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The Structural Model of Infrastructure and Social Development Effects on Economic and Environmental Growth in the Independent Integrated City (IIC) of Hinterland Area of Telang, South Sumatra - Indonesia

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ABSTRACT

The Integrated City (IIC) of Telang is a part of transmigrate area in South Sumatera which have been opened and developed in last 10 years. The evaluation of progress in developing of IIC become the main purpose of this study. The output of this study is to formulate the further strategy to design the IIC of Telang area as the better city based on a sustainable development aspect. The research used two data which were obtained using the questionnaires as the primary data and some data obtained from related agencies. A Structural Equation Modelling Analysis (SEM) was then used to formulate the interaction model between the infrastructure interaction, social growth on the economic sector and environmental growth in the IIC of Telang and the Hinterland area. The result showed that there was a correlation between each sector which proved that the Infrastructure and Social Development Model affected to the Economic Growth which further provided an impact to the environment. The further investigation in the IIC of Telang and the Hinterland area showed that Banking Service become the main infrastructure which had the most powerful impact to the social aspects which correlated to the economic growth in the IIC of Telang and the Hinterland area. The new strategy pathway of sustainable development in the studied area was then directed as an urban function such as a government area and a center for community services which made the area was not only as a growth center in the agricultural industry which have been developed in last 10 years.

Keywords: Hinterland Area, Independent Integrated City, Regional Development, Structural Equation Modelling

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INTRODUCTION

Economic growth is the most important part of the guarantee of people's welfare through determinants such as natural and financial resources, as well as technology and infrastructure (1–3). Meanwhile, the infrastructure is the most important component of economic activity because public infrastructure can bear costs in most manufacturing industries and increase resource productivity (4,5). Economic growth, improving quality, and national security can be supported by efficient infrastructure (6). Infrastructure is the most important part of regional development because it can directly or indirectly affect socio-economic activities and other regional capacities, as well as production factors (7). This is because infrastructure can be a dense infrastructure and not for the public interest. Physical infrastructure or infrastructure capital is a public activity that is actively used (8).

Infrastructure, public or physical infrastructure services (such as transportation, telecommunications, water supply, sanitation, energy, and environmentally friendly waste disposal) are fundamental to all types of household activities and economic production because of the many benefits from users(9). Infrastructure services and physical infrastructure are factors that can affect the climate of increasing the area and increase its attractiveness. Furthermore, we examine the extent to which infrastructure affects global competitiveness and resources. Infrastructure, in general, is defined as a set of facilities used to provide goods and services to the public (10).

Infrastructure development is one visible sign of technological progress. Research generally suggests that one of the most important factors in regional development is transportation infrastructure, which can allow the creation of new businesses that can support contacts with other regions. Not only that, there are many other factors that can affect economic growth, either directly or indirectly, related to infrastructure development (11). There is a precise relationship between infrastructure and development, where infrastructure investment in infrastructure affects economic development. Infrastructure investment itself is an important factor to be able to promote fast and sustainable economic growth(12). There is a positive relationship from other research between the level of economic development (the measuring indicator is per capita income and other indicators), and access to basic facilities such as safe drinking water, electricity, toilets, and the quality of housing(13).

Regional economic growth, increased access to health services, other basic services and reliable education through infrastructure development. Researchers found a relationship between regional economic development and infrastructure investment (14). A specific framework that helps economic space be formed from transportation infrastructure that provides together with other infrastructure industries to influence the social and economic objectives of a region with the basic human and

economic environment in a region (15). Infrastructure development has an impact on technical, economic, financial, environmental, land use and road safety aspects. Areas with adequate basic facilities such as education, transportation, health, air, communication, sanitation, energy, quality housing, and others will attract more investment, marginalized who start industrial activities, and especially small entrepreneurs (16). Skilled production lobby facilities, adequate facilities, low electricity costs always have a negative impact on costs but have a positive effect on profitability. The development of agriculture and industry is a determining factor for the prosperity of a country. Agricultural production not only requires machinery and equipment, but also requires electricity, credit, transportation facilities such as fireworks, roads, shipping, skilled personnel, communication and marketing facilities (17).

