Modeling Spatial Development Relationship between Sub districts: Case study in Ngawi, East Java, Indonesia

Haryono[1], Soemarno[2], Surjono[3], Imam Hanafi[4] & Anwar Fitrianto[5,6]

[1] Department of Environment and Development Study, University of Brawijaya, Malang, East Java, Indonesia

[2] Faculty of Agriculture, University of Brawijaya, Malang, East Java, Indonesia

[3] Department of Urban and Regional Planning, Faculty of Engineering University of Brawijaya, Malang, East Java, Indonesia

[4] Department of Public Administration, Faculty of Administrative Science, University of Brawijaya, Malang, East Java, Indonesia

[5] Department of Mathematics, Faculty of Science, Universiti Putra Malaysia, Malaysia

[6] Department of Statistics, Faculty of Mathematics and Natural Resources, Bogor Agricultural University, Indonesia

Correspondence: Haryono, Faculty of Administrative Sciences, University of Brawijaya, Malang, Jalan Mayjen Haryono 163 Malang 65145, East Java, Indonesia. E-mail: haryon_jiepp@yahoo.co.id

Abstract

Spatial development focuses on inner strength, through the development of community participation initiatives and creative, and productive, with the utilization of economic resources, social, technological and institutional, to support the creation of jobs for residents and local community. Modeling the connection of empowerment of each district to eliminate the gap between regions is required. This study uses descriptive statistics and quotient location to identify the location and concentration of excellence spatial development in order to know spatial relationship between sub districts. Spatial development linkages among sub districts are based on management scale; scale the position of the city and its territory; regionalization of the area; base development; forms of representation of the relationship of functional integration.

Keywords: spatial, relationship, sub-district, Location Quotient

1. Introduction and Reviews

Spatial development is a strength-oriented development effort through the development of initiative and participation in creative and productive society. It improves the quality of human resources, utilization of economic resources, social, technological and institutional, to support the creation of jobs for the residents and the local community. According to Therkildsen et al. (2009), spatial development coordinates the development of growth centers which is planned to reach an equilibrium pattern of activities and services for the expansion of the area. According to Merling et al. (2009), spatial development emphasizes the development of each region which focuses on improvement of the interaction between districts to improve the well-being together with reducing the level of spatial disparities between sub districts (region).

Inter-region developments are part of economic development policy framework that classifies territorial environment into sub-regional areas (districts) which then are grouped into physical and activity patterns Dall'Erba et al. (2008). This study aimed to describe dynamics of spatial development and comparative spatial portrait in Ngawi district, which is formulated as follows: (a) to identify the exact location and concentration of spatial development at the district level, and (b) to build a model of spatial development in relation to structural changes between sub-districts in Ngawi, East Java, Indonesia.

2. Methodology

Ngawi district is one of many districts in East Java, which covers area of 1295.98 km^2. It is divided into 19 sub-districts. Topographic conditions of Ngawi vary with altitude 40-3031 meters above sea level. The northern parts of Ngawi are less fertile which produces limestone. The middle parts are fertile agricultural land and the

southern parts are fertile hilly area on the slopes of Mount Lawu which also include district Kendal, Jogorogo, Ngrambe and Sine.

The research location involves 18 sub-districts in Ngawi. The main consideration is that Ngawi is away distance from the state capital of Surabaya which known has rapid economic growth in East Java. Secondary time series data between year of 2005 and 2012 were collected to see changes within the variable which contains production commodity, GDP, population, transportation, housing, market and land use. Other secondary data in form of economic activities includes food agricultural land, cash crops agricultural area, cooperatives, industries, shops.

Data collecting procedures analysis are conducted as follows:

- Descriptive statistics. It provides information only about the available data. Results of the analysis will be presented in form of tables, graphs and numerical summaries.

