



Increasing the Infrastructure Access of Low-Income People in Peri-Urban of Bandung Metropolitan Area

Sri Maryati* and An Nisaa' Siti Humaira

Research Cluster for Regional and City Infrastructure System, Department of Regional and City Planning, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung, Indonesia.

*Email: smaryati@pl.itb.ac.id

History:

Received: 25 May 2015

Accepted: 14 September 2015

Available Online: 30 September 2015

Keywords:

Infrastructure provision, Low-income groups, Peri-urban area

Contact Number:

+ 62-812 21415653 (S. Maryati)

ABSTRACT

Urbanization process occurred enormously in the last decade that increased urban population significantly. Rapid development caused by that process cannot be accommodated only by the core areas, particularly in the context of land availability. Facing this reality, peri-urban areas have been growing immensely. Peri-urban areas are those areas located beyond the core areas growth boundary and surrounded by the rural areas; therefore these areas are called as a gray area or transition region. Huge development of this area is one of the impacts of massive development of formal housing equipped by various types of infrastructure on one side without considering the existing infrastructure. On the other hand, the development of peri-urban area cannot be separated from growing numbers of informal housing for low-income groups who do not have access to the land in the core areas. Informal housings are generally not served by basic infrastructure. Infrastructure provision for low income people in peri-urban areas is not only generated by the problem of their economic condition, but also the problem of density, availability of land, and policy. That condition necessarily requires a scheme of specific solution for delivering basic infrastructure provision for those low-income groups in peri-urban area. The aim of this paper is formulating a model/scheme of basic infrastructure provision for low-income groups in peri-urban of Bandung Metropolitan Area (BMA) in order to increase community access to basic infrastructure. Method chosen in this study is descriptive and comparative analysis. This study recommends community-based model to be implemented in delivering infrastructure services for low-income groups.

1. Introduction

Urbanization process occurred enormously in the last decade that increased urban population significantly. The growth rate of urban population in Indonesia is 2.75% per year, much higher compared to national population growth rate of approximately 1.17% each year. It is estimated by the year of 2025, 68% of population in Indonesia will live in urban area and by 2045, 82% of population in Indonesia will occupy the urban areas. Rapid economic growth and employment opportunities, as well as rapid growth of infrastructure development in urban area are some of urbanization pull factors in Indonesia whilst lack of employment and limited infrastructure in rural areas are its pull factors (Ditjen Penataan Ruang, 2014).

Rapid development caused by the process of urbanization cannot be accommodated only by the core areas, particularly in the context of land availability. Facing this reality, peri-urban areas have been growing immensely. Peri-urban areas are those areas located beyond the core areas growth boundary and surrounded by the rural areas; therefore these areas are called a gray area or transition region. Agergaard (2009) in Pradoto (2012) argued that demographic, social, and economic transformation occurring in the peri-urban area is the manifestation of a

complementary relationship between urban and rural.

Huge development of peri-urban area is one of the impacts of massive development of formal housing equipped by various types of infrastructure on one side without considering the existing infrastructure. Torres et al. (2007) in Pradoto (2012) stated that the pattern of urban sprawl in Brazil's Sao Paulo metropolitan area was driven by the growth of real estate investment. On the contrary of decreasing a number of population living in the city, real estate development has been growing. People move to the peri-urban areas where the land price is cheaper than those in the city. On the other hand, the development of peri-urban areas cannot be separated from growing numbers of informal housing for low-income groups who do not have access to the land in the core areas. Informal housings are generally not served by basic infrastructure. Low-income immigrants develop informal settlements due to the lack of affordable housing therefore informal land use becomes a crucial problem (Torres et al., 2007 in Pradoto, 2012). In some developing countries, social inequality represents a dualism between upper-middle income groups and low-income groups that exist in peri-urban areas. Inequality, as argued by Thorns (2002) in Pradoto (2012), is generally associated with spatial segregation, poverty, unemployment or under

employment, and lack of skills. Concerning infrastructure provision, in many countries, peri-urban areas generally lie outside the coverage of formal networked water and sanitation systems, which are, in most cases, restricted to a relatively small metropolitan core (Allen et al, 2006).

The problem of infrastructure provision for low income groups in urban areas is not only generated by economic condition, but also the density, availability of land, and policy. Compared to urban areas, the density of population in peri-urban areas are generally less dense. This condition draws that to develop integrated public infrastructure in peri-urban area is not that easy. Regarding availability of land, Pradoto (2012) expresses that conventional land registration systems in many developing countries do not provide the use of a plot with any security of tenure. This condition is exacerbated by the lack of consistency in spatial planning related to land-use control. The pace of urban expansion has outstripped the capacities of planning authorities to cope with the needs of developable land. This has led to the emergence of an unplanned periphery, including the informal development of housing without building permits spreading between established neighborhoods and on *unserved* land (Pradoto, 2012). Regarding the policy, in some cases, infrastructure provision in peri-urban area is not government priority. Biases in investment standards, pricing policy, and administrative procedures sometimes deny the poor good shelter, safe water, acceptable sanitation, good roads and electricity (UN-Habitat, 2011). That condition necessarily requires a scheme of specific solution for delivering basic infrastructure provision for low-income groups in peri-urban area.