The development of the Tanjung Api-Api Port (TAA) is part of the economic corridor of Banyuasin Regency, South Sumatra. This development supports economic activities based on plantations, coconut, palm oil, rubber, coal, petroleum and natural gas. The TAA area is the center of the downstream industrial area and the gateway to international trade in South Sumatra (18). Development of seaports, toll roads, double railroad, and development of Special Economic Zones are some of the national and provincial programs that have been launched. In addition, Banyuasin Regency is also a transmigration area in South Sumatra Province which has the benefit of reducing poverty by providing land to increase resources and employment for the poor (19).

IIC of Telang aims to create an independent transmigration area with an urban nuance designed holistically and comprehensively, as an acceleration of rural economic development. The development of IIC Telang is one of the essential programs of the Ministry of Manpower and Transmigration (Kemenakertrans) of Republic of Indonesia which aims to accelerate rural economic growth in the agricultural and plantation sectors, so that local communities and transmigrant communities can improve their welfare (20). The development of the Hinterland area carried out by the government aims to improve economic linkages between IIC as the center of economic activity and Hinterland village as the center of its natural resources so that the welfare of the community and its economy increases (21). Along with the ongoing development in Banyuasin Regency, the researchers focused their research on development in the Hinterland area by increasing synergies in order to improve development programs based on suitability and capability. The suitability referred to is the typology and potential of a village that is commensurate with its territory so that it will have an impact on better public services.

RESEARCH METHODOLOGY

Based on the Banyuasin Regency Regional Regulation Number 22 of 2008 concerning the Establishment of IIC Areas and the Decree of the Regent Number 341 of 2008 dated 17 July 2008 concerning the Determination of the Location of the Center of IIC Telang, this research was conducted for eight months from August 2019 to March 2020 at the IIC Telang in Mulya Sari Village which was in accordance with the regulatory procedure. IIC of Telang covers three sub-districts, namely Tanjung Lago, Muara Telang, and Sumber Marga Telang districts. However, this research only focuses on Mulya Sari Village as the center for the IIC and six other selected villages that represented the Hinterland area of IIC telang.

Primary data used were the data which collected from direct observations in the studied area, field surveys and in-depth discussions with parties related to this research such as local farmers, stakeholders, communities and governments around the studied area. In order to support the primary data, the secondary data was obtained from related agencies, such as the village office and sub-district of each research location, BAPPEDA and the Banyuasin District Research and Development Agency, the Banyuasin Central Statistics Agency (BPS), the working and expert groups and other related literatures. The data technique was combined from several methods which have been summarized into a unity, including the following:

