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A. Study design/  
Zaplanowanie badań  
B. Data collection/  
Zebranie danych  
C. Statistical analysis/  
Analiza statystyczna  
D. Data interpretation/  
Interpretacja danych/  
E. Manuscript preparation/  
Przygotowanie tekstu  
F. Literature search/  
Opracowanie  
piśmiennictwa  
G. Funds collection/  
Pozyskanie funduszy

**THE IMPACT OF THE SURAMADU BRIDGE ON RURAL POVERTY  
IN KABUPATEN BANGKALAN, EAST JAVA, INDONESIA**

**WPLYW MOSTU SURAMADU NA UBÓSTWO NA OBSZARACH WIEJSKICH  
W KABUPATEN BANGKALAN, JAWA WSCHODNIA, INDONEZJA**

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Karyadinata, H.K., Pudjihardjo, M., Manzilati, A., Syafitri, W. (2019). The impact of the Suramadu Bridge on rural poverty in Kabupaten Bangkalan, East Java, Indonesia/ Wpływ mostu Suramadu na ubóstwo na obszarach wiejskich w Kabupaten Bangkalan, Jawa Wschodnia, Indonezja. *Economic and Regional Studies*, 12(4), 353-361. <https://doi.org/10.2478/ers-2019-0032>

ORIGINAL ARTICLE

JEL code: R11

Submitted:  
October 2019

Accepted:  
November 2019

Tables: 2  
Figures: 2  
References: 32

ORYGINALNY ARTYKUŁ  
NAUKOWY

Klasyfikacja JEL: R11

Zgłoszony:  
październik 2019

Zaakceptowany:  
listopad 2019

Tabele: 2  
Rysunki: 2  
Literatura: 32

**Summary**

**Subject and purpose of work:** This research was conducted to measure the influence of the Suramadu Bridge on the reduction of rural poverty and to determine the impact of production factors such as physical capital, natural capital, human capital and financial capital on poverty before and after the Suramadu Bridge began operating in Kabupaten Bangkalan.

**Materials and methods:** This study adapted the model used by Nashwari et al (2017) which was analysed applying Ordinary Least Square (OLS). The data from Village Potential 2007 and 2017 was used in the research.

**Results:** Many production factors in the village did not have a significant effect on the poverty reduction before the Suramadu Bridge began operating. After the Suramadu Bridge opened, it has had a significant negative impact on poverty. The number of farmers, rice fields, non-agricultural activities, superior products, skills facilities and credit facilities has a significant positive effect on the reduction of the poverty level.

**Conclusions:** The existence of the Suramadu Bridge has increased the influence of production factors in the villages on the poverty reduction in Kabupaten Bangkalan.

**Keywords:** poverty, infrastructure, rural development, East Java

**Streszczenie**

**Przedmiot i cel pracy:** Badania zostały przeprowadzone w celu określenia wpływu mostu Suramadu na zmniejszenie ubóstwa na obszarach wiejskich oraz wpływu czynników produkcyjnych takich jak kapitał rzeczowy, naturalny, ludzki i finansowy na poziom ubóstwa przed i po oddaniu do użytku mostu Suramadu w Kabupaten Bangkalan.

**Materiały i metody:** W badaniu wykorzystano model zastosowany przez Nashwari i in. (2017), a przy analizie posłużono się metodą zwykłych najmniejszych kwadratów (OLS). Wykorzystano również dane z badania Village Potential z lat 2007 i 2017.

**Wyniki:** Wiele z czynników produkcyjnych nie miało istotnego wpływu na zmniejszenie poziomu ubóstwa przed oddaniem mostu Suramadu do użytkowania. Wraz z otwarciem mostu nastąpił istotny wpływ w zakresie zmniejszenia ubóstwa. Istotny pozytywny wpływ na redukcję ubóstwa ma liczba rolników, pól ryżowych, działają pozarolniczych, lepsze jakościowo produkty, zakłady rzemieślnicze oraz instrumenty kredytowe.

**Wnioski:** Istnienie mostu Suramadu przyczyniło się do wzrostu wpływu czynników produkcyjnych w wioskach w zakresie ograniczania ubóstwa na terenie Kubapaten Bangkalan.