The aim of this paper is to formulate a model or scheme of basic infrastructure provision for low-income groups in peri-urban of Bandung Metropolitan Area (BMA) in order to increase community access to basic infrastructure. Model of infrastructure provision for low income people in Indonesia is clearly distinguished between urban and rural areas. As peri-urban area is an interface between urban and rural then the question arises whether the model of infrastructure provision for the poor in peri-urban area will adopt the model for urban areas or rural areas. Allen, et al. (2012) stated that the peri-urban is the location of a mixed population which often disproportionately comprises poor households and producers. Many of the localities in the peri-urban of metropolitan areas can be described as in transition from being predominantly rural to acquire urban features. This process is often accompanied by substantial pressures over natural resources (such as land and water) due to their increased marketability and greater volumes of pollution generated by higher concentrations of population and commercial activities. The problem of increasing access rate for the urban poor appears smaller than poverty issue in the rural areas because possible solutions include the possibility of relying on the existing infrastructure and thus expanding at lower costs. In most cases, the main concern of the reform is not the cost but how to generate the resources necessary to subsidize poor urban dwellers due to their inability to pay (UN-Habitat, 2011).

There is strong relationship between infrastructure and poverty. The adequate supply of infrastructure services has been viewed since a long time ago as an essential factor for economic development and poverty reduction (UN-Habitat, 2011). Infrastructure provision can reduce poverty, "...countries that have made concerted efforts to provide infrastructure in rural areas for example, Indonesia and Malaysia have succeeded in reducing poverty dramatically" (Worldbank, 1994). On the other hand the poor generally do not have access to infrastructure. In general, public infrastructure provision in urban areas is better

compared to rural areas. Access to basic infrastructure services is one of the important criteria for defining welfare. The poor can be identified as those who are unable to consume the minimum amount required of clean water and who are subject to unsanitary surroundings, with extremely limited mobility or communications beyond their immediate settlement (Worldbank, 1994). "In general, non-poor households seem to benefit more from public infrastructure investments than poor households (World Bank 1994). In Bangladesh, for example, non-poor groups receive over 80 percent of subsidies on infrastructure (Kessides, 1993 in Worldbank, 1994). Generally, the urban poor are increasingly situated at the periphery of cities where access to city facilities and job opportunities is restricted" (UN-Habitat, 2011).

2. Methodology

Methods used in this study are descriptive and comparative analysis. The analysis is started by compiling some models of infrastructure provision for the poor based on some literatures. In this step the appropriateness of the models to be applied in peri-urban are analyzed. The analysis considers the characteristics of the poor in peri-urban areas.

This research was undertaken in Bandung Metropolitan Area (BMA) as the study area (Refer to Figure 1). The BMA, which is located in West Java Province, is one of seven metropolitan areas in Indonesia. The BMA consists of Bandung City, Cimahi City, Bandung District, West Bandung District, and five sub-districts in Sumedang District. There are only 8.91% of people living in the peri-urban area of BMA are served by public water supply system (PDAM). For the urban areas within BMA, this figure counts for 48.24% of the total population of BMA. Thus, the citizens of BMA are largely unserved by PDAM (Maryati dan Humaira, 2014).

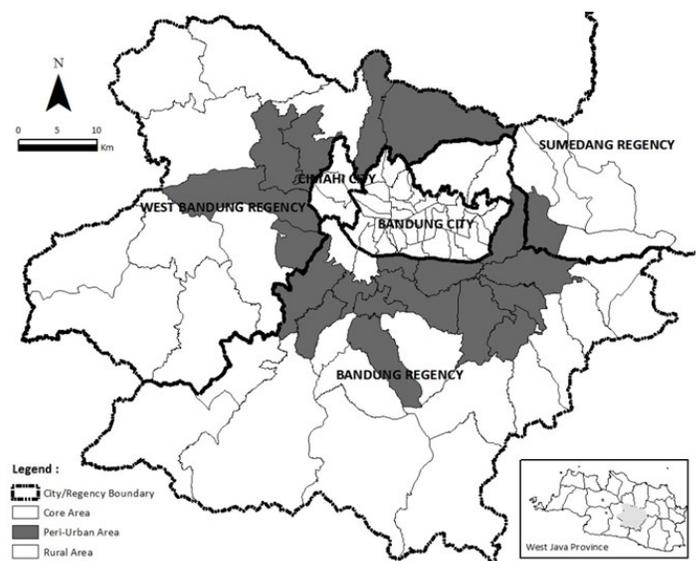


Figure 1 Bandung Metropolitan Area

3. Results and Discussions

3.1 Model of Infrastructure Provision for the Poor

Indonesian government has initiated the program for the poor which is related to the infrastructure provision, namely PNPM (*Program Nasional Pemberdayaan Masyarakat*). PNPM is a national program for community empowerment which was launched in 2007 by the Indonesian Government. The aims of this program are to alleviate the poverty by improving economic and social welfare of the poor and to empower communities in managing development activities and decision-making. As stated by Haider (2012), PNPM adopts a community-driven development (CDD) approach, providing direct block grants to local communities at the sub-district level to finance an open menu of local development priorities (typically small-scale social/economic infrastructure, education and health activities, and micro-loans to women's savings groups).

