Towards Sustainable Transportation: Identification of Development Challenges of TOD area in Jakarta Metropolitan Area Urban Railway Projects

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Abstract. Transit-Oriented Development (TOD) becomes one of sustainable transportation concepts that have been implemented around the world to overcome the transport problems in certain area. This paper aims to identify and to explain general challenges encountered by Jakarta Metropolitan Area (JMA) in the process of adopting TOD. The study is expected to explain the local context discourse and important elements of the TOD area development. The study utilizes a qualitative approach, by applying both primary and secondary sources. The primary data was obtained from in-depth interview in 4 (four) Focus Group Discussions (FGD) conducted from October 2017 to July 2018. The secondary data was acquired from literature reviews, institution reports, and existing policy review. The study observed 5 (five) TOD project currently developed by the private and public sector, such as TOD Dukuh Atas, TOD Ciracas, TOD Cikoko, TOD Pasar Senen, and TOD Tanjung Barat. It is found that the challenges of developing TOD in the case studies comprise 4 (four) important elements, such as regulation, planning and design of TOD, institutional issues, and funding. In this early stage of developing TOD, Indonesia, specifically JMA, still has ample in understanding the challenges of implementing TOD.

Keywords: development challenges, Transit-Oriented Development, Jakarta Metropolitan Area

1. Introduction

1.1. Background

The concept of sustainable transportation becomes an important issue due to its relation to supply, demand, and resource management in the future. One of the concepts of sustainable transportation that has been implemented in major cities around the world is Transit-Oriented Development (TOD). This concept rests on the efficiency of mobility costs, income from property, health improvement, reduction the risks of traffic accidents, improvement of mobility for non-motorists, and decrease of energy consumption as well as adverse environmental impacts [1]. Indonesia, especially in some large cities, has adopted this concept as part of the transportation and spatial planning. The urban railway projects such as Mass Rapid Transit (MRT), Light Rail Train (LRT), and commuter rail in Jakarta Metropolitan Area (JMA) are connected to the development of TOD area projected as an integrated
solution of public transportation problems, particularly for commuting journey to its satellite cities (Bogor, Depok, Tangerang, and Bekasi).

However, as an adopted concept, the planning and implementation of TOD development requires an established and well-defined policies and regulations according to the local context of a country. The process of policy adoption has the context-specific aspect and policies from different context which cannot entirely be adopted identically. Indonesia adopts TOD policy through studying the lesson of successes and failures in other countries, especially from the developed countries. The approach taken by the Government of Indonesia, in fact also occurs internationally in the context of transferable policy. In the Indonesian context, it is argued that the lack of implementing regulations and the absence of a pioneer institution leading the planning process become the two main causes of this phenomenon. Thus, policymakers tend to look for examples from other countries and to emulate policies that have been successfully adopted in their countries [2, 3, 4]. Recognizing that the policy adoption process is different from the country being emulated, understanding the specific context remains important to note. This article presents the general challenges faced by Jakarta and surrounding cities in planning the development of a TOD-based area as an effort to introduce a more specific context. It is hoped that, by understanding the challenges that arise, the development of the TOD area in the Metropolitan area of Jakarta and in Indonesia may consider these aspects more thoughtfully.

The article will be divided into 4 parts, including introduction, literature review, results and discussion and conclusions. The literature review contains a study of regulatory, planning/design, institutional and funding aspects in developing TOD. After reviewing theory and regulation, the discussion will focus on the results and discussion consisting of challenges at the stage of regulation formulation, planning/design, institutional and financing, concluded with recommendations.

1.2. Aims and objectives
This paper aims to identify and explain general challenges encountered by JMA in the planning process of adopting TOD. This study is expected to provide clearer direction to the government and other involved stakeholders, both from the public and private sectors, regarding the context-specific discourse and important elements of the TOD area development.