- Location Quotient (LQ) analysis (Setiono, 2011). It is a technique for calculating the export capacity in order to obtain an idea of the establishment of excel sector as a major sector of economic activities and determine the degree of independence of an economic sector in a region. Result of the descriptive statistics, will be used for the analysis. For calculation Location Quotient, we use the following expression:

$$LQ_{ji} = \frac{VA_{ji} / VA\,Ii}{PDRB_{BJ} / PDRB_{BI}},$$

where:

LQ$_{ji}$ = Location Quotient sector i in region j

VA$_{ji}$ = Nilai tambah sektor i in region j

VA$_{Ii}$ = Nilai tambah sektor i in district level I

PDRB$_J$ = GDP in region J

PDRB$_I$ = GDP in region I

- In-depth interviews (Sugiono, 2009). The aims for this approach are to collect information about the lives, attitudes, behavior, views and stances on spatial development in Ngawi.

- Focus Group Discussion (Bungin, 2007). It is a technique to draw conclusions on difficult inter-subjective meaning which is hard to be interpreted by the researchers.

3. Empirical Results

3.1 Choosing Location and Concentration of Spatial Development

Selecting location of spatial development activities should be considered appropriately so that these activities can take place productively and efficiently (Brakman et al., 2001). Role of the selecting location becomes larger on land use planning, when the geographical dimension and fundamentals economics are included as an additional variable in development theory frame (Mc Cann, 2007). Most of plantation commodities at Lawu Mountain become excel commodities in sub-districs Sine, Ngrambe, and Jogoroko. Meanwhile, Kendal produces tobacco plantation, cocoa, and tea leaves. It is known that, mountainside of Lawu produce a bulk of food crops such as rice paddy, corn, soybeans, green beans, and sweet potatoes.

Site selection decisions cause rise and growth of the region (Tarigan, 2004; Kuncoro, 2002). Areas which has potential for rapid growth is expected to have a positive impact on the surrounding areas so that to develop a livestock commodity which has not been a base commodity, need to select location accurately especially in northern part of Ngawi district such as sub-district Pitu, Ngawi, Kasreman, and Padas It can be done by utilizing waste food crops. Areas which has better infrastructure (sub district Ngawi, Paron and Mantingan) are suitable to develop become industrial and services sectors.

Table 1 is the results of LQ value calculation for excellent products of each sub district in Ngawi. Based on the LQ analysis, the description of three leading commodities of each sub-district in Ngawi is displayed in Table 2. Development planning has various aspects that are well planned and coordinated (Widodo, 2006). Focus of spatial planning is the achievement of social subsystems organized territorially. Regions at Lawu mountainside have their own characteristics. Mountainside region produces crops. Meanwhile, even though the central regions of Ngawi district are less fertile but has lines crossing overland transport. Northern are also less fertile. Those characteristics lead them to systematically determine concentration of spatial development, find patterns location

industry (sub-district Ngawi, Paron and Mantingan) to achieve a spatial balance between areas as a basic framework for the analysis of regional development planning. Spatial equilibrium can occur when there are maximum profits, production-consumption balance, and free out (Yunus, 2010; Wibowo & Soetriono, 2008).

Maximum advantage in establishing the location can become a growth pole. Place of concentration and growth poles, in general, are urban areas which have industry-related activities with front and back linkages to industries (Tarigan, 2004). That makes it superior so that it will have the ability to mobilize and spur economic activity and growth of a region. The industry groups will attempt to choose a location to consider the convenience of a wide range of infrastructure and facilities, although it still keep considering the relationship with supporting regions as the suppliers of inputs to the form of agglomeration economies (Bosker, 2007). Since growth does not appear in various areas at the same time and different intensities so that it is necessary to model the spatial development relationship between sub-districts to avoid the growing inequality between them.

