Identification of the Most Influential Infrastructure for the Development of Disadvantaged Villages in Sumberpetung Village, Malang Regency, Indonesia

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Abstract— *The aim and one of the main targets for regional development contained in the 2015-2019 National Medium-term Development Plan (Rencana Pembangunan Jangka Menengah Nasional—RPJMN) is rural development, namely by reducing the number of disadvantaged villages to 5,000 villages or increasing the number of independent villages at least 2,000 villages. In 2014, Indonesia had 74,093 villages with 20,167 disadvantaged villages. In East Java, there are 333 villages with 238 developing villages and 95 disadvantaged villages, one of which is Sumberpetung village in Kalipare sub-district, Malang regency. Sumberpetung village is categorized as a disadvantaged village by a community empowerment agency of Malang regency based on the village development index issued by the national development agency in collaboration with the Central Bureau of Statistics. The village development index is assessed based on the condition of road infrastructure, education, health, clean water, electricity, and telecommunications infrastructure in the village. Sumberpetung village is categorized as disadvantaged due to physical, social, and economic infrastructure problems. This research aims to explain the infrastructure that is most influential in developing villages and how much influence these infrastructures have on village development. The data were collected through direct observation and questionnaire distribution. The data were then analyzed using confirmatory factor analysis, a descriptive analysis method. The results show that the most influential infrastructure on the development of Sumberpetung village in Malang regency is the physical infrastructure which includes transportation networks (roads and bridges), clean water networks, telecommunication, and drainage networks.*

Keywords— *Village Development, Infrastructure.*

I. INTRODUCTION

Rural development as a process whereby joint efforts are made to facilitate a significant increase in rural resource productivity aiming to increase rural income and create employment opportunities so that the community can still work in their villages [1]. Infrastructure development is a support for the progress of an area. The availability of infrastructure, in addition to functioning for social progress, the economy can also strengthen the nation's unity and integrity.

In addition to physical infrastructure, the existence of economic, education, and health infrastructure can also be used as a measure of progress in rural areas [2]. According to the evaluation results of the Community Empowerment Agency of Malang regency in 2014, infrastructure problems are the most occurring problems in 16 disadvantaged villages in Malang regency. In fact, one of these 16 disadvantaged villages is categorized as a very disadvantaged and underdeveloped village. This very disadvantaged and underdeveloped village is Sumberpetung village located in Kalipare district. Therefore, this study aims to identify the most influential infrastructure for village development.

II. LITERATURE REVIEW

A. Infrastructure

Infrastructure can be defined as a physical component of an interrelated system providing essential services to enable, maintain, or improve people's living conditions. Physical infrastructure usually includes technical structures such as transportation infrastructure (roads and rail networks, bridges, and tunnels), water supply networks, heating and cooling supply networks, sewerage networks, and electricity and telecommunication networks [3].

Infrastructure is a complex field with so many different components that can be categorized into two main types of infrastructure, namely hard and soft infrastructure. Hard infrastructure refers to the physical networks that make the nation's industrialization function smoothly. Hard infrastructure includes capital assets such as utilities, transportation, telecommunication systems, roads, highways, railways, subways, traffic and road lights, dams, walls and culverts, drainage systems, airports and bus terminals [4].

Infrastructure systems can be defined as basic facilities or structures, equipment, an installation that are built and needed for the functioning of community social and economic system [5].

Infrastructure also refers to the physical system in providing transportation, irrigation, drainage, buildings and other public facilities such as electricity, telecommunications, clean water, etc., which are needed to meet basic human needs in the social and economic sphere [6].

The infrastructure used in urban areas is usually to supply power, water, and gas consistently into a unity because the people fully depend on physical infrastructure [7].

B. Types of Infrastructure

Classification of physical infrastructure: physical infrastructure can be divided into two main categories namely surface infrastructure and underground infrastructure. Surface infrastructure includes transportation infrastructure, electricity and communication poles, ports, bus and train stations, and airports. Underground infrastructure includes pipelines for

water supply, hear and natural gas, electricity and communication cables, and tunnels which include subway networks [3].

Types of transportation infrastructure: train and bus stations, subway tunnels, overpasses, bridges, marine terminal, seaport, airdorm ports, airports, communication facilities, navigation and traffic management systems, overpasses, parts of motor roads, railways and inland waters, helicopter, landing sites, as well as buildings, structures, facilities and equipment that provide transportation industry development. Road, rail, water, and air transportation routes [8]. Basic transportation infrastructure facilities that provide economical transportation and communication for successful economic system development.