1.3. Literature review
In analyzing the theoretical point of views, the paper utilizes the findings from the study regarding the challenges in creating TOD [9], particularly in developing countries. From the varied factors, it is summarized that the challenges are classified into regulation, planning and design, institutional framework, and financing mechanism. Hence, the following literatures are referred to those four aspects. To build literature foundation, notable and important articles are gathered, synthesised, and eventually compared with the empirical cases in the result section.

1.3.1 Aspect of regulation in TOD area development
Some concerned literatures indicated that there was no specific regulation or standard applied to the TOD area, due to its innovative, contextual and growing concept. Yet, there have been general rules in understanding the thought. For instance, a regulatory concept emphasizes collaboration between levels of government, cooperation between sectors, and accommodation of all segments of society, especially in the marginalized one [9]. From this point, it can be concluded that the regulatory aspect was inseparable from the actor, such as the government apparatus and the purpose of the plan. Consequently, regulations will involve those who make the rules, regulate the subjects and produce the rules.

Supportive regulatory policies and tools will encourage the successful development of a TOD area, especially in terms of the integration of transportation and land use policies. The successful integration of land use and transit systems is visible in cities such as Hong Kong, China, Tokyo and Curitiba marked increases in local government revenues through property development and air rights.
due to land use and mass transportation integration. The success schemes are originated from a learning process and understanding of vision and long-term goals of TOD concept. This process requires the involvement of all actors and will be affected by the planning of a TOD area, including risk management strategies to deal with potential pitfalls or future mistakes [4]. Instrument rules about TOD are flexible and adaptable in the situations which accommodate the needs of each actor [3].

1.3.2 Aspect of planning and design in TOD area development

Aside from the integration between transportation and facilities, the design of the area becomes an important means for marketing value. With a well-planned area, it is expected that the community can contribute to change their lifestyles by using mass transportation and facilities around TOD more frequently. Furthermore, an-800-meter radius concept to plan compactness of the area enables proximity around mixed-use facilities towards the transit point. This can be done by combining different functions of activities, such as varied housing type, retail area, offices, open spaces, and other facilities aiming to provide comfort for residents and workers in using several modes of transport. In general, the development of transit points will strive to optimize the development of the area around the Rapid Transit System station through the TOD approach. The concept of TOD places transit facilities as the center of the development of the surrounding area, not only limited to the means of mass public transportation [5, 6, 7].

Theoretically, there are several TOD typologies that have been defined. Cervero divides TOD based on the stages of development, such as: new TOD, high-density TOD, and low-density TOD [6]. The characteristics of the "new TOD" are distinguished by the development of areas along with high quality and high passenger capacity corridors of public transportation. In DKI Jakarta, this type of TOD is apparently found out in the development of MRT transportation facilities with several stations along the corridor. The concept produces a hallway and is often represented as a 'node or set of nodes in the corridor', describing the development area within an 800-meter radius around the transit station. The function and density of potential development areas within a circle are differentiated from the structure outside the existing urban area. In a regional or metropolitan scale, these nodes or circles are intertwined as an infrastructure path referred as 'pearls on a necklace' [8].

The other typologies of TOD are high-density TOD and low-density TOD based on the existing conditions of the built environment. The development of TOD in high-density areas is more focused on diversification and TOD design, while in low-density areas the development of TOD is emphasized with the improvement of public transportation facilities to increase population density. Both of these concepts have been unconsciously developed by the DKI Jakarta government and its satellite cities. For the high-density, TOD example can be seen by the development of TOD Dukuh Atas located in a densely populated area with 5 modes of transportation. Whereas, low-density TOD is described as TOD in suburban environments that only consist of 1 or 2 types of public transportation. This development was seen in the construction of the Ciracas TOD.

1.3.3 Aspect of institution in TOD area development

Institutions and regulations in developing TOD are inseparable. It is revealed that institutions in TOD involve government structures, institutional governance, government initiatives (planning regulations, transit mode investments, and tax policies) [9]. Thus, the institution does not only mean institutions / organization, but also the collaboration between institutions and planning. Apparently, it is certain that institutions overshadow the actors involved, in a form of cooperation where institutions that play a role formulate policies related to TOD. In addition, the relationship between the government and the market (market) is obviously important, since the development of TOD cannot be separated from the effort to exploit land to gain profits.