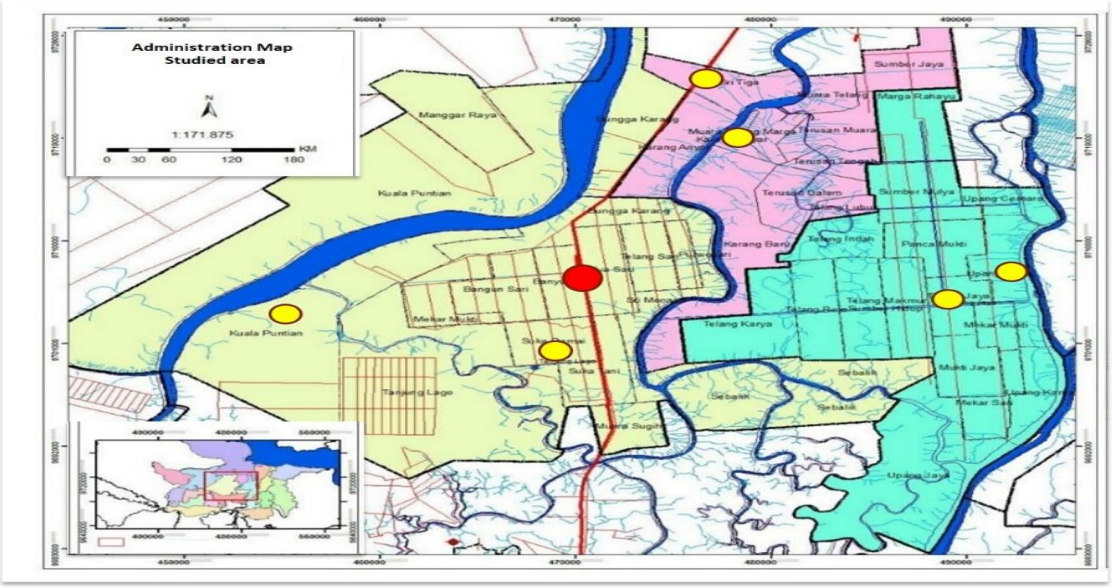


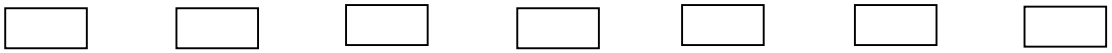
Fig. 1. The research location in Tanjung Lago, Banyuasin

Structured Interview

Interviews were conducted using a questionnaire method to obtain information as the data related to the main variables (Y1), environment (Y2), infrastructure development (X1) and social conditions (X2) based on community perceptions. The questionnaire method was carried out based on self-reporting or minimal knowledge and personal beliefs of respondents about the IIC of Telang. This method is done by giving a questionnaire to each respondent through the survey team which also functions as a companion in filling out the questionnaire. The questions in the questionnaire consisted of two kinds of questions, namely:

1) Open questions, consisting of several questions that are used to find out the identity of the respondent, such as: name, address, age, gender, education, occupation, income, and land area owned. Answers to open-ended questions will be very helpful and useful when the analysis is being carried out.

2) Closed questions are a series of questions used to obtain data related to the research variables of the IIC of Telang such as Economic Growth (Y1), the Environment of IIC Telang (Y2), Hinterland Economic Growth (y3), Hinterland Environment (Y4), Development Infrastructure (X1) and Social Conditions. (X2). This closed question is made with reference to the Likert scale, using a scale of 1-7 as follows:



SSTS STS TS N KS S SS

Where:
SSTS : Very strongly disagree
STS : Strongly disagree
TS : Disagree
N : Neutral
KS : Less agree
S : Agree
SS : Very agree

In-depth Discussion

This discussion was conducted to see qualitative data about conditions and problems that had arisen in the village community in the research location that could not be known through new interviews. This method is expected to collect various specific data and information so that it can be more detailed.

Observation

Observation is aimed at seeing firsthand the general condition, facilities and infrastructure in the potential location for area arrangement in agricultural development. The data processing method used in formulating the IIC of Telang hinterland development model based on infrastructure, social, economic and environmental factors was carried out using SEM (*Structural Equation Modeling*) analysis. The SEM method is a statistical modeling technique that is highly cross-sectional, linear and general in nature. A method that combines two separate statistical methods involving factor analysis and a simultaneous equation model developed in econometrics. The SEM method is used to determine several variables, the SEM modeling process requires sample size, data normality, does not have outliers and does not have multicollinearity and singularity problems.

RESULT AND DISCUSSION

The measurement model for the third confirmatory factor analysis included the variables of infrastructure development, social conditions of the community, economic growth of the IIC center, the environment of IIC, Hinterland economic growth and Hinterland environment. The third confirmatory factor analysis in each measurement model was presented as follows:

Result

The model for measuring the effect of infrastructure development and social conditions on economic growth and the environment at the center of IIC Hinterland consisted of 28 (twenty-eight) indicators. The results of the test on measurement model of the influence of infrastructure development and social conditions on the living environment of the IIC and Hinterland centers consisting of 28 (twenty-eight) observed variable (indicators) were presented in Figure 2.

Based on the results of the examination of the measurement model that had been carried out and the findings that the measurement model of the influence of infrastructure development and social conditions of the community on the central environment of the IIC city and Hinterland area, it was indicated that it was not fit so it is necessary to improve the measurement model, to obtain a better measurement model. Improvements could be made by reducing the factors that were suspected to be the cause of the measurement model not being fit.

