

Land Use Change, Spatial Interaction, and Sustainable Development in the Metropolitan Urban Areas, South Sulawesi Province, Indonesia

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by [Batara Surya](#)^{1,*}, [Despry Nur Annisa Ahmad](#)², [Harry Hardian Sakti](#)³ and [Hernita Sahban](#)⁴

Reviewer 1: Anonymous

Reviewer 2: Anonymous

Reviewer 3: Anonymous

Reviewer 4: Anonymous

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(This article belongs to the Section [Urban Contexts and Urban-Rural Interactions](#))

Round 1

Reviewer 1 Report

In this study, the authors investigate the relationship between spatial interaction, spatial integration, urban agglomeration and the sustainable development of the Mamminasata metropolitan area, Indonesia. The suburbs and regencies connected to Makassar city serve a meaningful study case for the research question in this study. I would like to suggest minor revisions with the following comments:

- Before moving to the objectives at the end of the introduction, the authors should consider highlighting the contributions based on the literature review of previous studies. There are some hints at the end of the conclusion but seem general and implicit. One suggestion is to focus on the unique characteristics of Mamminasata. The lines 78 to 105 provide details of the spatial configuration in the regions, but it needs to be distilled and related to expected contributions for the sustainable development problems in the rapid urbanization metropolitan areas of the global south. Moreover, the literature review tends to focus on spatial integration and its environmental consequences, but much ignores the spatial interaction side.
- The methods part could be improved by clarifying several points: what is path analysis and why it is suitable for this study; what are the indicators for categories X, Y, and Z, and how they are measured; the spatial interaction analysis equations are not fully or clearly explained through description in lines 192-196, is it a gravity model; how the shift-share method is used and what are the meanings of decomposed components.
- The major problem in result presentation is the abusive usage of bullet points in several parts. Since bullet points serve as concluding marks, the basis for the statements in bullet points should be clarified. For example, a lot of conclusions are actually drawn from the tables in the appendix, but they are not referred to in the manuscript (e.g. lines 347 – 351). In the discussion section, a lot of policy suggestions and implications are also delivered by bullet points, but without indicating or discussing with the results like which quantitative or qualitative analysis, or which source like field facts, survey, or document study, they are derived from. As a result, the discussion is not down to earth and related to the sustainable development problems in the regions.
- Minor problems in the presentation are: the place of investigated regencies is not illustrated in figure 1; period but no comma is used as thousand separators in figures, or vice versa.

- The frameworks in figure 1 and figure 3 look similar to each other, and the relationship among components, like economic growth and spatial components, is altered from figure 1 to figure 3. May consider to merge or accommodate accordingly.

Author Response

The following list fixes the results of the first reviewer correction:

1. *Before moving to the objectives at the end of the introduction, the authors should consider highlighting the contributions based on the literature review of previous studies. There are some hints at the end of the conclusion but seem general and implicit. One suggestion is to focus on the unique characteristics of Mamminasata. The lines 78 to 105 provide details of the spatial configuration in the regions, but it needs to be distilled and related to expected contributions for the sustainable development problems in the rapid urbanization metropolitan areas of the global south. Moreover, the literature review tends to focus on spatial integration and its environmental consequences, but much ignores the spatial interaction side. **This comment has been corrected in page 2***
2. *The methods part could be improved by clarifying several points: what is path analysis and why it is suitable for this study; what are the indicators for categories X, Y, and Z, and how they are measured; the spatial interaction analysis equations are not fully or clearly explained through description in lines 192-196, is it a gravity model; how the shift-share method is used and what are the meanings of decomposed components. **This comment has been corrected in page 8-11***
3. *The major problem in result presentation is the abusive usage of bullet points in several parts. Since bullet points serve as concluding marks, the basis for the statements in bullet points should be clarified. For example, a lot of conclusions are actually drawn from the tables in the appendix, but they are not referred to in the manuscript (e.g. lines 347 – 351). In the discussion section, a lot of policy suggestions and implications are also delivered by bullet points, but without indicating or discussing with the results like which quantitative or qualitative analysis, or which source like field facts, survey, or document study, they are derived from. As a result, the discussion is not down to earth and related to the sustainable development problems in the regions. **This comment has been corrected in page 11-26***
4. *Minor problems in the presentation are: the place of investigated regencies is not illustrated in figure 1; period but no comma is used as thousand separators in figures, or vice versa. **This comment has been corrected in page 3***
5. *The frameworks in figure 1 and figure 3 look similar to each other, and the relationship among components, like economic growth and spatial components, is altered from figure 1 to figure 3. May consider to merge or accommodate accordingly. **This comment has been corrected in page 3***

