Padalarang Station Area to Become Transit Oriented Neighborhood as Part of Bandung Urban Railway

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Abstract

Padalarang is a suburban area in Bandung Metropolitan region which has large commuter worker who makes their living in Bandung city. Padalarang Station located in the heart of Kecamatan Padalarang and become one of local activity center with the traditional market next to it. Padalarang Station built in early 20th century by Dutch colonial government as part of Bandung – Jakarta railway. Today, Padalarang Station serves as commuter station to Bandung and several routes to other city.

As a response to increasing number of commuter worker in Bandung Metropolitan Area and in order to solve severe congestion, Indonesian Railway Company (PT. KAI) with assistant from central government planned a railway based mass transportation line called Bandung Urban Railway which connecting Bandung with several suburban areas around Bandung municipality. The line will be double track stretching from Padalarang to Cicalengka. Today Padalarang Station Area surrounded by low density detached housing, busy trading activity around the market and has narrow road as the only access to the station which led to heavy congestion during peak hour which stretched to Padalarang highway gate.

This paper is trying to find the appropriate urban design principles for Padalarang Station Area development as commuter neighborhood to support Bandung Urban Railway concept. The aspects of urban design include land use, intensity, housing, pedestrianization, open space and accessibility. A Transit Oriented Development (TOD) theory is used as procedural theory to find urban design principles for transforming Padalarang Station Area to become a Transit Oriented Neighborhood. How a Transit Oriented Neighborhood can support mass transportation system is to be explained in this paper. Finally this paper emphasizes the needs of promoting density, walkability and active public space to minimize automobile journey and incarnating Padalarang Station Area into Transit Oriented Neighborhood.

Keywords: urban design, transportation, Transit Oriented Development, Bandung, station area planning

Padalarang Train Station

Padalarang, located between Cimahi and Cianjur, is a sub–district region of Bandung Barat Regency. It is a crossing path of Bandung – Jakarta via Puncak. The developing economic sectors of Padalarang are industry and nature tourism.

In early 20th century, Padalarang is a part of Bandung – Jakarta railway which the Dutch colonial built. It was marked with the development of Padalarang train station at the same period. Not for long after that the traditional market and Paper Factory (PT. Kertas Padalarang, then PN. Kertas Padalarang) were built. Then the local settlement and factories were growing.

Today Padalarang Train Station still serves as an important station of railway transportation in Bandung Metropolitan Area. It serves local

economy train (Padalarang – Cicalengka) and several routes to other city such as Jakarta, Purwakarta and Cianjur to the North – West and Kediri in East Java.

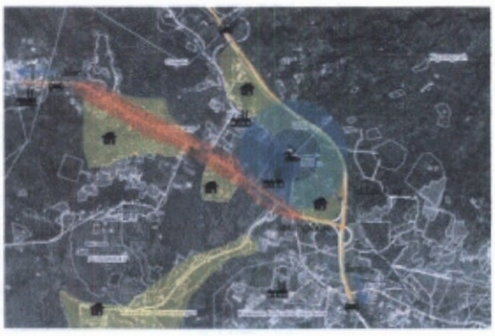

Figure 1 Site Analysis of Padalarang Area
Source: Analysis

Greater Bandung Metropolitan Area

To understand the role of Padalarang in Bandung metropolitan context, we can refer to the Spatial Plan (Rencana Tata Ruang Wilayah) of Bandung City and West Java Province. According to RTRW Bandung 2011-2013, Bandung is one of Nationwide Center (Pusat Kegiatan Nasional) which consists of Bandung city and Cimahi city as core (see table 1). We can also call this arrangement as Greater Bandung Metropolitan Area (GBMA).

PKN	Kota Orde I	Kota Orde II	Kota Orde III
Kawasan Perkotaan Metro Bandung	Kota Bandung		
		Soreang	Ciwidey
			Banjaran
			Majalaya
			Ciparay
			Cicalengka
			Rancaekek
			Cilengkrang
		Ngamprah	Cililin
			Padalarang
			Cisarua
			Lembang
	Cimahi		
		Tanjungsari	

Table 1 Hierarchy of PKN Metropolitan Bandung
Source: Buku Rancangan RTRWP Jawa Barat, 2008

Padalarang can be categorized in Order III city or suburban area. Administratively, it's under Bandung Barat regency with Ngamprah as its center of administration. Economically, Padalarang has interdependency with Bandung city. Some of the Padalarang's resident working and schooling in Bandung city. The current trends shows that a number of upper-middle working class who has job in Bandung choose to reside in Kotabaru Parahyangan, a new developed residential area located approximately 1 km of Padalarang Train Station.

