Identification of slum typologies based on priority infrastructure (Case studies Jember District)

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Abstract. Slums are one of the urban problems that occur in almost all regions in Indonesia. As one of the pillars of sustainable development, and to deal with problems related to slums, every City / Regency based on Government Regulation are required to prepare RP3KP documents as a master plan for regional settlements. Jember is one of the areas in Besuki Raya that already has housing and settlement planning products but is still in the RP4D format. Based on these conditions, Jember is categorized as a district that does not have a settlement area planning instrument that meets the standards. In fact, there are 37 villages classified as slums with an area of 47.2 ha, uninhabitable houses reaching 3,940 units in slums in Jember Regency (Kotaku, 2017). The results of the study is useful as a basic reference in the formulation of resident area planning policy in Jember Regency. With the typology and formulation of priority infrastructure needs analysis in slum areas, a general description of the condition of the characteristics of slums in Jember Regency can be described. The results show that physically, the infrastructure to be aware of are road infrastructure, building conditions, waste management and fire danger

1. Introduction

Land use as a settlement that occurs due to human needs, results in changes in the shape and pattern of space. The right policy strategy is needed to control and limit land use in planning, as well as the provisions of the right land use patterns so that it does not have a negative impact on the sustainability of the space (Zamroh 2014). The most noticeable impact of uncontrolled changes in spatial shape and pattern is the decline in environmental quality within the settlement itself (Fatchurohman, 2011). The environment is one of the pillars of sustainable development, if there is a decrease in the quality of the environment in a development then this should be a concern for relevant stakeholders in order to realize sustainable development (Nielsen 2010).

Regarding the settlement policy, the government set a target of achieving 100% drinking water supply, reducing slum areas to 0% and providing 100% access to proper sanitation for the people of Indonesia by the end of 2019. The target was called the 100 - 0 - 100 Movement (RPJMN III of 2015–2019). On the other hand, every City / Regency based on Permen No 12 of 2014 and PP No 14 of 2016 are required to prepare RP3KP documents as a basis for planning and implementing development related to housing and settlement areas (PKP). In general, terms that were reviewed in the RP3KP based on PP No. 14 of 2016 are:

a. How to formulate policies and strategies for the development and development of housing and settlement areas?

b. How to allocate space for each typology of housing and settlements?
c. How to handle/regulate housing quality related to meeting the needs for facilities and infrastructure?

d. How is the formulation of appropriate, effective and efficient policies, strategies and programs related to housing and settlements?

With the formulation of PKP planning products, the regional government has: (1) Scenarios for the development of the "Grand Design" of housing and settlement areas in the regions (Provinces, Regencies and Cities) (2) Reflecting accommodation to the aspirations of the community in the construction of housing and habitable settlements. (3) Reference for all development stakeholders (housing) and residential areas in preparing and describing their respective activities.

Regional conditions in East Java, several areas still do not have RP3KP documents or have prepared housing and settlement planning products but are still in the RP4D format. Within the Besuki Raya area, conditions for the availability of planning instruments related to housing and settlements are presented in Table 1.

Table 1. Preparation Status of RP3KP in Besuki Raya

| District/ Municipality | Academic Paper | Explained |
|------------------------|----------------|-----------|
|                        | Not Yet | Ever | Finished | |
| Probolinggo           | v 2003 |       | Proposed in 2017 |
| Jember                 | v 2010 |       | There is no RP4D Academic Paper |
| Situbondo              | v 2012 |       | There is no RP4D Academic Paper |
| Banyuwangi             | v 2012 |       | There is no RP4D Academic Paper |
| Lumajang               | v       |       | Proposed in 2017-2018 |
| Bondowoso             | v 2015 |       | Already in the form of an Academic Paper |

Source: Report of the Coordination Meeting Forum for Understanding and Urgency RP3KP East Java Province Year 2017

Within the Besuki Raya area, it can be seen that only Bondowoso Regency has an instrument for planning residential areas with the status of already having an academic paper. Until now, Jember is categorized as a district that does not yet have a settlement area planning instrument. In fact, there are various problems related to settlements including slums which reach 37 villages with an area of 47.2 hectares, uninhabitable houses reaching 3,940 units in slums (KOTAKU Document, 2017).