Based on the location where the program takes place, in general there are two types of PNPM: (1) PNPM for Rural Areas (PNPM 'rural'); and (2) PNPM for Urban Areas (PNPM 'urban'). To compare these two programs, key performance indicators will be used in this study. Those programs will be described further as follows.

PNPM 'Rural'

PNPM 'rural' has been initiated since 1998 as *Kecamatan* Development Program (KDP). According to the fact sheet published by PSF (2012), this program helps the poor increasing their access to basic services. It is main program for community-based poverty alleviation efforts that has some principles of community demand-driven development and stresses community empowerment (PSF2, 2012).

In delivering basic infrastructure provision to rural communities, this program is perceived as an effective means. It is not only improves the provision of basic services but also improves household welfare by decreasing the existing infrastructure gap in rural areas. Considering this

Table 2 PNPM Rural Scheme and Model

Key Indicators	Performance
Location	Rural areas characterized with the livelihood activities often based primarily on agriculture and lack of basic services facility and access to information. Some areas are fast-growing areas that need particular process of community empowerment. ¹
Number of location in 2013	32 provinces, 394 districts/cities, 5,146 sub-districts. ¹
Type of sub-project in infrastructure	(1) farm/rural roads; (2) clean water system; (3) school buildings; (4) health facilities; (5) public toilets and washing facilities; (6) bridges; (7) irrigation system; and (8) village electricity units. ²
Funding in 2013	Direct funding to communities: IDR7,806.2 billion. ¹ Total allocation: IDR597.65 trillion with 5,100 sub-districts as target. ¹
Stakeholders involved	Central and local government, facilitator, consultant, and communities. ¹

(Source: ¹The Ministry of National Development Planning, 2013; ²PSF, 2014)

Table 3 PNPM Urban Scheme and Model

Key Indicators	Performance
Location	Urban areas characterized with the high number of urban poor and immigrant, high density of settlement, and lack of basic services quality. ¹
Number of location in 2013	33 provinces, 256 districts/cities, 1,183 sub-districts. ¹
Type of sub-project in infrastructure	(1) provision of safe water including safe drinking water through public taps; (2) provision of electricity as well as community level public infrastructure investments; (3) drainage; (4) sanitation infrastructure; (5) improved footpaths and roads; (6) garbage bins and collection vehicles; (7) public washing and toilet facilities; (8) neighborhood health clinics; (9) and primary school buildings. ²
Funding in 2013	Direct funding to communities: IDR1,391.3 billion. ¹ Total allocation: IDR 1.7 trillion with 1,153 sub-districts as target. ¹
Stakeholders involved	Central and local government, facilitator, consultant, and communities. ¹

(Source: ¹The Ministry of National Development Planning, 2013; ²Burger et al 2014)

good practice, continued funding for infrastructure with a focus on maintenance and sustainability of infrastructure is urgently needed in order to scale-up the benefits to be utilized effectively. So that, the following program in the following years should focus on the equality of maintenance project.

PNPM 'Urban'

PNPM for Urban Areas commenced in 1999 as the Urban Poverty Program (UPP). This program delivers block grants to the urban poor for small scale infrastructure and small projects for social and economic development with the aims of improving local governance, fostering community participation, and delivering basic needs including addressing basic infrastructure at the community level (PSF, 2013).

According to the study conducted by PSF (2013), it is drawn that PNPM Urban increases quality of infrastructure significantly for the urban poor and it works relatively well with more transparent, accountable, and participatory governance. Roughly 70% of grants for community are used for infrastructure investment which mainly include roads, bridges, drainage, public toilets, infrastructure improvements (housing and public facilities), and clean water projects (drinking water, bathing, and water sources (wells and natural springs)) with the largest share of projects were roads (45%), followed by drainage (23%) and infrastructure improvements (23%).

The study also recommended some design changes for the upcoming PNPM Urban as summarized below:

- Improving the community participation.
- Strengthening the relationship between local governments and PNPM-Urban.

- Consolidating the role of facilitators. Facilitators are integral part to the success of the program.

As shown in Table 2 and 3, it is obvious that the target areas for PNPM 'Rural' in the last five years are almost ¾ of Indonesia region. Besides scaling-up in the context of coverage, some of pilot projects have been issued to strengthen basic activities of community empowerment in rural areas. On the other side, despite the increasing number of target areas of PNPM Urban, yet the target areas and funding allocation of this program, if it is compared to PNPM 'Rural', is still far below those of PNPM Rural target areas and funding allocation. It can be seen that PNPM Rural is the main core of PNPM as a whole considering the condition of the poor dwelling in the remote areas.

There were several best practices of infrastructure provision for urban poor worldwide. Allen et al (2012) have explored some models as described follows.

Community-based Wastewater Management in Rufisque Dioukoul (Senegal)

Rufisque Dioukoul is an informal, semi-urban area comprised of nine low-income communities, situated 25 km outside Dakar with unplanned settlements. The model of infrastructure provision is a partnership between local authorities and communities and the international NGO ENDA Tiers-Monde. The infrastructure developed was a low-cost shallow sewerage system linked to a decentralized treatment plant after treatment sewage and refuse were used for urban agriculture. Funding for the sustainability of the project relies on a revolving fund managed by committee from the community.