Author Response File:  [Author Response.pdf](#)

Reviewer 2 Report

This work adds values to the literature by deciphering the synchronized effects of spatial interaction and agglomeration upon the dynamics of urban activities. Overall, this paper is well structured, and figures and tables are well presented and discussed in the text, though a few aspects should be improved.

Restructure section 2: materials and methods. Suggest to reserve a whole section to talk about your framework and modules of the framework, and another section to introduce the case study region and used data sets.

Line 115: the framework is the core of this study, which should be discussed in a separate section probably as a subsection under section 2.

Line 174: recite the equation with an equation number.

Line 196: Improve the formatting of equations. Now the formatting is quite confusing.

Author Response

Response to Reviewer 2 Comments

Point 1: Restructure section 2: materials and methods. Suggest to reserve a whole section to talk about your framework and modules of the framework, and another section to introduce the case study region and used data sets.

Response 1: This comment has been corrected in page 6-11

Point 2: Line 115: the framework is the core of this study, which should be discussed in a separate section probably as a subsection under section 2.

Response 2: This comment has been corrected in page 3

Point 3: Line 174: recite the equation with an equation number.

Response 3: This comment has been corrected in page 9-11

Response 4: Line 196: Improve the formatting of equations. Now the formatting is quite confusing.

Response 4: This comment has been corrected in page 9-11

Reviewer 3 Report

The paper "Land use change, spatial interaction and sustainable development in the metropolitan urban areas, South Sulawesi Province, Indonesia" is a very interesting paper but, in my opinion, it presents different points that should be clarified before, eventually, publication. For this reason, I suggest MAJOR REVISIONS. See below for further details.

Abstract:

The authors should better specify the research question of their study in this part (see lines 108-112). Furthermore, lines 30 – 33 express an obvious concept. Perhaps, why do not they try to join their findings with national or international targets (i.e. Agenda 2030)?

Introduction:

Lines 88 – 105: In my opinion, the authors should move this part in "2. Materials and methods" section, point (d). On this paragraph maybe should interest to describe the urban growth model and their physical and environmental impacts. I suggest to the authors to extend this part, the following references could be considered:

- European Commission. Urban Sprawl in Europe: The Ignored Challenge. 2006. Available online: http://www.eea.europa.eu/publications/eea_report_2006_10;
- Ding, C.; Zhao, X. Assessment of urban spatial-growth patterns in China during rapid urbanization. *Chin. Econ.* 2011, 44, 46–71.
- Barrington-Leigh, C.; Millard-Ball, A. A century of sprawl in the United States. *Proc. Natl. Acad. Sci. USA* 2015, 112, 8244–8249.
- Li, D.; Wang, D.; Li, H.; Zhang, S.; Zhang, X.; Tao, Y. The Effects of Urban Sprawl on the Spatial Evolution of Rural Settlements: A Case Study in Changchun, China. *Sustainability* 2016, 8, 736.
- Ewing, R.H. Characteristics, Causes, and Effects of Sprawl: A Literature Review. In *Urban Ecology*; Marzluff, J.M., Shulenberger, E., Endlicher, W., Alberti, M., Bradley, G., Ryan, C., Simon, U., ZumBrunnen, C., Eds.; Springer: New York, NY, USA, 2008; pp. 519–535.
- Romano, B.; Zullo, F.; Fiorini, L.; Marucci, A.; Ciabò, S. Land transformation of Italy due to half a century of urbanisation. *Land Use Policy* 2017, 67, 387–400.

Fig.1 – Do the colors have any meaning? Otherwise, the same color must be used (It is the same for figure 8, 9 and 10).

Study area:

The authors should add a map that focuses on the three urban suburbs selected (use google satellite as a base map layer). Furthermore, lines 133-144 should be moved in the 2.1 section. Here, the authors should describe their study area characteristics (morphology, demographic dynamics, population density...)