Table 1. LQ values of excellence product in each sub-districts in Ngawi

Commodity	Sine	Ngram-be	Jogo-roko	Kendal	Ge-neng	Kwadu-ngan	Pang-kur	Karang-jati	Bringin	Padas	Ngawi	Paron	Kedung-galar	Pitu	Wido-daren	Manti-ngan
Rice paddy	18.12	62.00	50.41	20.29	118.28	33.22	89.61	58.34	25.85	91.61	28.06	162.62	117.86	23.31	116.51	-
Corn	8.14	83.61	43.00	70.81	2.83	0.09	19.11	8.54	45.87	19.67	12.38	138.41	12.83	137.80	52.58	-
Cassava	64.58	86.01	116.27	73.71	12.83	3.62	44.94	3.99	54.84	16.48	8.63	81.82	73.26	69.12	21.02	5665
Sweet potato	44.62	772.40	243.23	255.39	2.34	-	0.05	-	-	-	5.77	-	42.39	-	13.08	24992
Soybean	-	0.10	-	16.04	93.75	18.11	99.20	67.08	67.29	172.54	54.88	299.15	122.42	163.19	97.05	-
Ground nut	66.77	162.98	170	57.75	14.45	11.29	119.71	19.97	159.87	109.56	16.93	5.97	29.44	31.69	19.23	-
Green bean	-	-	-	11.22	0.01	273.62	210.62	15.18	24.80	491.68	-	23.36	-	31.93	48.02	-
Tea Leaves	1730	175.98	66805	599.71	0.08	188.76	152.60	8706	269.29	1.89	353.18	57.03	66681	342.71	1.17	-
Tobacco	14797	483.75	422064	8852	13.57	6291	887.83	287238	6374	11.90	16778	1502	738613	938.13	12.23	-
Coffee	-	-	-	-	-	2.30	6536	234221	4897	2.50	-	-	-	-	-	-
Cocoa	-	983.20	-	3055	-	-	-	-	-	-	-	6.73	262.55	-	-	-
Melinjo	1456	374.42	134662	301.00	47.90	2711.51	175.08	75250	1155	15.45	2168	237.51	117300	56221	29.12	134.02
Dairy cattle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69.95
Javanese cow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	221.79
Buffalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	337.61
Layer	24.58	82.59	23.23	80.52	50.77	17.04	115.80	39.86	95.23	80.43	37.11	92.66	22.83	56.98	50.50	-
Broilers	6.91	19.23	32.35	90.20	13.28	2.88	1360	-	5.71	2.15	1.87	25.67	4.36	28.09	444.56	158.56
Kampong chicken	23.00	48.04	-	-	71.35	24.60	169.42	-	111.70	71.35	72.16	72.06	101.47	-	117.48	6908
Duck	38.25	81.11	21.85	118.00	81.02	23.46	78.48	2066.00	78.78	29.00	22.07	59.70	29.52	78.24	107.11	-

Table 2. Excellence commodities of each sub-district in District Ngawi

No	Sub-district	Excellence commodities
1	Sine	tobacco, tea leaves, melinjo
2	Ngrambe	cocoa, sweet potato, tobacco
3	Jogorogo	tobacco, melinjo, tea leaves
4	Kendal	tobacco, cocoa, tea leaves
5	Geneng	rice paddy, soybean, duck
6	Gerih	sweet potato, chicken, cocoa
7	Kwadungan	tobacco, melinjo, tea leaves
8	Pangkur	coffee, broilers, tobacco
9	Karangjati	coffee, tobacco, melinjo
10	Bringin	tobacco, coffee, melinjo
11	Padas	green bean, soybean, ground nut
12	Kasreman	green bean, sweet potato, chicken
13	Ngawi	tobacco, melinjo, tea leaves
14	Paron	tobacco, soybean, melinjo
15	Kedung Galar	tobacco, melinjo, tea leaves
16	Pitu	melinjo, tobacco, tea leves
17	Widodaren	broilers, rice paddy, chicken
18	Mantingan	sweet potato, chicken, cassava

3.2 Model of Spatial Development Relationship between Sub-Districts

It is required to have a policy direction to speed up development and growth in strategic areas in order to quickly grow so as to develop the relationship between sub-districts in a system in an area of synergistic economic development. This can be done through the development of excellence products, as well as to force the establishment of coordination, synchronization, integration and cooperation between sectors, between government, business, and society in supporting of business and investment opportunities in the region. Activities of home industries which are spread evenly in Ngawi district have great potential, such as teak wood craft in sub-district Mantingan, batik in sub district Widodaren, craft woven bags in sub district Karangjati, food industries Ledre Bananas and tempe chips in sub district Ngawi (BPS, 2012).