Based on the picture of the fit model above, there were 11 variables excluded from the calculation, namely X11 (TAA Port Development), X12 (KEK Development), X13 (KIG Development), X21 (Increased land conversion), X26 (Unemployment), X27 (Institutional), Y12 (Production Increase), Y13 (Service access improvement), Y23 (KTM Air Pollution), Y24 (KTM Land Fragmentation), and Y43 (Hinterland Air Pollution).

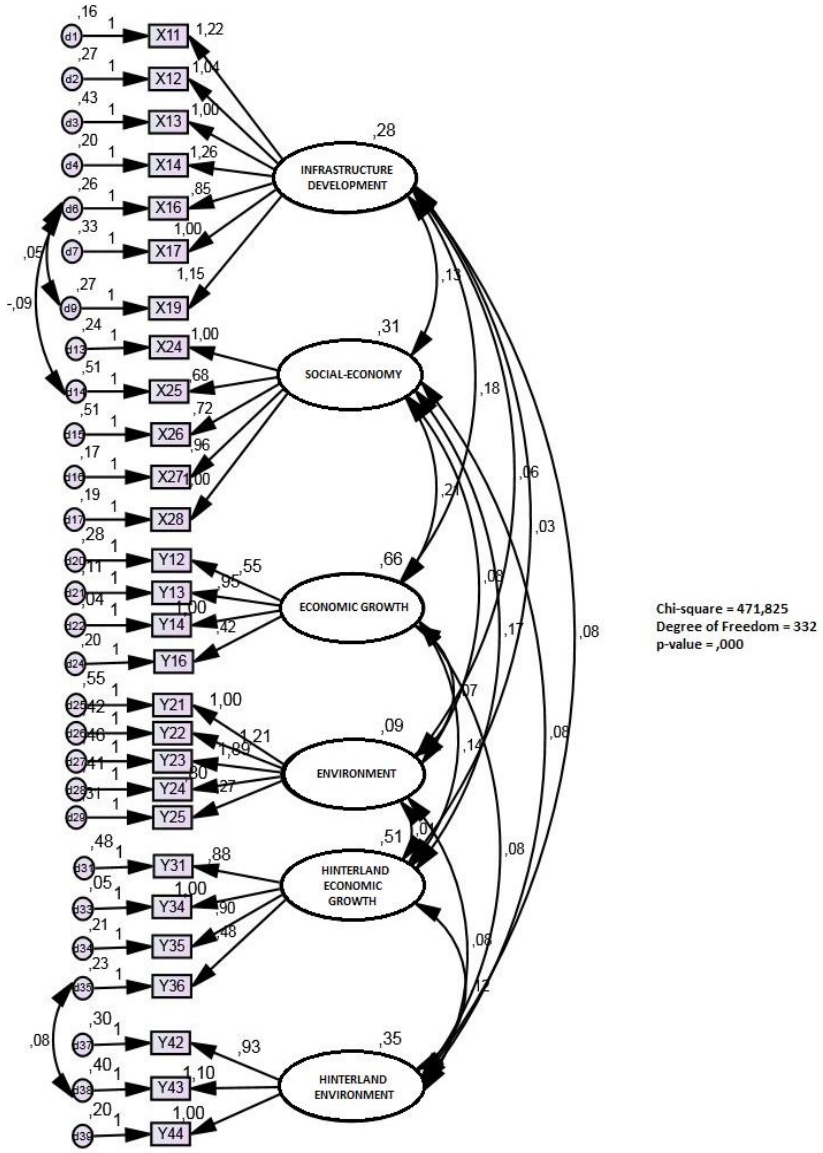


Fig. 2. Measurement model of the infrastructure and social development effects on economic and environmental growth in the IIC of Telang and the hinterland area of IIC Telang