Slum settlement is a condition of residential environment with a very unsuitable quality, with characteristics including very high building density in a very limited area, prone to social and environmental ailments, and very low quality of buildings, not served by adequate environmental infrastructure and endanger the survival and livelihood of its inhabitants (Budiharjo, 2005). The conditions and characteristics of slums in Jember becomes the urgency of doing this research. This urgency is supported by strategic issues in the points of Sustainable Development Goals (SDGs) which are the international agenda of the United Nations. The related research points that become the reference of urgency stated in the 11th goal target in 2030 are:

- Access to decent housing for all, safe and affordable;
- Access basic infrastructure services
- Sustainable management of slums
- Adequate public space services

Based on the points above, the issue of handling slums becomes a topic of urgency that deserves to be examined. The hope for the future is that the implementation of this research can be an input for the policy formulation process by the government related to handling slum areas. Some things that will be the focus of this research are the process of slums typology and determining the priority infrastructure that must be met in efforts to improve the quality of settlements.
1.1. Research Problems
Jember Regency is one of the Besuki Raya areas that do not yet have a settlement area planning instrument. On the other hand, slums are an urgent problem that must be addressed. Based on data from Kotaku (City without Slums), Jember has slums in 37 villages with an area of 47.2 hectares, with uninhabitable houses reaching 3,940 units in slums. Uninhabitable homes in slums reflect a decrease in environmental quality that should be a concern for stakeholders related to the realization of sustainable development. Referring to the above problems, the basis for doing this research is related to urgency:
1. What is the typology of slums in Jember Regency?
2. What priority infrastructure must be met in efforts to improve the quality of slums in Jember Regency?

2. Methods
2.1. Research Steps
The research was conducted in 6 stages, namely:
1. Literature review to formulate indicators, variables, typology characteristics of slums by looking at standards, guidelines, and infrastructure needs as a basis for the field survey process.
2. Identification of existing slums in the Jember Regency.
3. Survey / observation at all slum points in Jember Regency with reference to the survey design prepared in step 1.
4. Distributing questionnaires to stakeholders for basic input of priority infrastructure analysis in slum areas.
5. Processing and analyzing data to formulate a typology of slums.
6. Recommendations on planning for revitalization of slums based on the need for settlement infrastructure in Jember Regency.

2.2. Research Variables
Research variables are the basis of what is produced from a literature review that has a measure. The variable is used to see the characteristics of the object being observed and becomes a limitation in conducting research. In the process of assessing research variables hypotheses, arguments and empirical logic are needed based on respondents so that this type of research is qualitative research. The variables identified for this study are:

| Variable          | Sub Variable                  | Indicator                                                                 |
|-------------------|-------------------------------|---------------------------------------------------------------------------|
| Physical condition| Road condition                | Road network coverage                                                     |
|                   |                               | Quality of road surface environment                                      |
|                   |                               | The width of the neighborhood road                                        |
|                   |                               | Puddle on the road                                                        |
| Drainage conditions| Puddles of rain               | Availability of drainage channels                                         |
|                   |                               | Drainage system                                                           |
|                   |                               | Maintenance of drainage channels                                          |
|                   |                               | Quality of environmental drainage construction                             |
| Provision of drinking water | Availability of access to drinking water |                                                                          |
| Waste water management | The need for drinking water |                                                                         |
| Waste management  | Waste water management system |                                                                         |
|                   | Waste water management infrastructure and facilities |                                           |
|                   | Suitability of infrastructure and facilities for technical requirements | Timothy |
| Variable          | Sub Variable                          | Indicator                                                                 |
|-------------------|---------------------------------------|---------------------------------------------------------------------------|
| Waste management system | Maintenance of waste processing facilities and infrastructure |
| Condition of the building | Building irregularity               |
|                    | Building density level               |
|                    | Building quality                     |
| Fire Danger        | Fire protection infrastructure       |
|                    | Provision of decent housing          |

Sources: Analysis, 2019

2.3. Research Design

Research design is the process of the research stage starting from the background of the research carried out to the stages of the analysis process carried out. The research design is discussed to facilitate understanding of the research flow.

2.4. Data analysis technique

Based on the research design presented in Figure 1, some of the analysis techniques used are described in the following discussion:

2.4.1 Identify the Characteristic of Slum Areas

Identification of settlement characteristics is carried out on the basis of determining the typology of slums. The analysis technique used at this stage is descriptive analysis with a descriptive statistical approach. This analysis technique is carried out by applying research methods that focus on the actual phenomena problems at the time of the study, then describe the facts about the problem being investigated as they are accompanied by rational and accurate interpretations.
Before formulating priority infrastructure weighting that must be provided in order to revitalize slum areas, it is first necessary to identify the characteristics of slum areas from each existing slum level. This analysis aims to describe and interpret the meaning of data collected systematically, factually and accurately to the facts or characteristics under study which can then be presented through tables and figures. This analysis will describe quantitatively in the form of a percentage of the results of a structured questionnaire regarding the variable characteristics used in the study.