**Słowa kluczowe:** ubóstwo, infrastruktura, rozwój obszarów wiejskich, Jawa Wschodnia

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**Journal indexed in/ Czasopismo indeksowane w:** AGRO; AgEcon Search; Baidu Scholar; BazEkon; CEON; CNKI Scholar; CNPIEC - cnpLINKer; EBSCO; Google Scholar; Index Copernicus ICV 2018: 100,00; J-Gate; KESLI-NDSL; Naviga (Softweco); POL-index; Polish Ministry of Science and Higher Education, 2015-2018: 9 points; Primo Central (ExLibris); QOAM; ReadCube; Summon (Serials Solutions/ProQuest); TDNet; WanFang Data; WorldCat (OCLC). **Copyright:** © 2019 Pope John Paul II State School of Higher Education in Białą Podlaska, Henry Kusumas Karyadinata, Muhammad Pudjihardjo, Asfi Manzilati, Wildan Syafitri. All articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License (<http://creativecommons.org/licenses/by-nc-sa/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material, provided the original work is properly cited and states its license.

## Introduction

Poverty can be found in developing countries especially in rural areas, including Kabupaten Bangkalan, East Java and Indonesia. One of the reasons is limited mobility and accessibility. To overcome this problem, the Government built the Suramadu Bridge, which connects Kabupaten Bangkalan on Madura Island with Kota Surabaya on Java Island, so that mobility and accessibility in both areas could be improved. This study aims at measuring the impact of the Suramadu Bridge development on reducing rural poverty in Kabupaten

development, so that the existing resources (human capital, natural capital and financial capital) in rural areas are distributed to urban areas (Ke & Fesser, 2010).

The development paradigm is changing over the last few decades. The development which was the most prominent in rural areas at first by using the macro indicator has changed into specific and regional development. A trickle-down effect which was expected to stimulate rural development did not happen. Urban areas are growing and developing faster, while rural areas are unable to recover (Rustiadi et al., 2009).



**Figure 1.** East Java Province and Madura Island  
Source: Wikipedia, 2019.

Bangkalan, using Village Potential Data in 2007 and 2017 by Badan Pusat Statistik (The Central Agency of Statistics). The dependent variable is the number of the poor population, and the independent variables include physical capital, human capital, natural capital, and financial capital, which were analysed by using OLS. The Suramadu Bridge has had negative impact on poverty, which means that after the Suramadu Bridge opened, the poverty level in rural areas decreased. Before the Suramadu Bridge opened, only the natural capital had any impact on poverty, while after the Suramadu Bridge began to operate, all the independent variables had an impact on poverty reduction. The existence of the Suramadu Bridge can assist the Government on launching its poverty reduction policy in rural areas.

Poverty is found in rural areas especially in developing countries, including Indonesia (Heineman et al., 2011). In 2017, the number of poor people was around 26.98 million: 10.67 million (39.54%) in urban areas and 16.31 million (60.45%) in rural areas (BPS, 2018). The high number of people living under the poverty line in rural areas indicates that rural development is not optimal in utilising the existing resources (Hayami, 2001). This condition is exacerbated by the backwash effect of rural

Indonesia is the biggest archipelagic country in the world. Around 60% of the Indonesian economy is in Java Island, which is only 6% of the Indonesian territory. The biggest cities in Indonesia, Jakarta and Surabaya, also lie in Java Island. This condition shows that Java Island is the economic centre of Indonesia.

Madura Island is a part of the East Java Province separated by Madura strait. Kabupaten Bangkalan (Bangkalan Regency) is an area of Madura Island which is closest (5 km) to Surabaya, a city that lies in Java Island. Even though the distance is not too far apart, but the development in Kabupaten Bangkalan is far behind compared to the city of Surabaya. This is indicated by the amount of Per Capita Income (PCI) of Surabaya, which is 6 times more than Kabupaten Bangkalan.

The economics of this archipelagic country is very dependent on inter-island connectivity through the availability of ports. The development of ports and the availability of ships is the strategy chosen by the Government, also including the development of an inter-island bridge. The Suramadu Bridge is built to connect Java Island and Madura Island, with an expectation to increase the accessibility and mobility of goods and services. The Suramadu Bridge was built in 2004 and began to operate in 2009, which made

it the biggest bridge in South East Asia, and its only inter-island link. Kabupaten Bangkalan located in Madura Island's area near the Suramadu Bridge must have the biggest impact compared to other areas in Madura Island. This is a condition for the occurrence of trickle-down effect.