Where:
X11: Port development TAA
X12: KEK development
X13: KIG development
X14: Intermodal development
X16: Market infrastructure development
X17: Irrigation infrastructure development
X19: Post harvest infrastructure. Development
X24: Human capability
X25: Working together tradition
X26: Unemployment
X27: Institutional condition
X28: Association
Y12: Production increase
Y13: Access services improvement
Y14: Economic diversification
Y16: Banking access improvement
Y21: Land conservation improvement
Y22: River pollution in the IIC city
Y23: Air pollution in the IIC city
Y24: Land fragmentation in the IIC city
Y25: Green open area in the IIC city
Y31: Hinterland income improvement
Y34: Hinterland farm diversification
Y35: Hinterland connectivity improve.
Y36: Banking access improvement
Y42: Hinterland river pollution
Y43: Hinterland air pollution
Y44: Hinterland land fragmentation

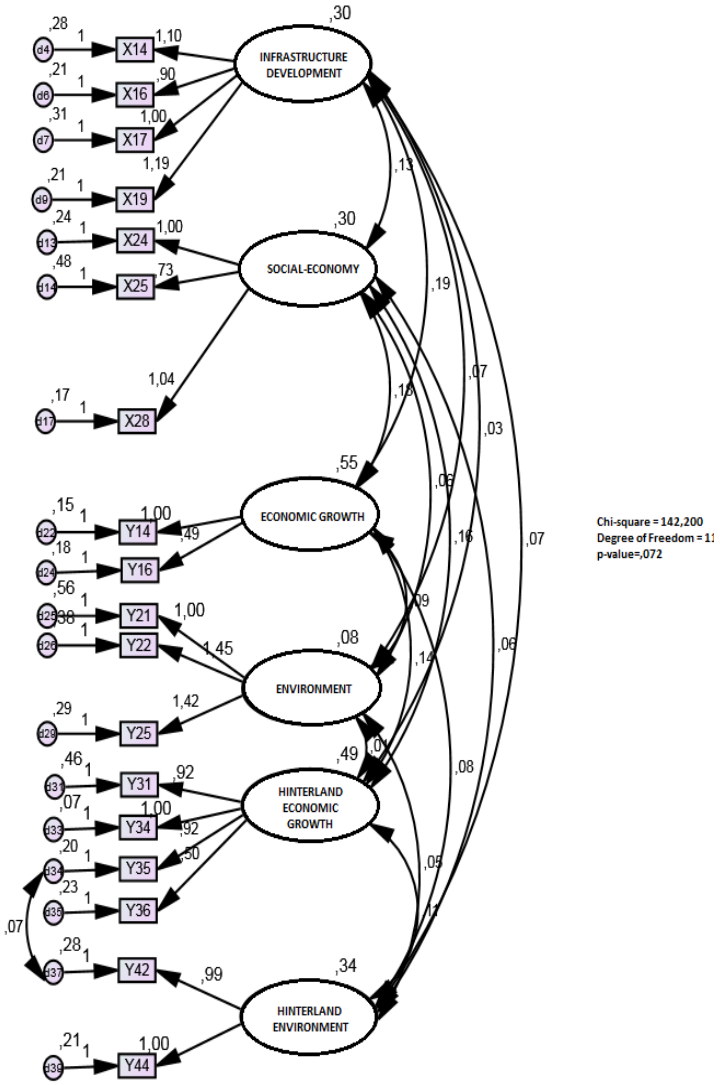


Fig. 3. Structural model of the infrastructure and social development effects on economic and environmental growth in the Telang KTM center and its Hinterland area

Where:
X14: Electricity Development
X16: Market infrastructure development
X17: Irrigation infrastructure development
X19: Infrastructure development, Procurement of agricultural products
X24: Human resource capabilities
X25: Tradition of Gotong Royong
X28: Association
Y14: Business Diversification
Y16: increased access to banking
Y21: Increased Land Conversion
Y22: KTM river pollution
Y25: KTM Green Open Space
Y31: Hinterland Income Increase
Y34: Hinterland Business Diversification
Y35: Improved Hinterland Connectivity
Y36: Increasing Access to Banking
Y42: Pollution of the Hinterland River
Y44: Fragmentation of the Hinterland