According to Wahab (2012), modeling is an attempt to simplify a complex reality. A model is the simplest representative of chosen aspects from a problem which is developed for a particular purpose. In connection with the policy, the model is made especially to explain the process, characteristics, mechanisms, and to determine policy strategies. It is made to achieve the policy objectives, services to be provided and will be the target of such services. Policy models can be classified into several categories based on the implementation, scope, sustainability, and issues (Tjiptoherijono, 1993).

According to Healey (2004), spatial development model is developed (including in Ngawi) to address the needs of development by utilizing its asset base, to establish a form of natural resources space requirements and optimal land. It is to realize sustainable development. Based on results of Focus Group Discussion, it is established policies and strategic criteria, namely: (1) scale of plantation management adapted to the geographical concentration in the sub districts Sine, Jogorogo, Kendal and Ngrambe, (2) scale of position of the city and the region for the development of industry and services sector in sub districts Ngawi, Paron, and Mantingan, (3) regionalization of hinterland in sub districts Pitu and Padas, (4) the feasibility of materials and identity in the sub districts Geneng, Kedunggalar, and Widodaren, (5) the concept of development in the sub districts Gerih, Kwadungan, and Pangkur, and (6) forms of relationship representation of functional integration in the sub-districts Ngawi, Karangjati and Kedunggalar. Here are simple map to describe the potential of each sub district (Figure 1).

All of these criteria are further elaborated in the operational policy measures in spatial development perspective.

Based on the results of the Focus Group Discussion, sub district has a role in providing services to the community and the economy. The more complete service provided indicates that these sub districts have higher role levels. The ability of the sub districts in providing services are indicated by the availability of facilities owned by each sub district. The more varied and complete facilities in a sub district shows that the sub-district is able to provide a more complete service to the community compared to other sub districts. These conditions lead a sub district serves as a center of growth as well as an attraction for the surrounding sub districts. These facilities are grouped into two groups: the facilities associated with the infrastructure of economic facilities, and facilities related to social activities (education and health).
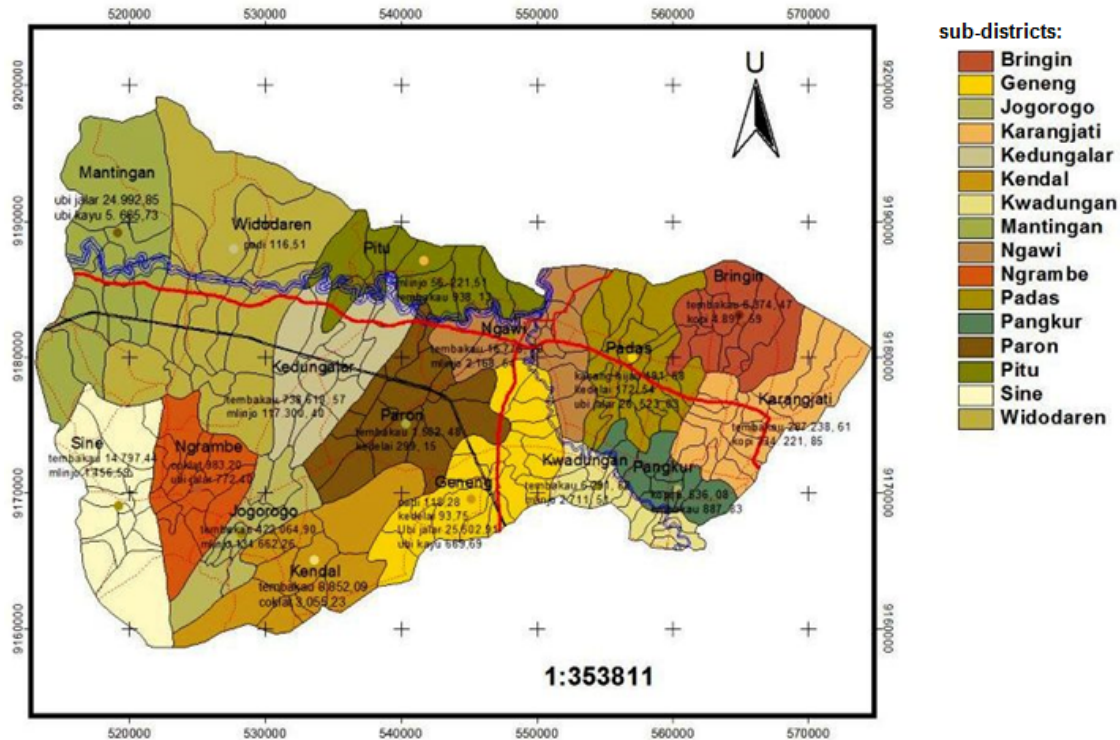