III. METHOD

A. Type of Approach

The type of approach used in this research is the quantitative method. The quantitative method is based on the philosophy of positivism intended to examine a particular population or sample. Quantitative data analysis aims to test the hypothesis [9]. While the data were collected though direct observation, interviews, questionnaires, and data from relevant agencies.

B. Research Variables

The research variables used to develop an infrastructure development model of disadvantaged village in Sumberpetung, Malang regency consist of physical infrastructure including road conditions, types of road paving, road conditions based on the road hardening process, bridge condition, types of bridge construction, sources of clean water, services at the clean water area, irrigation conditions, services at irrigation area, drainage condition, types of drainage, sources of electricity, services at electricity area, strength of phone signals, services at the phone network area. Social infrastructure which includes condition and service at kindergarten area, condition and service at elementary school area, condition and service at middle school area, condition and service at the village maternity hut area, condition and service at Posyandu area. The economic infrastructure consists of condition of trade and service facilities which include market, shop, kiosk, stall, tailor, and cooperative) and the services in the area of service trade facilities.

C Identifying the Impact of Infrastructure on Village Underdevelopment

The descriptive method in this study aims to explain the impact of infrastructure on village underdevelopment in Sumberpetung village, Malang regency with a descriptive analysis model using scoring. The scoring refers to research reference [2].

D. Identifying Factors That Influence the Development of Disadvantaged Village Based on Infrastructure in Sumberpetung Village

Confirmatory factor analysis used is one of the multivariate analysis method that can be used to confirm whether the measurement model constructed in accordance with the hypothesized latent variable is considered as the causal variable (independent variable) that underlies the indicator variable [10]. CFA aims to examine whether there is a relationship between latent constructs (not observed) and observed variables [11]. Confirmatory factor analysis using SPSS 22.0 software.

The stages in factor analysis in this study are
a. Grouping variables into several factors according to a review of the theory
b. Analyzing each factor separately
c. Performing variable reduction, one by one, in one factor that has a measure of sampling adequacy (MSA) < 0.5
d. Seeing the validity of each factor by looking at the kaiser meyer olkin measure (KMO) on the analysis result. If the KMO > 0.5, the factor is declared valid.
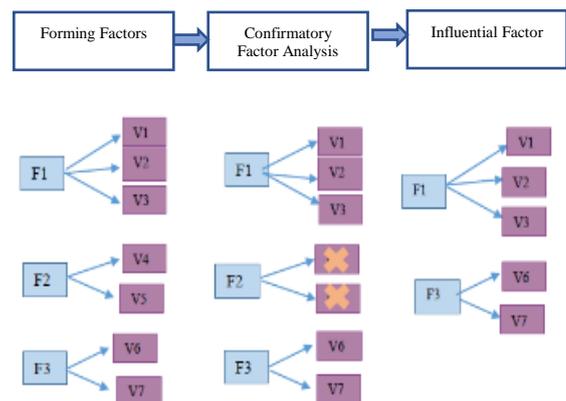

Figure 1. Diagram of Confirmatory Factor Analysis Process

IV. RESULTS AND DISCUSSION

A. Identifying the Impact of Infrastructure on Village Underdevelopment

Infrastructure has an influence on the village underdevelopment. This is clearly stated in the theory of disadvantaged village that one of the factors of disadvantaged village is because lack of facilities and infrastructure.

The infrastructure that will be discussed in this study is the physical, social, and economic infrastructure. The following is the results of tabulated questionnaire data that have been analyzed to get the percentage of how much influence each variable has on the underdevelopment of Sumberpetung village.

In the table 1 represents bad qualification, 2 represents medium qualification, and 3 represents good qualification. Based on the analysis results, physical infrastructure has an influence on the village underdevelopment with highest percentage of poor qualification of 100% for irrigation networks, 51% for drainage networks, and 81% for drainage types, and 43% for road networks.