Table 1. Model Fit Index in the CFA Test

Test	Terms	Score	Information
Chi Square	Small expected	142,200	Fit*
P-Value	P≥ 0.005	0.072	Fit*
Goodness of Fit Index (GFI)	≥ 0.902	0.882	Marginal*

Adjusted Goodness of Fit Index (AGFI)	≥ 0.901	0.831	Marginal*
Root Mean Square Error of Approximation (RMSEA)	≤ 0.103	0.042	Fit*
Comparative fit index (CFI)	≥ 0,901	0,963	Fit*
Tucker-Lewis Index (TLI)	≥ 0,904	0,952	Fit*
Normed Fit Index (NFI)	≥ 0,903	0,816	Fit*
Construct Reliability (CR)	≥ 0,602	0,948	Fit*
Average Value Explained (AVE)	≥ 0,40	0,515	Fit*

Note: * Meets the criteria of the measurement model
** Still considered to meet the criteria of the measurement model

The construct reliability based on the CR value of 0.948 was obtained greater than 0.7 so that based on this CR value the measurement model had good reliability. The calculated AVE value of 0.515 was greater than 0.5 so that the AVE value of the measurement model was declared fit. Based on the fit model criteria, the p-value of the model was 0.072 which was much greater than α = 0.05, CFI = 0.963 ≥ 0.9, RMSEA = 0.042 which was smaller than 0.1, GFI = 0.882 ≤ 0.9, AGFI = 0.831 ≤ 0.9, TLI = 0.952 ≥ 0.9 and NFI = 0.816 ≤ 0.9, which mean that almost all indicators of model fit had been met the criteria of the measurement model.

After the model was analyzed through confirmatory factor analysis (CFA), each indicator was identified and proven to be used to define latent constructs, so that a full model analysis could be provided. Based on the CFA test of the full measurement model (full model), a fit measurement model was obtained, and this model was used for further analysis.

The test results on the structural model showed that the influence model of Infrastructure and Social Development on Economic Growth of the IIC of Telang and the Hinterland area and its impact on the Environment in the IIC and the Hinterland Region was proven to be fit to the obtained model which was indicated by a probability value of 0.080 (greater than 0.05). The result showed that the sample covariance matrix was the same as the population covariance of the Structural model. This finding showed that the model of the Influence of Infrastructure and Social Development on Economic Growth of the IIC of Telang and the Hinterland area and its impact on the Environment in the IIC of Telang and the Hinterland area was a good and acceptable model.

The results of testing the interaction model of the influence of social and infrastructure development on the Economic Growth of the IIC of Telang and the Hinterland area and its impact on the environment in the IIC of Telang and the Hinterland area consisted of 18 (eighteen) observed variables (indicators) and are presented in the figure below.

