban areas into housing and urban settlement functions [1]. There are also around 1,105,000 daily commuters travel to the centre of Jakarta from its peripheries, which contribute to traffic congestion, air pollution, and inefficient energy consumption issues [1]. In facts, urbanisation process in many Indonesian cities is still depending on core cities as their peri-urban areas are still poorly organised, especially in terms of the provisions of workplace, commercial, and public facilities for local residents [2, 3].

The so-called Transit Oriented Development (TOD) recently came into account as one of the strategies to encourage more effective, productive, and sustainable development in peri-urban areas in



Indonesia. It is a combination of transport integration and compact land use in strategic transit areas providing convenient high density settlement, working space, shopping centre, and many other facilities all in one [4]. In the context of peri-urban, its main objective is to generate high quality settlements as alternative growth poles for the city centre in urban system. It is also featured to solve typical peri-urban issues such as poor infrastructure, unorganised land uses, and dereliction. According to some studies, TOD in peri-urban could potentially decentralise urban development, and hence, reduce commuting activities [2]. TOD in peri-urban also encourages the developments of transport integration for commuters that help to promote public transport uses and reduce car dependency [5]. From different perspectives, some studies believe TOD in peri-urban is an effective means of promoting health and green environment through the promotions of walking, cycling, and green spaces in TOD areas [4].

Implementing TOD peri-urban is very challenging, especially in terms of institution, politics, business viability, and administration. TOD peri-urban requires multi-sectoral actions or close coordination amongst different stakeholders such as government from cross-boundaries, traditional and private land providers, transport operators, developers, planners, community and informal businesses [6, 7]. Problems such as conflict of interests and lack of coordination amongst stakeholders appear as the common barriers in peri-urban management [8].

Having reviewed different research in TOD institutionalisation process in many countries, there are generally two types of TOD institutional model, which are government-led and private-led TOD developments. In many European cities, government played more facilitating roles in promoting TOD. Whilst they usually only focused to release public land into market and provided incentives, real estate developers played an active role such as engaged with banking industries to secure financial arrangements to realise property projects in TOD areas. Developers were also responsible as enablers for designs, constructions, and maintenance works [9]. These collaborations provided strong engagements towards individual residents [9]. In some Asian cities, on the other hands, government dominated TOD development including managing public transport, land values, and property revenues to finance redevelopment and maintenance of TOD areas. In this regard, government set regulations and working schemes for other stakeholders. Private developers focused as enablers in construction projects, but they had limited authorities to determine designs and concepts [9]. In Hong Kong, for instance, the program called 'Rail+Property' (R+P) was introduced as government initiative to organise and manage regulations, plans, development strategies, and property leasing agreements for TOD. They also determined other stakeholders roles in the process [10, 11]. In few cases, government engaged with few private sectors in managing property in TOD areas resulting a monopoly and leading to inequality and critical level of individual and community group opportunities to secure property and social spaces [11].

Although many research have been conducted to discuss TOD topics in Indonesian literature, there are still few of them touched the institutional and organisational issues. Most research only focus on conceptual design, technical plan, economics, and business aspects [1, 12, 13]. This paper focuses on studying the institutionalisation process of TOD peri-urban in Indonesia. It examines stakeholder interactions in TOD peri-urban development. We define stakeholder interactions from stakeholder activities in the establishment of TOD peri-urban planning standard in two TOD peri-urban case studies, Gedebage (Greater Bandung) and Purabaya (Greater Surabaya). Applying the logic of Actor Network Theory (ANT), this paper discusses key actors, networks, intermediaries, and their interaction processes. Findings of this paper provide actor interaction maps in TOD peri-urban that can be considered for further establishments of TOD peri-urban institutions.

## **2. Case Study and Methodology**

### *2.1. Case Study*

In 2014, the government of Indonesia through Directorate General of Spatial Planning, the Ministry of Public Works (now Ministry of Land and Spatial Planning) launched a project called the establishment of Spatial Planning Standard for Transit Oriented Development (TOD). It was conducted in 7 (seven) months involving planners, supervisory team from the Ministry of Land and Spatial Planning, and local

stakeholders as the study team. The work focuses on developing a standard model of TOD containing technical and institutional provisions to guide local stakeholders in the development of TOD in their regions.