**Figure 2.** The Suramadu Bridge in the East Java Province  
Source: Wikipedia, 2019.

Many of the research outcomes demonstrated that transportation infrastructure development had a positive impact on area development. Laird & Venables (2017) explained that the road infrastructure has a positive impact on area development through interaction linkage between infrastructure and area development by using the following theories: (1) the theory which showed infrastructure and area development (2) the theory that emphasised infrastructure as an important factor of area development; and (3) equal development which emphasised the role of infrastructure and economic development in the area. The road infrastructure service availability can increase efficiency and household welfare by reducing household expenditures such as electricity, water, telecommunications, and fuel. The transportation infrastructure has a direct impact on comfort, efficiency, safety, security, health, education, information network development, creating jobs and the environment. The road infrastructure availability improves the residents' accessibility and mobility to open business opportunities for residents, creating many job vacancies, and can increase the income and decrease poverty (Rammelt & Leung, 2017).

On the other hand, the economic impact of the beneficial infrastructure is not singular but consists of many factors that are interrelated. There are several other factors such as physical capital, natural capital, human capital and financial capital which result in reducing poverty. Education and skills will increase the abilities, experience and education level of the residents. A high level of education and skills will reduce the level of residents' poverty (Ogutu & Qoim, 2019). The accessibility of credit options among residents will encourage them to open a business and reduce poverty (Agbola et al., 2017). The availability of clean water sources essential for people's lives increases the quality of life and the existence of

superior products brings the comparative advantage of rural areas in reducing poverty (Broeck & Maertens, 2017). The use of land for buildings encourages residents to open businesses in villages to decrease poverty (Akotey & Adjasi, 2015). The wide area of rice fields and irrigated grounds will increase residents' businesses and lessen poverty levels (Nashwari et al., 2017). The existence of farmers will increase the number of businesses and reduce poverty (Larson et al., 2016).

This research was conducted to measure the impact of the Suramadu Bridge on poverty reduction in Kabupaten Bangkalan. Besides, it aims to measure the impact of production factors such as physical capital, natural capital, human capital and financial capital on poverty before and after the Suramadu Bridge opened.

## Literature Review

The World Bank defines infrastructure in terms of the sufficiency of facilities and means of transportation, telecommunications, sanitation and clean water, education, health, irrigation and energy to meet public needs (World Bank, 1994). Roads have a role in creating the value of goods. Following the neoclassical theory, an item has a value below the cost of production or specifically by the cost of labour's sacrifice spending. Roads are tools which can create higher value for an item to satisfy customers. In this case, roads provide value for an item through the process of moving goods from the centre of production to the centre of consumption. The creation of value for goods through roads makes them economically valuable tools (Polak & Heertje, 2001).

The road transportation system was built to increase the access and mobility of goods and services, so that the transfer of the fulfilment of basic needs from the source of production to the final consumer works well. Roads' capacity for development or improvement will cause industries to move near the location of the road, and close to each other, so that production costs will be lower. Falling production costs are also the reason for agglomerations and the trade-off between economies of scale and transportation costs. Companies which sell goods to the urban market can minimise costs by moving factory locations further away but employing larger production capacities, or locating factories close to markets but with smaller production capacities (Anderson & Lakshmanan, 2004).

Purwoto and Kurniawan (2009) explain that the benefits of road construction can be measured by increasing the mobility and efficiency of residents. Increasing the quality and number of roads will encourage the movement of people, goods, and services rendered by the residents within a region, as well as inter-regional mobility. In the economic context, the existence of roads will increase the productivity of road transportation, which results in cost efficiencies, either in the cost of household transportation for purposes related or unrelated to

production. Increased cost efficiency means that there are cost savings calculated per unit of production or unit of consumption, so that the potential of the region can be realised by the existence of roads. On the other hand, roads will also impart benefit from the increasing income from sectors which supply inputs (labour, capital, and raw materials) in their development. An increase in income also means an increase in people's purchasing power, which in turn will have an impact on increasing residents' economic activity.