The Sambizanga Project in Luanda (Angola)

The principle of the model is developing water standpipes as small enterprises. The enterprises are managed by a community committee elected to collect water fees, to pay the water company and to oversee maintenance. Before the model being implemented, community relied on water vendors and they spent an average of 25% of their income for acquiring clean water. The success of the intervention is premised on its use of an inclusive model for basic service provision, with successful replication validating this judgment. By utilizing a system of community-based commerce, the project has been able to achieve a level of sustainability

Partnership Approach to Water and Sanitation in Tshwane (South Africa)

The project incorporated two additional components: promotion of local economic activity and a community-based lending scheme. The former was achieved through a mentoring system encouraging the establishment of viable small, medium and micro enterprises (SMMEs), to provide construction services as well as ongoing maintenance and improvement services. The community based lending scheme was established through introduction of a social investment fund designed to provide financial support, training, information and technical assistance to organize community water and sanitation committees.

Secure Access through NGO Intermediation in Dhaka (Bangladesh)

The project was based on the assumption that, given the opportunity, informal communities can be capable and responsible managers of

capital assets providing essential services and reliable clients for the relevant service providers. A key principle underlying this model is that interventions must respond to demand for water, which is indicated by willingness to pay. This approach aims to achieve sustainable service provision by focusing on small community-based business involvement. User groups are expected to have responsibility for management of water points and are integrally involved in all planning and implementation phases. Community groups were organized to manage the water points and ensure the payment of water bills, meet supervision and maintenance costs as well as repaying the capital cost.

Public-Community Partnership in Port-au-Prince (Haiti)

The project is based on a partnership between the public water supply utility, CAMEP (Centrale Autonome Metropolitaine d'Eau Potable), an international NGO, GRET (Groupe de Recherche et d'Echanges Technologiques) and local water committees across 37 informal communities, representing as many as 600,000 people. The project required the installation of water distribution points, reservoirs and supply networks and the establishment of management procedures by community committees. On this basis, standpipe construction costs were shared between CAMEP and the communities, the latter providing labor towards construction. Community water committees were then established to provide overall financial and administrative management. Each committee received relevant training and hired a standpipe manager to supervise the standpipe and collect payment. They also retained the right to utilize any surplus generated to finance small collective infrastructure projects in their area.

The Tegucigalpa Model: Water Supply and Hygiene (Honduras)

The community had first to demonstrate its commitment to the initiative through mobilization and formal application. Additionally, they had to provide labor and purchase construction materials, as well as contribute financially through water tariffs. They were expected to recover the full investment cost from the construction process onwards. To meet these obligations, they established independent Water Foras to collect tariffs administer the water system and manage required maintenance.

Sustainable Solutions through Community Action Committees in La Sirena (Colombia)

This project was developed by the community with the support of CINARA at the Universidad del Valle, a national research institute specializing in water and sanitation; the Departmental Health Secretariat and Planning Department; and the Secretariat of Health of the municipality of Cali. The financial resources for the construction were raised and controlled by the community. This system was complemented by a multi-stage filtration mechanism and a piping network that provided and distributed potable water throughout the settlement. Since the conclusion of improvement works in 1987, the system has been managed by a voluntary, user-elected and legally recognized, community-based organization.

Pro-poor Model of Private Sector Participation in Moreno (Argentina)

The project titled 'Public-Private-Community Partnerships for the Delivery of Water and Sanitation in Informal Settlements of Argentina' forms part of the global UNDP-funded Public-Private Partnership for

Urban Environment (PPPUE) initiative. The project is dependent on strategic alliances between community organizations, the municipality and the local private concessionaire, guided by the overarching goal of tackling problems of water and sanitation provision and, therein, contributing simultaneously towards poverty eradication and environmental protection. It is committed to the maintenance of transparency and extensive community participation in its operations.

Locally-managed Water Supply Systems in Cochabamba (Bolivia)

Domestic water charges levied by the locally-managed water supply systems include a connection fee and a monthly fee. Locally-managed water supply systems are common in Bolivia, especially in rural and peri-urban areas. These systems were often initiated by the inhabitants themselves, in the absence of government or municipal services.

In addition to the community-based models explained previously, there are some models of infrastructure provision with top-down approach as well. Its infrastructure provision and management is delivered by the government or other institutions with large-scale coverage in general. In that case, community only contributes to the subsidized dues payment. Tariff structure is generally classified into some clusters based on the average income of household. Low-income groups will pay less than those who have higher average income.

3.2 Condition of Poverty and Infrastructure Provision in Indonesia

From 1970-2008, poverty rate in Indonesia is fluctuating (see Figure 2). The rate is between 19.1 in 2000 to 15.4% in 2008 as well as poverty rate in rural area is higher. For example in 2013 (September), the number of the poor in urban and rural area subsequently are 10.63 million (8.52%) and 17.92 million (14.42%). With the poverty line in urban area is IDR 308,826 and IDR 275,779 in rural area (BPS, 2014).

There is some pattern of the poor distribution across Indonesia (see Figure 4) which is concentrated in Java Island. West Java Province is the province with the highest number of the urban poor followed by East Java Province as a province with the highest number of the rural poor. This position will be different if it is seen from its percentage.