2.4.2 Performance analysis index as a determination of priority infrastructure in slum areas
Performance analysis index (IPA) is an analytical method which is a combination of attributes of the level of importance and perceptions of service quality in the form of two dimensions. The results of the analysis include 4 different suggestions based on measures of importance and quality of service (performance), which can be used as a basis for setting further strategies.

![IPA Quadrant](image)

**Figure 2. IPA Quadrant**

The process carried out at this stage is the selection of data from residents in slum areas using a questionnaire. The results of this questionnaire are perceptions of the importance of the variables determined in the study.

3. Result and Discussions

3.1. Profile of Study Area
1. Jumerto Village

Jumerto Village is an area included in Patrang District. The indicator of sluminess seen in Jumerto Urban Village is the low quality of Human Resources (Human Resources) with the average community working as a service (labor). Physically, the road conditions in Jumerto Urban Village are divided into two types of pavement, namely paving and land whose width is less than the standard. Meanwhile the drainage conditions in Jumerto Urban Village are still not up to standard. The provision of drinking water and sanitation in Jumerto Sub-District is good. At present the water needs have been met by the PDAM (Municipal Waterworks) and the community has used MCK (public bathing, washing, and toilet facilities) without using the river. Waste management in Jumerto Village still uses combustion methods, this is certainly a bad impact on the environment. There are two types of settlement conditions in Jumerto Subdistrict, namely groups and following roads with permanent building types, but fire protection facilities are still needed.
2. Bintoro Village

Bintoro Village is included in the Patrang District administration with the characteristics of slum settlements that are found in the Bintoro Village is in terms of low community economy and inadequate infrastructure. Based on the physical aspects of road conditions, the slums of Bintoro Urban Village have roads with road network conditions that are difficult to reach by two or more wheeled vehicles. Some areas are included in the KOTAKU (City Without Slums) program so that they get help in making drainage channels. The availability and need of drinking water in the Bintoro village still relies on the source of water for daily activities both for washing, drinking, and cooking. The source of water is channeled through hoses and pipes that are channeled to each of the residents' homes. The community of slum settlements in the Bintoro Village currently use MCK (public bathing, washing, and toilet facilities) in terms of sanitation, this is an improvement from before using the river for waste disposal. Similar to other regions, waste management is still by burning and direct disposal so that it is dangerous for the environment. The current condition of settlements is still scattered with the percentage of non-permanent buildings (made of bamboo) more than permanent buildings with minimal fire protection aids.

3. Andongrejo Village

Andongrejo Village is included in the administrative area of Tempurejo District. The characteristics of slum settlements found in Andongrejo Village are rural slum settlements formed linearly following the road network. Physically, the road conditions in Andongrejo Village have pavement with bumpy contours. The width of the road in the delineation ranges from 2-3 m and there is drainage on the shoulder of the road. Meanwhile, the existing drainage conditions in the existing conditions are on the right and left side of the road and are still in the process of being worked on, so the quality is still untested. Pavement used for drainage already uses a mixture of stone and cement. Provision of drinking water in the delineation of slums in Andongrejo Village comes from wells and springs. The source of drinking water from wells is intended for 5-10 people, while the source of water is done independently by visiting and transporting water to each house. In terms of sanitation, Andongrejo Village has used MCK (public bathing, washing, and toilet facilities) built for community communal needs. Meanwhile for waste management in Andongrejo Village, the community still burns and discharges the riverbanks, this can affect the health of the environment. The condition of
buildings in Andongrejo Village consists of permanent and non-permanent buildings that still have a low level of regularity, therefore this condition is vulnerable to fire hazards. In general, the government has played a role in the eradication of slums in Andongrejo Village by providing environmental quality improvement programs and infrastructure through housing renovation programs, building latrines and waterways.

![Figure 5. Settlement Conditions in Andongrejo Village](image)

4. Jember Kidul Village
Jember Kidul Village is included in the administrative area of Kaliwates District. The characteristics of slums that are found in Jember Kidul are in terms of low community economy and very dense settlements. The condition of the road contained in the delineation of the slums of Jember Kidul Village has a range of road networks that are difficult to reach by large vehicles with a width of only 1-1.5 m with cast pavement. The drainage infrastructure in the Jember Kidul village is quite good and lacks a pool of water. The availability and need of drinking water in Jember Kidul village still relies on the shared well (the KOTAKU program) for daily activities for washing, drinking and cooking. Waste water here is still mixed with other disposal results by emptying into rivers. The majority of Jember Kidul people still use the river instead of public toilets. In the Jember Kidul area there is no waste management, so people burn rubbish on the ground every day and throw it into the river. Structuring the building there is not arranged even kitchen, bedroom, living room into one. In Jember Kidul there is no fire protection infrastructure and facilities. Actually, in the Jember Kidul area, a surgical renovation program has been offered, but because almost all of these areas do not have SHM (Freehold Title), the government cannot provide the program. In return, the government has provided assistance related to public toilets and repair of drainage channels. The majority of the community works such as scavengers and pedicab drivers and the last education is the majority of Vocational School.