Padalarang with its significant greenery, act as green buffer for GBMA. With its significant role as the gate of GBMA, the development of Padalarang area should comprehensively planned so it's not consuming the green area surrounding it.

Bandung Urban Railway

Severe congestion tends to happen in Padalarang during rush hours. The source of traffic jam is the exit way of Padalarang-Cileunyi Highway headed directly into an intersection which confronting traffic flow from Cimahi, Padalarang, Bandung and entry access to Kotabaru Parahyangan. A new ring road is build recently to divert the flow from highway gate into Kotabaru Parahyangan, but still the congestion problem is not fully solved.

The central government initiated a project to solve congestion problem and increase connectivity in Bandung municipality called Bandung Urban Railway Transportation Project. This project funded by US$157 million loan from France. According to the Medium Term Overseas Loans Planning List/2011-2014 Bappenas Blue Book, the urban railway project and the Padalarang-Cicalengka electrification require total funds of US$175 million[1]. The loan consist of US$ 13,5 million for Engineering service and US$ 161,5 million for construction, which will took 48 months of completion.

[1] http://www.thejakartapost.com/news/2013/08/05/bandung-develop-railway-project.html

Bandung Urban Railway Transport Development and Electrification Padalarang – Cicalengka Line Project's scope of work are[2]:

- Development of electrification system and improvement of 24 km long Padalarang – Bandung – Gedebage existing track.
- Double track development and improvement on 5 km long Kiaracondong – Gedebage existing track.
- Development of signaling and telecommunication system for Upper Electrification (Listrik Aliran Atas [LAA]) and double track.
- Development of 4,1 km long elevated track/viaduct in the center of Bandung city.

It is hoped that Bandung Urban Railway can helped on connectivity issue, mass transportation, traffic and reduce level of fuel consumption on private vehicle.

Theoretical Background

Regional City

Physical boundaries of a city are become harder to recognize visually. Mostly those boundaries are just administrative. So does the distinction between urban and suburban area. One can hardly aware the urban transition if they travelling from Bandung to Cimahi and then Padalarang.

Calthorpe et al. (2001) said there were three interrelated phenomena which occur on a metropolitan city; the emerging region, the maturing suburb and the renewed city. Taken together, these trends shape the outline of a new metropolitan form they called "Regional City". Regional City connecting communities from neighborhood to regional scale by minding its history, ecology and diversity aspects healthily and sustainably. Regional city must be viewed as a cohesive unit – economically, ecologically and socially – made up of coherent neighborhoods and communities, all of which play a vital role in creating the metropolitan region as a whole[3].

Basic principles of designing an environment with vision of Regional City are: human scale, diversity, and conservation. The basic elements of region and urban design on Regional City are:

1. Centers: destination on local and regional scale.
2. Districts: an area with special use or distinct function e.g. campus, airport etc.
3. Preserves: conserved open space around the region.
4. Corridors: built or natural connecting elements e.g. river, road or transportation.

Transit Oriented Development

Transit Oriented Development (TOD) is a regional development concept which emphasizing on pedestrian friendliness and land use diversity (mixed use) that centered around transit station. The goal of TOD is to increase transit ridership and reducing private vehicle use. It is also aimed to control city growth through mass transportation.

The supporters of this theory include Robert Cervero and Michael Bernick. TOD based design principles are promoting mixed of land use and higher density on the walking radius of transit station. Access to the transit station is improved by optimizing its access, designing comfort pedestrian way, providing communal parking space and creating vibrant public space around the transit station.

Cervero et al. (1997) coined the term of Transit Village. It is an idea that brings together the disciplines of urban design, transportation and market economics. As its core, the transit village is a compact, mixed-use community, centered on the transit station that, by design, invites

[2] http://kereta-api.info/bandung-urban-railway-transport-development-dan-electrification-padalarang-cicalengka-line-project-228.htm

[3] Calthorpe et al. 2001

residents, workers and shoppers to drive their cars less and ride mass transit more[4].

Elements of a Transit Villages according to Cervero et al. 1996 are:

- Enhanced mobility and environment
- Pedestrian friendliness
- Alternative suburban living and working environments
- Neighborhood revitalization
- Public Safety
- Public Celebration

By comparing the theories on development around transit with Shirvani's elements of urban design, the theories have something in common (**see table 2**). These theories are the guidelines to designing the elements of urban design around transit station.