TABLE I. Results of Physical Infrastructure Description

Item	1		2		3	
	f	%	f	%	f	%
X1.1	43	43%	31	31%	26	26%
X1.2	25	25%	49	49%	26	26%
X1.3	43	43%	40	40%	17	17%
X2.1	1	1%	50	50%	49	49%
X2.2	4	4%	23	23%	73	73%
X3.1	33	33%	64	64%	3	3%
X3.2	26	26%	17	17%	57	57%
X4.1	0	0%	0	0%	100	100%
X5.1	0	0%	0	0%	100	100%
X5.1	14	14%	15	15%	71	71%
X5.2	5	5%	11	11%	84	84%
X6.1	51	51%	31	31%	17	17%
X6.2	80	80%	9	9%	11	11%
X7.1	100	100%	0	0%	0	0%
X7.2	100	100%	0	0%	0	0%

In addition to physical infrastructure, social infrastructure also has an influence on the underdevelopment of the village in terms of low human resources. Social infrastructure includes education and health facilities. To put it more clearly, the analysis results are as follows:

TABLE II. Results of Social Infrastructure Description

Item	1		2		3	
	f	%	f	%	f	%
X8.1	15	15%	9	9%	76	76%
X8.2	30	30%	4	4%	66	66%
X8.3	0	0%	14	14%	86	86%
X8.4	16	16%	12	12%	72	72%
X8.5	0	0%	20	20%	80	80%
X8.6	24	24%	45	45%	31	31%
X9.1	32	32%	41	41%	27	27%
X9.2	67	67%	4	4%	29	29%
X9.3	32	32%	36	36%	32	32%
X9.4	26	26%	22	22%	52	52%

Based on the analysis results, social infrastructure in Sumberpetung village has the lowest qualification in the service at village maternity hut area followed by posyandu condition. This proves that the village underdevelopment is also influenced by the level of service and distribution of education and health facilities.

In addition to physical and social infrastructure, economic infrastructure is also one of the influential infrastructure on the village underdevelopment. This is because a good economy is supported by good and quality economic activities. Therefore, analysis results of economic infrastructure in Sumberpetung village are as follows:

Based on questionnaire analysis results of economic infrastructure, condition and service of the area have the worst percentage of 61% and 72% respectively, and followed by service at tailor area of 49%.

TABLE III. Results of Economic Infrastructure Description

Item	1		2		3	
	f	%	f	%	f	%
X10.1	25	25%	2	2%	73	73%
X10.2	36	36%	28	28%	36	36%
X10.3	1	1%	29	29%	70	70%
X10.4	10	10%	16	16%	74	74%
X10.5	19	19%	28	28%	53	53%
X10.6	30	30%	44	44%	26	26%
X10.7	17	17%	41	41%	42	42%
X10.8	44	44%	8	8%	48	48%
X11.1	35	35%	62	62%	3	3%
X11.2	49	49%	51	51%	0	0%
X11.3	61	61%	39	39%	0	0%
X11.4	72	72%	28	28%	0	0%

According to the results, economic infrastructure has an influence on the village underdevelopment. If the condition and level of infrastructure services are low, the village will be left behind compared to other villages.

B. Identifying Infrastructure That Influences the Development of Infrastructure-Based Village in Sumbereptung village

From the literature review, the factors that influence the development of disadvantaged village based on infrastructure are:

a. *Physical infrastructure, includes:*

Road condition, types of road hardening, road condition based on road hardening, bridge condition, types of bridge construction, source of clean water, services at the area of clean water, irrigation condition, services at the irrigation area, drainage condition, types of drainage, source of electricity, services at the electricity area, phone signal strength, service at the phone network area.

b. *Social infrastructure, includes:*

Condition and service at kindergarten area, condition and service at elementary school area, condition and service at middle school area, condition and service at the village maternity hut area, condition and service at Posyandu area.

c. *Economic infrastructure, includes:*

Condition of trade and service facilities which include market, shop, kiosk, stall, tailor, and cooperative) and the services at the area of service trade facilities.

The following are the results of the confirmatory factor analysis using SPSS 22.0 software.