The concepts and definitions of poverty are quite diverse, and this diversity is caused by different data and methodologies, and is also the background of the methodology adopted by experts and institutions, as well as influencing defining the problem socially and economically. The measurement of poverty is compatible with the concepts and definitions developed by each economic institution and country in measuring poverty; as Todaro and Smith (2003) state, the percentage of the poor population can be measured with or without reference to the poverty line. In addition, the measure of poverty, as a difference in opportunities to accumulate social resources, includes 1) assets such as land, housing, equipment, and health, and 2) financial resources (adequate income and credit), socio-political organisations, and social networks to obtain jobs, goods or services, adequate knowledge and skills, and useful information. The limitations on getting an opportunity to make an effort also coax people to earn an income to meet the minimum basic needs which must be fulfilled. Low income is also used as a measure of poverty, but social, environmental, and even empowerment aspects, and the level of participation, also contribute to these limitations.

## Methodology

This study adopted the model used by Nashwari et al. (2017), which examined the characteristics of poverty at the village and sub-district levels in the Jambi Province, Indonesia. The difference was the addition of physical capital variables, i.e. the existence of the Suramadu Bridge. The model was analysed using Ordinary Least Squares (OLS) in the conditions before and after the Suramadu Bridge began operating. Analyses were conducted descriptively on all research variables, and econometrically in determining the effect of the independent variables on the dependent variable.

The research was conducted in 281 villages in Kabupaten Bangkalan. The data source used secondary data from Village Potential in 2007, which defined the conditions before the Suramadu Bridge opened, and Village Potential in 2017, which described the conditions after the Suramadu Bridge opened. Village Potential is the subject of data released by the Central Statistics Agency which is performed every three years and details the condition of villages in Indonesia.

The dependent variable in this study was the percentage of poor people in villages, which was

measured on the basis of the Number of Affidavits (SKTM) issued by the village. 14 independent variables were used in this study, i.e. (1) the percentage of the population working as farmers (%), (2) the percentage of rice fields (%) and (3) irrigated rice fields (%), (4) the number of non-agricultural businesses in the villages, such as shops, stalls, and micro and small industries (%), (5) the percentage of land used as buildings (%), (6) the population who have migrated abroad as Indonesian workers (%), (7) the status of the village in terms of access to clean water (dummy, 1 = the village is not constrained by the access to clean water), (8) the presence of superior products in the village (dummy, 1 = the village has a superior product), (9) the existence of a market in the village (dummy, 1 = the village has a market), (10) the number of educational facilities in the village, consisting of elementary, junior high or equivalent, high school or equivalent, and tertiary institutions (%), (11) the existence of skills facilities in the village such as clothing, language, electronics, etc. (dummy, 1 = the village has skills facilities), (12) the existence of credit institutions in the village such as Banks and Cooperatives (dummy, 1 = there are credit institutions in the village), (13) the existence of a credit programme in the village, such as people's business credit (*Kredit Usaha Rakyat*), food & energy security credit (*Kredit Ketahanan Pangan dan Energi*), small business credit (*Kredit Usaha Kecil*), etc. (dummy, 1 = there is a credit programme in the village) and (14) the existence of the Suramadu Bridge by treating the 2007 poverty variable as an independent variable.

## Results

The existence of the Suramadu Bridge increased the accessibility and mobility of goods and services between Madura Island and Java Island, which can be seen from the length of the journey. Dewi & Widyastuti (2009) explain that the journey distance from the centre of Kota Surabaya to the centre of Kota Bangkalan using the Suramadu Bridge was shorter than by using ports. Besides, the Suramadu Bridge also ensured convenience along the journey because there was no interruption from unloading and loading in ports, and it had lower rates than using ships.

Table 1 shows the results of descriptive statistics from the research variables. The average poverty in villages in 2007 was 1.952% and decreased to 1.576% in 2017. The average number of farmers in villages in 2007 was 71.402% and decreased to 67.342% in 2017. The declining number of farmers also occurred in the area of irrigated rice fields and the existing villages, in 2007 the area of rice fields and irrigated rice fields was 37.703% and 6.605%, while in 2017 it was 21.480% and 4.935%.