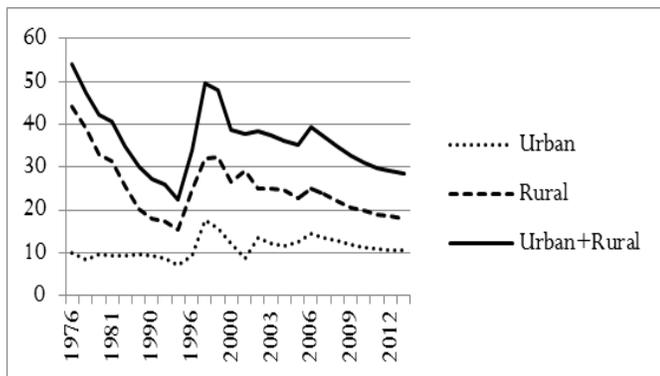


Figure 2 The Number of Poor People (in Million)
(Source: BPS Indonesia, 2014)

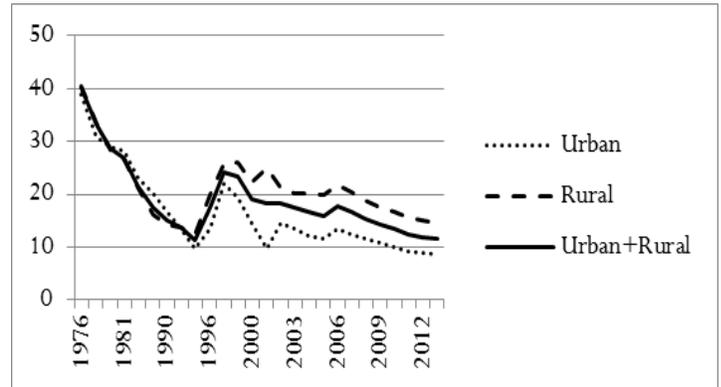


Figure 3 Percentage of the Poor (in Million)
(Source: BPS Indonesia, 2014)

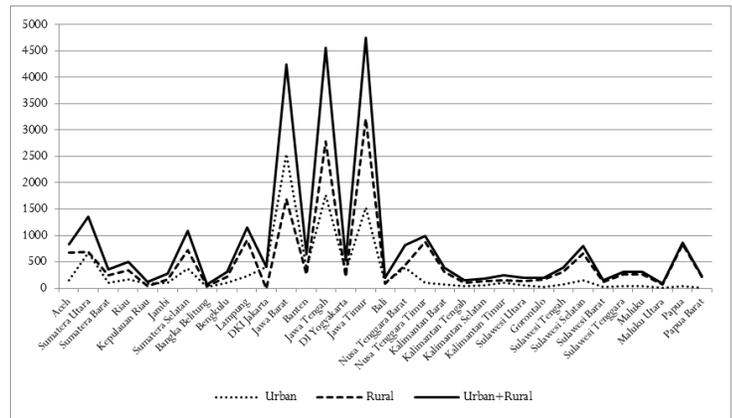


Figure 4 Distribution of the Poor (million) based on Province
(Source: BPS Indonesia, 2014)

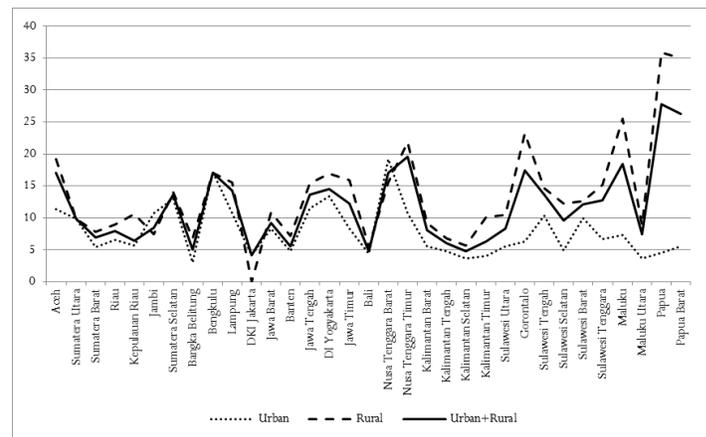


Figure 5 Percentage of the Poor (million) based on Province
(Source: BPS Indonesia, 2014)

As we can see in Figure 5, the highest percentage of the poor is not distributed in Java Island yet still is categorized in high level in average. Percentage of access to public water supply based on province is shown in Figure 5. Although most of the poor is concentrated in Java Island, the access to public water supply in this island is not the worst. East Kalimantan is the province with the highest access to public water supply, in contrast with Riau province as the lowest one. This pattern of access to public water supply has a strong relationship with the pattern of the poor percentage.

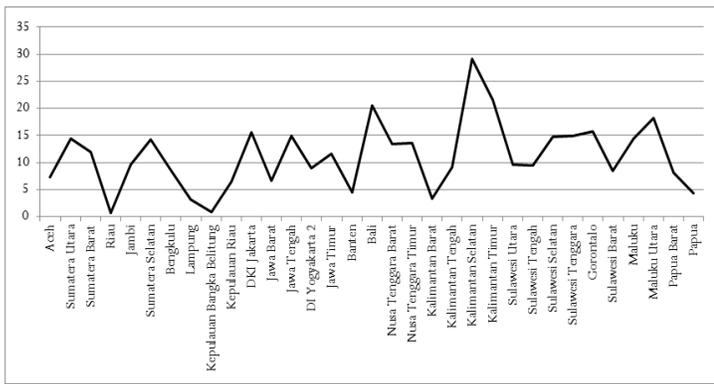


Figure 6 Access to Public Water Supply based on Province (%)
(Source: BPS Indonesia, 2014)

industrialization does not always give positive impact to poverty rate and access to public infrastructure.

