Authors' response to reviewers' comments

Dear Ms. Mateja Makan and all reviewers,

Thank you for giving us the opportunity to submit a revised draft of our manuscript titled "Spatio-temporal Distribution Patterns and Local Driving Factors of Java's Regional Development" to the International Journal of Geo-Information (IJGI). We really appreciate the time and effort that you and the reviewers have dedicated to provide your valuable feedback on our manuscript. We are grateful to the reviewers for their insightful comments on our paper. We fully considered and dealt with all of them. We have been able to incorporate changes to reflect most of the suggestions provided by the reviewers. In addition to dealing with all of the comments below, the current version of this manuscript has been checked and updated. We hope all issues have been fully dealt with. Once again, many thanks for your kind supports to improve the quality of our manuscript. Here is a point-by-point response to the reviewers' comments and concerns.

Response to Reviewer #2

The paper is well readable, interesting from an empirical point of view, and focused on a highly relevant topic. Nevertheless, there are certain weaknesses especially in the theoretical discussion that should be addressed:

Comment #1:

The theoretical discussion in the Section 1 is too superficial and not well connected to the methodological section and selection of independent variables. The authors do not have to (or even cannot) discuss all relevant factors of regional development, but they should discuss all factors that are operationalized in the Section 2 into the independent variables – X1, X2…X11 (why the landslide, tubercolosis, GDP…).

Response #1:

Thank you for your comments. We added some more detailed information about the reason we selected those independent variables. Please find them in line. 167-187 in our revised manuscript.

"GRDP and distance to CBD were chosen to be variables representing economic aspects. GRDP shows the economic performance of a region while the distance to CBD is a representation of the physical distance to the economic center which also influences the level of regional development. Then, according to Tadjoeddin et al. (2017), the level of development in the social aspect can be observed from the level of human resources and the level of crime. The high level of crime tends to inhibit investment activities and human creativity in socio-cultural life (Zhu and Simarmata, 2015). As for the infrastructure aspect, we poxy using the number of educational facilities. Previously we have involved several variables related to facilities including education, health, and social facilities. Among the three, only educational facilities were significantly correlated with RDI.

The level of regional development in Indonesia is generally closely related to the phenomenon of conversion of agricultural land to non-agriculture (Rustiadi et al., 2021; Wijaya et al. 2018; Hudalah and Firman, 2012) whose growth follows the construction of roads (Fuadina et al., 2021). The added value of agricultural land around the settlement center which is lower than the value added of non-agricultural land triggers changes in land use from agricultural to non-agricultural land. Therefore, we chose this conversion phenomenon to represent the land use aspect. Finally, the level of regional development is correlated with the quality of the carrying capacity. Areas with limited carrying

capacity tend to limit economic activities. Massive development activities and increasing population raises new problems, such as declining quality of the environment, including the increasing disaster evidences (Pravitasari et al., 2016). We chose floods, landslides, droughts, and people suffering from tuberculosis (disease burden) as a representation of the region's carrying capacity."

Comment #2:

This discussion should connect sections 1 and 2 and supported by a relevant theoretical literature. For example, if the authors test the effects of education, I would expect at least very brief discussion of the role of human capital and the theory of endogeneous development

Response #2:

We agree with this and have incorporated your suggestion throughout the manuscript. We added the theoretical literature regarding the effect of HDI and Education Facilities in the relation to the role of human capital and the theory of endogenous development in the line 285-295 as follow:

"Human development index (HDI; X_3) has a role toward RDI with the assumption of the model is related to the human capital and the number of non-formal and formal educational facilities (X_5 and X_6) has a role in relation with human capital that has a non-decreasing marginal return due to the belief that a person with a higher level of education can more easily obtain additional knowledge [Ghost and Parab, 2021]. Education is also related to the endogenous growth theory which emphasizes that technological change is the result of efforts such as tax policy, basic research funding, and education by researchers and entrepreneurs who respond to economic incentives can potentially influence the long-run prospects of the economy [Romer 1990; Jones 2019]."

Comment #3:

I also miss the concept of urbanization (or more generally – agglomeration) economies. The role of distance should be related to the discussion of agglomeration economies and/or peripherality.

Response #3:

Thank you for your comments. For example, in Indonesia, especially the city of Jakarta, continues to grow into large cities that are connected to the surrounding suburbs as a large urban agglomeration that is spatially contingent. The phenomenon of urban agglomeration causes changes in socio-spatial structures, such as industry agglomeration, land use change, increased demand for settlements accompanied by population growth (Darodjatoen 2009; Rustiadi *et al.,* 2021)

Based on statement in line 334-340, The conurbation that occurred in the Jakarta and Bandung areas is related to its role as the capital city of Indonesia (Jakarta) and the capital city of West Java (Bandung). Population density continues to increase due to the impact of urban agglomeration. According to Rustiadi *et al.,* (2021) increase in population density, especially in areas along toll roads in the North and the non-toll roads in the South.

Comment #4:

The authors should be more precise in their formulations and terminology. For example, what is „the portion of settlements ", „GRDP ", „portion of poor people "? They should not use formulations like

„…and so on", their selection of factors affecting regional development is too vague. „Number of populations "(row 118) is probably wrong, should be the population or a number of inhabitants.

Response #4:

Thank you for your suggestion. We already revised them in the manuscript based on your suggestion.

Comment #5:

More detailed explanation of the construction of the Regional Development Index is needed – which indicators were used?

Response #5:

Thank you for your suggestion. We agree with this and put some detailed explanation about the definition and construction of Regional Development Index in the manuscript, as follow:

RDI is one method that is often used among Indonesian researchers instead of GRDP. RDI determines the level of regional development through the ratio between the number of facilities and the population. The facilities include education, health, economy, and government services (see Ramadhan et al. 2020; Murtadho et al. 2020). The data were obtained from Indonesia's Statistics Agency.

This index was calculated using the weighted Scalogram involving three steps. The initial one was the calculation of facilities' service capacity using the formula as follows:

$$A_{ij} = \left(X_{ij}P_i\right)/1000 \quad (1)$$

where A_{ij} is the index of facility *j* in region *i*; X_{ij} is the number of facility *j* in region *i*; P_i is the populations in region *i*. The facilities included social, health, education, and economic facilities either state- or private-owned. Then, the following formula was used to determine the weight of each *j* in each region *i*:

$$I_{ij} = X_{ij}X_{.j}A_{ij} \quad (2)$$

$X_{.j}$ is the sum of facility *j*. Finally, The RDI was calculated as follows:

$$K_{ij} = \left(I_{ij} - min\, I_j\right)S_j \quad (3)$$

where K_{ij} is the raw scalogram index value; *min* I_j is the minimum value of *I* in facility *j*, and S_j is the standard deviation value.

Comment #6:

The model includes the Human Development Index and also the GDP? What about the multicolinearity? These indicators are probably correlated.

Response #6:

Thank you for pointing this out. In Indonesia, one of the component of Human Development Index (HDI) is per-capita expenditure, not GDP. In our research, all variables included in the model were selected based on stepwise regression results. So, there is no multicolinearity between variables.

Comment #7:

Figure 3 should be provided in higher resolution. Legends are hard to read.

Response #7:

Thank you for pointing this out. As suggested by reviewer, all figures including Figure 3 have been replaced with pictures/images in a better quality and higher resolution.