Non-agricultural businesses in villages in 2007 accounted for 1.449% and increased to 1.526% in 2017. The same condition occurred in the percentage of built-up areas in villages; in 2007 13.271% of the land became buildings and increased to 19.971% in 2017. Meanwhile, 3.173% of villagers migrated

**Table 1.** Descriptive statistics of the research variables

No.	Variable	Before Suramadu opened		After Suramadu opened	
		Mean	Std Dev	Mean	Std Dev
1	Poverty (%)	1.952	0.816	1.576	0.571
2	Number of Farmers (%)	71.402	23.093	67.342	23.44
3	Rice Field Area (%)	37.703	35.474	21.480	21.32
4	Irrigated Rice Field Area (%)	6.605	14.363	4.935	11.11
5	Non-Agricultural Business (%)	1.449	2.172	1.526	0.498
6	Built-up Area (%)	13.271	18.791	19.971	17.427
7	Migration Abroad (%)	3.173	4.956	4.019	9.092
8	Clean Water Access (dummy)	42.321	-	42.321	-
9	Superior Product (dummy)	22.378	-	32.345	-
10	Market Access (dummy)	22.123	-	24.124	-
11	Educational Facilities (%)	0.129	0.088	0.128	0.084
12	Skills Facilities (dummy)	9.265	-	14.234	-
13	Credit Institutions (dummy)	12.832	-	17.327	-
14	Credit Programme (dummy)	14.215	-	37.038	-

Source: Village Potential, 2017, 2007.

abroad in 2007, and in 2017 the number increased to 4.019%.

Most of villages in Bangkalan had difficulty in accessing clean water, especially during the dry season; only 42.321% of villages had guaranteed access to clean water. On the other hand, only 22.378% of villages had superior products in 2007, increasing to 32.345% in 2017. Less than a quarter of villages had markets. Likewise, skills facilities were only located in 14.234% of the villages in 2017. In 2007, credit institutions were found in 12.832% of villages and credit programmes in 14.215% of villages, while in 2017 credit institutions were found in 17.327% of villages and credit programmes operated in 37.038% of villages.

Table 2 shows the results of the econometric statistics on the influence of the independent variables on poverty in villages. In the model before the Suramadu Bridge operated, the model had a significant effect on poverty with an  $R^2$  of 24.44% (or the poverty in villages before Suramadu operated can be explained by the model in 24.44%). Meanwhile, many factors of production in villages did not have a significant effect on poverty. Only the clean water access variable had a negative effect on poverty, meaning that villages with guaranteed access to clean water had a positive impact on the reduction in the number of poor people compared to villages which had difficulty in accessing clean water.

In the model after the Suramadu Bridge operated, it can be seen that the model had a significant effect on poverty in villages, with an  $R^2$  of 22.34%, or the poverty in villages before the operation of the Suramadu Bridge can be explained by the model of 22.34%, while the rest was influenced by other factors outside the model. The Suramadu Bridge had a negative effect on poverty, which means that it reduced poverty in villages. The Suramadu Bridge, which facilitated the access and mobility of goods and services, encouraged people to open businesses, and made it easier for residents to find employment,

resulting in increased income, which in turn reduced poverty levels.

The number of farmers and rice fields in the study had a negative effect on poverty, i.e. the more farmers and rice fields in the village, the lower the poverty rate. The percentage of non-agricultural activities in the built-up area had a negative effect on poverty in villages, so villages with higher levels of non-agricultural activities had lower poverty levels.

The above analysis shows that the existence of superior products in villages has a negative and significant effect on poverty levels among the people. The superior products generated by villages indicate their superiority because they are supported by natural conditions or the expertise of their residents. Leading products will trigger the growth of residents' businesses and become a source of income, which will reduce poverty in villages.

The existence of skills facilities also has a negative and significant effect on poverty levels. The more skills facilities in villages, the more residents' skills will improve, thereby creating opportunities for communities to open businesses, which in turn will increase income and reduce poverty. The existence of credit facilities has a significant lowering effect on poverty levels. People's businesses which require capital operate more easily with the availability of credit facilities in villages. This situation spurs on the residents to do business in villages, whether new businesses or existing business development, which, in turn, will reduce poverty among them.