![Figure 6. Settlement Conditions in Jember Kidul Village](image)

5. Karangrejo Village
Karangrejo Village is included in the administrative area of Sumbersari District. The characteristics of the slums found in Karangrejo Urban Village are more caused by the
economic condition of the community (low income community) because most of the people work in the service sector (labourers) with the latest education being the elementary and junior high schools. The width of the environmental road in the Karangrejo Village is 1-1.5 m. Provision of existing drainage in the system is good enough because the final disposal has been poured into the river and the construction quality is quite good because it has used cement pavement. Fulfilment of the availability of drinking water is sufficient by only using wells for daily activities. The existing condition of wastewater management at the location has begun to improve due to the existence of a program from the government for the construction of toilets and septic tanks in each resident's home. The waste management system that is often done is to carry out a collection process and then sometimes it is burned directly into the river. The condition of the building consists of 2 types, namely houses with walls and houses with bamboo woven walls. The density of the house is moderate. There are no fire protection facilities. Government programs that have been carried out in Karangrejo Sub-District include house renovations, drainage repair, construction of private toilets. Community service or mutual assistance is rarely done because most people only care about the environmental hygiene conditions around their respective home areas.

Figure 7. Settlement Conditions in Karangrejo Village

6. Baratan Village
Baratan Village is included in the administrative area of Patrang District. The characteristics of slums are medium slums with the characteristics of rural settlements with the majority of the population working as artisans, traders and farm laborers and the majority of education levels are still low, namely elementary and junior high school graduates. The road network is an environmental road which has a width of 1.5m-2m with paving pavement and some is still pavement. Drainage along the road network that uses paving blocks is in the form of cement pavement. Provision of drinking water in the delineation of slums in Baratan Village is divided into two sources, namely springs and wells. Problems related to clean water sources in Baratan Village are the small supply of water from springs and dry wells during the dry season. During the dry season the community meets their drinking water needs by buying for Rp.500 / drum. There are several MCK (public bathing, washing, and toilet facilities) that have been built in community homes but are constrained in terms of small water supply even to dryness so that the program is less than optimal for the community. The waste management system in the delineation of slums is still limited to self-help collection by each family. After the garbage has been collected for so many times then the combustion process is carried out. The condition of buildings in the delineation of slums in Baratan Urban Village is majority walled with mixed pavement between cement and brick with moderate settlement density and tends to cluster. The unavailability of fire extinguishers with narrow road conditions increases the potential for large scale residential fires. In general, the role of the delineation community in the slums of Baratan is carried out through community service activities. Community service activities are only carried out when welcoming holidays, religious days and other village activities.
3.2. Priority Infrastructure Based on IPA Results

Based on the results of the IPA (Importance Performance Analysis) analysis, several priority infrastructures are needed for slums and have a very high level of importance but the existing performance is still very poor based on community perceptions so that it becomes a priority infrastructure in each village.

1. Jumerto Village
   Factors that are considered important by the people of Jumerto Village, but need to be increased as a top priority based on the results of the IPA analysis
   a. Availability of access to drinking water, because currently the people in Andongrejo Slum Area still use non-piped drinking water sources, from communal wells and springs with a manual system.
   b. The quality of the surface of the road that still has unfavorable conditions where the pavement is still ground with bumpy contours.
   c. The availability of drainage channels is still at the manufacturing stage so that the quality of the channels is still not good.
   d. The Andongrejo community waste management system still uses manual methods, they burning and disposal of rubbish to the river banks
   e. The drainage system is not yet as needed
   f. Puddles of rain that occur due to poor drainage system
   g. The level of community education mostly only reaches the elementary and junior high levels
   h. Strategic Value Location in terms of economy is still lacking because the main livelihoods of the community are farm laborers and farmers.