One of the models developed in the standard is TOD peri-urban. It is developed from several case studies of TOD peri-urban plans, which the two largest cases are TOD Gedebage (Greater Bandung) and TOD Purabaya (Greater Surabaya). TOD Gedebage has been formally mandated by Bandung City Spatial Plan 2011-2031 and Local Transportation Plan. Meanwhile TOD Purabaya has been included as a plan in Regional Transport Plan of Gerbang Kertosusila (Greater Surabaya) 2012-2032. In the process of establishing the standard, stakeholders from the two TOD peri-urban are encouraged to work together to define the consensus standard through meetings, focus group discussions, workshops, and many other forums chaired by the study team.

### *2.2. Data and Information*

There are two major information required in this study. First information is about general overview of TOD policy, especially TOD peri-urban plans and characteristics in Indonesian metropolitan cities. This information provides basic understanding about TOD peri-urban in Indonesia including its objectives, development models, and involved stakeholders. These information are obtained from the final draft of TOD planning standard document, TOD plan documents and other city plan documents such as local transportation plans, city and provincial spatial plans, city and provincial mid-term development plans in two case areas, Bandung-West Java Province and Surabaya-East Java Province, and also research documents with relevant topics.

The second information is about the networks or stakeholder groups and their interactions within the establishment of TOD peri-urban plans in each case study area. These information give main inputs for the actor network analysis. We applied semi-structured interview to explore information, opinions, problems, and conflicts amongst stakeholders in the planning of TOD in their areas. Semi structured interviews were conducted during the project of 'The Establishment of Spatial Planning Standard for Transit Oriented Development (TOD)' in 2014 facilitated by the Indonesian Ministry of Public Works. We defined our relevant interviewees through snowball process by asking participants in regular meetings and focus group discussions, which conducted as parts of the project in April-November 2014. Our semi-structured interviews involved 25 interviewees including representatives of planning agency, transport agency, experts from the Worldbank, JICA, police department, Indonesian railway company, NGOs, and academicians from Surabaya and Bandung cities and relevant provinces.

### *2.3. Methodology*

This research applies the logic of Actor Network Theory (ANT) to analyse stakeholder interactions in TOD peri-urban. It is applied in three steps, which are (1) defining networks within TOD peri-urban, (2) identifying actors and examining their interactions within the networks, and (3) analysing the strengths and weaknesses of networks. Analysis is conducted in two cases of TOD peri-urban providing comparative results of stakeholder interaction maps that can be used as consideration materials to draw institutional frameworks for TOD peri-urban in the future.

ANT is a social science approach to explore how socio-material interactions emerged and interrelated each other to construct particular fluid networks or assemblages that create actions towards particular topics or subjects [14]. The use of ANT logic in this study has a meaning that this study attempts to examine stakeholder interactions within TOD peri-urban by adopting few key aspects of ANT analysis, which are 'networks', 'translation', 'key actors', 'intermediaries', and 'blackbox'. Network is a dynamic group comprising of actors with similar perspectives [15]. Translation is the way actor defines particular subjects or the understanding of actor that bring him to join his allies in a network [15]. Key actor is defined as determinant actor that connects, encourages and enrolls other stakeholders as allies to support particular subjects [16]. Intermediaries are entities, can be human actors, agencies, documents, materials, concepts, and artefacts that have functions to engage actors to stay in the network [15]. And, blackbox are entities that can be law, policy, agreement, contract, and many others that implicitly exist

and accepted by all actors without any obligation [14]. Nevertheless, this study adjusts the ANT concept by limiting the discussions only on human actors (people, institution, agency) and their interactions, although other (non-human) actors such as materials, artefacts, and technology are also involved in the construction of network.

This study uses UCINET network analysis software to draw actor interactions network. Actor interactions are justified from documentary reviews and interviews, which are conducted during the establishment of TOD peri-urban planning standard. The drawing provides illustration about stakeholder interaction within the networks and identifications of key actors, enablers, and followers. This software calculates key actors based on the role of ‘betweenness’ or level of connection to other actors within the networks [16].

In summary, the application of method in our case study is based on the rule of ANT ‘following the actor’. We firstly defined key stakeholders and outlined their interactions with other actors (including interactions in knowledge and information sharing and decision making process), which are justified from semi-structured interviews and documentary reviews. Interactions are descriptive by describing that particular actors contribute in sharing and providing knowledge, information, and consideration in decisions of other actors in the process of preparing TOD plan in their areas. These interactions were processed by UCINET applying the rule of score ‘1’ for relevant interaction and ‘0’ for no interaction. These practices of outlining stakeholder interactions were done by previous research in actor and social network related topics discussing role of actors in planning practices [17-19].