## Discussion

Many regional disparities occur in some countries, as also happens in Poland. The economic transition in Poland has taken place since 1989 and developed further since joining the European Union in 2004. In some cases, the development of Poland exacerbated the regional disparities. A strategy is needed to overcome the disparities by considering

**Table 2.** The impact of the Suramadu Bridge on rural poverty

No.	Variable	Before Suramadu opened	After Suramadu opened
1	The Suramadu Bridge	-	-0.075* (0.039)
2	Number of Farmers	0.000 (0.002)	-0.003** (0.001)
3	Rice Field Area	0.000 (0.002)	-0.005*** (0.003)
4	Irrigated Rice Field Area	0.002 (0.005)	-0.003 (0.003)
5	Non-Agricultural Business	0.011 (0.024)	0.014 (0.111)
6	Built-up Area	0.004 (0.003)	-0.008*** (0.002)
7	Abroad Migration Abroad	0.004 (0.010)	0.002 (0.003)
8	Clean Water Access	-0.224** (0.110)	-0.029 (0.077)
9	Superior Product	0.141 (0.111)	-0.161* (0.981)
10	Market Access	0.009 (0.117)	-0.114 (0.082)
11	Educational Facilities	-0.051 (0.596)	-0.401 (0.382)
12	Skills Facilities	0.069 (0.187)	-0.166* (0.097)
13	Credit Institution	-0.139 (0.158)	-0.288*** (0.093)
14	Credit Programme	0.132 (0.150)	0.010 (0.075)
15	C	1.776*** (0.233)	2.426*** (0.202)
	N	281	281
	Prob > F	0.0497	0.0000
	R <sup>2</sup>	0.2444	0.2234

Notes: \*\*\*  $p < 1\%$ , \*\*  $p < 5\%$ , \*  $p < 10\%$

Source: Village Potential, 2017, 2007.

the demographic potential and the labour market, economic development, social development, and infrastructure (Pawlas, 2017).

Investment in the transportation infrastructure is often made to have an impact on the economic performance of a region. There is a hope that good transportation acts as a catalyst for private sector investments, creates jobs, increases economic activity, and grows the local economy. Improved transportation generates time and cost savings for users, consisting of individuals and households in their working activities, as well as for companies which need to move goods, services, and employees. Time and cost savings change the flow of traffic, which leads to increased flow in some parts of the network, and less traffic in others. A good transportation resource can increase proximity, bring business entities closer, and trigger the relocation of economic activity, because companies and households respond to new opportunities. Improved transportation facilitates savings in transportation and communication costs for companies, workers and consumers, which in turn

makes transportation cheaper, more reliable and faster, allowing companies to change the way they manage their production (Laird & Venables, 2017).

Proximity and relocation create hubs that make economic activity and productivity more effective. It goes further than the direct productivity effect of faster travel because intensive economic interactions occur in economically large and dense places. Improved transportation will make the locations in question more attractive for investment. The benefits experienced by residents, workers and companies can stimulate investment and land use changes. Transportation can also increase labour supply due to easier travel, and, on the other hand, will create demand in some places even if it is lost in other places (McFadden & Gorman, 2016; Laird & Venables, 2017). This situation is also expected to occur with the Suramadu Bridge, which increases access and mobility in Kabupaten Bangkalan, thus making poverty levels decrease.

The number of farmers has a negative effect on poverty. According to research by Larson et al. (2016),

Hazzel et al. (2010) and Bezemer & Headey (2008), more farmers will reduce poverty levels. The main characteristic of farmers in Kabupaten Bangkalan is the very small areas of land owned. In 2013 it was noted that the number of agricultural business households with an area of land below 0.5 hectares was 55.33%, so that high efficiency and productivity would be hard to achieve, and also an increase in economic income and welfare would be very difficult to obtain. As a result, low farmer's income encourages the farmer to look for other sources of income outside the agricultural sector, because the bargaining power of farmers for agricultural products is relatively low. Small farmers and farm workers experience a deficit in income from the agricultural sector (income from the agricultural sector alone is not enough to provide maintenance for their families) so they are forced to look for labour-intensive and less capital-intensive jobs, such as in small shops, as traders, in handicrafts, working in services, and so on (Nashwari et al., 2017).