The implementation of a TOD is generally pursued through cooperation between the government and the private sector as a transit agency, referring to the TOD project financing mechanism [10]. Further, the complexity of the processes that occur in the development of TODs makes achieving agreement between the actors as a matter that greatly influences the success of
development. One way that can be done to minimize frictions that occur is to develop and implement strategic and coordinative policies [11]. In practice, coordinative planning is closely related to the institutional design to be implemented, where procedures, organizational structures, and regulations, encourage or prohibit an action in accordance with the objectives achieved. Referring to this understanding, it is obvious that the institutional aspects are specific but comprehensive. Specific means touching to a specific domain at each stage of planning, comprehensive that the whole process has one big umbrella which becomes a reference for more detailed stages.

In the context of practice, efforts to achieve city goals and the development of TOD cannot be separated from political aspects. It is explained that policies, regulations, norms and beliefs are seen as limit based on agreements between actors normatively and substantively [12]. While, some argue that the institutional form of the TOD area can be done by independent body, alike in Hong Kong carried out by forming an independent body where most of its shares are owned by the government. They are in charge of managing all stages of the TOD development process, starting from planning, implementing and maintaining business continuity [13].

1.3.4 Aspect of funding and financing in TOD area development
Questions in terms of funding and financing for a development are: who pays for whom? who is financing the provision of urban public transportation, and for whom? or who receives benefits from the facility? Even decision makers and finance agencies are eager to know who can afford to finance and have to finance urban public transportation, including: users, governments, companies, or business people. How should variations in funding sources be distributed and allocated to various modes of transportation? What is the most appropriate source of financing for sustainable development? How to mobilize it?

The question about urban transport is whether urban public transportation is included in public goods. Public goods are understood as goods available for consumption by everyone, without limiting who pays / finances, with non-excludable and non-rivalrous properties [14]. In the debate on this matter, a scholar describes that urban public transportation is clearly defined as a public service facility for broad public use, including the transit category and specifically the paratransit category [15].

The price or amount of financing will depend on the mode of transportation chosen. However, whatever the choice, the key lies on how to build a long-term financing condition for investment (infrastructure and rolling stock) and operations (operations, maintenance, and replacement). Therefore, all costs for long-term use must be taken into account in the strategy of choice.

However, due to the large amount of funding, conflicts usually occur to provide other public services such as health, education, access to clean water and sanitation, communication, culture, which must also be fulfilled. Therefore, it is important to consider a new mechanism of finance involving players other than the government, such as the investors from private sector, including technology providers and operators.

2. Methods
The study applies a qualitative approach, and the data is collected through primary and secondary sources. The primary data were obtained from in-depth interviews of 26 (twenty-six) interviewees from the public and private sectors. The interviews were conducted by semi-structured questions. Besides, the author also participated in 4 (four) Focus Group Discussions (FGD) from October 2017 to July 2018. Afterwards, the interview and FGD results were delivered in transcript manuscript before analyzed through thematic analysis. In doing so, the author listed a set of keywords then analyzed the result by matching the content with the keywords from interviewees' statements. To complement the data, a series of resources from literature reviews, institution reports, popular media, and existing policy reviews were acquired. The locus of study includes the 5 (five) TOD projects currently developed by the private and public sector, such as TOD Dukuh Atas, TOD Ciracas, TOD Cikoko,
TOD Pasar Senen, and TOD Tanjung Barat. In explaining the result, the study applies explanatory descriptive study in order to describe the cases empirically.

3. Results and Discussions
This chapter will explain the findings related to the challenges in the TOD planning process obtained from the results of interviews with different stakeholder groups, divided into 2 major groups, consisting of: transit agency and regional / central government, which answered questions about the regulatory, design, institutional, and financing frameworks in working on the TOD area. The results will be delivered in 4 aspects, including: regulations, planning and design, institutional and financing, which are then elaborated on by the author's thoughts.