### 3. Results and Discussions

#### 3.1. Peri-urban Transport Dynamic

Planning standard of TOD peri-urban defines TOD Gedebage and TOD Purabaya as regional transit centre. Their functions are mainly to serve commuter activities between the city centre and its hinterland and neighboring cities. Detail characteristics of TOD peri-urban in two case studies are explained in the following table 1.

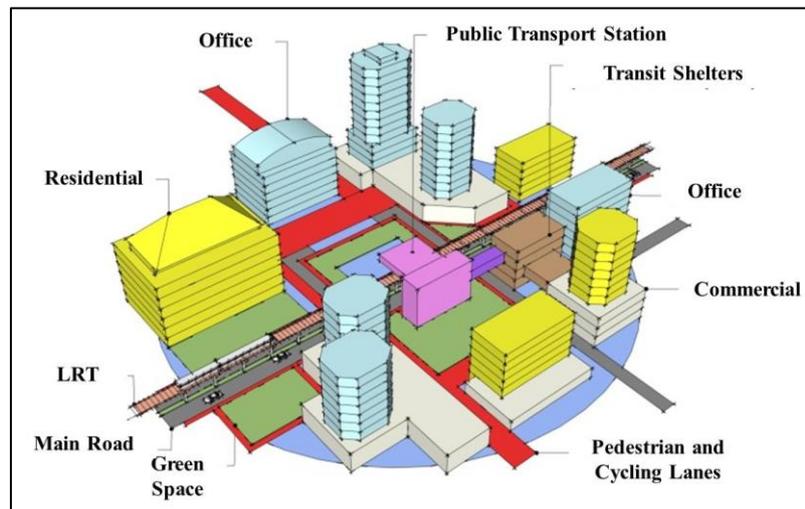
**Table 1.** TOD Peri-urban as the Case Studies of TOD Planning Standard

Characteristics	TOD Gedebage	TOD Purabaya
Served population	Bandung City (2,429,176 inhabitant) Bandung District (3,235,615 inhabitant)	Surabaya City (1,566,072 inhabitant) Sidoarjo District (1,949,595 inhabitant)
Average commuter trip	District to City (36,785 trip/day) City to District (44,129 trip/day)	District to City (28,713 trip/day) City to District (18,885 trip/day)
Radius area	800 meters	300-800 meters
Distance to city centre (core urban area)	15 km	12 km
Main transport facilities (TOD core area)	Gedebage railway station and bus terminal	Purabaya bus terminal and Waru railway station
Dominant land use	Industries, open space, and residential	Commercial, open space, and residential

*Source: Ministry of Land and Spatial Planning (2014)*

The standard of TOD peri-urban arranges several requirements for TOD peri-urban as sub-centre transport hub. For instance, in terms of transport characteristics, this type of TOD should at least have

(1) transport integration between city train, bus, and local feeder, (2) transit railway station type B (regional), and (3) located in hinterland of the city. In terms of land use characteristics, the area should have (1) area size of 58 hectares, (2) radius area of 600-800 meters from the railway station to the area borders, (3) a mixed land use functions comprising of high density residential (minimum 30 houses/ha) with office, commercial, and public facility areas, and also (4) supported by basic functions such as pedestrian, cycling lane, bus and small bus shelters, parking facilities, green open spaces, and social facilities.



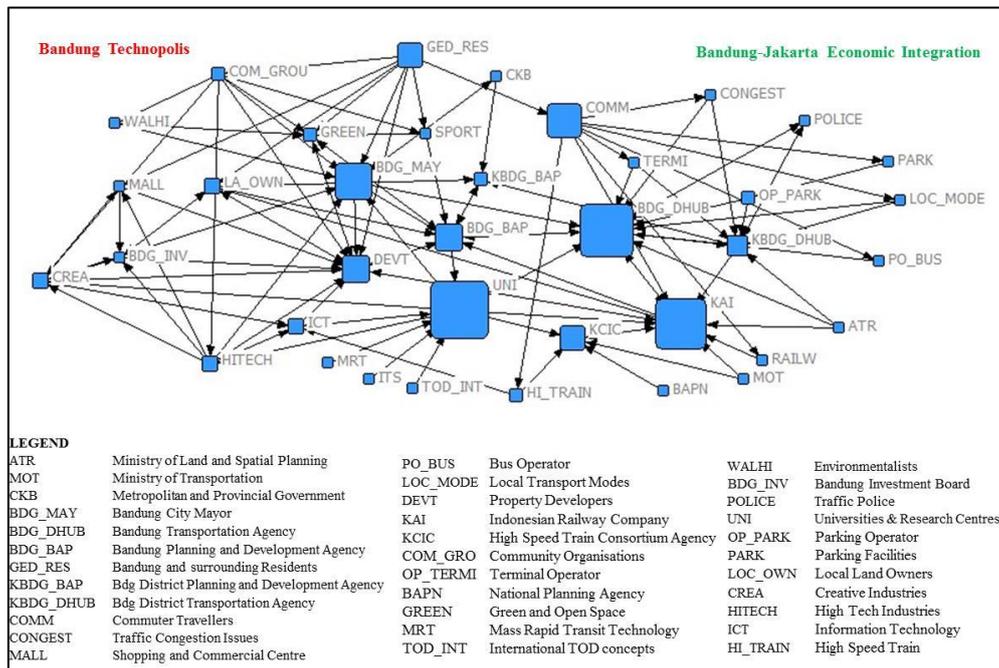
**Figure 1.** Illustration of the standard of TOD peri-urban (sub-centre)