TABLE IV. Calculation of MSA and KMO

Factor	Variable	Sub-Variable	KMO Value	MSA Value	Remarks
Physical infrastructure	Transportation Infrastructure	Road Condition	0.676	0.615	Influential
		Road Hardening		0.644	Influential
		Road Size based on Road Hardening		0.858	Influential
		Bridge Condition	0.500	0.500	Influential
		Construction Types		0.501	Influential

Factor	Variable	Sub-Variable	KMO Value	MSA Value	Remarks
	Clean Water networks	Clean Water Source	0.500	0.500	Influential
		Service of the area		0.500	Influential
	Irrigation networks	Irrigation Types			Irrigation networks have a huge influence on village development because it supports food production. Irrigation networks cannot be analyzed using SPSS software because it is poor and only has one character which cannot be analyzed.
		Service of the Area			
	Electricity networks	Electricity Source			The electricity networks have a huge influence on village development. With the existence of an adequate electricity and quality networks which can provide stimulation for socio-economic activities. The electricity networks in this study cannot be analyzed using SPSS due to its good quality and the fulfillment of the need for electricity networks has reached all rural areas, and has only one character.
		Service of the Area			
	Communication networks	Signal Strength	0.500	0.500	Influential
		Service of the Area		0.500	Influential
	Drainage networks	Drainage Types	0.500	0.500	Influential
		Drainage Condition		0.500	Influential
Social Infrastructure	Education Facility	Kindergarten Condition	0.222	0.274	Not Influential
		Service at Kindergarten Area		0.285	Not Influential
		Primary School Condition		0.155	Not Influential
		Service at Primary School Area		0.269	Not Influential
		Middle School Condition		0.033	Not Influential
		Service at Middle School Area		0.182	Not Influential
	Health Facility	Village Maternity Hut Condition	0.455	0.265	Not Influential
		Service at Village Maternity Hut Area		0.388	Not Influential
		Posyandu Condition		0.464	Not Influential
		Service at Posyandu Area		0.462	Not Influential
Economic Infrastructure	Trade Facilities	Market Condition	0.579	0.331	Not Influential
		Service at Market Area		0.556	Influential
		Shop Condition		0.414	Not Influential
		Service at Shop Area		0.660	Influential
		Stall Condition		0.753	Influential
		Service at Stall Area		0.590	Influential
		Kiosk		0.749	Influential

Factor	Variable	Sub-Variable	KMO Value	MSA Value	Remarks
		Condition			
		Service at Kiosk Area		0.565	Influential
	Service Facilities	Tailor Condition	0.583	0.756	Influential
		Service at Tailor Area		0.517	Influential
		Cooperative Condition		0.598	Influential
		Service at Cooperative Area		0.559	Influential
Policy	Government Policy	Program	0.500	0.500	Influential
		Fund		0.500	Influential

From the overall factor analysis results, there are two factors that have no influence on the development of infrastructure-based disadvantaged village in Sumberpetung, namely social factors and variables of shop and market condition on economic factors. These two factors and variables that have no impact have served and covered the community needs. Therefore, the results obtained have no effect.

All physical factors are influential and economic factor includes the condition and service of the area of cooperative and tailor, kiosks, stalls, market, and shop.

V. CONCLUSION AND SUGGESTION

A. Conclusion

Infrastructure discussed in this study consists of three parts. First, physical infrastructure which includes transportation networks, clean water networks, irrigation networks, electricity networks, telecommunication networks, and drainage networks. Second, social infrastructure which includes education and health facilities. Third, economic infrastructure which includes trade and service facilities. Among the three parts, there are several infrastructures that influence and have no effect on the development of Sumberpetung village. To determine whether a factor is influential or not, a confirmatory factor analysis was performed using SPSS software. Based on the analysis results, the influential factor on Sumberpetung village development is physical infrastructure which includes transportation (road and bridge), clean water networks, communication and drainage networks. For electricity and irrigation networks cannot be analyzed using SPSS software because they only have one character. However, based on the theory and the existing condition, the two networks have an influence on the stimulation of village development. Besides physical infrastructure, economic infrastructure (trade and services) also has an influence on Sumberpetung village development. Meanwhile, social infrastructure (education and health) has no influence on Sumberpetung village development.

B. Suggestion

Based on the analysis results, the suggestions that can be

concluded are:

a. In the context of developing disadvantaged infrastructure-based village in Sumberpetung, it needs policies that lead to infrastructure-based development as one of the most influential aspects, as well as, launching programs that support the increase of human resources available in Sumberpetung village.

b. Infrastructure development carried out in Sumberpetung village is expected to be evenly distributed in all hamlets or areas in the village; Because at this time, even distribution of development occurred in Sumberpetung village was still uneven between one hamlet and another.

c. Road infrastructure development needs to be done first because in carrying out social and economic activities, the main thing is road condition. If the existing road conditions are good, socio-economic activities will go smooth and well.

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