Neighbourhood Relationship among Villages in Gedangan District: Multidimensional Poverty Approach

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Abstract. Poverty becomes one of the global problems especially in developing country. Poverty is condition when people have difficulty to access basic needs and unable access it. This research takes place at Gedangan District, Malang Regency. This research aims are to: i) measure multidimensional poverty index and ii) find out neighbourhood relationship among villages in Gedangan District. There are two research methods which are used: i) Multidimensional Poverty Index (MPI) – consists of three dimensions (health, education and living standard); and ii) Spatial Data Analysis. MPI value measurement indicates that there are 2 MPI levels: low level (4 villages) and medium level (4 villages). Therefore, based on the MPI measurement, there are 4 villages with medium level of MPI as the priority villages to deal with poverty. The result of LISA map by spatial data analysis indicates that cluster of Low-High is form by Sidodadi village. It means that there are inequality facilities services between low value area and high value area. Sidodadi gets better services than its neighbour because it gets better service from another district, and it is vice versa for the village that have high value but does not get good facility services from Gedangan District.

Keywords: Poverty Alleviation; Multidimensional Poverty Index; Spatial Analysis

1. Introduction
No Poverty in all forms and dimensions is one of SDG’s important goals and is the greatest challenge faced by society and government. According to the most recent estimates, in 2015, 10 percent of the world’s population lived on less than US$1.90 a day [1]. Poor people have difficulty in accessing food, clean water, and sanitation [2]. Moreover, poverty provides much effect, such as malnutrition, mental illness, infectious diseases, and dependence of drugs. Poverty problems are derived from lack of ability, unemployment, low income, low education’s level, have a bad health, insecurity, and inconfidence [3]. The human development paradigm have a evolution that made theoretical base to measure multidimensional poverty [4].

Indonesia has 25, 95 million people or 9, 82% living below poverty line in March 2018. Most of them are living in Java Island spreading over six provinces that is 13, 34 million poor people or 8, 94% [5]. Indonesian government endorses strategies to alleviate poverty by 3 aspects, such as: implementing the comprehensive social protection, increasing the public services, and promoting sustainable livinghoods. Government’s program in Indonesia in poverty alleviation consists of *Beras Miskin* (Rice
for the poor), Beras Sejahtera (Rice for Prosperous), Bantuan Pangan Non Tunai (Food Aid Non Cash) and Bedah Kemiskinan Rakyat Sejahtera (Surgical Poverty People Prosperous) [6].

Malang Regency is the part of East Java Province having the highest number of poor peoples that is 293,740 poor people or 11.4% from total population and one of the districts in Malang Regency is Gedangan District. Based on data from Gedangan District, the number of poor people in Gedangan District is 5,178 people. In general, poor people in Gedangan District also accept Beras Miskin. Gedangan District have 8 (eight) villages, such as: Tumpakrejo, Sindurejo, Gajahrejo, Sidodadi, Gedangan, Segaran, Sumberejo, and Girimulyo Village.

The understanding towards the poverty condition in Gedangan District plays a crucial role to recommend poverty policies based on priority village location. Therefore, an approach by figuring out the level of poverty index in Gedangan District is the important attempt. Poverty’s level in Gedangan District was analyzed by using MPI (Multidimensional Poverty Index) focused on the 3 dimensions such as: health, education and living standard. To add, interrelationships among the variables are estimated by using spatial data analysis.

2. Methods

This research utilizes two methods of: Multidimensional Poverty Index and Spatial Data Analysis.

2.1. Multidimensional Poverty Index

Multidimensional Poverty Index (MPI) is one of poverty’s level analyses and is popular due to being applied by Oxford Poverty and Human Development Initiative (OPHI) and United Nations Development Program (UNDP). However, the inventor of this method is Alkire and Foster in 2011. MPI method involves the three dimensions consisting of ten indicators at each. The indicators was divided into two indicators for health aspect (0.1667 per indicator), two indicators for education aspect (0.1667 per indicator) and six indicators for living standards (0.0556 per indicator) [7][8]. The MPI is a multiplication of the percentage of people who are poor or multidimensional headcount ratio (H) with intensity of poverty (A) [8]. The MPI formula can be expressed as follow:

\[ MPI = H \times A \]  

\( MPI \) = Multidimensional Poverty Index  
\( H \) = Headcount  
\( A \) = Intensity of Deprivation

Based on module of MPI Research Team in Indonesia [9], MPI or poverty level values can be classified as:

- Very High : >0, 36
- High : 0, 27-0, 36
- Medium : 0, 18-0, 27
- Low : 0, 09-0, 18
- Very Low : <0, 09

2.2. Spatial Data Analysis

Spatial data analysis is performed by utilizing Geoda Program (Geographic Data Analysis), which is free and open source software. Dr. Luc Anselin and his team introduced this software in 2003 [10], providing a user-friendly methods to analyze spatial data such as spatial data autocorrelation and basic spatial regression analysis [11]. Spatial analysis is an analysis engaging spatial data input by using arcgis tools to process spatial data that has been surveyed. Then, spatial data will be analyzed by using the Geoda tools. Spatial analysis have weights matrix to calculate the value of regression.