Source:[1]

### 3.2. The Dynamic of Actor Interaction in TOD Peri-urban

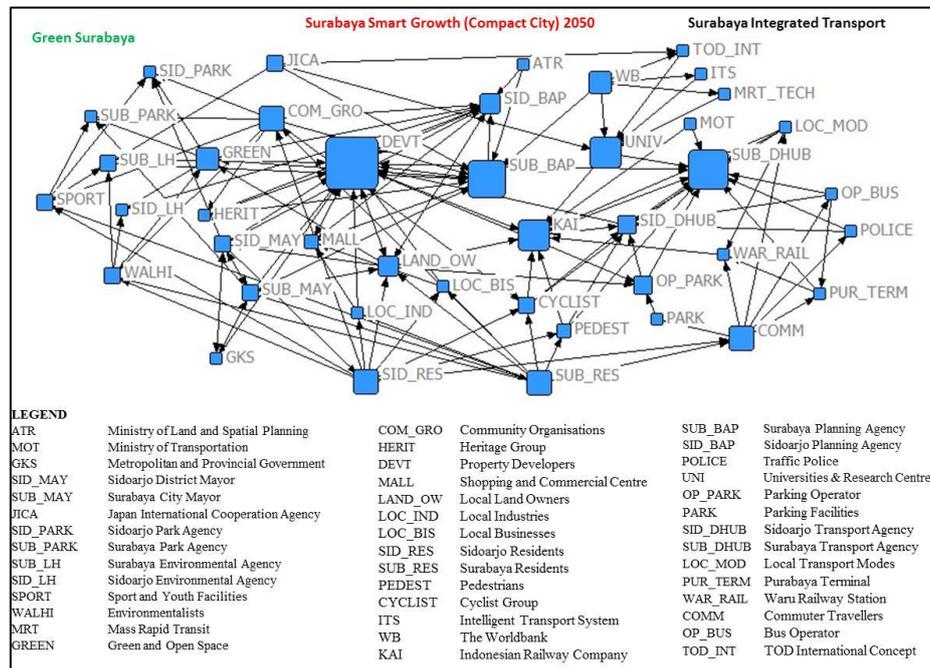
Our study has identified dynamic actor interactions in the two case of TOD peri-urban. In TOD Gedebage plan, there are 'Bandung Technopolis' and 'Bandung-Jakarta Economic Integration' as the two networks promoting the idea of TOD peri-urban. Meanwhile, in TOD Purabaya plan, there are three networks, which are 'Surabaya Integrated Transport', 'Surabaya Smart Growth 2050', and 'Green Surabaya'.

In TOD Gedebage, 'Bandung Technopolis' concerns on the development of new central business district that focuses on creative and high technology industries in the city in accordance with the vision of smart city. TOD Gedebage is translated as transit area to support creative and high technology industrial centre. 'Bandung Jakarta Economic Integration', on the other hands, concerns on the economic connectivity between Bandung and the state capital city, Jakarta. TOD Gedebage is translated as the key transit area to serve investments, workers, and trade movements between the two cities. The TOD is an area that integrates plan of Bandung-Jakarta high-speed train and city public transports so it can be an attractive living and working spaces for intercity commuters, traders, and businessmen. Actor interactions in the two networks of TOD Gedebage is illustrated in the following Figure 2.