3.3 Condition of Infrastructure Provision for Low-Income Groups in Peri-Urban of Bandung Metropolitan Area

3.3.1 Low-Income Groups in Bandung Metropolitan Area

As mentioned before, the number of poor people in West Java Province is relatively high compared to others. Bandung Metropolitan Area (BMA) is located in West Java Province. The number of poor people in cities and regions in BMA are relatively low (see Figure 8). Moreover, if we explore further the percentage of the poor in West Java Province, it is clear that the percentage of the urban poor in the city is lower compared to in rural areas (see Figure 9).

Low-income category can be determined from regional minimum wage. This minimum wage within a province is varied either in every city or district. In the year of 2013, as it was issued by the Governor of West Java Province in the Decree of Governor of West Java Province Number 561/Kep.1405-Bangsos/2012, the average of regional minimum wage in BMA itself was Rp1,398,694 with Bandung City as a region that had the highest minimum wage in the amount of Rp1,538,703. In this paper, low-income class is defined as people who have income lower than the average minimum wage declared by the Governor of West Java Province as it is shown in Table 4.

3.3.2 Condition of Infrastructure and Public Service Provision for Low-income Groups

As it is mentioned before that peri-urban area is a gray area between urban settlement areas and rural hinterland. This condition leads to an urban agglomeration that is driven by economic growth and restructuring, new development opportunities, growth of transport infrastructure, population growth and household change, decline of traditional rural economies, and intangible factors such as cultural values, lifestyles, social segregation, and urban/rural attitudes and perception (European Union. 2010). Unfortunately, this high economic growth in this area is not accompanied by strong and integrated governance so that it will generally produce the worst type of urban sprawl that also generates urban pressures in peri-urban area such as: housing shortages, transport congestion, decline of landscape quality, economic restructuring and social change (European Union. 2010).

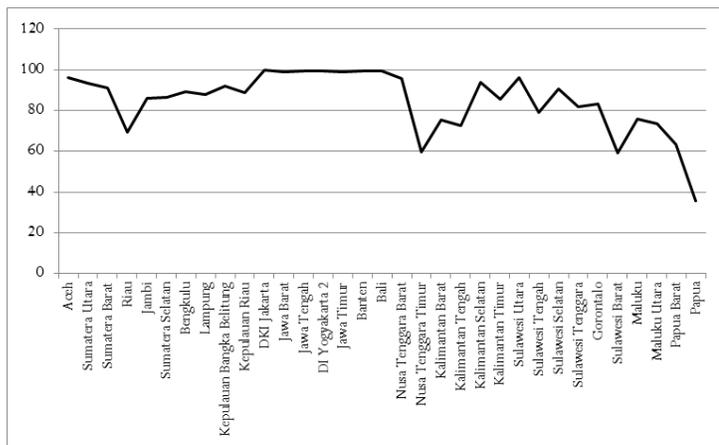


Figure 7 Access to Electricity based on Province (%)
(Source: BPS Indonesia, 2014)

Table 4 Regional Minimum Wage in Bandung Metropolitan Area based on City/District, 2013

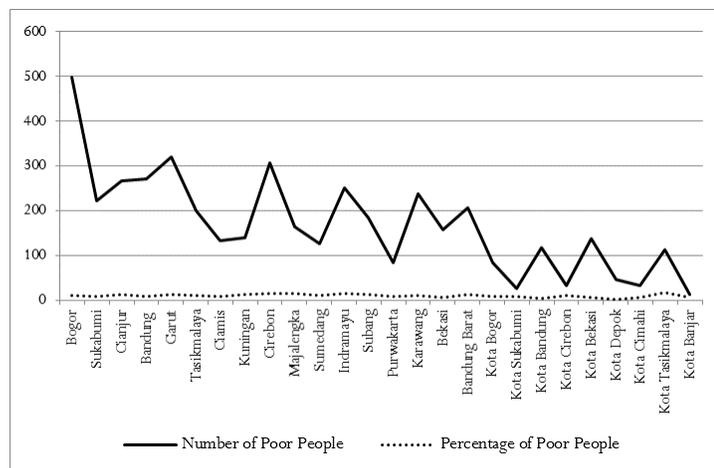


Figure 8 The Number of the Poor in West Java Province
(Source: BPS West Java Province, 2013)

City/District	Regional Minimum Wage (IDR)
Bandung City	1,538,703
Cimahi City	1,338,333
Bandung District	1,338,333
West Bandung District	1,396,399
Sumedang District	1,381,700
Average	1,398,694

Note: 1 USD = IDR 13,000

Different with public water supply provision, access to electricity in Indonesia is quite better (Figure 7) with nearly 100% of coverage area in Java Island. It is driven by the industrialization concentrated in this island as well as the main island of Indonesia. The fact related to the number and percentage of the poor and access to public infrastructure shows that

On the other hand, according to PLUREL Project (2010) by the rapid economic growth and restructuring that occur in this area, it results a capital accumulation dynamic, therefore this area is often seen as a place to make higher profits at lower risk than in urban areas: by landowners and developers, entrepreneurs and investors, and by house builders and house-owners. This phenomenon widens socio-economic disparities. This vast economic opportunity has merely benefited the middle-upper classes who are only a small part of the peri-urban communities and these classes tend to be cut off from the neighboring poorer communities (Hudalah. 2010).