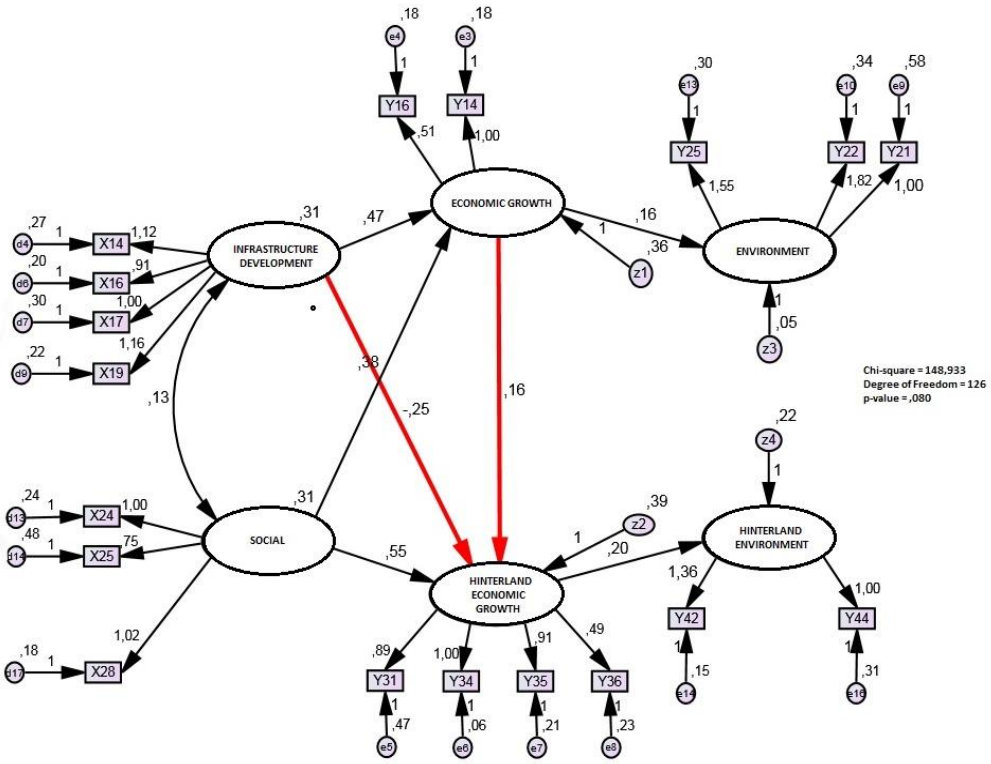


Fig. 4. The Influence Model of Infrastructure and Social Development on Economic Growth of the IIC of Telang and the Hinterland area and its impact on the Environment

Where:
X14: Electricity Infrastructure
Y31: Hinterland Income Increase

X16: Market Infrastructure
X17: Irrigation Infrastructure
X19: Banking Infrastructure
X24: Human resource capabilities
X25: Tradition of Gotong Royong
X28: Association
Y14: PKTM Connectivity
Y16: PKTM Banking Services
Y34: Hinterland Connectivity
Y35: Hinterland's New Business Opportunity
Y36: Hinterland Banking Services
Y21: PKTM Agricultural Land Conversion
Y22: Pollution of the PKTM River
Y25: Reduced green open space
Y42: Pollution of the Hinterland River
Y44: Fragmentation of Hinterland Farms

Table 2. Examination Results of the Structural Model Goodness of Fit Criteria

Type Fit Size	Goodness of Fit Measure	Acceptance Limits	The calculation results	Conclusion
Absolute Size	*Chi-square*	Small / low	149,191	Fit
	p-value	>0,05	0,078	Fit
	GFI	>0,90	0,881	Marginal
	AGFI	>0,90	0,838	Marginal
	RMSEA	<0,10	0,041	Fit
Incremental Size	*CFI*	>0,90	0,963	Fit
	TLI	>0,90	0,955	Fit
	NFI	>0,90	0,909	Fit

Source: Primary data processed, 2018

The results of calculations through confirmatory factor analysis and full model analysis with the Structural Equation Model (SEM) showed that the model in this study was acceptable, because the measurement results of the goodness of fit index criteria, including the chi-square of 149.191; probability of 0.078; RMSEA of 0.041; CFI of 0.963; TLI of 0.955 and NFI of 0.909 was proved meeting the requirement of acceptablew which make the hypothesis testing can be done.

Discussion

Based on government regulations the direction for the development of the IIC of Telang City Center has a role as an urban function, namely as a government area and a community service center such as education, health, government, banking, work and skills training centers and centers as well as a trade center. Meanwhile, the development direction for the hinterland area acts as a growth center in the agricultural industry. The hinterland relationship with the center IIC of Telang in accordance with the direction and development plan was initially a reciprocal relationship, where the hinterland area which is the back area serves as a supplier of production factors which will then be forwarded to the city center of IIC as an agricultural industrial area. Then the output produced from the IIC of Telang center is also accepted by the community in the hinterland area. However, in fact the reciprocal relationship in the field is not in accordance with the initial plan, where the hinterland area sells its production factors or agricultural products to other regions such as Palembang, Bangka Belitung, Belitang, Jambi and other areas without going through the center IIC of Telang. This condition indicates that there is an area leakage between the hinterland area and the center IIC of Telang.