![Figure 1. Challenges in developing TOD in Indonesia](image)

In general, this study identified challenges of TOD development process that are divided into 4 (four) important elements, such as: the element of regulations, the element of planning and design of TOD area, the element of institutional issues, and the element of funding and financing.

3.1. Challenges in regulatory aspect
In general, stakeholders’ views on TOD regulations are different in terms of tasks and obligations. In terms of the transit agency, the TOD regulations already existed but were not optimal. "The TOD regulations already exist, but they are still not optimal. Regulations related to FAR are still largely unclear" (PT MRT) while existing regulations "are still not maximal, and they should still be developed" (PT Adhi Karya). At present, the regulations related to TOD are still in the form of normative regulations and not yet operational, such as Minister of ATR Regulation No. 16 of 2017 concerning Guidelines for the Development of Transit Oriented Areas, with regard to incomplete regulations, excluding the scope of authority of the transit agency and an obligation of the central government. At least, one of the institutions expressed his views, "we do not have the authority to issue policies. With regard to regulations made by other parties, we do not pay too much attention" (PT KAI). Some of the above findings explain that inadequate regulations have become a significant challenge for transit agency and potentially hinder the TOD development process.
3.2. Challenges in planning and design aspect

Based on the results of interviews conducted, it was found that the actors' understanding of the TOD planning concept were various. For stakeholders who already have experience as developers, they value TOD as an area. Thus, the TOD planning built by the actors also processes the area around the station points into high-value strategic functions, such as mixed-use, residential, commercial, and others. Although in practice, the cultivated area is not exactly 400 or 800 meters but the embryo of regional development that is integrated with the transit point is visible. On the other hand, the TOD Dukuh Atas developed by PT MRT is still limited to the construction of transit stations.

The spokesman of PT MRT said that, “MRT has authority related to the intensity of buildings, but does not have land that can be built”. Besides the source’s limitation, another agent (PT Jakpro) also said that, “The challenge in planning is due to an assumption that operators can manage everything related to existing land, yet the abundant makes the coordination is sometimes unclear.” The unclear regulation also perceived by Perumnas confirming that “The absence of clear regulations made it difficult to synchronize station design. Many parties offered strange designs and developments.”

The absence of detailed regulation also leads the design process with a non-standard facility, especially the lack of placemaking design in a radius of 400 m for pedestrian or for other non-motorist’ mobility and accessibility to railway stations.

3.3. Challenges in institutional aspect

In the institutional aspect, the absence of agents who lead the overall development of the TOD (leading institution) caused the parties involved to wait for instructions. The absence of an agent appointed by the government as the holder of authority in regulating the TOD also has an impact on the absence of full authority holders in maintaining TOD as a sustainable business cycle. As clarified in the interview, the role of each stakeholder was diverse, which depended on the project. PT MRT said that,” Jakarta MRT was appointed as the main operator with the second Governor Regulation, namely Governor Regulation 140 in 2013. The MRT acts as an extension of the government's involvement in managing the TOD area”. While, for PT Adhi Karya, “Initially, Adhi planned to become the initiator of the TOD project. However, until now Adhi has been appointed as a provider of LRT infrastructure using design and built mechanism”. In this regard, PT Adhi was only appointed as provider of LRT infrastructure and was not appointed as TOD developer or manager.

The unclear constraint and role in the project also have an effect on the market mechanism where investors / business people have the lack of confidence in the political climate that is not yet established. Another basic thing is the absence of regulations that govern the process of developing TOD in detail, resulting in the rise of negotiations and improvisations between actors to facilitate development. This practice is already familiar in Indonesia, but the resulting impact weighs heavily on developers because it can increase transaction costs.

In the context of the institutional aspect, the absence of a leading institution causes a conflict of interest in which each agency acts in their own interest without optimal output. In the long run, it may stimulate the undeveloped market mechanism where the business actor is reluctant to invest and the available source remains idle.