**Figure 2.** Actor Interactions in TOD Gedebage Networks

In TOD Purabaya, ‘Surabaya Integrated Transport’ focuses on the integration of transportation system between Surabaya City and its hinterland and neighboring cities. This network defines TOD Purabaya as the sub-centre transit node that serve connectivity between Sidoarjo District to the city centre by providing inter-connections of inter-city railway, bus, and local feeders. ‘Surabaya Smart Growth 2050’ concerns on smart land use management through the promotion of compact city development towards sustainable development in 2050. In this network, TOD Purabaya is translated as a prototype for compact developments in peri-urban areas by bringing a large station, bus terminal, housing, industries, office, and green and open space areas in a single development zone. As for ‘Green Surabaya’, this network focuses on the green city vision in the future. This network considers TOD Purabaya to be a strategic settlement promoting more green and open space such as urban parks, pedestrian realms, and outdoor sport facilities. Detail illustration is presented in Figure 3.



**Figure 3.** Actor Interactions in TOD Purabaya Networks

By focusing on human and agency actors, our actor interaction network map (Figure 2) shows three most strategic stakeholders as the key actors in TOD Gedebage networks, which are (1) universities and research groups, (2) Bandung City Transportation Agency, and (3) PT KAI (national railway company). Universities and research groups have a central position in terms of knowledge transfer and sharing towards other stakeholders within the two networks. These groups also mobilise other potential stakeholders to support TOD plan, and also help the network to define role of actors in TOD development. They interact through research publications, seminars and workshops events, and professional advisory services and consultancies.

Other key stakeholders in TOD Gedebage are Bandung City Transportation Agency and PT KAI. The two agencies have strong connections to other relevant stakeholders in terms of providing transport integration in the area. PT KAI ensures the integration between high-speed train project stakeholders and the city transport stakeholders, whilst Transportation Agency facilitates the integration between local transport networks in the city and also provides communications with the neighboring city, Bandung District. These agencies interact through meetings, physical projects, and transport management policies.

**Table 2.** Summary of Key Actors in TOD Gedebage

Network	Key Actor	Main Ally / Enabler	Potential Ally	Non-Human Aspects
Bandung Technopolis	Universities and research groups Bandung Transport Agency	Bandung City Mayor and Planning Agency Property developers High speed train operator (KCIC) Indonesian Railway Company (KAI)	Metropolitan and provincial govt Resident, land owners, and community groups High tech and creative industries Investment board Environmentalists Bandung District Mayors, Transport Agency, and Planning Agency	High speed train project Information technology Intelligent transport system MRT technology TOD best practices Shopping and commercial center Green and open space

Network	Key Actor	Main Ally / Enabler	Potential Ally	Non-Human Aspects
Bandung-Jakarta Integration	Bandung Transport Agency Indonesian Railway Company (KAI)	High speed train operator (KCIC) Bandung City Mayor and Planning Agency Bandung District Mayors, Transport Agency, and Planning Agency Parking and Terminal Operators	Bus Operators Local transport operators Police Commuter travelers State Government Agencies High tech and creative industries Investment board Resident, land owners, and community groups	Parking facilities Railway station Bus terminal Traffic congestion High speed train project MRT technology High tech and creative industries

Our study suggests high-speed train planning project as the key intermediary for TOD Gedebage networks, and TOD international best practices as the potential blackbox. Although still in a preliminary stage, high speed train project has attracted many stakeholders to believe TOD Gedebage is a prospective area in the future for Greater Bandung. Many stakeholders accept TOD international best practices and they believe TOD is a good and suitable development approach for Indonesia, moreover for peri-urban area.

Furthermore, if we analyse Figure 3, by focusing on human and agency actors, our study identifies two stakeholders as the most strategic actors in the development of TOD Purabaya, which are (1) property developers and (2) Surabaya-Sidoarjo collaborative local governments. Property developers play the most strategic actor in all networks providing strong connections and influences to other stakeholders such as local businesses and industries, metropolitan government, heritage and environmental groups, and also local governments from the two administrative regions. This stakeholder can engage other stakeholders by initiate stimulant projects in TOD area such as housing projects, industrial park projects, innovative green parks, and or shopping mall projects.

Other strategic actors in TOD Purabaya are Surabaya-Sioarjo collaborative governments, which appear in strong communication between Transportation and Planning Agencies of the two administrative areas in terms of land use and transport planning policy issues for TOD Purabaya area. Collaborative transport agencies ensure the integration of a railway company, bus operators, local modes, and commuters through instruments such as traffic management, public transport rerouting, and public transport facility revitalisations in TOD Purabaya area. Meanwhile collaborative planning agencies ensure the integration of land uses in the TOD area through the instruments of spatial plan, intercity agreement plan, and collaborative land use projects.