Infrastructure was the driving force of economic growth. Infrastructure development such as transportation facilities made it possible and easier for people, goods, and services to be transported from one place to another throughout the world. Infrastructure had a very important role both in the production process and in supporting the distribution of economic commodities (22). Public infrastructure development had the effects that promoted the economic growth through various channels such as private input productivity, complementary effects on private investment, and production of health and education services (23,24). Investment in infrastructure leads to economic growth both directly and indirectly (25).

On the other hand, government policies related to the development of the ICC of Telang area through infrastructure at the ICC of Telang Center such as markets, banking services have led to a shift in the function of agricultural land into a business activity center (processing industry / offices) resulting in land conversion and reduced green open space. Urban development also leads to high land consumption.

The investigation on the studied area found that the mayor infrastructure effect which affect the economic growth and the environmental quality were the easy access to the electricity, market, irrigation, and banking service. However, several improvements were still needed such as the electricity infrastructure which was ofter experiencing the power outage in both studied areas. In addition, the current market conditions were still found less than optimal. The lack of sellers and buyers causes the market to be quiet compared to the market in Palembang City as the Capital City in South Sumatera. Residents were more interested in shopping for daily necessities in small shops and markets closer to the residential areas.

The social factors that had been identified as influencing economic and environmental growth were the ability of human resources, the tradition of cooperation and association. The tradition of cooperation at the IIC of Telang was strong. The involvement of the population in an association, for example, the farmer group was massive where almost all farmers were the members of the farmer group. In addition, there was an association of housewives who were members of entrepreneurial organizations which had a productive activity such as producing tempeh crackers, bananas, tofu, sweet potatoes, and others to support the family income. The product was then packaged with the specific IIC of Telang label and sold at the local market as the merchandise of the IIC of Telang. The high quality of product was potentially developed into the wider market in the near future.

The social aspect that also supports the growth of IIC of Telang is religion. The inhabitants of IIC Telang are transmigrants who come from various tribes such as Java, Bali, and Madura which causes the creation of cultural diversity and customs as a result of the diversity of the population in the IIC of Telang area. The majority of IIC of Telang residents embrace Islam (Muslim) with a percentage of 98.03 percent. The second largest religion after Islam which is spread in every district is Christianity (1.00 percent), Catholics 0.23 percent, Hindus 0.48 percent, Buddhism 0.25 percent and Konghucu 0.0002 percent. The diversity of religions in the IIC of Telang area creates a high tolerance attitude between communities. This attitude of tolerance encourages the IIC of Telang community to have a high spirit of mutual cooperation in various aspects of community life at IIC of Telang.

The aspect of economic growth in the IIC of Telang which was influenced by infrastructure development and social aspects was the increase in banking services and connectivity at ICC of Telang. Banking services available at the IIC of Telang were the national bank such as Bank BRI, Bank of South Sumatra-Bangka Belitung, and Mandiri. The availability of banking service opened the society to attract and developed their local business. The bank usually provided a program to support or invest the local business to develop their business. The savings transactions were found only conducted by a small part of the community unfortunately. It should be noted that this banking service was the only facility that was used by the people in the IIC of Telang and the hinterland area. However, the impact on the development of IIC and the hinterland area was found to generate the high conversion of agricultural land, initiating the river pollution and reducing the green open space. But the study found that the infrastructure and social development affected the economic growth in the Hinterland region, which included the increasing of people income, connectivity, creating new business opportunities and increasing access to repair the services.

CONCLUSION

The influence of infrastructure and social development is proven to increase the economic growth in the center of IIC Telang but not on economic growth in the hinterland area. The influence of infrastructure and social development that can encourage economic growth and maintain environmental quality of IIC Telang. The development of access in the electricity, markets, irrigation and banking institutions found to be the mayor aspect which make the progress in the developing of IIC and the hinterland area. Meanwhile, the social aspect is carried out by fostering the quality of human resources, the spirit of cooperation and association. The pathway of sustainable hinterland development was the IIC Telang area directed as an urban function as a government area and a center for community services such as education, health, government, banking, work and skills training centers and centers as well as a trade center. Meanwhile, the development direction for the hinterland area acts as a growth center in the agricultural industry.

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