Method of Collecting Data

The authors should add the data source of their data (a) and the technical specifications.

Data analysis method:

Line 174: What is e_1 in the formula? Furthermore, I would suggest to rephrase this paragraph because it is very confusing. A description of the used indexes is completely missing (IB, IAb, TH, A), I suggest to the authors to include a flowchart which can facilitate the reader in understanding this part.

Figure 4: The y label is missing. The description of part C is missing. Part A: there is an error on a grey label number (the correct value is 3.610).

Results:

It could be interesting to insert the land change matrix between 2001 and 2019. Thus, it would have complete knowledge of the changes that have affected the area also from a numerical point of view.

How were KPN, KPK, KPP and PN calculated?

Discussion:

It is very difficult to understand the meaning of the values shown in the table 1, if the authors not explain what are the equations for the used indexes. This is a serious weakness that makes it difficult to understand the whole section (4.1).

Conclusions

The considerations expressed in the conclusions are too generalistic. Indeed, these would be valid for any urban reality of this size.

Author Response

Response to Reviewer 3 Comments

Commentar 1: The authors should better specify the research question of their study in this part (see lines 108-112). Furthermore, lines 30 – 33 express an obvious concept. Perhaps, why do not they try to join their findings with national or international targets (i.e. Agenda 2030)?

Response 1: has been fixed on page 1 in attachment

Commentar 2: Lines 88 – 105: In my opinion, the authors should move this part in “2. Materials and methods” section, point (d). On this paragraph maybe should interest to describe the urban growth model and their physical and environmental impacts.

Response 2: has been fixed on page 6-11 in attachment

Commentar 3: The authors should add a map that focuses on the three urban suburbs selected (use google satellite as a base map layer). Furthermore, lines 133-144 should be moved in the 2.1 section. Here, the authors should describe their study area characteristics (morphology, demographic dynamics, population density...)

Response 3: has been fixed on page 7 in attachment

Commentar 4 in Method of Collecting Data: The authors should add the data source of their data (a) and the technical specifications.

Response 4: has been fixed on page 7-8 in attachment

Commentar 5 in Data analysis method:

Line 174: What is e_1 in the formula? Furthermore, I would suggest to rephrase this paragraph because it is very confusing. A description of the used indexes is completely missing (IB, IAb, TH, A), I suggest to the authors to include a flowchart which can facilitate the reader in understanding this part.

Response 5: has been fixed on page 8-11 in attachment

Commentar 6 in Data analysis method: Figure 4: The y label is missing. The description of part C is missing. Part A: there is an error on a grey label number (the correct value is 3.610).

Response 6: has been fixed on page 12-13 in attachment

Commentar 7 in Results: It could be interesting to insert the land change matrix between 2001 and 2019. Thus, it would have complete knowledge of the changes that have affected the area also from a numerical point of view.

Response 7: has been fixed on page 14-16 in attachment

Commentar 8 in Results: How were KPN, KPK, KPP and PN calculated?

Response 8: This has been described in Page 10

Commentar 9 in Discussion: It is very difficult to understand the meaning of the values shown in the table 1, if the authors not explain what are the equations for the used indexes. This is a serious weaknes that makes it difficult to understand the whole section (4.1).

Response 9: has been fixed on page 21-22 in attachment

Commentar 10 in Conclusions: The considerations expressed in the conclusions are too generalistic. Indeed, these would be valid for any urban reality of this size.

Response 10: has been fixed on page 26-27 in attachment

Author Response File:  [Author Response.pdf](#)

Reviewer 4 Report

Authors presented a paper that deal with land use changes, spatial interaction and spatial integration in the metropolitan city of Mamminassata, Indonesia.

Despite the interesting topic, the scientific level of the whole research is in my opinion quite poor and not adequate for a peer reviewed journal.

In my opinion the manuscript cannot be published in the present form. It requires some important corrections in order to improve the scientific level of the research.

Below I detail the issues detected in the paper.

Introduction

Part of the introduction focused on urbanization process in general, despite the authors use only reference related to East Cities, and in particular China, Indonesia, Korea.