Weights matrix in Geoda Program can be operated with the space concept. This matrix contains about neighborhood relationship in a dataset. This study indicates that the neighborhood relationship among eight villages in Gedangan District with Queen Weight Matrix. Queen Weight Matrix defines a village's neighborhood as those with either a shared border or vertex. Connectivity histogram was
displayed by the characteristics of weights matrix. Every bar in connectivity histogram was explained by the frequency from each number of neighbors in Gedangan District.

3. Result and Discussion

3.1 Multidimensional Poverty Index

Table 1. Multidimensional Poverty Index for each Village in Gedangan District

| No. | Villages   | MPI Values | Classification | Contribution of deprivation in Dimension to overall poverty (%) |
|-----|------------|------------|----------------|---------------------------------------------------------------|
| 1   | Tumpakrejo | 0,12       | Low            | Education 53, Health 0, Living Standards 47                |
| 2   | Sindurejo  | 0,20       | Medium         | Education 54, Health 0, Living Standards 46                |
| 3   | Gajahrejo  | 0,25       | Medium         | Education 56, Health 0, Living Standards 44                |
| 4   | Sidodadi   | 0,18       | Medium         | Education 55, Health 0, Living Standards 45                |
| 5   | Gedangan   | 0,27       | Medium         | Education 51, Health 0, Living Standards 49                |
| 6   | Segaran    | 0,15       | Low            | Education 59, Health 0, Living Standards 41                |
| 7   | Sumberejo  | 0,14       | Low            | Education 48, Health 0, Living Standards 52                |
| 8   | Girimulyo  | 0,16       | Low            | Education 53, Health 0, Living Standards 47                |

Based on Table 1, the result of MPI indicates that there are four villages classified as medium level and four villages classified as low level. The medium level of MPI occurs in Sindurejo, Gajahrejo, Sidodadi, and Gedangan. Meanwhile, low level of MPI occurs in Tumpakrejo, Segaran, Sumberejo and Girimulyo. The highest value of MPI is in Gedangan village with the value of 0, 27 MPI. MPI level map of each village is visualized in the following figure 1.
3.2 Spatial Data Analysis

The first result of spatial autocorrelation is Morans Scatter Plot, providing a statistic (Moran’s I) to determine the extent of linear association between the MPI values in a given village (x-axis) with the MPI values in neighbouring villages (y-axis). Each quadrant corresponds to a different type of spatial autocorrelations, such as: high-high and low-low for positive spatial autocorrelation; low-high and high-low for negative spatial autocorrelation. The type of spatial autocorrelation in a data distribution of MPI values in Gedangan District is visualized in the following figure 2.

![Figure 2. Morans Scatter Plot](image)

Based on Figure 1, the values of MPI in Gedangan District are spread, indicating the value of Moran’s I which is closer to the zero. The closer value of Moran’s I to the zero means the absence of spatial autocorrelation. Contrastingly, the closer value of Moran’s I to the one means the existence of spatial autocorrelation. The slope of the scatter plot indicates a little negative spatial autocorrelation in Gedangan District, as visualized in LISA Cluster Map below.

![Figure 3. LISA Cluster Map](image)

Based on figure 3, there is one type of cluster in Gedangan District, which is: the Low-High Cluster covers 1 village in Sidodadi Village, having Low MPI value correlated with high neighboring MPI
values. Based on Morans Scatter Plot and LISA Cluster Map, it is apparent that the poverty in Gedangan District (which measured by MPI) tends not to form a cluster.

4. Conclusion
From the research, in order to lessen poverty level in the research area, there are two conclusions as recommended such as:
- Villages In Gedangan District only has two classification of MPI level, low level and medium level. The low level occurs in 4 villages, such as in Sindurejo, Gajahrejo, Sidodadi and Gedangan.
- Gedangan District, especially in Village belongs to Low-High classification in LISA cluster, having low value of poverty or MPI measure but surrounded by village who has high value of poverty.

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