Figure 1. Excel commodities in District Ngawi based on LQ analysis

Ngawi's GDP structure is still dominated by the agricultural sector which cannot be separated from rural development. Household economy of farmers and rural economies tend to be more pluralistic (on-farm, off-farm and non-farm). This requires the development of agriculture-based rural industrialization in the region by utilizing existing areas, within sub district, between sub districts, by considering scale of regional economies (instead of scale of business-unit economic). The development of the agricultural sector in Ngawi is expected to produce competitive agro-based commodities. Low of production level which is combined with inconsistent of supply produces many agro-based companies which are operating under capacity and low competitiveness. That facts force to strengthen within and between sectorial especially with the support of the downstream sector.

Awareness of environmental developments both domestic and global level requires innovation and efficiency for sustainable development of agro-based sector. Initiation step which can be done to improve the competitiveness of which is to develop an excellence commodity. This is done by selecting a commodity from a wide range of commodities owned by the region towards economic efficiency. Operations of the initiation is done by standardizing the process until the final product, the toxic-free products or hazardous materials, integration of supply chain management, quality improvement of the quality and food safety by making a model of moderation when agricultural products have surplus or scarcity.

In Ngawi, it is required an agribusiness system that emphasizes the linkages and vertical integration between multiple business subsystems in a commodity system. Agribusiness system approaches will increase the potential of agriculture sector because it will provide greater added value for agricultural products and to boost business efficiency. Vertical integration in the agribusiness sector led to the acquisition of value-added agriculture will be linked to the value added which are generated by the industrial sector, trade, and services that can be emphasized

in short-term development plan (D'Amours, et.al, 1999)

Agribusiness development of progress in Ngawi is still driven by the abundance of factors of production, namely natural resources and uneducated manpower. On production technology, the increase of production aggregate value is sourced from the increase in the amount of use of natural resources and uneducated manpower. Meanwhile, in terms of the structure of the final production, in generally, still produce a product that is dominated by primary commodities (agricultural-based economy). Considering the majority of agricultural commodities in Ngawi are sold into the market in the form of primary products, then the agro-based cluster is expected to awaken a strong agro-processing industry which is supported by other agribusiness subsystems so that the value-added of a product can be improved. Moreover, commodity competitiveness can be strengthened so that the transformation of the economy of the Ngawi district from agricultural-based economy into agroindustry-based economy can be implemented gradually.

4. Conclusion

Growth centers in Ngawi district can be divided into 2 functionally and geographically. Functionally, the center is the located where the concentration of the growth of business groups or branches of industry, because of the nature of the relationship, has elements of dynamics so as to stimulate economic life both inside and outside (hinterland) (sub districts Ngawi, Paron, and Mantingan). Geographically, the center of growth is a location which has many facilities and services so that it becomes the center of attraction, which causes various businesses keen to be located there.