As a consequence, this socio-economic gap causes segregation in socio-economic life that will transform into fragmented regional structure and infrastructure network (Hudalah. et al. 2007). It is caused by the condition whereas the land price in this area is affordable enough to be bought by some developers. Developers built large-scale housing included create new infrastructure without considering the existing infrastructure so that this new independently built urban infrastructure is often not integrated into the existing regional infrastructure network provided by the government (Hudalah. et al. 2007).

This infrastructure deficiency significantly affects the lower class, which remain the largest parts of the peri-urban communities. These people cannot meet the needs to fulfill their basic infrastructures and public services which are supposed to be provided by both of the local and central government in public/centralized system. Some studies that reveal these phenomena are discussed as follows.

Based on the research conducted by Humaira (2013) by interviewing 62 respondents who resided in peri-urban area of BMA, most of low

income groups acquire clean water supply from non-PDAM (NOTE: PDAM is a water supply company) service because the average monthly cost for this is more affordable. For non-PDAM users, high consumption of clean water does not have any significant impact to the price of water since they only have to pay for electricity that generates electric power for deep well water pump. This individual pumped water is the main source of water for low-income groups. Besides, there is also piped water network provided by collectively-managed schemes (communal system) using groundwater and spring as sources of water. Compared to PDAM service, ability to pay (ATP) for non-PDAM service is much lower. From the data obtained by Sabrina (2013) it was known that the average household income for low-income groups in peri-urban of BMA were roughly 1million in a month. Therefore if it is referred to The Decree of the Ministry of Home Affairs Number 23/2006 regarding Guidelines for PDAM Tariff Setting, it is stated that monthly water cost should be no more than 4% from total household income. It means that the monthly water cost in peri-urban area of BMA for low-income groups should be Rp40.000 in average. Whilst, the average monthly cost for non-PDAM service for low-income group in this area was only Rp12.818 which was much lower than it should be. This thing caused most of low-income groups were not willing to have a water connection from centralized/public system (PDAM service).

3.4 Model for Infrastructure Provision for the Poor in Bandung Metropolitan Area

Before considering which scheme and model that fit the most for infrastructure provision and service delivery system of low-income

Table 5 Characteristics and Differences in Typical Rural, Peri-Urban, and Urban Areas

Characteristics	Rural Areas	Peri-urban Areas	Urban Areas
Livelihoods	Engaged in mixed livelihoods activities- often based primarily on agriculture but increasingly combined with nonfarm activities. Limited opportunities for earning cash income.	Usually very mixed, including agriculture, small industry and work on large industrial developments. Agriculture may be profitable – serving urban consumers – but land availability may be threatened by urban expansion and rising prices.	Mainly based on activities in urban labor markets (formal and informal) including making and selling goods and services
Changing dependence on natural resources and cash	High dependence on access to common property resources, including water, land, forests and others.	Increasing access to cash incomes, but access to ‘free’ common property resources is often reduced.	Highly dependent on cash to pay for essential items such as food, rent, school, energy, transport, water, and sanitation.
Location and housing	Isolation, due to distance from urban centers, poor quality or no roads, and weak physical infrastructure. Access to housing is rarely a problem.	Rapid growth of new informal settlements, which emerge because the poor cannot afford to buy land, gain secure tenure, or pay for adequate housing.	Limited access to adequate and affordable housing. Huge numbers live in slums with insecure tenure.
Access to services	Limited access to services, including healthcare and education – mainly due to distance.	Limited access to basic services despite increasing environmental health risks as population density increases, industrial activities expand without regulation and adequate infrastructure is not provided.	Limited or no access to services to mitigate the effects of disease, environmental hazards, and violence. This is due to cost and lack of delivery to poor areas.
Government	Limited government presence.	Administrative boundaries and the division of responsibilities between rural and urban authorities are often unclear.	Vulnerable to the misapplication of bureaucratic rules, for example mass evictions and harassment of street vendors.

(Source: Department for International Development, UK)

groups in peri-urban of BMA, it is essential to observe the characteristics and differences in rural, peri-urban, and urban areas first as shown in Table 5.

The programs of infrastructure provision have been evaluated by some studies with the results that those programs have the same concept, aim, and scheme. The distinctions are only on the location, target areas, and budgeting allocation. Since the peri-urban areas as described by Table 5 is a transition zone between urban and rural areas, therefore this area can adopt both of the approaches.

The entire models mentioned above require strong community initiatives and participation. Some models involve the government, NGO, and/or enterprise, and independent community in some cases. In those cases, project operation and maintenance are mainly managed by the community. All of the models impose tariffs for acquiring infrastructure provision. Participation model is generally applied in the neighborhood area or communal scale. In the context economic of scale related to density population, this model is suitable enough to be implemented in peri-urban areas which has low density and undistributed population.