The effect of small-scale farming on poverty reduction is more pronounced because it is based on the inverse hypothesis that the relationship between productivity and efficiency results in higher allocations in small-scale agriculture. An increase in small-scale agricultural income can directly result in poverty reduction, and creates a multiplier effect through the consumption relationship of small-scale farmers, who are more likely to be poor and spend additional income on locally produced or non-agricultural goods and services, so it can stimulate the non-rural agricultural economy. This shows that smallholders can allocate resources more efficiently and operate with high-efficiency allocations suitable to meet the demand of local and regional markets (Larson et al., 2016).

The influence of the number of farmers on poverty is further explained by Mellor & Malik (2017), who claimed that in regions with low and medium incomes, overcoming poverty in rural areas is achieved by accelerating the growth of agricultural production and income from small farmers. The mechanism for reducing poverty occurs by increasing farmers' expenditures to be utilised in the non-agricultural rural sector, so that it increases income for the non-agricultural rural population, and reduces poverty levels. Small farmers are households which produce agricultural products that are above the poverty line, but they are still not enough to maintain a lifestyle in urban life. The same result is also explained by Imai et al. (2017), who state that high growth in the agricultural sector creates more poverty reduction compared to the non-agricultural sector. Also, the development of the agricultural sector is the most effective poverty reduction factor compared to non-agricultural businesses.

Rice field area has a negative effect on poverty, according to the research by Mazumder & Lu (2015) and Nashwari et al. (2017). Increasing the area of rice fields will increase the scale of agricultural business, which will encourage the growth of residents' businesses to support agricultural activities. Fertile land will contribute to an increase in non-farming

activities because farmers will have more free time (McNally, 2001). Vulnerable agriculture such as rain-fed agriculture and that without productive factors can increase non-agricultural businesses (Knanal & Mishra, 2015).

Built-up areas have a negative effect on poverty level, according to the results of research by Akotey & Adjasi (2015) and Nashwari et al. (2017). An increase in built-up areas leads to an increase in land use for non-agricultural businesses. This increase in built-up areas directly exhibits a growth in business done by the residents, which in turn reduces poverty levels.

Skills facilities have a negative effect on poverty, according to the results of research by Ogutu & Qoim (2019). The performance of residents' businesses in villages is very much influenced by the level of their skills – the higher the level of residents' skills, the more their businesses grow. A high level of skills will increase the ability of residents to do business. It will also increase their ability to find opportunities and make decisions (McElwee, 2006). Residents, when making business decisions, will usually seek advice from their family, friends, and support groups, depending on their level of education and skills. Poor and inconsistent advice will limit the decision to go into non-agricultural business. Education will improve one's abilities, skills, and mental behaviour. The existence of skills facilities will increase more residents' opportunities to improve their abilities, skills, and mentality. This will provide greater opportunities for work and reduce poverty (Ogutu & Qoim, 2019).

The existence of credit facilities in villages has a negative effect on poverty levels, looking at the results of Dupas & Robinson's research (2013). The availability of credit facilities can increase the access to and the use of credit by the public. Through more open access to credit, the public is expected to be able to take advantage of this access and increase their income through borrowing, especially if it is used for productive activities. Difficult access to credit causes residents to rely on limited savings for investment, and small entrepreneurs must rely on profits to continue their businesses. As a result, income inequality is not reduced, and economic growth slows down. The role of credit in the economy can mean creating jobs, whether it is through expansion in production and in other business activities, or through its influence in encouraging the emergence of new business entities. Furthermore, credit can be used for the equal distribution of business opportunities, inter alia, through the allocation of credit according to development priorities and economic groups, to expand the distribution of development outcomes. In relation to this, Government policy adopted in the credit sector is directed at financing economic sectors with high productivity, so that the allocation of funds can be achieved more efficiently. The research conducted by Agbola et al. (2017) shows that credit institutions and credit programmes play an important role in reducing poverty and increasing living standards in the Philippines, so

that efforts need to be made to expand programmes to reduce poverty in this country.