It is strongly highlighted that inter-city collaboration is required due to the nature of Purabaya peri-urban terminal as the centre of TOD plan area that located in between two city administratives. This terminal is developed under local government agreement between Surabaya City and Sidoarjo District where Surabaya operates and develops the facilities and Sidoarjo leases the land for certain period. This situation demands the collaboration as transport system will be led by Surabaya Transport Agency, whilst land use plans could be mainly initiated by Sidoarjo Planning Agency.

**Table 3.** Summary of Key Actors in TOD Purabaya

Network	Leading Stakeholder	Key Follower / Enabler	Passive Supporter	Non-Human Aspects
Surabaya Integrated Transport	Property Developers Surabaya-Sidoarjo collaborative local governments	State Agencies Indonesian Railway Company (KAI) The Worldbank Universities and research groups	Metropolitan and provincial govt Bus operators Local transport operators Commuter travelers Police Parking operators	Parking facilities Railway station Bus terminal Intelligent transport system MRT technology TOD best practices

Network	Leading Stakeholder	Key Follower / Enabler	Passive Supporter	Non-Human Aspects
Surabaya Smart Growth	Property Developers Surabaya-Sidoarjo collaborative local governments	Local businesses and industries Residents and community groups	Local transport operators Commuter travelers Residents, land owners, and community groups Metropolitan and provincial govt	Parking facilities Railway station Bus terminal TOD best practices Shopping centre
Green Surabaya	Property Developers Surabaya-Sidoarjo collaborative local governments	JICA Environmentalist Residents and community groups	Heritage group Metropolitan and provincial govt Residents, land owners, and community groups Pedestrians and cyclists	Railway station Bus terminal TOD best practices Green and open space

Our study suggests Greater Surabaya Spatial Plan and Regional Transportation Plan as the two intermediary documents to engage all stakeholders in the networks, and TOD international best practices as potential blackbox similar to the case of TOD Gedebage. The regional plans clearly mention the agenda to improve transport networks, realise compact city development, and achieve green sustainable development through TOD peri-urban concept. These documents also define role sharing amongst stakeholders and their benefit in the future. All stakeholders show very strong supports and use these plans as the fundamental guidance for them to contribute in the development of TOD peri-urban in Greater Surabaya. In this regard, Surabaya City stakeholders lead the engagement process. As for the blackbox, likely to the case of TOD Gedebage, our study also identifies TOD international best practices come as very potential blackbox in the three networks of TOD Purabaya. All stakeholders have strong opinions that TOD is very good approach to be applied in their region to achieve three missions, transport integration, smart growth, and green development.

#### 4. Conclusion

Our study concludes that the initiatives of TOD peri-urban in Indonesian metropolitan cities are mainly involving four key actors, which are inter-city local government stakeholders, Indonesian railway company, property developers, and universities and research groups. Their interactions were shaped into cross boundary administrative and public private partnership collaborations. Cross boundary administrative collaboration has significant roles in mediating transport and land use integration plans for TOD peri-urban, which usually located in the border area of two cities. Public private partnership collaboration has more roles in terms of promoting and executing the plan into projects, in which local government stakeholders as regulator and controller, and private developers as the executors.

Having compared the two cases, our study found that more involvement of state government and national issues in Bandung TOD have been leading to more complicated institutionalisation process of TOD, and hence, stronger in concept, planning integration, and promotion but still very weak in terms of progress and implementations. Meanwhile, in the second case, active engagements between cross-boundary governments and developers, and keeping the plan only for local issues in Surakarta, and the TOD has been leading to more simple institutionalisation process, which resulted stronger in implementation but still very weak in terms of conception, integration, and plan.

Overall, our study concludes that in terms of the application of ANT logic, there are several analytical aspects of ANT are potential to be used to define stakeholder interactions in TOD peri-urban, such as 'network', translation', 'key actors', and 'blackbox'. These aspects can be used as indicators to measure the strengths and weaknesses of TOD institutions. However, our study suggests further detail researches to explore potential organisation model for TOD peri-urban. Such potential researches should be able to

use resources from this paper to develop various alternatives of organisation structure for TOD peri-urban such as BID (Business Improvement District), enterprise zone, strategic development area, or communicative development forum.

## 5. References

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