Another model that can be used is the top-down scheme with subsidized tariff. It is commonly implemented in all kind of large-scale infrastructure provision. In the context of population density, this model fits to be applied in the areas with high population density.

Despite of the distinctions of those two models, both models requires some willingness such as willingness to pay from community as user. According to Humaira (2013), the willingness to pay to acquire water supply provision in peri-urban area of BMA is still low. It is mainly caused by the availability of individual system in water supply provision. With that individual system, people do not need to pay any additional cost for water treatment just like in PDAM case, they just need to pay for the electricity used to generate power for the pump and they will easily meet their needs of clean water with good quality.

4. Conclusions and Recommendations

To deliver infrastructure services for low-income groups, there are two models that viable for implementation: top-down model and community-based approach. The top-down model is usually in the form of public water supply. Based on the evaluation by some previous studies, model of community-based approach generates the best results in the context of infrastructure provision. Besides, the top-down model is relatively difficult to implement in the peri-urban areas that generally have less population density such as in the case of peri-urban area of BMA with only 4,031 people/km² of population density. Another reason is that the community-based approach lacks 'willingness to pay', which is important for the sustainability of the system. This shortcoming is particularly valid in the areas where access to water resources is good.

The 'willingness to pay' of the community is deemed necessary for the continuity of operation of the community-based model. This alternate mechanism can be a backbone of this model in involving the community participation in every development stage including in planning and decision-making. Thus, they would have a strong sense of belonging to the project they built. In this model, community should be the primary actor holding the central role that is enabled to share and influence in all development process. Furthermore, this model should be designed to be able to sustain and continue the program particularly in maintaining and sustaining the infrastructure assets.

Acknowledgments

The research, on which this article is based, is funded by the Ministry of Research, Technology, and Higher Education under the scheme of National Strategic Approach in FY 2015. The title of the research is "Kebijakan Penyediaan Infrastruktur Dasar bagi Masyarakat Miskin di Wilayah Peri Urban". The authors would like to thank all stakeholders involved in this program. However, the authors alone are responsible for any mistakes and shortcomings.

References

- Allen, A., Dávila, J., Hofmann, P. (2006), 'Governance of water and sanitation services for the peri-urban poor: a framework for understanding and action in metropolitan regions', Development Planning Unit, University College London: London, ISBN: 1 8774502 60 9.
- BPS Indonesia-Statistics of Indonesia, (2014), 'Indonesia in Figures'.
- BPS West Java Province-Statistics of West Java Province, (2013), 'West Java Province'.
- Ditjen Penataan Ruang, the Ministry of Public Works, (2014). 'Kebijakan Penataan Ruang Perkotaan', Presented in Semarang.
- European Union. (2010). 'Rural-urban regions and peri-urbanisation in Europe: towards a European policy to sustain urban-rural futures'. *Executive Summary of Synthesis Report: Peri-urbanisation in Europe: Towards a European Policy to Sustain Urban-Rural Futures for PLUREL Project*.
- Governor of West Java Province. (2012) 'The decree of Governor of West Java Province Number 561/Kep.1405-Bangsos/2012 regarding city/regency minimum wage di West Java Province in the year of 2013'.
- Hudalah, D. (2010). 'Peri-urban planning in Indonesia: contexts, approaches and institutional capacity'. Doctor of Philosophy. Groningen.
- Hudalah, D., Winarso, H., and Wotljer, J. (2007). 'Peri-urbanisation in East Asia: a new challenge for planning?'. *International Development Planning Review*. Volume 29. No.4:503-520.
- Humaira, A.S. (2013) 'Characteristics of clean water supply provision based on spatial pattern: a case study of Bandung Metropolitan Area'. Unpublished Final Project. Department of City and Regional Planning. School of Architecture. Planning and Policy Development - Bandung Institute of Technology. Bandung, Indonesia.
- Maryati, S and Humaira, A. (2014), 'The relationship between spatial pattern and water infrastructure provision in Bandung Metropolitan Area', *Proceeding of IPTEK and Socio-Economic Sustainable Development in West Java Seminar*, ISSN: 977-240-744-970-9.
- Ministry of Home Affairs (2006). 'The Decree of the Ministry of Home Affairs Number 23/2006 regarding guidelines for PDAM tariff setting'.
- Pradoto, W. (2012), 'Development patterns and socioeconomic transformation in peri-urban area: case of Yogyakarta, Indonesia', Technische Universität Berlin.
- Sabrina, Y. (2013) 'Ability to pay and willingness to pay of clean water service improvement based on spatial pattern in Bandung Metropolitan Area. Unpublished Final Project. Department of City and Regional Planning. School of Architecture'. Planning and Policy Development - Bandung Institute of Technology. Bandung, Indonesia.
- UN-Habitat, (2011), 'Infrastructure for economic development and poverty reduction in Africa', *the Global Urban Economic Dialogue Series*, United Nations Human Settlements Programme: Nairobi, ISBN: 978-92-1-132027-5.
- Worldbank, (1994), 'World development report, 1994: infrastructure for development', *World Development Indicators*, Oxford University Press, Inc: New York.