### **Implications**

Since it is the biggest bridge in South East Asia and the only bridge which connects 2 islands, the Suramadu Bridge has the allure to draw local or international tourists. To maximise the impact of the Suramadu Bridge, it requires the tourism development strategy. The economic function of tourism is seen as a driving factor in regional economic development, as happens in Slovakia. Since 2013, the Government of Slovakia have developed the potential of nature tourism by instigating tourism development until 2020, with the aim of reducing the regional disparities and creating new job opportunities. In 2015, tourism directly produced 59,000 jobs (2.5% of the total jobs) and indirectly created 143,000 jobs (Gucic and Marcis, 2017).

The existence of the Suramadu Bridge should increase the regional attraction, which can draw investment to develop the rural areas. Economic globalisation have made many investors consider many investment locations, especially in concentrated areas close to the centre of development, which has a unique resource. However, attracting investment to rural areas is not easy. Adamowicz (2019) states that Poland's experience in attracting investment can be utilised in the Masovian Voivodeship and some other voivodeships in western and central Poland. The Lubelskie Voivodeship, which is located in rural areas, even if it has potential which can be used, cannot attract sufficient investment to encourage regional progress.

The implication is that the policy makers must be able to maximise the potential of the Suramadu Bridge by making Kabupaten Bangkalan a supporter of regional growth centres. The centre of growth in East Java is in Kota Surabaya, which is on one side of the Suramadu Bridge, so that the proximity of the location can make Kabupaten Bangkalan a provider of housing, trade, and tourism facilities. The agricultural sector still has a large role in reducing poverty in rural areas, even though the area of rice fields decreased after the Suramadu Bridge opened, so the protection of agricultural land must be stepped up, because the majority of the rural population still works in the agricultural sector.

The increasing presence of non-agricultural businesses does not affect poverty; this is due to the scale of non-agricultural businesses which are predominantly small and unable to generate sufficient and continuous results for the residents. However, the built-up areas which represent non-agricultural activities in the form of housing and warehousing play a role in reducing poverty, so that trading activities on a large scale can be increased. Migration abroad does not influence poverty, which shows that migrants' money returned to villages is not distributed for productive business, but for the daily needs of the families left behind.

The superior products owned by villages influence poverty, so it is important to make serious efforts in developing superior rural products. The Suramadu Bridge has encouraged people to visit Kabupaten Bangkalan, and they need gifts, souvenirs, or food which can be provided by residents in Kabupaten Bangkalan. The existence of a market in villages did not influence poverty reduction because the scale of the business of a small market economy and the limited number of residents involved was not significant in increasing resident businesses.

The existence of human capital is illustrated by educational and skills facilities, but only the existence of skills facilities influences poverty reduction. This shows that educational facilities in villages are generally basic, so do not play a role in improving skills. Improving residents' skills can be facilitated by the existence of skills facilities to encourage residents into entrepreneurship.

The existence of credit facilities, especially cooperatives, must be used as a means of reducing poverty in rural areas through increasing the number of cooperatives as providers of residents' financial capital. The existence of credit programmes whose purpose is to reduce poverty does not actually affect poverty. It is suspected that many credit programmes are not properly targeted, so many credit programmes are received by residents who are not eligible to receive them.

### **Conclusions**

The existence of the Suramadu Bridge has increased the influence of production factors in villages in reducing poverty in Kabupaten Bangkalan. The results of this study support many of the results of previous studies, which indicated that the transportation infrastructure can increase mobility, and that accessibility is a catalyst in reducing poverty. Before the Suramadu Bridge operated, the only factor of production which could reduce poverty in villages was access to clean water, which illustrated the role of natural capital in rural economic development. Different conditions developed when the Suramadu Bridge opened, because physical capital (built-up areas), natural capital (rice field area, superior products), human capital (skills facilities), and financial capital (credit facilities), also began to play a role in reducing poverty in rural areas.

### **Acknowledgements**

This research was funded by the Centre for Development, Education, and Training of Planners (Pusbindiklatren) at the National Development Planning Agency (Bappenas) with the permission of the Kabupaten Bangkalan Government, and guidance from the Faculty of Economics and Business, Brawijaya University, Indonesia. The author would like to thank the Head of Pusbindiklatren Bappenas, the Regent of Bangkalan, and the Dean of FEB UB, for the help and support given.

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