Elements of Urban Design Shirvani	*Transit Village* Cervero	*Regional City* Calthorpe & Fulton
Land use	*Alternative suburban living and working environments*	*Diversity Districts*
Building form and massing		*Human scale*
Open Space	*Enhanced environment*	*Preserves*
Circulation and Parking	*Enhanced mobility*	*Corridors*
Pedestrian Ways	*Pedestrian friendliness*	
Signage		
Preservation	*Neighborhood revitalization*	*Conservation*
Activity support	*Public Safety Public Celebration*	*Centers*

Table 2 Theoretical background comparison
Source: Analysis

Discussion

Despite the good intention in the initiation of Bandung Urban Railway project, to increase mass transportation ridership needs more than increasing the capacity of railway. The station area planning should be designed in which can support people to access the transportation mode easily. The most important aspect of making a mass transit supportive environment is the urban design itself[5]. People would attracted to live far from workplace if it has benefit economically – e.g. more affordable housing and lower transport cost – and the environment could give better "quality of live".

In this case, if there is a significant number of Padalarang residents have their jobs in Bandung and Cimahi, and then the development of Padalarang Station area into Transit Oriented Neighborhood would be supporting comprehensively with Bandung Urban Railway project and solving the problem of sprawl in Bandung city area.

TOD area type of Padalarang can be categorized as Transit Town Center[6] with commuter railway as main transit center. The characteristic of this category is a local center of economic and community activities. To incarnate Padalarang Station area into Transit Oriented Neighborhood, the main principles of urban design that should be considered are:

1. Creating walkable neighborhood; universal design of pedestrian way, increasing block permeability, minding thermal and wind comfort[7] of pedestrian.
2. Promoting density and intensity; affordable housing like Rusunawa and Rusunami for commuter workers could be placed around station.
3. Diversity of land use and building typology; mixed of residential and retail increasing access to daily needs just by walking. Making commercial and retail also creating

[4] Cervero et al. 1996 p.5

[5] Cervero et al. 1996

[6] Refer to categorization by Reconnecting America and the Center for Transit-Oriented Development. 2008.

[7] On "Climate-Sensitive Urban Design Measures for Improving the Wind Environment for Pedestrians in a Transit-Oriented Development Area". Journal of Sustainable Development. 2012 by Chunming Hsieh and Kangli Wu studying wind comfort at pedestrian level on TOD area.

trip attraction so the transit movement could run vice versa.
4. Creating vibrant environment by supporting public activity; create Station Plaza which is a conjoined open space between station and traditional market.

Contextual approach should be considered on applying these principles on Padalarang Station Area. Some of site's characteristics are:

1. Commuter community.
2. Historic building conservation; Padalarang Station has been regarded as heritage building.
3. The presence of traditional market; the market should be relocated from street into other area which has direct connection physically and visually to the station.
4. The presence of industrial building; there should be buffer from factory to residential area for safety and aesthetical reason.
5. Green area conservation; the forest has important role on preserving water for GBMA area. Karst Citatah has significant geological and historical value that should be preserved.

By analyzing the principles and characteristics of this area, a zoning plan of development can be divide with Transect system (**see figure 2**).