2. Bintoro Village
   The main priority factor in the Bintoro Village is based on the IPA analysis, i.e
   a. The quality of the environmental road surface is partly still in the form of dirt roads
   b. The reach of the road network is still lacking because it is difficult to reach by two or more wheeled vehicles
   c. Building quality
   d. The availability of drainage channels in some areas that do not get the KOTAKU program is still lacking with poor conditions
   e. Inundation on the road that occurs around the road with pavement and is not supported by a good drainage network
   f. Strategic value of location. The study area is far from urban areas and the economic conditions of the people who work a lot become construction workers and farmers whose income is uncertain causing the region to become less developed to the fullest.
   g. The response of the government has not been evenly distributed in all slum areas in the Bintoro Village, seen from the construction of facilities and infrastructure that has not been evenly distributed in the study area.

3. Andongrejo Village
   Based on the IPA analysis, the priority factor in Andongrejo Sub-District is building quality.
4. Jember Kidul Village
   a. Infrastructure Roads that are still not in line with community expectations because they tend to be still narrow for access to 4-wheeled vehicles.
   b. Drainage infrastructure that still needs maintenance
   c. Wastewater management infrastructure is still not available and the community still tends to dispose of wastewater directly into rivers
   d. Fire protection infrastructure is still not available, given the density of settlements with high scale and access roads that are still narrow, so that the potential for catastrophic fires with large scale.

5. Karangrejo Village
   a. Weighing water management infrastructure that needs to be prioritized so that the community does not directly dispose of wastewater into the river.
   b. Waste management infrastructure that is still conventional, that is, there is no garbage transportation system to the landfill, so planning is needed related to the existing waste management system in Karangrejo Urban Village.
   c. The availability of fire protection infrastructure is not yet available, even though this infrastructure is needed for the Karangrejo District, given the density of houses is classified as medium density.

6. Baratan Village
   a. Road infrastructure is considered to still not provide good satisfaction for the community, given the narrow dimensions of the road and there are still roads with the pavement, even though road infrastructure is very vital for the level of accessibility/affordability of an area.
   b. Drinking water infrastructure is still very much needed to improve both its availability and quality. Because if the dry season comes, it causes a very severe drought so that people buy clean water for Rp. 500 / drum.
   c. Waste management infrastructure is still not available, people still tend to burn or throw directly into the fields even though these activities can damage the ecosystem.
   d. The absence of a fire protection system that has the potential for fire disasters.

Based on the results of the analysis, it was found that there were a number of infrastructures that were priority in each slum area which was different in each location. Based on the quality of basic infrastructure currently available, as well as the importance of the infrastructure, it can be concluded that the infrastructure which is the most important priority for the typology of slums in Jember Regency is road infrastructure and building conditions.

Table 3. IPA results based on priority infrastructure needs in six villages

| Village     | Road | Drainage | Drinking Water | Wastewater | Waste Management | Building Condition | Fire Danger |
|-------------|------|----------|----------------|------------|------------------|--------------------|-------------|
| Jumerto     | √    | √        | -              | -          | -                | √                  | -           |
| Bintoro     | √    | √        | -              | -          | -                | √                  | -           |
| Andongrejo  | -    | -        | -              | -          | -                | √                  | -           |
| Jemberkidul | √    | -        | √              | √          | √                | -                  | √           |
| Karangrejo  | -    | -        | -              | √          | √                | √                  | √           |
| Baratan     | √    | -        | √              | -          | √                | -                  | √           |

Sources: Analysis, 2019

4. Conclusions
Characteristics of slum area formation in Jember district belongs to the naturally process. Its different, when we compared to the conditions of slum area that occurs in metropolitan areas that tends to occur
due to massive activity attraction. Metropolitan communities tend to occupy slums because there is no other option for them. Economic insistence, low ability to access land or decent occupancy is the cause of the metropolitan slum area.

In Jember District, the formation of slum tends not because of the massive attraction activity. Slum area in Jember occurs because of settlements that grow independently so that not served a good basic infrastructure. There is a tendency to stay with families without balanced with the opportunities of job availability around the environment causing the level and quality of life on the slums in Jember becomes difficult to increase. On the other hand, there are actually several programs from government that enter such as building physical quality improvement programs, sanitation, roads, and drainage. But some of these programs are considered not maximums. Some government roles are considered not maximal in Jember Kidul, Karangrejo, and Bintoro areas.

Need to raise the role of government, especially in reviewing the quality improvement policy of slum. Based on the results of this research, each slum area in Jember has a priority infrastructure to be completed. Physically, the infrastructure to be aware of are road infrastructure, building conditions, waste management and fire danger. The government can use this concept as an input to revitalize the slum area in Jember based on priority infrastructure needs.

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