From the analysis, we can conclude that a model of spatial development is needed to accelerate the development and growth of the region which result in equality of opportunity between districts in a system of synergistic economic. This can be done through excellence products development, promote the establishment of coordination, synchronization, integration and cooperation between sectors, between government, business, and society in support of business and investment opportunities in the region. The built model of spatial development should establish policies and strategic criteria, namely (1) the scale of management, (2) scale position of the city and region (3) regionalization region (4) the concept of development (5) forms of representation of the relationship of functional integration.

References

Bosker, M. (2007). Growth, Agglomeration and Convergence: A Space-time Analysis for European Regions. *Spatial Economic Analysis*, *2*(1), 91-110. http://dx.doi.org/10.1080/17421770701255237

Brakman, S., Garretsen, H., & Charles, V. M. (2001). *An Introduction to Geographical Economics*. New York: Cambridge University Press.

Bungin, B. (2007). *Data Penelitian Kualitatif*. Rajawali Press, Jakarta.

D'Amours, S., Montreuil, B., Lefrancois, P., & Soumis, F. (1999). Networked Manufacturing: The Impact of Information Sharing. *International Journal of Production Economics*, *58*, 63-79. http://dx.doi.org/10.1016/S0925-5273(98)00088-7

Dall'Erba, S., Percoco, M., & Piras, G. (2008). The European Regional Growth Process Revisited. *Spatial Economic Analysis*, *3*(1), 7-25. http://dx.doi.org/10.1080/17421770701733399

Healey, P. (2004). The Treatment of Space and Place in the New Strategic Spatial Planning in Europe. *International Journal of Urban and Regional Research*, *28*, 45-67. http://dx.doi.org/10.1111/j.0309-1317.2004.00502.x

Indonesian Central Statistics Beureau. (2012). *Ngawi in Numbers*. District Ngawi: Indonesian Central Statistics Beureau.

Kuncoro, M. (2002). *Analisis Spasial dan Regional (Studi Aglomerasi dan Kluster Industri Indonesia*. Yogyakarta: UPP AMPYKPN.

Therkildsen, H. P., Hansen, C. J., & Lorentzen, A. (2009). The Experience Economy and the Transformation of Urban Governance and Planning. *European Planning Studies*, *17*(6), 925-941. http://dx.doi.org/10.1080/09654310902794059

Marling, G., Jensen, O. B., & Kiib, H. (2009). Design and brand in the experience city: Hybrid cultural projects, *European Planning Studies*, *17*(6), 863-885. http://dx.doi.org/10.1080/09654310902794018

McCann, P. (2007). Sketching Out a Model of Innovation, Face-to-face Interaction and Economic Geography. *Spatial Economic Analysis*, *2*(2), 117-134.

Setiono, D. N. S. (2011). *Ekonomi Pengembangan Wilayah*. Jakarta: LPFEUI.

Sugiono. (2009). *Metode Penelitian Pendekatan Kuantitatif, Kualitatif dan R & D.* Bandung: Alfa Beta.

Tarigan, R. (2004). *Perencanaan Pembangunan Wilayah*. Bumi Aksara, Jakarta.

Tjiptoherijono, T., & Said, Z. A. (1993). *Reformasi Administrasi dan Pembangunan Nasional*. LPFEUI, Jakarta.

Wahab, S. A. (2012). *Analisis Kebijakan: Dari formulasi ke penyususnan model model implementasi kebijakan public*. Jakarta: Bumi Aksara.

Wibowo, R., & Soetriono. (2008). *Konsep, Teori dan Landasan Analisis Wilayah*. Malang: Bayumedi Publishing.

Widodo, T. (2006). *Perencanaan Pembangunan*. Yogyakarta: STIM YKPN.

Yunus, H. S. (2010). *Dinamika Wilayah Peri-Urban, Determinasi Masa Depan Kota*. Jakarta: Pustaka Pelajar.

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