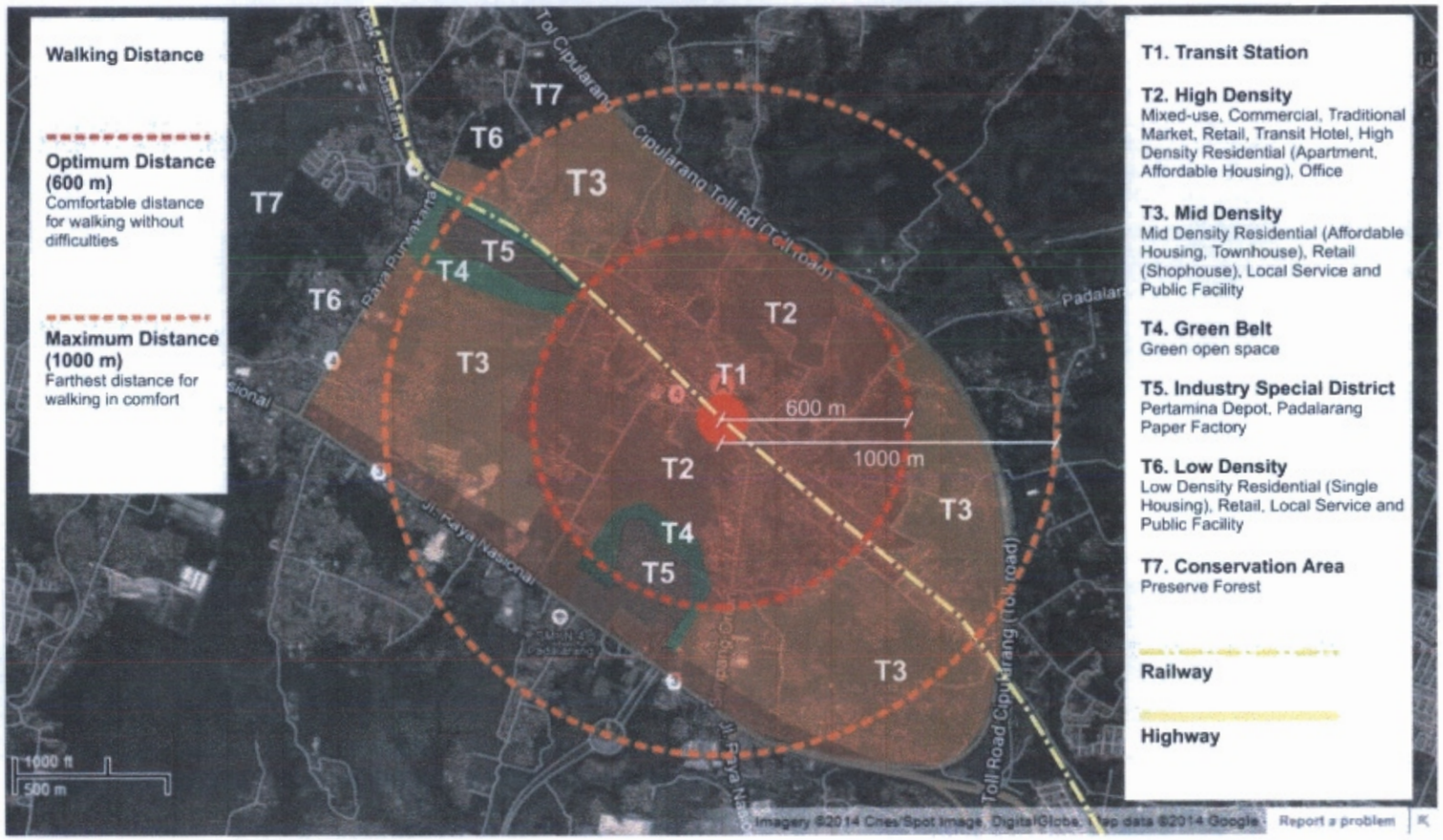

Figure 2 Zoning for Padalarang Station Area Planning
Source: Analysis

	CONSERVATION ZONE	LOW DENSITY ZONE	INDUSTRIAL ZONE	GREEN BUFFER ZONE	MID DENSITY ZONE	HIGH DENSITY ZONE	STATION AREA ZONE
CODE	**T7**	**T6**	**T5**	**T4**	**T3**	**T2**	**T1**
MACRO LAND USE PRINCIPLES	Preserve Forest	Residential, retail and commercial, public and social facility	Industry	Green Open Space	Residential, retail and commercial, public and social facility	Residential, retail and commercial, institutional, office, public and social facility	Transit Station and commercial area
MICRO LAND USE PRINCIPLES	-	*Single detach housing*, neighborhood scale retail and commercial, communal open space	Factory, warehouse	Neighborhood park as buffer between industrial area and residential	Cluster housing, affordable housing, shophouse, neighborhood scale retail and commercial, communal open	Apartment, affordable housing, local scale retail and commercial, shophouse, school, public service, public and social facility,	Train station, interchange, commercial area, transit hotel, station plaza

					space	open space	
INTENSITY	-	GFR 30%	-	-	GFR 60%	GFR 80%	-
BUILDING HEIGHT	-	≤ 2 stories	2 – 4 stories	-	2-4 stories	4-6 stories	6-8 stories
CIRCULATION	Pedestrian only	Pedestrian, bicycle, light vehicle	Pedestrian, bicycle, heavy and light vehicle	Pedestrian, bicycle, limited light vehicle	Pedestrian, bicycle, heavy and light vehicle	Pedestrian, bicycle, limited light vehicle	Pedestrian, bicycle, limited light vehicle
PARKING	-	On-street parking and front house	-	-	Communal parking, on-street parking, bicycle parking	Parking building, communal parking, limited on-street parking, bicycle parking	Parking building, parking lot, bicycle parking, public transport pool
NOTES	-	Resident's village	Paper factory and Pertamina Depot	-	-	Job and commercial center	Padalarang Train Station

Table 3 Planning with Transect Division
Source: Analysis

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