Different aspects of urbanization dynamics, physical aspect of the cities, economy roles and others are mixed without a clear aim. Author should organize the topics in order to put in evidence the importance of the presented study and justify the research design.

Parts of the introduction focused on the case study. I suggest the author to move those parts in a case study paragraph (ie paragraph 2.2 Study area)

Just in the third part of the introduction research aim is presented.

Please revise lines from 108 to 113. The aim of the research can't be related to analyse relationships, but to develop a method that allow to analyse relationships.

Finally, a literature review concerning the research issue is totally missing. Concept of spatial interaction, spatial integration, urban agglomeration should be defined trough an adequate literature review.

Materials and Methods

The first period of the paragraph focused on case study, than I suggest to move it in the subparagraph 2.2 Study area.

On the contrary the period 2.2 Study area, contain the methodological framework, that is not explained properly. Totally missing are references about previous similar studies on metropolitan areas. In addition there are no explanations about the research variables and about the indicator chosen for the evaluations.

subparagraph 2.3 Method of collecting data.

Please explain in detail the meaning of "field observation" In Which way land use changes, distributions of flows and others aspect of the metropolitan city were observed?

subparagraph 2.4 Data Analysis method.

Lines from 162 to 168 are not part of the method. I suggest to delete it, or move in another paragraph.

Variables of path analysis are already defined. Please delete one.

Concerning the spatial interaction formulas, please clarify the used terms

Results

The results section should be where researchers report the findings of the study based upon the methodologies applied.

Focusing on this research, the first two paragraphs (lines from 209 to 231) are not results. It deals with development effects on metropolitan areas, without any link with the research method. I suggest to delete it or move in the introduction.

Also lines from 253 to 262, are not results, but general considerations about changes in land use. Lines from 264 to 293, focusing on changes in land use in the three study areas, are more similar to discussion,

Lines from 297 to 327, focusing on spatial interaction, not contains results, but general considerations.

Is not clear how the 4 indicators for the measurement of service disparity, presented in lines 249, 250, were used. The results of this analysis are missing.

In addition, Fig.4 the label of the third diagram is missing. In addition, I suggest to uniform colours and type of diagrams. In line 305 one of the three categories of linkages of the urban system is missing.

In conclusion, the paragraph **Results** mainly contains general considerations. Nothing is said about the result of the Path Analysis, spatial interaction analysis, accessibility analysis, shift share analysis. As a consequence, results of the quantitative part of the method, are totally missing.

Parts of the paragraphs should be classified as discussion.

Pleas rewrite the paragraph putting in evidence the results of the adopted methodology

Discussions

Lines from 362 to 424 focusing on spatial interaction

Table 1 show the results of spatial interaction analysis. It Should be moved on result paragraph

The results presented in figure 9 and in lines from 439 to 470 seems to be the results of Path Analysis. Also this part should be moved on results paragraph.

The paragraph 4.2 is not interpret and describe the significance of the research findings, how discussions should do. On the contrary the paragraph introduces a new topic, never addressed in the research. This paragraph is totally unrelated with the rest of the research.

Sustainable development is addressed just in the title of the paper, in the abstract and in introduction, but is not part of the method. It should be consider as a topic for future researches.

I also suggest to rewrite the title of the research removing sustainable development.

I believe the authors should work on these aspect of their paper, in order to improve the scientific soundness of the entire research.

Author Response

Comments 1 from Reviewer in Introduction:

1. Part of the introduction focused on urbanization process in general, despite the authors use only reference related to East Cities, and in particular China, Indonesia, Korea.
2. Different aspects of urbanization dynamics, physical aspect of the cities, economy roles and others are mixed without a clear aim. Author should organize the topics in order to put in evidence the importance of the presented study and justify the research design.
3. Parts of the introduction focused on the case study. I suggest the author to move those parts in a case study paragraph (ie paragraph 2.2 Study area)
4. Just in the third part of the introduction research aim is presented.
5. Please revise lines from 108 to 113. The aim of the research can't be related to analyse relationships, but to develop a method that allow to analyse relationships.
6. Finally, a literature review concerning the research issue is totally missing. Concept of spatial interaction, spatial integration, urban agglomeration should be defined trough an adequate literature review.