3.4. Challenges in funding and financing aspect

The development of TOD can be an opportunity to use alternative financing mechanisms, such as Land Value Capture (LVC) by using the non-fare box component, such as: property, advertising, access fees, as company revenue. This value captures the mechanism to identify the increase in the value of a land or area due to the development of infrastructure, especially transportation infrastructure, which increases accessibility to the land [16]. LVC has been implemented by several countries to fund part or all of the TOD construction costs, such as in: Hong Kong, Japan, United
Kingdom, and Colombia. Each country applies a different LVC mechanism adapted to the economic, political and ideological systems adopted. Broadly speaking, LVC allows local governments to be able to take up the value of land caused by the construction of public infrastructure. Then, the profit is utilized to finance the construction of other public facilities / infrastructure. At present, there is no LVC mechanism that has been implemented in Indonesia. The implementation of the LVC mechanism is something that will need to be done by the government, because of the projection of land value increases in the proximity of TOD area.

Based on the interview, the value of project has not been seen vividly for a certain stakeholder. As said by PT MRT, “Until now, the MRT has not considered financial benefits. Consideration is still only seen from the perspective of urban planning. New financial benefits will be considered when TOD will be built or developed in accordance with UDGL”. From this point of view, the return on investment mechanism remains unclear. A similar result also occurred in PT KAI, where the corporation has not thought about the funding, since they “Don’t know yet, because of (the project) is conducted by the different directorates”. The answer gave an insight of unsynchronized sharing information in the bodies of corporation.

Different from transit agency point of view, the central government’s view represented by Jabodetabek Transportation Management Agency revealed the opportunity of obtaining profit of Floor Area Ration (FAR). It is said that, “FAR is still a problem. Many requests from developers, hoped that the calculation of FAR should be calculated based on area basis. But on the other hand, there must still be provisions on the limits of FAR in general, because calculations per area will cause different regulation for each region and potentially cause problems in the future. It is understood that this stakeholder has perceived TOD as a source to gain land value through the excess allowed of FAR, yet the regulation that arranged this mechanism had not been formulated clearly. Hence, the practice of obtaining land value has not occurred in the context of case study; however, the idea has been understood conceptually.

4. Conclusion
In summary, the high quality of public transit is greatly important to the sustainability of urban development. A well-defined integration between the transit system and land use planning might encourage environmental sustainability, institution, financing and legal evolvement, as well as better quality of the urban facility. TOD more specifically - through densification approach around the station as a transit hub by placing amenities, workplaces, commercial activities and housing in close proximity becomes one of the most effective ways to achieve sustainable urban development. A well-designed property will get accessibility and agglomeration benefits.

Furthermore, the agency and all institutions involved in the TOD have pivotal roles and responsibilities in creating a supporting environment for the initiation of the TOD project. However, it is argued that provincial government is the most potential agency to manage and develop TOD project, since the development of urban dan transport project is under their expected roles by referring the decentralization concept conducted in Indonesia. However, the central government is more focused on formulating policies and regulations. The current regulations are also inadequate to overcome the problems, because it only covers normative aspects. Therefore, the detailed policies and strategies are needed to produce workable structures for all institutions involved, without draining resources or harming a certain institution. The formulation of alternative financing mechanisms is important for the sustainability of the development of TOD. To achieve that point, good collaboration among central government, local government, transit agency, developers, landowner and society are immensely required through proper and clear policy, workable working structure, as well as open dialogue among involved actors. In this early stage of developing TOD, Indonesia, specifically JMA, still has ample in understanding the challenges of implementing TOD as a stepping stone to conduct sustainable transportation in the future.

In the context of public policy, the development of TOD, with all of the promising benefits, offers the adoption of policy examples related to the integration of land use for transportation as the
commonplace for government officials (as a learning material). Regardless of the good goals, the policies utilized as guidelines must be in accordance with the specific context of the location. In this point of view, several case studies of TOD area development in Indonesia, especially Jakarta Metropolitan Area (JMA) have proven this premise, by finding 4 main challenges in the development of TOD that differ from the problems of the sample countries.

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