Response 1:

According to the instruction of Reviewer in Intorduction, our preliminary revision starting from paragraph 6 on page 2-4 in attachment

Comments 2 from Reviewer in material and methods:

1. The first period of the paragraph focused on case study, than I suggest to move it in the subparagraph 2.2 Study area.
2. On the contrary the period 2.2 Study area, contain the methodological framework, that is not explained properly. Totally missing are references about previous similar studies on metropolitan areas. In addition there are no explanations about the research variables and about the indicator chosen for the evaluations.
3. subparagraph 2.3 Method of collecting data.
4. subparagraph 2.4 Data Analysis method.
5. Variables of path analysis are already defined. Please delete one.
6. Concerning the spatial interaction formulas, please clarify the used terms

Response 2: Has been repaired on page 8-13 in attachment

Comments 3 in Results:

1. The results section should be where researchers report the findings of the study based upon the methodologies applied.
2. Focusing on this research, the first two paragraphs (lines from 209 to 231) are not results. It deals with development effects on metropolitan areas, without any link with the research method. I suggest to delete it or move in the introduction.
3. Also lines from 253 to 262, are not results, but general considerations about changes in land use. Lines from 264 to 293, focusing on changes in land use in the three study areas, are more similar to discussion,
4. Lines from 297 to 327, focusing on spatial interaction, not contains results, but general considerations.
5. Is not clear how the 4 indicators for the measurement of service disparity, presented in lines 249, 250, were used. The results of this analysis are missing.
6. In addition, Fig.4 the label of the third diagram is missing. In addition, I suggest to uniform colours and type of diagrams. In line 305 one of the three categories of linkages of the urban system is missing.
7. In conclusion, the paragraph **Results** mainly contains general considerations. Noting is said about the result of the Path Analysis, spatial interaction analysis, accessibility analysis, shift share analysis. As a consequence, results of the quantitative part of the method, are totally missing.
8. Parts of the paragraphs should be classified as discussion.
9. Pleas rewrite the paragraph putting in evidence the results of the adopted methodology

Response 3:

Has been repaired on page 14-22 in attachment

Comments 4 in Discussion:

1. Lines from 362 to 424 focusing on spatial interaction
2. Table 1 show the results of spatial interaction analysis. It Should be moved on result paragraph
3. The results presented in figure 9 and in lines from 439 to 470 seems to be the results of Path Analysis. Also this part should be moved on results paragraph.
4. The paragraph 4.2 is not interpret and describe the significance of the research findings, how discussions should do. On the contrary the paragraph introduces a new topic, never addressed in the research. This paragraph is totally unrelated with the rest of the research.

Response 4: Has been repaired on page 22-28 in attachment

Author Response File:  [Author Response.docx](#)

Round 2

Reviewer 3 Report

Dear authors,

thanks for your work. All of my points have been addressed. I would recommend the publication on Land.

Author Response

Dear Reviewer.

Thanks you for the input, correction, and suggestions for our article. Hopefully this latest change is in line with expectations and input from reviewer. For all the input and suggestions we again thanks you still.

Author.

Author Response File:  [Author Response.pdf](#)

Reviewer 4 Report

The new version of the paper is it is not very different from the previous one.

The method is better organized as well as the cases study that are analyzed in depth trough a proper conceptual framework

On the contrary authors haven't taken into account comments related to results and discussion.

I 'think authors should have work on those paragraphs of the paper, according to the comments outlined in previous review

Author Response

Dear Reviewer.

We hereby submit the change to our article, according to the suggestions and input as follows. We have fundamental changes, especially in several sections:

Research Result, consisting of several sections:

4. Result

4.1. Increase in Population and Change in Land Use (Pages 20).

4.2. Urban Agglomeration and Economic Growth (pages 20-21).

4.3. Spatial Interaction and Spatial Integration (pages 23-24).

4.4. The Relation Ship of Spatial Integration, Spatial Interaction, and Urban Agglomeration to Economic Growth (pages 26).

5. Discussion

5.1. Impact of Change in Land Use and Enviromental Quality Decline (Pages 27).

5.2. Urban Activities System As Determinants of Economic Growth (Pages 28).

5.3. Sustainable Development of the Mamminasata Metropolitan Suburban (pages 28-31).

Thanks you for the suggestion, correction to our article.

Author